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SHARING WATER

TOWARDS A TRANSBOUNDARY CONSENSUS ON THE MANAGEMENT OF THE OKAVANGO RIVER BASIN

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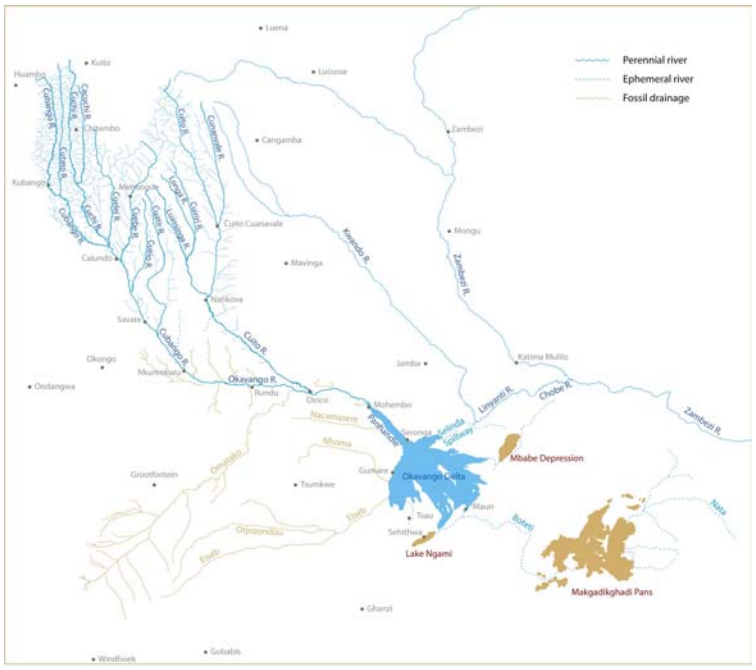
SHARING WATER:
TOWARDS A TRANSBOUNDARY CONSENSUS ON THE MANAGEMENT OF THE OKAVANGO RIVER BASIN

FINAL REPORT



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ACRONYMS

ACADIR	Association for the Environment, Conservation, and Rural Development
AWIRU	African Water Issues Research Unit
BMP	Best Management Practices
CBO	Community Based Organization
CECT	Chobe Enclave Community Trust
CSIR	Counsel for Scientific and Industrial Research
GEF	Global Environmental Facility
GIS/RS	Geographic Information System / Remote Sensing
HOORC	Harry Oppenheimer Okavango Research Center
IMP	Integrated Management Plan
IUCN ROSA	IUCN – The World Conservation Union Regional Offices for Southern Africa
JEA	Juventude Ecologica Angolana
MOU	Memorandum of Understanding
NACSO	Namibian Association of Community-based Natural Resources Management Support Organisation
NGO	Non-governmental organization
NHI	Natural Heritage Institute
NNF	Namibian Nature Foundation
TechWoG	Technical Working Group
ODMP	Okavango Development Management Plan
OKACOM	Permanent Okavango River Basin Water Commission
PNA	Parallel National Action
RAISON	Research and Information Services of Namibia
RCSA	Regional Center for South Africa
SADC	Southern African Development Community
SEI	Stockholm Environment Institute
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WEAP	Water Evaluation and Planning System
WERRD	Water and Environmental Resources in Regional Development

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EXECUTIVE SUMMARY

Sharing Water: Towards a Consensus on Transboundary Management of the Okavango River Basin was an 18-month initiative funded by the U.S. Agency for International Development Regional Center for Southern Africa. Project objectives included:

1. To help promote the long-term sustainable management of the Okavango/Kubango River
2. To promote joint fact-finding through the development of a shared data management system, and a transparent, decision-making model of the basin
3. To broaden stakeholder participation in the OKACOM planning process, particularly Angolan water managers and stakeholders
4. To build capacity in the region to analyze complex scenarios and management strategies

Project partners included the Natural Heritage Institute (NHI) based in California, USA and IUCN – The World Conservation Union's Regional Office for Southern Africa (IUCN ROSA) based in Harare, Zimbabwe. Partner organizations from the three basin countries include Juventude Ecologica Angolana (JEA) from Luanda, Angola and the Association of Preserving the Environment of Integrated and Rural Development (ACADIR) from Angola's Kuando-Kubango province; IUCN – The Botswana Office in Gaborone (IUCN-Botswana), Botswana; and Namibia Nature Foundation (NNF) based in Windhoek, Namibia. The Harry Oppenheimer Okavango Research Center (HOORC) in Botswana, the Counsel for Scientific and Industrial Research (CSIR) in South Africa, and Research and Information Services of Namibia (RAISON) in Windhoek, Namibia all brought regional technical expertise to *Sharing Water*. Finally, CONCUR Inc. of California, USA and African Water Issues Research Unit (AWIRU) of South Africa formed a team, which guided the overall workshop facilitation provided training in negotiation and joint fact-finding. (Appendix A: Project Partner Contact List).

Over the 18 months of the project, *Sharing Water* tested a strategy based on the following assumptions: 1) river basin planning will proceed more smoothly and efficiently if a broad range of stakeholders understand the planning process; 2) in order to increase learning, stakeholders should have a hands-on learning experience navigating and manipulating planning tools such as a Shared Okavango/Kubango Database and a river basin planning model, even if the delegates will not become "experts" in these technical areas; and 3) this "collaborative learning" can occur in a series of workshops rather than individual training. In addition, *Sharing Water* implemented a new approach of maintaining a core group of delegates through the life of the project, rather than holding a series of workshops with different topics and different delegates attending.

Sharing Water produced valuable tools and analysis to aid in managing the Okavango River Basin including the Shared Okavango/Kubango Database Version II. The database includes over 200 data sets and GIS layers describing basin hydrology, land use, topography, history, vegetation, tourism and socio-economics, and over 200 journal articles, book chapters, and other literature relevant to the Okavango/Kubango River Basin (www.sharingwater.net). This information is in the public domain and available across borders. *Sharing Water* also conducted a data gaps analysis highlighting geographic and subject areas in the basin that are missing data critical to transboundary river basin planning and made recommendations for filling these gaps.

The Shared Okavango/Kubango Database is a concrete product of the project. A more intangible but equally important result of *Sharing Water* is broad agreement that data should be made available freely and openly across borders. The Shared Okavango/Kubango Database is a physical manifestation of this commitment. The importance of this shared database cannot be overstated as a critical first step in the development of a river basin management plan. With the development of the

Shared Okavango/Kubango Database, the Okavango Basin has catapulted ahead of other international river basin planning efforts - many of which are still not sharing information for the benefit of cooperative planning even after 10-30 years of joint effort.

Sharing Water also advanced the process of river basin modeling in the Okavango River Basin. *Sharing Water* developed a Model Evaluation and Scoring Tool, which is a new and innovative approach that takes seriously the pre-step of evaluating the range of river basin planning models for their applicability to a particular river basin. This approach contrasts to the most typical situation in which models are developed and applied based on the favorite model of an organization or individual rather than through a careful screening process. The *Sharing Water* approach first determined what modeling was already underway in the basin. The project then evaluated a range of models based on an initial analysis of needs and priorities in the basin. This evaluation ranked ten models, which hold the most promise for the Okavango/Kubango basin.

After the evaluation process, *Sharing Water* then took one of the models that emerged as a potentially appropriate tool for the basin and produced a prototype river basin planning model that built on existing modeling efforts already underway in the basin. This prototype model used the Water Evaluation and Planning System (WEAP) developed by the Stockholm Environment Institute (SEI) as the initial platform.

The next step involved articulating possible future scenarios for the basin and associated management strategies (Section IV of this report). These example scenarios and management strategies were incorporated into WEAP and were used in training exercises. The exercise provided an opportunity for joint analysis and evaluation of these options and promoted significant dialogue across borders.

The *Sharing Water* project also supported an analysis of the legal and institutional arrangements that govern river basin management in the Okavango Basin across several scales, including the local, national, transboundary, and international scale. This study concluded with recommendations regarding how to bridge significant gaps and how to harmonize disconnects in the policy, legal and institutional structure as they pertain to transboundary river basin management.

Figure 1: Hompa Alfons Kaundu of Mbunza District welcomes Sharing Water Delegates and Partners

In addition, the project contributed to a full visioning process by compiling the existing written information expressing the goals, objectives, and visions in all three countries and at a basin level. This information can be used as a springboard from which to launch a full fledged visioning process in the future. Not to be overlooked as project accomplishments were the site visits that *Sharing Water* provided.
Project delegates and partners visited the headwaters of the Okavango/Kubango River Basin in Angola to see both the ecological and social conditions in the upper basin. For many, this was the first time visiting the upper basin and it provided an opportunity to visualize and better understand the needs and desires of our Angolan neighbors. In Namibia, the project went to Rundu and the Namibian portion of the Okavango/Kubango River Basin. This trip included an overflight of the river, visits to several chiefs in the area, proposed hydropower facilities, and to agriculture and aquaculture projects.

Unfortunately, due to the high tourist season in the Okavango Delta in Botswana, we were not able to visit the Delta itself, but we did have an opportunity to understand the on-the-ground conditions in northern Botswana, at Kasane which are similar to those in the Delta. These site visits not only allowed participants to better understand the on-the-ground situation in the basin from the headwaters to the Delta, but they also provided a shared field experience that helped build relationships across interests and borders. Ultimately, these relationships may be the most important results of *Sharing Water* as effective transboundary management requires a high degree of trust between countries.

Many of the *Sharing Water* accomplishments described above were furthered by the core group of delegates as part of the workshop sessions. The workshops were designed to implement capacity building in several key areas including: facilitation and negotiation, joint fact-finding, hydrologic data analysis, transboundary river basin planning, and river basin modeling. To further this capacity building element of the project, *Sharing Water* designed a series of hands-on simulations, role playing, and exercises that were widely praised by the project delegates, and created significant dialogue around basin issues. In addition, *Sharing Water* designed and implemented a training program for facilitators in the region. As the project progressed, these facilitators became increasingly active in running workshop sessions and break-out groups, as well as recording outcomes from each session. In implementation of this complex, transboundary project under an 18-month timeline, project partners learned significant lessons that could be applied to future work in this basin and other basins around the world. Chapter VII provides a detailed list of these lessons. In addition Appendix B includes the *Sharing Water* Monitoring and Evaluation Report.

As a final note, project delegates crafted a statement at the last *Sharing Water* workshop. This Statement explicitly noted the following accomplishments and aspirations:

- The dialogue over sharing the resources of the Okavango/Kubango River has been advanced, developing a better understanding of the complexities surrounding transboundary water management.
- Approaches enabling effective collaboration over transboundary waters were introduced, including Joint Fact Finding and Parallel National Action (PNA). Additionally, capacity was built in core areas such as negotiations, hydrological analysis and facilitation.
- The *Sharing Water* project evaluated various river basin planning models and produced a prototype planning model for training purposes. This model was used to evaluate a range of planning scenarios and management strategies.

The Statement concluded with a request to the Permanent Okavango River Basin Water Commission (OKACOM) to consider the formation of an Okavango Technical Working Group, committed to maintaining and deepening the professional relationships that were established and strengthened as part of the *Sharing Water* project.

I. INTRODUCTION

The Okavango Basin – The Natural Dimension

The Kubango River (see Figure 2) rises on the Bie Plateau of Central Angola, gathering tributaries from a dense, semi-tropical drainage network as it heads south towards Namibia. By the time the river, now called the Okavango, reaches the border it has entered more arid terrain, gaining only one additional tributary of note, the Cuito, before flowing across Namibia's Caprivi Strip and into northern Botswana. Peak flow from the upper basin reaches this point in March or April, coincident with the end of the rainy season. Owing to an extremely gentle land surface gradient, this pulse of water escapes channel confinement and spreads out in a deltaic wetlands fan covering over 25,000 km². By August, the heart of the dry season, the pulse reaches the lower limit of the Delta 175 km to the south. At that point, its discharge substantially reduced by losses incurred during transit through the Delta, the river regains the riverine channel of the Boteti River, which flows into the ultimate terminal sink in the system, the Makgadikgadi Pans.[1] Over time, the river basin has evolved into a highly complex and variable ecosystem shaped by drought and flood, scour and deposition and by channel formation, migration, and abandonment.

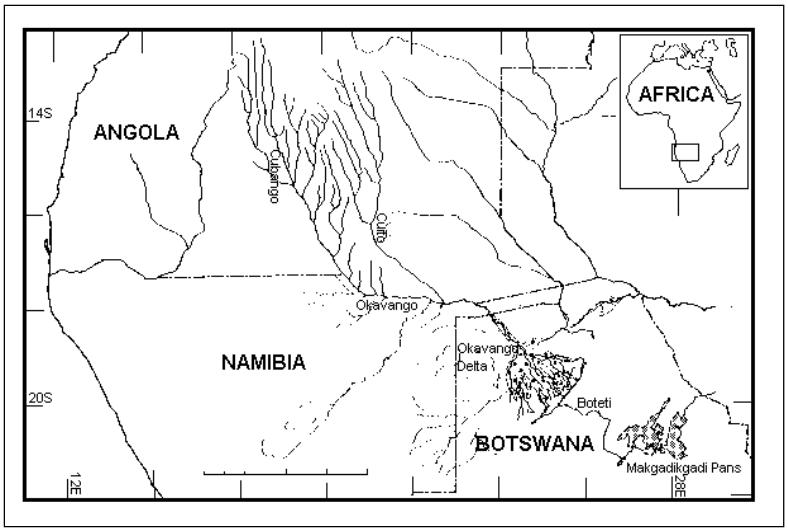

Figure 2: Map of Okavango

The expansive flooding in the Delta creates a network of channels, reedbeds, hippo pools and flood plains - home to innumerable species; 5000 insects, 3000 plants, 540 birds, 164 mammals, 157 reptiles, 80 fish and count-less micro-organisms. In the vicinity of the Delta and the Makgadikgadi Pans live some of Africa's last great free-roaming herds of Cape buffalo, zebras, antelope, and above all elephants - at some 60,000 strong, probably Africa's largest herd. In fact, the Okavango Delta is one of the best preserved corners of wilderness left in the world as no other wildlife resource of this contiguous extent remains on the African continent. There can be no dispute that the Okavango Delta, which is wholly dependent on the water and sediment entering from upstream, is a resource whose vitality should be assured.

[1] However, the flows from the Boteti River have not reached the Makgadikgadi Pans in over 15 years.

Average rainfalls over the basin are low in the south, increasing almost four-fold to higher rainfalls in the north. The variation in rainfall over the basin gives rise to correspondingly wide differences in the relative contributions to runoff that each basin state provides to the Okavango River.[2] Prolonged periods of severe drought during the 1980s and 1990s reduced average annual flows in the Okavango River by 15 to 45 percent.[3] Almost every southern African river system has experienced similar patterns of declining flows during the last twenty years.[4]

Figure 3: Okavango Delta

The Okavango Basin – The Human Dimension

Political demarcations superimposed on the Okavango Basin complicate this assurance of vitality, for upstream of the Delta lie two of Africa's newest nations - nations which deserve the same assurance. Namibia is home to 1.5 million inhabitants and since emerging from decades of South African domination in 1990, has worked to foster democratic institutions suited to the multi-ethnic character of the nation. Given time, Namibia could serve as an example for the rest of southern Africa, indeed for the rest of Africa, of the link between democratic processes, economic vitality and social stability. In addition to time, however, Namibia needs water for the country is the driest in sub-Saharan Africa, benefiting from an average annual rainfall of only 250 mm, of which all but 42.5 mm is lost to evapotranspiration. The Okavango, flowing along the northeastern border, is considered by many in Namibia as a logical source of water supply for the important Central Region.

Although by no means as dry as its neighbor, Angola also faces vexing resource management challenges. Since independence from Portugal in 1975, Angola endured nearly three decades of civil and social instability. The result is a decimated infrastructure and a disenfranchised population. The nation still struggles to emerge from political turmoil and has yet to respond to the profound re-development needs of the Angolan people. Given the privation they have endured, the people of Angola deserve the concerted effort of their government institutions, supported by the international community, to promote social and economic opportunity. As throughout human history, the

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[2] CSIR, 1997. An Assessment of the Potential Downstream Environmental Impacts in Namibia and Botswana of the Okavango River – Grootfontein Pipeline Link to the Eastern National Water Carrier in Namibia: Initial Environmental Evaluation Report. Contract Report to Water Transfer Consultants, Windhoek, Namibia, by Division of Water, Environment & Forestry Technology, CSIR, Pretoria. Report No. ENV/P/C 97120. 140 pp; Ashton, P.J. (2000a). Water security for multi-national river basin states: The special case of the Okavango River. In: (M. Falkenmark & J. Lundqvist, Eds), Proceedings of the Stockholm International Water Institute Symposium on "Water Security for Multi-National River Basin States", Stockholm, 19 August 2000. (In Press); and Ashton, P.J. (2000b). Potential environmental impacts associated with the proposed abstraction of water from the Okavango River in Namibia. South African Journal of Aquatic Sciences, 25(1): (In Press).

[3] McCarthy, T.S., G.R.J. Cooper, P.D. Tyson & W.N. Ellery (2000). Seasonal flooding in the Okavango Delta, Botswana – recent history and future prospects. South African Journal of Science, 96(1): 25-33.

[4] This pattern seems likely to be part of an eighty-year cycle of high and low flows (McCarthy *et al*., 2000).

manipulation of water resources in Angola will likely emerge as a compelling strategy for improving living standards. Given its upstream position in the Okavango Basin, the manner in which Angola implements its water sector re-development strategy will have profound downstream implications.

Figure 4: Washing and bathing near Menongue, Angola

Botswana, Africa's oldest democracy, derives the most direct benefit from the continued ecological vitality of the Delta, but must also cope with conflicting pressures for the use of the waters of the Okavango. Although the tourism and hunting industries, which depend on the integrity of the ecosystem, are an important element of the economy of Northern Botswana, farming, ranching and mining also contribute to the regional economy and require an input of water for their practice. When viewed from the perspective of Gaborone, the national capital in the south, the ecological integrity of the Delta is measured against a still wider array of objectives. In the past, these objectives have combined to yield ambitious plans for the hydraulic manipulation of the Delta. Although such plans have been postponed, the competing pressures exerted on Botswana's national planners leave open the possibility that similar plans for the southern Okavango will re-emerge.

The Okavango Basin – The Planning Dimension. The classic elements of a water allocation struggle are in place; competing demands set against the backdrop of a valuable ecosystem. The Okavango is unique, however, in that this physically remote system has remained unaltered by the massive investment in hydraulic infrastructure, which defined much of the 20th century. The Okavango Basin States are in a fortunate position to evaluate recent innovations in water resources management, with their associated institutional challenges and constraints, along side of traditional physical works and operating strategies, which often contribute to ecosystem decline and eventually precipitate massive restoration expenditures. This opportunity should be seized for the Okavango's period of benign isolation may well be coming to a close.

It is a hopeful sign that the three nations sharing the basin, Angola, Namibia, and Botswana, acting under the auspices of the OKACOM, have launched a process to develop an Integrated Management Plan (IMP). The IMP will be a comprehensive study of management options in each country's water sector and a detailed environmental assessment of each option – to provide essential background for negotiating the equitable and reasonable allocation of water to the Okavango Basin States. Ideally this process will meticulously and openly weigh the legitimate water supply needs and opportunities of the basin states against the preservation of the unique riverine ecosystem, which includes the Okavango Delta.

Negotiating an agreement capable of withstanding widespread scrutiny compels the Okavango Basin States, in concert with other organizations with constituencies in the region, to explore the full range of water management alternatives. The success of this kind of participatory decision making rests on:

1) an open forum to discuss how to equitably share costs and benefits; 2) the articulation of creative and innovative management strategies; and 3) the availability of transparent, easily-manipulated analytic tools for comparative evaluation of these alternatives.

As mentioned above, Namibia already faces significant water stress and is looking for additional supplies to augment its scant water resources. With only 42.5mm of effective rainfall it is not surprising that no perennial rivers rise in Namibian territory. To cope with irregular surface flow, Namibia invested in facilities to capture and store the episodic runoff in its ephemeral rivers. Given normal hydrologic patterns, ten existing dams in Namibia can yield 87.3×10^6 m^3/year at 95 percent assurance, nearly half of Namibia's estimated safe surface water yield from non-shared rivers. An estimated 300×10^6 m^3/year of safe yield from groundwater pumping compliment surface storage. In densely populated Central Namibia, however, only 14.5×10^6 m^3/year of surface water and 16.5×10^6 m^3/year of groundwater are locally available.[5]

Prior to the start of the 1996/97 rains, ten years of drought had left Namibia's reservoirs and aquifers so depleted that absent significant rainfall and runoff, Central Namibia, including the capital Windhoek, would have been left without water by the middle of 1998. Such was the climate in June 1996 when Namibian water officials announced that they would accelerate a long-held plan to tap the waters of the Okavango River, initiating the water conflict which was diffused only by the welcome rains of early 1997 and 1998. The rains of 1999, however, were below normal with more frequent, less intense storms resulting in decreased runoff and little recharge to the dams and to the aquifers. The 2000 rains were excellent, thereby buying Namibia more time before they will have to reconsider the extension of the Eastern National Water Carrier to the Okavango River.

The challenge of balancing the water needs of emerging nations with the preservation of a unique ecosystem is now being met within the framework of OKACOM's IMP. However, the structure of OKACOM, which relies on the expertise of official water planners from each member state, exposes the Commission to the perception, particularly on the part of interests from within Botswana and the international conservation community, that the IMP is is pre-disposed to favor the physical works and operating strategies already articulated by the member nations. In response to these perceptions, many stakeholders have made consistent requests for a participatory role in the planning process and for the adoption of a broader technical, environmental, and economic analytical scope. *Sharing Water* aimed to initiate such a broad exploration - one that can strike an appropriate balance between the basin states' need for water, watershed management, and the protection the Okavango Delta – which can garner support from across southern Africa and from around the world.

Stakeholders have consistently requested a participatory role in the basin planning process and adoption of a broader technical, environmental, and economic analytical scope. Sharing Water aimed to initiate such a broad exploration.

Sharing Water: Towards Consensus on Transboundary Management of the Okavango River. *Sharing Water* was an initiative (originally designed for three years) that recognized the complexity of the Okavango/Kubango Basin in terms of its international status, its cultural and economic diversity, its ecological importance, the expectations and possible pressures on the system to support local and national development, and the uncertainties associated with future management of a highly variable system. *Sharing Water* offered a platform, called collaborative learning, for collective resource inquiry, and for negotiation about shared benefits associated with the system. This approach was designed to build the commitment and knowledge base needed to manage ecological complexity and uncertainty.

[5] Water Transfer Consultants 1997. *Feasibility Study of the Okavango River to Grootfontein Link of the Eastern Water Carrier.* File Number: 13/2/2/2. Department of Water Affairs. Windhoek, Namibia.

Sharing Water was implemented by a broad partnership of organizations. Project partners included the Natural Heritage Institute (NHI) based in California, USA and IUCN – The World Conservation Union's Regional Office for Southern Africa (IUCN ROSA) based in Harare, Zimbabwe. Partner organizations from each of the three basin countries in the basin include Juventude Ecologica Angolana (JEA) from Luanda, Angola and the Association of Preserving the Environment of Integrated and Rural Development (ACADIR) from Angola's Kuando-Kubango province; IUCN – The Botswana Office in Gaborone (IUCN-Botswana), Botswana; and Namibia Nature Foundation (NNF) based in Windhoek, Namibia. The Harry Oppenheimer Okavango Research Center (HOORC) in Botswana, the Counsel for Scientific and Industrial Research (CSIR) in South Africa, and Research and Information Services of Namibia (RAISON) in Windhoek, Namibia all brought regional technical expertise to *Sharing Water*. Finally, CONCUR Inc. of California, USA and African Water Issues Research Unit (AWIRU) of South Africa formed a team and provided training in negotiation and joint fact-finding.

Sharing Water was funded by the United States Agency for International Development Regional Center for Southern Africa (USAID/RCSA) in support of the objectives of OKACOM.

Project objectives included:

1. To help promote the long-term sustainable management of the Okavango/Kubango River
2. To promote joint fact-finding through the development of a shared data management system, and a transparent, decision-making model of the basin
3. To broaden stakeholder participation in the OKACOM planning process, particularly Angolan water managers and stakeholders
4. To build capacity in the region to analyze complex scenarios and management strategies

There are very few examples worldwide of successful international river basin management on which the Okavango River Basin states can pattern their effort to develop an IMP. *Sharing Water* was aimed at helping to fill this gap by adapting a joint fact finding process that has proven extremely valuable in reducing conflict and moving towards consensus in other resource management situations. Through joint fact finding, the participants can build the trust necessary to reach agreement on the direction of an acceptable management plan.

Over the 18 months of the project, *Sharing Water* tested a strategy based on the following assumptions: 1) river basin planning will proceed more smoothly and efficiently if a broad range of stakeholders understand the planning process; 2) in order to increase learning, stakeholders should have a hands-on experience learning to navigate and manipulate planning tools such as a Shared Okavango/Kubango Database and a river basin planning model, even if the delegates will not become "experts" in these technical areas; and 3) this "collaborative learning" can occur in a series of workshops rather than individual training. In addition, *Sharing Water* implemented a new approach of maintaining a core group of delegates through the life of the training, rather than holding a series of workshops with different topics and different delegates attending.

Specific Tasks

Sharing Water was designed around the following nine tasks:

- **Task 1: Launching the Project**. Lack of attention to project management issues can have long-term implications for project success. This task ensured management, reporting, and communication elements of the project are in place. Under this task, a regional steering committee was to be established to help guide the project. This Steering Committee was

chaired by a member of the Southern African Development Community (SADC) Infrastructure and Services Water Division.

- **Task 2: Confirming the Delegates.** A central aim of this task was to obtain commitment from ten core delegates from each basin state. Particular attention was paid to recruiting Angolans. This task also initiated a series of trainings to train facilitators in techniques of collaborative processes, and delegates in joint fact-finding and the management of science-intensive water resource disputes.

- **Task 3: Defining Visions and Priorities.** This task was aimed at beginning to define core values, priorities and visions for the Basin. The intent of this task was to "map" areas of agreement and narrow areas of disagreement and uncertainty.

- **Task 4: Legal and Institutional Analysis.** This task included an analysis of existing legal and institutional arrangements for transboundary water management in the basin.

- **Task 5: Setting up the Shared Database**. This task involved a collaborative process of collecting existing data for the basin, compiling it into an internet-accessible, user-friendly Shared Okavango/Kubango Database, identifying knowledge gaps, and outlining a process for regular update of the system.

- **Task 6: Identifying Scenarios and Management Strategies.** This task resulted in a range of future scenarios and associated management strategies. This task also included a facilitated training for all delegates in option generation and maximum joint gain analysis.

- **Task 7: Building the River Basin Management Model.** This task first involved a review of river basin models to determine the most appropriate model for basin. This phase of the project then involved building a prototype river basin planning model and introducing it to the core group of delegates.

Figure 5: Abias Huongo dancing with welcoming dance troupe, Rundu, Namibia

- **Task 8: Simulating and Evaluating Management Strategies**. This task involved using the prototype model to simulate and evaluate the management strategies outlined in Task 6 in a workshop setting. The intent of this task was to increase understanding regarding the impact of various management options. This task aimed at compelling the type of "give-and-take" exchanges that will eventually lead to the discovery of consensus management direction for the basin.

- **Task 9: Ensuring Sustainability.** Although elements to ensure sustainability were built into the project, this task was designed to directly address the issue of on-going capacity to

manage the database system. A series of trainings and planning exercises were planned as part of this task to ensure sustainability and to transfer the lessons-learned in this project throughout the SADC region.

Expected Results

Most importantly, *Sharing Water* was designed to help further the OKACOM process towards the development of an IMP governing the equitable and sustainable sharing of the Okavango Basin's waters. More specifically, *Sharing* Water was designed to provide OKACOM and other stakeholders with a transparent, user-friendly data management system and a prototype decision-making model. Development of these management tools were combined with a process whereby delegates become familiar with how these tools can be used in a planning process.

Differential access to information and ability to analyze it has repeatedly proven to be a source of tension and even conflict in negotiations associated with water resources and other transboundary resources. The intent of *Sharing Water* was to help "level the playing field" of access to information and analytical capacity by providing delegates with a joint management tool and a common source of data on which it operates.

Both the SADC Protocol on Shared Watercourse Systems and the tripartite agreement between the three riparian countries pledge to promote stakeholder participation in the management of international rivers and in the Okavango Basin, in particular. *Sharing Water* intended to provide a process to expand stakeholder understanding of management alternatives and participation in management decisions.

In addition, the compilation of information related to value statements, and the legal and institutional arrangements in the Basin is expected to result in a platform for a full-fledged visioning process, and identification of gaps in institutional capacity to manage transboundary resources in the basin. In addition, the legal analysis makes recommendations regarding the need for harmonization of laws and policies across borders and when comparing regional and international agreements with national laws and policies.

Figure 1: Masego Madzwamuse, Windhoek, Namibia

Structure of the Final Report

Section II of this final report begins with a discussion of collaborative learning – the core principle behind the *Sharing Water* project. This section also describes how this organizing principle was implemented in *Sharing Water* through a focus on workshop-based learning, capacity-building and outreach.

Sections III of this report describe the steps taken to develop the foundation for a visioning process, and for the legal and institutional analysis – both critical social science components of *Sharing Water*. Sections IV-VI outline the technical components of *Sharing Water*, including the development of scenarios and associated management strategies, a Shared Okavango/Kubango Database, and a river basin planning model. In Section VII, we describe for

each of these project components, the key changes made as a result of project experience as well as general lessons learned that could be applied to other transboundary river basin management efforts. The report concludes with a section on recommended next steps for collaborative learning in the context of the Okavango/Kubango River Basin.

II. COLLABORATIVE LEARNING

Collaborative learning is a platform for collective resource inquiry about shared benefits associated with a system. Collaborative learning focuses on: 1) improving the use of local knowledge and participation in the research and management process, 2) developing social capital – trust, co-operation and networks – as a necessary underlying social environment to support the improved use of information, and 3) capacity building – supporting these approaches through training. An underlying premise of *Sharing Water* was that collaborative learning facilitates long-term stakeholder investment and a shared knowledge base required for building and sustaining an adaptive transboundary management plan in the Okavango/Kubango Basin.

Resolving complex natural resource management issues requires that stakeholders share an understanding of the technical dimensions of the problems they face and are able to articulate their interests.[6] Joint fact-finding, a tool used in collaborative learning, is a technique that uses a new generation of analytical tools to compile and analyze relevant information, and translate it into a form that can be used by decision-makers and others to create the foundation for broad-based consensus. Joint fact-finding, a new way to integrate science and decision-making, contrasts with traditional styles of science advising such as the technical "blue-ribbon panel" and the model of opposing scientific experts.

Sharing Water offered a joint fact-finding process in the Okavango River Basin by incorporating the following key characteristics:

- Joint fact-finding involved face-to-face dialogue between scientists, OKACOM and OBSC members, and other basin stakeholders.
- Rather than withholding information for strategic advantage, interested parties pooled relevant information.
- Training in communication, collaborative processes, and negotiating was an integral part of the joint fact-finding workshops.
- This process included a core group of delegates (ten from each country) who committed to participate in all three basin workshops, thereby striving to create the broadest understanding while extending legitimacy to the result of the process.
- Deliberations were relevant, transparent, accurately recorded, and summarized.

Selection of Delegates

Sharing Water drafted selection criteria used to identify 30 core delegates to attend the workshops. The logic of the *Sharing Water* project was to identify delegates who were likely to have a future role in water resource management for the Okavango Basin. Project partners agreed that there should be ten delegates from each riparian country offering equal representation. In addition, they agreed the project should encourage equal gender representation. Project partners screened delegates using the following additional criteria. The delegates should have:

- A sound level of understanding (technical or local knowledge) of water, environment and rural development issues in the basin

[6] McCreary, S.T., J.K. Gamman, and B. Brooks. 2001. Refining and Testing Joint Fact-Finding for Environmental Dispute Resolution: Ten Years of Success. Mediation Quarterly. V. 18 no. 4. pp. 329-348.

- Experience with local, regional and/or national policymaking
- Exposure to and experience with related initiatives in the basin
- A commitment to attend all three workshops
- Good communication and networking capabilities

In addition project partners agreed that some of the delegation should have:

- A basic understanding of water resource models and interpretation of their results
- Experience with the collection and management of relevant data (water, environment, land use, etc)
- A basic level of computer literacy

Sharing Water was not merely a modeling exercise, but rather a participatory process to broaden stakeholder involvement through the use of a new generation of transparent decision-making models, a shared data-base, training, and joint analysis.

In order to identify 30 delegates from Angola, Namibia, and Botswana, basin partners consulted with OKACOM Commissioners in each country, SADC Infrastructure and Services Water Division, in addition to various government departments, organizations, and universities. After final OKACOM approval, *Sharing Water* sent letters of invitation to ten delegates from each basin state. Delegates were asked to sign a letter of commitment in response to the invitation. The final core group of delegates represented a broad range of organizations (Figure 8).

With only a few exceptions, delegates were able to attend all three workshops. During the planning stages of each workshop, basin partner hosts, JEA, NNF, and IUCN Botswana received a number of requests from individuals and organizations who also wanted to attend. As a result, *Sharing Water* accommodated additional guests at each workshop with attendance often creeping towards 90 delegates, invited guests, and observers.

Figure 7: Sharing Water Delegates and Partners, Caiundo, Angola

- Association for the Environment, Conservation, and Rural Development
- Basin-wide Forum
- Conservation International
- Department of Crop Production, Botswana
- Department of Natural Resources, Angola
- Department of Tourism, Angola
- Department of Tourism, Botswana
- Department of Water Affairs, Namibia
- Department of Wildlife and National Parks, Botswana
- Kalahari Conservation Society
- Ministry of Agriculture, Angola
- Department of Water Affairs, Botswana
- Ministry of Agriculture, Water, and Rural Development, Namibia
- Ministry of Environment & Tourism, Namibia
- Ministry of Lands, Resettlement, Rehabilitation, Namibia
- Ministry of Water Affairs, Angola
- National Directorate of Water, Angola
- National Directorate of Environment, Angola
- NCSA, Botswana
- North West District Council
- Provincial Government, Kuando Kubango
- Tawana Land Board
- Trust of the Okavango Cultural and Development Initiatives
- Universidade Augostino Net

Figure 2: Organizational Affiliation of Delegates

Curriculum Development

Project partners conducted an initial assessment to gauge the background and experience of the core delegates (Appendix C: Pre-Project Assessments). The project discovered that delegates had a wide range of backgrounds with different levels of core skills as a function of professional experience, national context, and prior training. Based on this range, the project partners adopted an approach for the workshop training that attempted to find a middle ground, at the risk of the course content being set too high for some, while too easy for others.

Sharing Water's curriculum development for the workshops included several elements: (1) build a working vocabulary of principled negotiation concepts as well as terms related to hydrology and river basin modeling, (2) link theory to practice, by relating concepts to case studies of environmental decision-making in southern Africa, (3) create role-playing simulations built on southern Africa fact patterns, (4) work up to scenarios that realistically portrayed conditions in the Okavango Basin, (5) develop hands-on training to have delegates explore and implement concepts, and (6) take stock of results after each workshop and make needed adjustments.

Workshops

An objective of the *Sharing Water* workshops was to implement collaborative learning among the 30 core delegates in order to form a foundation on which to build towards consensus on a transboundary management plan for the Okavango/Kubango Basin. Project partners designed the workshops to offer hands-on training in a range of collaborative management approaches. Partners used pre-workshop and post-workshop assessments to adapt the training and workshop layout to the needs of the delegates (Appendix D: Workshop Evaluations)

The first delegates' workshop took place in October 2003 in Luanda, Angola, the second was held in March 2004 in Windhoek, Namibia, and the last workshop took place in August 2004 in Kasane, Botswana. *Sharing Water* workshop components included:

- Training in facilitation, negotiation and joint-fact finding
- Compilation of information necessary for a basin-wide vision
- Development of a user-friendly, basin-wide Shared Okavango/Kubango Database
- Drafting of a strategy to fill data gaps
- Determination of an appropriate river basin planning model
- Training in data analysis and river basin modeling
- Exploration of a range of management scenarios
- Analysis of legal and institutional arrangements in the Basin
- Training in topics related to transboundary river basin management

As part of the collaborative learning objective, the three *Sharing Water* workshops succeeded in providing a forum for the delegates from the three basin states to interact and share ideas on the management of the Okavango River Basin.

Angola Workshop. To immediately engage the Angolans directly in the project and to focus attention on the headwaters of the Basin, project partners held the first workshop in Angola.

The Minister on Water and Energy, Botelho de Vasconselhos, offered opening remarks. Specific components of the Luanda workshop included:

- Presentations by experts regarding the Okavango Basin, including historic water use in the basin, and plans for future use, with a focus on the Angolan portion of the basin
- Presentation by OKACOM Commissioner, Isidro Pinheiro on the history and role of OKACOM
- Presentation by Akiko Yamamoto on the status and goals of the GEF-funded OKACOM project
- Presentation by Dr. Tamar Ron, UNDP, entitled "Plans and Challenges for Biodiversity Conservation in Kuando – Kubango Province, Angola, in the Context of a Transfrontier Conservation Initiative"
- Presentation by Dr. Peter Ashton, CSIR, entitled "Overview of the Basin – Hydrology, Rainfall, Institutions and Flows"
- Building relationships and a foundation for collaboration, information-sharing and consensus-building between delegates from the three basin states
- Introducing the 30 delegates to fundamental technical aspects of model and database development
- Conveying the basic framework and techniques of joint fact-finding and interest based negotiation, and practicing new techniques through hands on simulations
- Field visit to the middle reaches of the Kubango River in Kuando Kubango Province

Figure 9: Charter planes in storm in Rundu, Namibia

Namibia Workshop. The Namibia Workshop, held in Windhoek, Namibia, was entitled *Moving from Sharing Water to Sharing Benefits*. Over 80 delegates, including several OKACOM Commissioners, Steering Committee members, and guests attended the workshop.

Specific workshop objectives included:

- To continue to build relationships and a foundation for collaboration, information-sharing and consensus-building between delegates from the three basin states
- To explore the concept of moving beyond sharing water toward sharing benefits
- To present the initial version of the Shared Okavango/Kubango Database
- To continue discussion of data inventory, data gaps and information needs
- To practice hands-on training in database usage and the use of hydrologic information
- To present and discuss a draft legal and institutional analysis of the basin
- To discuss potential management strategies for the basin
- To present the evaluation process for the river basin planning model
- To introduce the Scandinavian-derived concept of Parallel National Action (PNA)
- To learn more about on-the ground basin issues through a field visit to the Kavango region of Namibia

Botswana Workshop. The Botswana Workshop, held in Kasane Botswana, was entitled *Sharing Benefits: Tools and Analysis for Balancing Interests* and included the following objectives:

- To present the accomplishments of the *Sharing Water* project, and to receive input from delegates and OKACOM Commissioners on future activities for the basin
- To further explore the concept of moving beyond sharing water to sharing benefits through the use of river basin planning tools
- To allow basin delegates to express and refine various concepts around scenario development in the basin
- To discuss future management of the Shared Okavango/Kubango Database
- To present and discuss the legal and institutional analysis of the basin
- To present the foundation for a full-fledged visioning process in the basin, and to discuss how one moves from visioning to management strategies

- To better understand and coordinate with other initiatives in the basin, including the Okavango Delta Management Plan (ODMP), TWINBAS, and others
- To visit a community based initiative, the Chobe Enclave Community Trust (CECT) and to take a riverboat cruise in Chobe National Park
- To continue to build relationships for collaboration and information sharing between delegates from the three basin states

At the Kasane workshop, delegates formed a subcommittee, which produced the Kasane Statement (Appendix E : Kasane Statement). Chief among its components, the Kasane Statement proposed that the *Sharing Water* delegates form an Okavango Technical Working Group (TechWoG). Below, are sections of the Kasane Statement (Appendix F: Okavango Technical Working Group Contacts).

> *Recognizing that the Sharing Water project has brought together a broad array of interests and expertise in the delegates, who now respectfully request OKACOM to consider the formation of the Okavango Technical Working Group.*
>
> *This proposed Working Group will be committed to maintaining and deepening the professional relationships that have been established and strengthened as part of the Sharing Water project, and will communicate with the Basin-Wide Forum to provide a link between the community and technical committees and OKACOM.*
>
> *Further, this proposed Working Group affirms the underlying value put forth by the Sharing Water project – to share in an open and transparent manner all information, data, and understanding across borders and between disciplines in pursuit of shared visions and benefits for the Okavango/Kubango Basin.*
>
> *In addition, this newly formed Working Group, recommends that follow-on activities that occur in the basin take into account the lessons-learned described above, and respectively requests that additional funding be provided to support the Working Group and associated sub-committees to continue these roles of professional exchange, capacity building, basin exchange visits, and project and institutional coordination.*
>
> *We, the delegates and Sharing Water project partners sign below requesting the establishment of the Okavango Technical Working Group, giving thanks for the support to date, acknowledging lessons-learned, and committing ourselves to professional relationships across borders.*

Figure 10: Sharing Water Delegates and Partners, Kasane, Botswana

Capacity Building

One of the major goals of *Sharing Water* was to build capacity amongst a core group of basin delegates in topics directly relevant to transboundary river basin management. In most transboundary river basin settings, this planning tends to fall exclusively within the jurisdiction of government-level experts and diplomats. Decisions are often made without input from a range of stakeholders and thus, as a result, they are often not implemented. *Sharing Water* operated under the premise that a broad range of stakeholders could more efficiently and effectively participate in the planning process if they had a stronger hold on the planning process itself, as well as the components of the process, such as mutual gains negotiations, data analysis, and river basin modeling. *Sharing Water* aimed to build this capacity within a workshop setting instead of individual training in order to also build professional relationships across borders. These workshops provided opportunities to recognize and coordinate strategies towards common goals on multi-sectoral, national and international levels. Below is more specific information on *Sharing Water* training in six areas.

Negotiation and Facilitation Training

Sharing Water partners CONCUR Inc. and AWIRU conducted training in negotiation and joint fact-finding at all three workshops. First, partners sought to systematically introduce concepts of principled negotiation. Second, as information sharing is central to the *Sharing Water* project, project partners worked to introduce and elaborate concepts of joint fact-finding.

In Luanda, *Sharing Water* introduced a series of key concepts from the practice of principled negotiation. These included: recognizing distinctions between positions and underlying interests, techniques for identifying potential zones of agreement, the critical importance of developing objective criteria and devising multiple options, and the need to build in linkages to implementation for negotiated agreements. One simulation from this workshop included a three-way water allocation scenario in which representatives from three hypothetical basin states negotiate over a special one-time allocation of water. Another simulation required delegates to negotiate tradeoffs between protection of wetlands and development of needed infrastructure. (Appendix G: Detailed Descriptions of the Simulation Exercises).

Figure 11: Portia Segomelo, ODMP, at the Namibia Workshop

The negotiation training presentations in the following Windhoek workshop included two water-based simulation exercises – *"Manzini Lake Multi Party Simulation Collaborative Planning for Water Resources Management and Benefit Sharing"* and *"Mkuzi Wetland and its People"*. Together, these exercises had as objectives:

- Provide delegates experience in reframing sharing water as a sharing benefits opportunity
- Provide delegates experience in facilitating negotiations across multiple, linked issues
- Illustrate the value of creating a framework of issues as a catalyst for invention of new options
- Illustrate the technique of straw voting as a tool to track progress toward agreement
- Explore the role of a facilitator in collaborative planning
- Incorporate the role of traditional leaders in the management of natural resources

The focus of the Manzini Lake simulation was on mutual gains bargaining, in the context of benefit sharing. Delegates were asked to negotiate a "package" solution to three inter-related issues. In

addition, this exercise was formatted as a 'semi scoreable" simulation, in that each negotiators is given a ranked set of preferences for the outcomes. The Mkuzi wetland simulation, on the other hand, asked the delegates to work as members of a team, bringing to bear different disciplinary specialties. The scenario asked delegates to devise a strategy for consultation with local communities, given the proposed designation of a new RAMSAR site. Both scenarios were hypothetical and set in southern Africa.

At the Kasane workshop, project partners designed a negotiation training simulation that built directly upon the *Sharing Water* river basin modeling work. Unlike the previous simulations which constructed hypothetical southern Africa scenarios, this exercise was focused on the Okavango Basin itself. In this simulation, CONCUR Inc. and AWIRU organized delegates into eight roles: three representatives of OKACOM, three representatives of basin states, and two representatives of NGO's. The key themes which will be investigated are distinguishing underlying interests from fixed positions; framing issues clearly and identifying information sharing and fact finding needs; discovering potential zones of agreement among apparently divergent interests and determining which interests lend themselves well to representation in models.

Facilitation Training

In addition to offering a broad training in negotiation and joint fact-finding in the plenary workshops, project partners also instructed a two-day intensive course in facilitation for selected 14 delegates and project partners before each of the three workshops. The project's approach had several elements: (1) build a working vocabulary of principled negotiation concepts, (2) link theory to practice, by relating concepts to case studies of environmental decision making in southern Africa, (3) create scenarios built on southern Africa fact patterns, (4) work up to scenarios that realistically portray conditions in the Okavango Basin, and (5) take stock of results after each workshop and make needed adjustments.

In the facilitation training session in Luanda, Angola, project partners introduced a series of key concepts from the practice of principled negotiation. These included: recognizing distinctions between positions and underlying interests, techniques for identifying potential zones of agreement, the critical importance of developing objective criteria and devising multiple options, and the need to build in linkages to implementation for negotiated agreements. We also presented three models in order to bring scientific information to bear in public policy. In this way, we introduced the concept of Joint Fact Finding and described how it differs from "adversarial science" and the "panel of experts" techniques. We provided materials based on hypothetical case studies and ran two role-playing simulations, on collaborative water management approaches, which evoked a great deal of interest.

Building on the "lessons learned" in Angola, we made several adjustments in our teaching approach in the facilitation training for the Namibia workshop. These adjustments included: shifting to a focus with more elicitive, participatory teaching; shifting more of the teaching from CONCUR Inc. to AWIRU team members; bringing forward southern Africa examples, rather than relying on examples from outside the region; creating a simulation that required participants to brainstorm and work as a group; creating a simulation that illustrated the complexity of solving an environmental dispute with multiple dimensions (moving from sharing water to sharing benefits); adjusting the flow and agenda of the training to allow for more group discussion and to create more opportunities for caucusing before simulated negotiation; and using the simulation in both the pre-training workshop and the Plenary workshop to highlight differences in facilitator styles and tactics. Based on our review of the evaluations from the Namibia workshop, these adjustments were generally well received.

At the Kasane workshop, *Sharing Water* project partners aimed to include the trainees in facilitating the plenary workshop negotiation exercises. In a pre-workshop strategy meeting CONCUR Inc. and

AWIRU met with the facilitation trainees with the following three agenda items: 1) planning for the simulation exercise, 2) assigning roles for facilitators and recorders for the main workshop, and 3) reflecting on the trainees' experience in the *Sharing Water* project with the explicit aim of drawing broader "lessons learned". All three activities proved fruitful. By walking through the simulation exercise in advance, facilitators became familiar with the fact pattern and logistics of the simulation they would soon run. By assigning roles for facilitators and recorders, we created a relatively high degree of confidence that each session would be supported with strong guidance and note taking. Finally, the Kasane Statement, mentioned above, was also a great example of 'single text negotiation' in which the delegates participated in real time.

Figure 3: Sharing Water Delegate, Roberto Machalo, ACADIR at the Namibia Workshop

Joint Fact-Finding Training

As an integral part of the *Sharing Water* training, joint fact finding espouses the advantage of working directly with scientists, engineers and other specialists to assemble and clearly communicate the very best available technical information. By guiding and structuring the exchange of technical information together, joint fact-finding bypasses the pitfalls of "adversarial science" and builds a firm foundation for policy and political agreements.

At the Luanda workshop project partners presented other models for bringing scientific information to bear in public policy, and described how Joint Fact Finding differs from "adversarial science" and the "panel of experts" techniques. Presenters provided materials based on hypothetical case studies and ran two role-playing simulations on collaborative water management approaches, which evoked a great deal of interest.

To further work with the concept of joint fact-finding, project partners designed a presentation called *Collaborative Water Management: Southern Africa Case Examples* for the Windhoek workshop, which illustrated three broad approaches to natural resource decision making. All three approaches have advantages and disadvantages depending on the context in which they are being used. Project partners developed case examples from the southern Africa region of the following:

- ***Blue Ribbon Panel:*** the setting of the border-line between Namibia and South Africa on the Orange River
- ***Adversarial Science:*** the Sedudu/Kasikili island dispute between Botswana & Namibia
- ***Joint Fact Finding:*** the Tripartite Interim Agreement on the Nkomati River

In addition, project partners described *Sharing Water* as a working example of Joint Fact-Finding (Appendix H: "Refining and Testing Joint Fact-Finding for Environmental Dispute Resolution: Ten Years of Success").

Training in Transboundary River Basin Management

To illuminate the process of transboundary river basin management, *Sharing Water* designed a series of presentations. Dr. Tony Turton from AWIRU gave the first presentation entitled "*Transboundary River Basin Management in Southern Africa"* at the Luanda workshop. This presentation focused on strategies for negotiation amidst significant regional and international pressure to abide by treaties, protocols and agreements, as well as a need for effective stakeholder engagement in the decision-making processes. Dr. Turton highlighted data and trust as the two primary negotiating tools for negotiating water benefits between the transboundary river dependent national economies of southern Africa.

Also at the Luanda Workshop, Dr. Peter Ashton gave a presentation entitled: **"***Management Issues in the Okavango/Kubango Basin: Opportunities and Constraints.",* which described the data management process. He argued that in order for OKACOM to make decisions, it needs information on the current and projected system characteristics and information on stakeholder needs (especially relating to water quantity, quality and reliability of supply) and their concerns. Dr. Ashton argued that once a decision is taken at a high level, we need to understand the consequences theoretically, and then through monitoring and evaluation.

Later, at the Windhoek workshop, project partners introduced the concept of *Parallel National Action adapted to the Okavango Basin* and stimulated a structured debate around how the concept may be developed in the Okavango context. Dr. Turton described PNA as a concept, developed in Scandinavia over the past two centuries, which aims to strengthen bonds between states, leading to the pooling of skills and resources and harmonization of policies between states. Cooperation is promoted at various levels – between government departments, civil-society groups, NGOs and business interests of the states concerned. PNA focuses on "low-politics" – issues such as defense and foreign policy are not addressed. Over time the national laws become increasingly similar between the various states and cooperation is engendered from the lowest levels upwards. This process is implemented through an informal non-prescriptive environment with decisions taken on consensus and not majority ballots.

Project delegates concluded that to some extent, PNA already exists in the Okavango-Kubango Basin. The challenge is to extend the current reach of interaction to more stakeholders and improve the interaction between the governments of all three states.

Training Associated with the Shared Okavango/Kubango Database

Sharing Water engaged with delegates over the development of the Okavango Shared Database and presented the process as an implementation of the joint fact-finding concept. At the workshops, delegates provided input on the structure of the database, and identified gaps in the existing datasets. They also participated in a data analysis exercise, and learned to navigate the Shared Okavango/Kubango Database. In the workshop setting, delegates also discussed future housing for the database, appropriate systems to distribute data and information, and methods for quality assurance.

At the Namibia workshop, Dr. John Mendelsohn of RAISON, who developed the structure of the Okavango Shared Database and populated it, presented Version 1 of the database and an analysis of existing trends. Following the presentation, project partners conducted hands-on training and exercises using the database as a collaborative learning tool. Small break-out groups of delegates learned how to manipulate the database at their own computers and in the process, began to learn together about existing information on particular subjects, trends in existing data, and the value of data in decision-making processes. By engaging delegates in this way, *Sharing Water* actualized the

joint fact-finding concepts and furthered the delegates' investment in the Okavango Shared Database.

Figure 13: Delegates and partners involved in analysis of precipitation data

Training in Hydrology and River Basin Modeling

At the Luanda workshop, *Sharing Water* introduced the basic hydrological processes of watersheds and the vocabulary used to discuss them. Using hands on data manipulation exercises, presenters covered the concepts of precipitation, runoff, evapotranspiration, and interception in hands-on exercises in breakout groups. This foundation of knowledge prepared delegates for an introduction to river basin modeling at the Windhoek and Kasane workshops.

At the Windhoek workshop, project partners exposed delegates to river basin modeling, its uses and limitations. Using small breakout groups and computer workstations as the central training method, project partners designed exercises that allowed delegates to explore and analyze for themselves the process of selecting river models based on a set of key attributes using the River Basin Model Evaluation Tool developed for *Sharing Water*. This hands-on exploration of modeling was not meant to train delegates to be "modelers" but to give them a functional understanding of the role of modeling in the overall process of developing a river basin management plan.

Having established a sense of river basin modeling, project partners introduced the concept of how the models, along with the visioning and legal and institutional analyses can inform the exploration of a range of management scenarios for the Okavango / Kubango Basin. This component of the curriculum will be further detailed in Section IV of this report.

Figure 14: Delegates and partners involved in hands-on model selection

English Language Training

During the first workshop, there was a strong sentiment among delegates that *Sharing Water* should increase the level of interaction between the English-speaking Botswanan and Namibian delegates and the Portuguese-speaking Angolan delegates. Angolan delegates proposed that *Sharing Water* offer English language courses to the Angolan delegates in order to break down the language barrier. After project partners discussed the issue, *Sharing Water* funded English language classes for Angolan delegates in Luanda and Menongue in the spring of 2004.

Field Trips

As part of the Luanda workshop, *Sharing Water* succeeded in bringing an international party of basin stakeholders into the long-inaccessible Kubango basin in the Angolan headwaters. After flying to Kuando Kubango, the governor Chindange and vice governor of Menongue, Mr Francisco Manjolo welcomed the *Sharing Water* delegation. From there, the delegation traveled to Caiundo, where they could view the Kubango River. This experience provided the partners and delegates with valuable experience and insight into the social and ecological conditions of the headwaters of the Basin and also contributed to including the Angolan partners in the project. This built comraderie and a collective sense of having broken through an historical barrier.

Figure 15: Sharing Water Partner, Peter Ashton, CSIR, on the road from Menongue to Caiundo, Angola

After the Windhoek workshop, partners and delegates made a field visit to the Nambian sector of the Okavango River Basin. This field visit included a flight from Windhoek to Rundu in the Kavango region in the north of Namibia. Project delegates were able to view from the air the network of existing pipelines and reservoirs that transfer much needed water supplies to the arid country's growing urban areas, and would link to a water pumping scheme from the Okavango if and when any such pumping were initiated.

Figure 16: Popa Falls, site of proposed hydroelectric facility on the Okavango River

The delegation also flew over of the Kavango River between Rundu and Popa Falls. The flyover provided an opportunity for delegates to see the Kavango River in flood and to get a view of the winding Cuito River coming from Angola as it joined the Kavango River along the border between the two countries. The series of floodplain terraces along the Angolan and Namibian banks of the Kavango River were extensively flooded and water levels were some three meters higher than normal.

Once landed, project delegates made visits to local leadership centers including visiting the traditional palace in Kapako hosted by the Honorable Hompa Alfons Kaundu of Mbunza District, the Kayengona traditional palace in Shambyu District, hosted by the Honorable Hompa Matumbo Ribebe, and a visit to the Mukwe Tribal Court, hosted by the Honorable Fumu Munika Mbambo. The field visit allowed delegates to better understand the importance of the tribal structure in the region, to learn about the cultural history of various tribes, and to hear from tribal leaders regarding specific accomplishments and needs at the local level as they relate to transboundary river basin management.

Delegates also visited the Uvungu-vungu Agriculture scheme, the Kaisosi fish farming project, and the Popa Falls, which is the site of the proposed hydroelectric scheme. These site visits provided delegates with a close-up view of planned and on-going water use in the Namibia portion of the basin.

Figure 17: Sharing Water Delegate Traditional Leaders, Angola, Namibia, Botswana

The field trip after the Kasane workshop in Botswana brought delegates to Chobe where the Kgosi (Chief) of Kavimba village, Lux Masule, welcomed the delegates to the Elephant Kingdom of Chobe. He explained that Kavimba is the headquarters of the Basubia culture and the largest of the five villages in the CECT. The trust area is sandwiched between the Chobe National Park and the Forest Reserve. The Kgosi stated that the water comes from Angola – down the Kwando, into the Linyanti and then the Chobe. It has provided the communities with water for crops, river plants, livestock and fishing. In recent years the amount of water reaching the area has decreased substantially. He requested information on the dam built by Jonas Savimbi and asked if now that Mr Savimbi had died could some person please open the dam and release the water?

In response to the Chief's request to open the dam, OKACOM Commissioner Pinheiro made a statement addressed to the Kgosi and the community that in fact there is no dam in Angola on the Okavango nor on the Kwando rivers. Commissioner Pinheiro noted that the drop in flow is due to climatic factors and assured the community that consistent with the spirit and principles of collaboration discussed in the *Sharing Water* Project, should Angola wish to proceed with a development on any of their shared rivers they will first consult with the downstream riparians. Mr. Pinheiro's statements were then corroborated by Mr Masedi, SADC Infrastructure and Services Water Division, who explained that with modern remote sensing technology, it is possible to quickly discern whether a country is developing infrastructure on its portion of the river.

After the meeting at the Kgotla the delegates met local fishermen who demonstrated how people fish for tilapia, bream and catfish from the river. The next village visited was Satau, the fourth in the Chobe enclave. Renowned for their beautiful singing and dance movements, the women of the village made the delegates feel welcome with a performance before moving into the Kgotla. A representative of the fisheries committee of the village described the challenges faced by the fishermen of the region.

Figure 18: Washing clothes along the Chobe River, Botswana

Overall, the field trips brought Angolans, Namibians, and Botswanans to parts of the Okavango Basin they had never visited before, significantly deepening their understanding of their riparian neighbors' management concerns and interests.

OKACOM

Sharing Water has worked closely with OKACOM to ensure that the project is supportive and complementary to the goals and objectives of OKACOM. Before the project began, partners met twice with OKACOM as a Commission and with OKACOM Commissioners individually, subsequently revising the project proposal based on their input. Project partners continued to meet with individual OKACOM Commissioners throughout the life of the project.

Project partners coordinated the May 2003 OKACOM meeting in Maun, Botswana and presented *Sharing Water's* objectives and components at that time. At the Windhoek workshop in March 2004,

Sharing Water provided OKACOM members with binders of *Sharing Water* project documents, to brief them on *Sharing Water's* progress.

Figure 19: Commissioners Pinheiro and Heyns participating in Namibia field trip

On October 3, 2002, OKACOM Commissioners Stephen De Wet (Namibia), Dr. Tombale (Botswana), Mr. Da Silva (Angola), and Mr. Pinheiro (Angola) signed an endorsement of the *Sharing Water* project at a meeting in China (Appendix I: OKACOM Endorsement). As part of this endorsement OKACOM requested that the project develop a Memorandum of Understanding (MOU) with OKACOM to address issues related to data sharing and intellectual property rights. Accordingly, project partners drafted a MOU to formalize the working relationship between the *Sharing Water* project and OKACOM (Appendix J: Draft Memorandum of Understanding between OKACOM and *Sharing Water*). The MOU defined a communication and coordination strategy to promote a cooperative relationship, and committed the *Sharing Water* partners to making work products available to OKACOM and the general public in both electronic format and print.

Close on the heels of the *Sharing Water* Windhoek workshop, OKACOM met in Luanda from 27-29 April, 2004. NNF and JEA attended the meeting to represent *Sharing Water* and receive feedback on the draft MOU. At the meeting OKACOM offered the following recommended next steps to the *Sharing Water* project:

- The Commission decided that there was little point in signing a MOU with the *Sharing Water* project at this late stage of Phase I. However, for Phase II of the project they would review a MOU
- The Commission would like to review the aims and objectives of future work in the Okavango at the concept stage in order to have the opportunity to provide input
- The Commission would like to see more funding spent in the basin states in Phase II, and correspondingly more focus on the partners in the basin states, particularly in Angola
- The Commission would like to see more use made of local technical inputs

Over the life of the project, JEA made laudable progress in engaging the Angolan OKACOM Commissioners and garnering their support despite their initial hesitation. JEA spent considerable

time meeting with Angolan OKACOM Commissioners to clarify project objectives and receive input from OKACOM on key activities. In particular, JEA worked with Angolan Commissioners to clarify the goals of the project's river basin modeling component. The Angolan Commissioners also provided welcome assistance in the difficult task of gathering documents on legal and institutional arrangements, visioning statements, and management scenarios.

Basin partner, IUCN Botswana, also succeeded in engaging OKACOM Commissioners in Botswana. Commissioner Khupe was appointed as a focal point for the *Sharing Water* project for Botswana following a meeting with OKACOM Commissioners and Okavango Basin Steering Committee (OBSC) members in February 2004.

Figure 20: Commissioner Khupe from Botswana and Commissioner Kahuure from Namibia at the Namibia Workshop

NNF enjoyed a very close relationship with the Namibian OKACOM Commissioners partly as a result of occupying office space down the hall from two of the OKACOM Commissioners in the Department of Water Affairs. The Namibian Commissioners treated the NNF *Sharing Water* representative as a "pseudo-secretariat" and as a result, she was well connected to the activities of OKACOM.

In addition, the *Sharing Water* Steering Committee included OKACOM representatives from each country: Mr. Isidro Pinheiro from Angola; Dr. Stephen de Wet from Namibia; and Mr. Stevie Monna from Botswana. Their active guidance through the Steering Committee further legitimized the project and drew it closer to advancing OKACOM's goals.

In addition to sitting on the Steering Committee, several OKACOM Commissioners and OBSC members actively participated in the *Sharing Water* workshops. Commissioners Isidro Pinheiro, Piet Heyns and Gabaake Gabaake gave speeches at the Angola, Namibia and Botswana workshops respectively. OKACOM's participation facilitated direct interaction between stakeholders and Commissioners and furthered OKACOM's understanding and engagement in the project's aims and activities. Overall, *Sharing Water* provided a vehicle through which OKACOM Commissioners could interact with their constituents and learn more about their needs.

In addition, OKACOM Commissioners recommended that *Sharing Water* consult with identified senior hydrologists from each basin country in order to garner guidance and lend legitimacy to the final "prototype model". As a result of this suggestion, project partners consulted with Namibian hydrologist Guido van Langenhove and Botswanan hydrologist Ontlogetse Dikgomo to solicit input and comments on the river basin planning model. Project partners tried to meet with OKACOM Commissioner Armindo Da Silva and his colleague Minguel Panzo in Luanda to review the model selection criteria and receive their input unfortunately project partners could not secure a visa in time for travel. In an attempt to further engage Angolan input in the model selection and development process, *Sharing Water* invited Angolan OKACOM Commissioners and modeling experts to the NHI offices in the USA to discuss modeling and exchange ideas on modeling strategies for the Okavango Basin. Unfortunately, representatives could not travel during the months remaining in the *Sharing Water* project, but responded favorably by expressing their intention to make this trip at a later date. Commissioner Da Silva nominated Minguel Panzo as an Angolan modeling expert with whom *Sharing Water* should consult.

Figure 21: Mr. Gabaake Gabaake, OKACOM Commissioner / Department of Water Affairs and Dr. Tombale, OKACOM Commissioner and Permanent Secretary of the Ministry of Minerals, Energy, and Water Resources, at the Kasane Workshop

SADC

Project partner, Lenka Thamae, IUCN ROSA, met with and briefed SADC Infrastructure and Services Water Division on *Sharing Water*. At this meeting, SADC welcomed the *Sharing Water* project and reiterated their interest in playing an active part in interactions with OKACOM. They mentioned that previously there had been limited involvement of SADC Water in OKACOM processes, and they hoped that this project might provide a bridge for such communication. In a separate meeting in Harare, Chris Brown, NNF, also briefed the SADC Infrastructure and Services Water Division on *Sharing Water*. Later, Mr. Obonetse Masedi of SADC Infrastructure and Services Water Division, became the Chair of the *Sharing Water* Steering Committee.

Steering Committee

Project partners discussed representation on the Steering Committee at the initial project partners meeting in Kruger, South Africa. Project partners recommended that SADC be represented, as well as someone from the Every River Project and the UNDP GEF OKACOM project to ensure

coordination between these three main basin projects. After finalizing the Terms of Reference for the Steering Committee, *Sharing Water* invited the recommended representatives to sit on the *Sharing Water* Steering Committee. After the first Steering Committee meeting at the Luanda workshop, project partners decided to also invite an OKACOM Commissioner from each basin state to join the Steering Committee. Ultimately, the eight Steering Committee members represented: United Nations Development Programme (UNDP-GEF); SADC Infrastructure and Services Directorate -Water Division; ACADIR-Kuando Kubango, Angola; Ministry of Environment, Wildlife, and Tourism, Botswana; Namibian Association of Community-based Natural Resources Management Support Organisation (NACSO), Namibia; Kalahari Conservation Society; and one OKACOM Commissioner from each of Angola, Namibia, and Botswana (Appendix K: Steering Committee Contact List).

The purpose of the Steering Committee was to guide and advise the implementation of the *Sharing Water* project. The Committee met three times during the life of the project and at the end of each of the three main workshops (Appendix L: Steering Committee Minutes – Angola, Namibia, Botswana). At the last meeting, the Committee indicated that the *Sharing Water* project had played a complementary role in the basin. They agreed that the project had brought stakeholders together to actively participate in shaping the management of the Okavango River Basin. The Committee emphasized the need for river basin organizations to demonstrate ownership and share best practices and hoped that there would be a "Phase II" for *Sharing Water*.

Outreach

Throughout the life of the project, *Sharing Water* coordinated outreach through several different modes including: website, newsletter, radio, and press briefings. In an attempt to put all the information from *Sharing Water* in the public domain, and to make it accessible to as many people as possible, *Sharing Water* created a website with the following address: www.sharingwater.net. NHI oversaw the development of the new website with eDot Web Technologies in South Africa. Project partners tested the website and provided comments on improvements. This website hosts all the data collected in the Okavango Shared Database; provided a communications portal for people interested in discussing the management of the Okavango/Kubango River Basin; and provides the project documents, analyses, presentations, and some of the tools developed.

In addition to creating the website, *Sharing Water* also conducted outreach by publishing and distributing a project newsletter to partners, delegates, and a wide range of interested parties (Appendix M: *Sharing Water* Newsletter). Furthermore, in Angola, JEA produced radio programs as means of promoting *Sharing Water's* work in the basin. Included in these programs were periodic updates on the activities of the *Sharing Water* project, and reports on the workshop activities and field visits. In addition, Abias Huongo, JEA, gave a radio interview after the Botswana workshop in which he discussed the *Sharing Water* Shared Okavango/Kubango Database, river basin modeling, and legal and institutional analyses. Basin partners wrote and distributed press releases before and after the workshops in each country, and provided interviews to the press. The press joined the delegation for parts of the Kavango field trip in Namibia, and parts of the Angola workshop were shown on national television.

In order to reach out to others involved in southern African transboundary river management, project partners presented *Sharing Water* at a variety of conferences including the WaterNET Symposium in October 2003 in Gaborone, and at the First Southern African Network for Training and Research on the Environment (SANTREN) Exhibition and Conference in May 2004 in Gaborone. The presentation discussed technical tools in general as they relate to transboundary river management, and then specifically referenced and described the *Sharing Water* project, to give context to the ongoing application of these concepts. Participation in the conference provided an opportunity to raise the profile of *Sharing Water* in the region, particularly in academic circles, and to

promote the integrative and participatory approach that *Sharing Water* brought to transboundary river basin management. Conference attendees working in other regional river basins such as the Zambezi showed a strong interest in applying a similar approach in their respective river basins.

Sharing Water had significant impact for Angolan stakeholders in terms of capacity building and networking. *Sharing Water* served as a platform from which basin partner, JEA, established itself as an internationally recognized environmental organization with regards to the Okavango and other environmental issues in Angola. As testament to this, JEA has been approached to join teams applying for work under USAID RCSA's new strategy in the Okavango. NNF and the Every River project are planning to work with JEA to complete its community surveys in the Angolan part of the Okavango/Kubango Basin. The National Directorate of Water is planning to involve JEA in more national issues related to water. In addition, the working relationship between current Luanda-based project partner JEA and ACADIR continues to develop. This relationship is critical if significant on the ground activities are to be initiated in the Angolan portion of the Basin. On a national level *Sharing Water* enabled JEA to make inroads with Angolan OKACOM Commissioners and other government agencies, further solidifying its identity as the frontline Luanda environmental organization working on the Okavango and broader environmental issues for Angola.

Figure 22: Delegates, Raymond Kwerepe, Botswana and Dorothy Wamuniya, Namibia on the Botswana field trip when the bus broke down

Furthermore, according to JEA, *Sharing Water* provided the first opportunity for Angolan stakeholders to participate directly in the process of moving towards transboundary management of the Okavango Basin. This kind of project was a first for the Angolan delegates in terms of the number of people attending the workshops, countries involved, and integrated focus on the basin through a broad range of tasks. In light of this, *Sharing Water* has made a contribution to moving towards securing the full participation of Angola in the development of transboundary management plan for the Okavango/Kubango Basin.

Coordination with Other Projects

Sharing Water invested considerable effort in coordinating with other projects in the Okavango/Kubango Basin to ensure that the project's efforts are supportive, consistent, and non-duplicative. Towards this end, *Sharing Water* put together a widely distributed Matrix of Complementary Projects in the Okavango Basin (see the enclosed CD for the Matrix of Projects in the Okavango). This matrix gives current and future projects a broad snapshot of activities in the

basin, provides the beginning of a basin network, and demonstrates gaps between projects. This matrix was broadly distributed and posted on the *Sharing Water* website.

Several new projects with a focus on the Okavango Basin have been initiated, including Water and Environmental Resources in Regional Development (WERRD), the Okavango Delta Management Plan (ODMP), and Twinbas Plan. *Sharing Water* also spent considerable time meeting and coordinating with various managers of these projects. In order to ensure productive coordination with them, *Sharing Water* convened an international conference call with individuals involved in each of these projects to identify unique project opportunities and overlaps. Where they found overlaps, they discussed whether it was a useful redundancy or a potentially inefficient duplication. *Sharing Water* representatives also traveled to Delft, Netherlands to meet the WERRD project and discuss the models of the basin it had produced and their ability to inform the selection of potential management scenarios. Building on the relationships *Sharing Water* had established, project partners invited representatives from WERRD and Twinbas to attend the Kasane Workshop in order to introduce these projects to the *Sharing Water* delegates. WERRD invited *Sharing Water* to present project results at a workshop that they organized during November 2004 in Johannesburg. Most recently, NHI has been collaborating with the ODMP to provide input data for their delta model. IUCN-Botswana also coordinated with ODMP during the *Sharing Water* visioning exercise. All projects committed to continue to collaborate to the benefit of the Okavango riparian states.

Figure 23: NHI Meeting with WERRD staff

III. BASIN SETTING ANALYSIS

The *Sharing Water* tasks associated with describing and analyzing the Okavango Basin setting involved: 1) compiling existing written values, visions, and objectives to help launch a future visioning exercise for the basin; 2) analyzing the existing institutional capacity in the basin; and 3) analyzing the legal and policy in relationships to transboundary river basin management. Below each of these tasks are described in more detail.

Visioning Objectives and Methodology

In general, the objective of a visioning exercise is to move from where we are today to where we need to be to meet future water needs and ensure sustainable use of water. This exercise involves a process of study, and consultation, which will produce a consensus on a vision for water for some time into the future, raise awareness on water issues among the population and decision-makers and generate a framework for action. The framework then sets the basis for the development of a detailed action plan to help move from the concept outlined in the vision to tangible results. In addition, a long-term visioning exercise promotes sustainable development as it takes into account the silent future generation, otherwise known as "the next lot."

Initially, the intent of the visioning aspect of *Sharing Water* was to develop a "mock" or draft vision for the basin based on existing documents and stated interests and needs. This draft vision would then be used to develop scenarios and management strategies to motivate the modeling effort. Based on this original approach, *Sharing Water* would demonstrate how visions, scenarios, strategies, modeling, and data collection are all linked and useful steps in river basin planning. This approach regarding visioning, however, was adapted twice during the implementation of the project.

Beginning at the project partners' meeting in Kruger, South Africa, project partners discussed the possibility of broadening this effort and launching a full-fledged visioning exercise that would involve consultations at all levels of society from community to national, and then across countries. After careful consideration, this full-fledged effort was curtailed given that for such an effort to be successful more time and resources than were available to the project were necessary. In addition, we decided that OKACOM would need to call for and help structure such a visioning exercise in order for it to be widely accepted.

Eventually, after six months of discussion, project partners returned to the original intent of collecting the existing strategies, plans, goals, and visions at both national and regional levels, and organizing them into a background document that could be used as a springboard for a future basin-wide visioning process mandated by OKACOM.

Once compiled, these documents were then circulated to project partners for comments. Project partners reviewed and commented on this set of preliminary visioning statements. The comments from project partners were incorporated into a final report (Appendix N: Towards Development of a Vision for the Okavango Basin), which was then translated into Portuguese for distribution.

Legal and Institutional Analysis Objectives and Methodology

The objective of this component of *Sharing Water* was to document the governance structures, and the legal and institutional arrangements, present in the three basin states. The legal analysis involved identifying the legal and policy instruments that govern the sustainable use of the Okavango River in each basin state. For the institutional analysis, the task involved identifying the institutions and stakeholders at local, national and basin levels; determining the specific roles played by institutions in the management of the Okavango River Basin; and finally identifying possible gaps and shortfalls in these arrangements.

Figure 24: IUCN ROSA Project Partners, Nyasha Chishakawe, Lenka Thamae, and Eben Chonguica, at the launch of the Every River – Sharing Water Okavango Database

To implement this task, IUCN ROSA drafted the Terms of Reference (TOR) including a questionnaire for collecting information on profiles of the institutions. The TOR was circulated to project partners for their comments. These comments were then incorporated into a revised TOR.

Basin partners, JEA, NNF, and IUCN Botswana collected and compiled policy documents, national master plans, national development plans and strategies that govern the use of the Okavango River in each basin state. This literature was then renewed by IUCN ROSA's legal expert.

NNF identified Namibian institutions active in the basin both at national and local (within the Kavango Region) levels and sent a questionnaire to them. In addition, NNF collected documents on policies, reports and legislative documents, including emerging policies and legislation still in draft form, and undertook a detailed review of these documents.

When NNF did not receive responses from community level institutions active in the basin and the private sector (perhaps because they found the questionnaire too daunting), they employed a more informal interview approach. Angola and Botswana did not use the questionnaire but provided information on the institutions and their roles in the management of the river basin based on their own research.

IUCN ROSA undertook a literature review on institutional arrangements in other river basins and then combined this basin-level information with the national level information into a draft report. Project partners reviewed draft reports and provided detailed feedback based on their own knowledge of current conditions and best practice. IUCN ROSA, on behalf of *Sharing Water*, presented the draft Legal Report and Institutional Report at the Windhoek, Namibia workshop in March 2004. Based on feedback at the workshop, IUCN ROSA incorporated comments and combined the two reports into a draft report entitled "River Basin Management Governance – The Importance of Regulatory and Institutional Aspects in Managing a Shared River Basin" for presentation at the Botswana workshop in August 2004.

After the Kasane workshop, IUCN ROSA incorporated additional information from NNF on the legal analysis for Namibia and circulated the report to project partners for comments. Project partners examined and evaluated the "Governance" document in terms of its ability to provide an accurate description of the current situation in the Okavango Basin and an appropriate analysis framework against which management options and plans for the Okavango Basin could be formulated.

While the second document was a major improvement on the earlier preliminary draft, there remained a number of inaccuracies and inconsistencies that needed to be clarified. The corrected final version of this document specifies the prevailing legal and statutory instruments in each basin state (as well as any that may shortly prevail – such as the SADC Water Policy), and highlights the responsibilities of each appropriate authority. This final document forms the foundation for the development of a set of rational management strategies for the Okavango basin, and informs the relevant authorities as to the nature of any interventions that are needed to ensure and improve management of the Okavango Basin (Appendix O: River Basin Governance: The Importance of Regulatory and Institutional Arrangements in Managing the Okavango River Basin). After finalizing the Governance Report, *Sharing Water* translated the report into Portuguese to facilitate effective information sharing with Angola (Appendix O: River Basin Governance, Portuguese version).

Key Results: Visioning and Governance Analysis

For the visioning report (Appendix N: Towards Development of a Vision for the Okavango Basin), IUCN ROSA outlined at the regional and international levels, the value, goals and visions associated with the Millennium Development Goals, the World Water Vision, the Africa Water Vision, the Southern African Water Vision, and the SADC Objectives. In reviewing the development goals for Botswana, IUCN Botswana found that Ngamiland has one of the highest levels of poverty in the country; Botswana plans on eliminating the poverty in this area by 2016. Clearly, the management of the Okavango Delta is key to this goal. NNF highlighted principles for a future full-fledged effort that includes: 1) articulation of the comparative advantages as a foundation for basin planning; 2) adopting a "rolling plan" approach that is refined and revised over time, and 3) incorporating a full partnership approach to visioning and implementation of a basin plan that includes governmental and non-governmental partners. JEA found that Angola's visions and plans call for inter-sectoral integration, a role for the private sector, and acknowledgement of international agreements. In addition, project delegates discussed the importance of a vision in underpinning decisions regarding basin management. One project partner quoted Alice in Wonderland saying, "If you don't know where you are going, it doesn't matter how you get there."

In addition, *Sharing Water* produced "River Basin Management Governance – The Importance of Regulatory and Institutional Aspects in Managing a Shared River Basin" (Appendix O), which examines institutional and legal arrangements in the Okavango River Basin. The report highlighted key challenges including: increasing demand for water, diverse stakeholder groups, conflicting interests, regulatory and institutional framework weaknesses, and development of mutual benefits without loss of sovereignty. The institutional analysis identified government departments, non-governmental institutions, Community Based Organizations (CBO's) and private sector companies. Ultimately, this report outlined key emerging regulatory and institutional frameworks that the basin states and community may want to address individually or collectively. The legal analysis yielded a synthesis of the policies and strategies at a local, national and regional level that govern the use of the Okavango River.

The report observes that Angola and Namibia are in a more advanced state of reform in the water sector, than Botswana. In addition, the basin states display different developmental emphasis in their national agendas. For instance, Botswana's water sector policy and legislative framework focus on efficient utilization of internal and shared water resources rather than equitable and reasonable use.

The report notes that there is a need to incorporate conservation and sustainable use principles into polices in the sectors of trade, investment, and industry, which generally emphasize development without provisions for sustainability or conservation.

Specific to Botswana, this report highlights the fact that Botswana does not have a specific document that outlines a national water policy, although water use is guided by the National Water Master Plan, which is currently under review. Efforts are underway to develop a National Water Conservation Policy that will address water conservation measures. In addition, the institutional analysis revealed that there are numerous players in the water sector in Botswana and efforts are underway from the Botswana Government to define responsibilities within these institutions.

During the Windhoek workshop, there was a lively discussion around whether or not there is a need for adding provisions to national-level laws and policies so that they reflect international transboundary agreements. Many delegates noted that there is only a need to "harmonize" laws so that there is not a conflict between national and international laws, policies, and agreements, and that integration is not necessary. Others maintained that integration serves an additional purpose of changing the way people think – by including these additional provisions in national laws, people are educated that they need to think of their resources in an international context.

An overall gap in the basin states' regulatory frameworks is the lack of provisions promoting equitable and reasonable utilization of shared river basins as stated in international law. Angolan provisions formally acknowledge the existence of shared watercourses and provide for their joint management. However, these provisions still fall short of reflecting international law. Namibia has drafted provisions reflecting international law in its' Water Resources Management Bill, which is yet to be approved. In addition, the basin states also need provisions that establish transboundary mechanisms for enforcement, dispute settlement, and conflict resolution. These mechanisms are critical to attaining compliance with transboundary regulatory frameworks.

Another significant gap in transboundary governance of the Okavango River Basin is that all three basin states are not party to the Ramsar Convention. Botswana designated the Okavango Delta a Wetland of International Importance and Namibia is party to this Agreement. However, Angola, which contributes 94 percent of river inflows has not signed the Convention.

The *Sharing Water* Governance Report also shows that basin-wide institutions are still in development. A significant challenge will be to coordinate and reach out to the numerous stakeholders at local, national, and basin levels. There is an urgent need to facilitate stakeholder coordination, cooperation, and integration, which could be partially addressed with the establishment of a Permanent Secretariat. The basin needs a formal basin-wide forum, which would serve as a conflict-resolution platform for different groups of stakeholders. Every River has established such a basin forum, which, if officially formalized, can provide a useful vehicle for community consultation and involvement in OKACOM. This basin-wide forum could partially satisfy a need for overarching conflict-resolution mechanisms in the basin. Yet, other platforms beyond this will still be needed at the basin and sub-basin level.

The institutional review also revealed that the current institutional frameworks lack clarity on their long-term visions. A common developmental vision is a critical tool for institutional coordination and cooperation in the basin.

One realization that emerged from the institutional analysis was that OKACOM currently does not have a mandate or the authority to jointly manage the Okavango Basin, but is charged with giving advice to their governments and coordinating activities in the basin. Furthermore, the OKACOM

Agreement does not include provisions for enforcement, dispute settlement, conflict resolution, or corollary sanctions.

Although the Revised SADC Protocol on Watercourse Systems makes provisions for the establishment of river basin authorities, the basin states have not established such authorities to the full extent necessary. While OKACOM provides for inter-state interactions, a basin-wide authority is required to organize and supervise the cooperation of the basin states. Such an authority is required for operational tasks such as joint operation and management of infrastructure; standardization of data collection; monitoring water quantity and quality; exchange of hydrologic information; development of concerted action program; enforcing agreements; dispute resolution; and facilitation of compensation for benefit sharing.

Institutional coordination of efforts to build on each other and reduce duplication is also needed. There is no clear basin-wide institution that is coordinating cooperation and data sharing across the basin. While Namibia and Botswana have been cooperating on data sharing, joint research and monitoring for many years, it is critical now to engage Angola fully in these efforts. In addition, in some cases communication inside basin states between sectors, national agencies, and stakeholders is insufficient.

Finally, inadequate provision of financial resources remains a key constraint for the institutional arrangements in the Okavango Basin. There is also a need to mobilize private sector contributions to the development and management of the basin.

IV. SCENARIOS AND MANAGEMENT STRATEGIES

Objectives and Methodology

The overall intent of developing a range of future scenarios for the basin is to promote a forward-looking planning process, whereby stakeholders begin to articulate likely scenarios given shared values, goals, and visions. Once these scenarios have been articulated, then stakeholders can begin to explore management strategies that support these scenarios. This drafting of scenarios and management strategies allows a creative space for stakeholders to discuss a range of options and innovative responses to fulfill shared goals and aspirations.

Sharing Water's specific objective with regards to developing management scenarios was to develop a short suite of relevant and appropriate management strategies that could be applied and potentially deployed in the Okavango Basin (Appendix P: Selecting Scenarios that Reflect the Possible Futures of the Okavango River Basin: A Proposed Planning Network for the Sharing Water Project).

Sharing Water, primarily led by CSIR, reviewed available information on management strategies and approaches used in the three basin states and compared this information with examples of current practice deployed elsewhere in southern Africa. From this, *Sharing Water* developed a rational set of possible scenarios for the basin, identifying respective management strategies required to reflect the most likely development options in Angola, Botswana and Namibia. These scenarios were developed to promote informed discussion of the potential consequences of each strategy and were not intended to reflect or promote any particular strategy or choice of strategies. In April 2004, CSIR presented to delegates a scenario development approach and then presented the scenarios themselves at the August 2004 workshop in Kasane, Botswana.

Key Results: Scenarios and Management Strategies

Each of the four scenarios provided an informative basis that could be used to select appropriate management strategies. In turn, these could provide OKACOM with an overview of the typical sets of management challenges that would need to be overcome. The scenarios were grouped into four contrasting sequences, namely:

- "Least development", or "Maintain the current levels of water resource exploitation and only allow for population growth" (where there is no change or improvement in the existing situation in each basin state, and demands for more water were driven solely by increased numbers of people);
- "Minimal level of development in the short- to medium-term" (covering the realistic developments that could occur during the next five to ten years – i.e. up to 2015);
- "High development level" (that reflected the likely consequences of each basin state continuing to maximize its own national development agendas in the Okavango Basin in the medium-term); and
- "Water Import Level" that sought to offset the increased demands for water from the basin by importing water from the Kasai system to the north – this could be used to ensure that demands for water in the Okavango Basin would not lead to an unacceptable decline in the quantity of water available.

Each management scenario contained progressively greater water demands providing instructive insights into the specific management needs that each scenario would require from each basin state and institution.

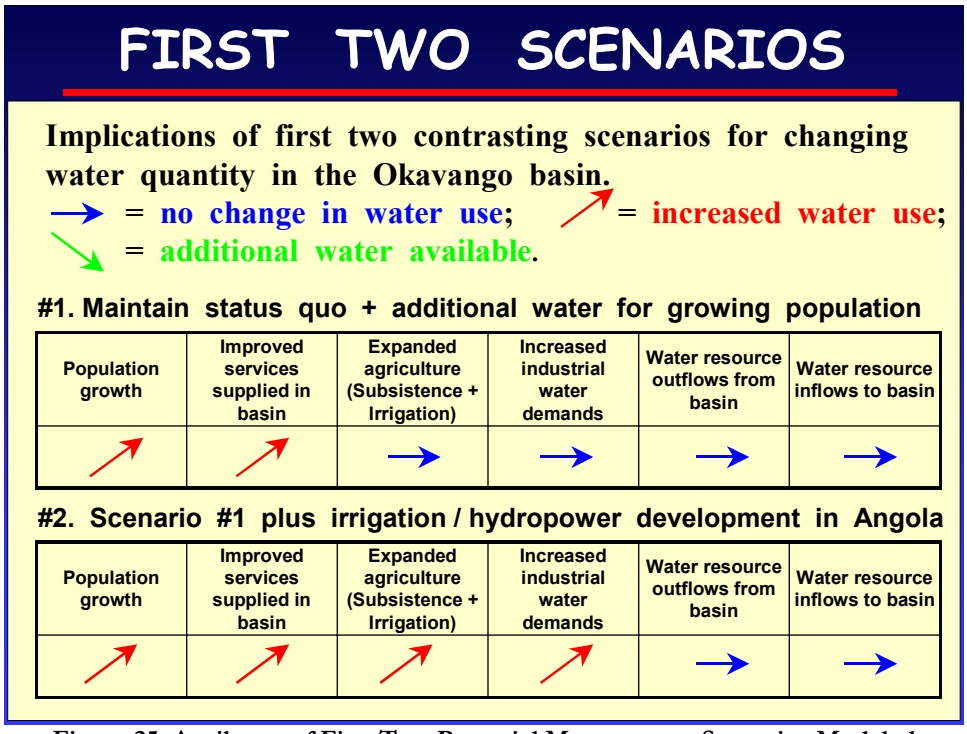


Figure 25: Attributes of First Two Potential Management Scenarios Modeled

The final list of four potential management strategies for each of the three scenarios outlined above was presented at the Kasane Workshop in August and elicited considerable interest and discussion amongst the delegates. Delegates discussed the need for people living near the river to be aware of these management issues. It was suggested that OKACOM needs to mandate suitable people to educate all basin residents and other stakeholders. Dr. Ashton suggested current activities engaging stakeholders need to be intensified, so that stakeholders can hold the management organization accountable. In addition, delegates suggested that there should be external reviewers in place so that the correct data gathering and monitoring is done. OKACOM Commissioner Gabaake Gabaake elicited suggestions from Dr. Ashton as to whether a top-down or bottom-up approach was more appropriate. Dr. Ashton responded that sometimes a hybrid approach is the most effective. The top-down aspect gives direction to the process, but in the long-term it is necessary to get buy-in from stakeholders to make the process stable and sustainable. For instance, managers can propose principles that need to be incorporated into a vision, but after that, stakeholders' needs should be incorporated. These scenarios and management strategies were then used to drive the prototype model as described in Chapter VI of this report.

V. SHARED OKAVANGO/KUBANGO DATABASE

Objectives and Methodology

The success of participatory decision-making in a river basin context rests on the articulation of creative and innovative management strategies and on the availability of a common, shared data system and transparent, easily manipulated analytic tools for comparative evaluation of these alternatives. Specifically, the availability of a common, shared data system allows for joint fact finding, and interpretation of data, and the generation of shared assumptions about the river basin and proposed management alternatives. A Shared Okavango/Kubango Database also levels the negotiating table between parties and avoids mistrust generated by withholding data and information for unilateral advantage. Despite the importance of sharing data across borders, there are few examples of this process in the context of transboundary rivers.

The objectives of the *Sharing Water* project relative to the task of developing a Shared Okavango/Kubango Database for the basin involve a collaborative process of collecting existing data for the basin, compiling it into an internet-accessible, user-friendly shared database, identifying knowledge gaps and an institutional home for the database.

The Shared Okavango/Kubango Database task consisted of four concurrent activities: 1) compiling relevant data; 2) populating and building the database; 3) making the database Internet accessible; and 4) finding a permanent institutional home for the database. The relationships between these three activities are summarized in Figure 25 below. Following is a detailed description of the methodology used for each of these database activities and the key results achieved.

Data Subcommittee

The project formed a Database Subcommittee with the project partner members (NHI, HOORC, IUCN ROSA, NNF, and CSIR) at the first project partners meeting in Kruger in May, 2003. This subcommittee oversaw critical decisions regarding the form, character, and implementation of the Shared Okavango/Kubango Database. The database subcommittee's first task was to create a "wish list" or a data matrix that defined what data it would like to include in the Shared Okavango/Kubango Database (Appendix Q: Sharing Water Data Collection).

Data Matrix

The data matrix was further refined and presented to the project delegates at the Angola workshop in October 2003. The delegates broke into country-based working groups and reviewed the data matrix, added data and information to be included in the database, and most critically, identified people and/or organizations that could source missing data.

Database

In May 2003, the database subcommittee deliberated extensively over the form and character of the Shared Okavango/Kubango Database. The question was whether to create a database that serves as an efficient and simple data retrieval tool or "metadatabase"; a database that displays, charts, and interprets the data; or a comprehensive database system that includes data quality assurance and an explicit process for updating and refreshing data overtime. The key variables in the decision were the resources required for database development; the ultimate utility of the chosen database; and the needs of the basin's database users.

Project partners spent the next few months analyzing the options, reviewing the existing Shared Okavango/Kubango Database, and considering the costs and benefits. At the Angola workshop, the database subcommittee reconvened and decided by consensus that given the resources available, the

timeframe of the project, and most importantly, the needs of the basin, the best option was to create a simple and efficient data retrieval system or "metadatabase". Essentially, the database committee decided resources should be invested in compiling the data rather than interpreting them (Appendix R: Database Memo).

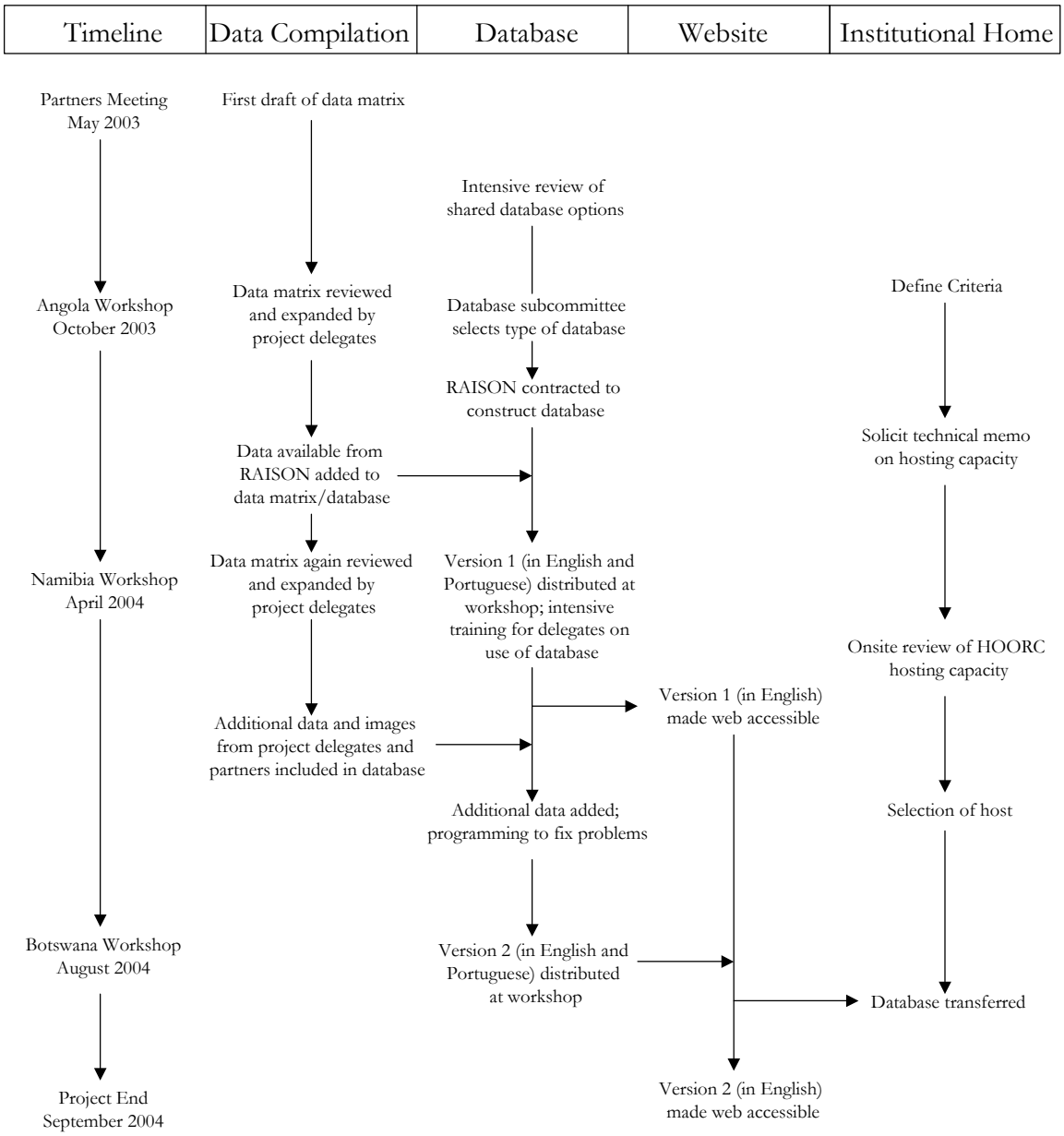


Figure 26: Shared Okavango/Kubango Database Methodology

Data Compilation

Sharing Water project partners used this revised data matrix to gather and compile data sets. The most significant contribution of data came from RAISON, which had recently completed two books, *Okavango: Flow of a Lifeline* and *Sand and Water: A Profile of the Kavango Region,* which involved a significant data compilation effort. *Sharing Water* contracted RAISON to digitize the data in these two publications including graphics, photos, maps, and descriptions of the Okavango system and its people.

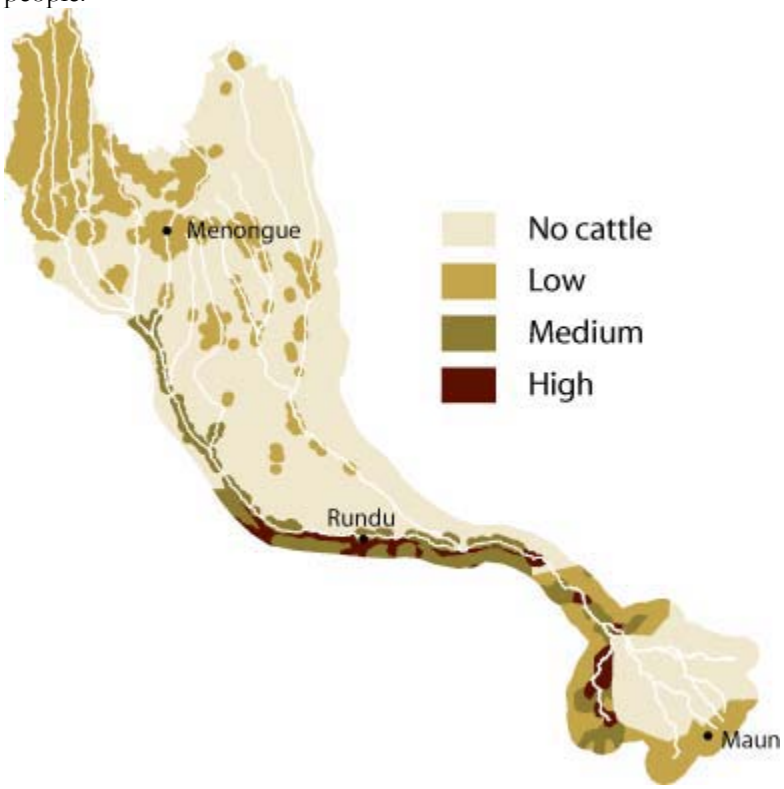


Figure 27: Map of cattle populations from online Shared Okavango/Kubango Database

RAISON organized all the data sets into appropriate theme folders. Then they compressed ArcView data sets to ensure that all the component files held together. RAISON then listed the data in a Microsoft Access table with one data set per record. Fields in the table provided items that could be used to search for data based on themes, the regions covered by the data and key words. The table also included brief descriptions on the sources, coverage, meaning and dates for the data. Lastly, the table included hyperlinks to the data itself. Figure 26 above, demonstrated the type of data and maps available in the Shared Okavango/Kubango Database.

RAISON compiled a similar table for literature resources to facilitate searches for published documents and reports on the basis of theme, key words and authors' names. They listed these scanned and pdf converted documents by reference in table form. In addition, RAISON listed approximately 140 other references for which pdf versions were not available and connected them with key words.

To create the database, RAISON converted over 200 maps and graphs into jpeg images, and listed each of these in a Microsoft Access table. The three tables (for data, literature and graphics) formed part of the searchable MS Access metadatabase. Listings of satellite images and institutions working

in the Okavango River Basin also formed part of the metadatabase. Below is a screen shot from the database.

Data Gaps

Simultaneous to the data collection, *Sharing Water* analyzed data available and key gaps in data necessary for river basin planning models in the Okavango/Kubango system and proposed strategies for filling the data gaps. The process involved input from delegates at the Angola and Namibia workshop on both the existence and availability of data and their needs and desires for additional data (Appendix S: Data Gaps Analysis).

This collaborative work to gather data resulted in the completion of Version 1 of the Shared Okavango/Kubango Database, which RAISON presented and distributed (in English and Portuguese) at the Namibia workshop in 2004. The workshop included nearly a day of presentations and interpretation of data, exploration of the database, and hands-on training in retrieving and displaying the data. After these presentations, project partners again asked project delegates to indicate which additional data sets were available and where to find them.

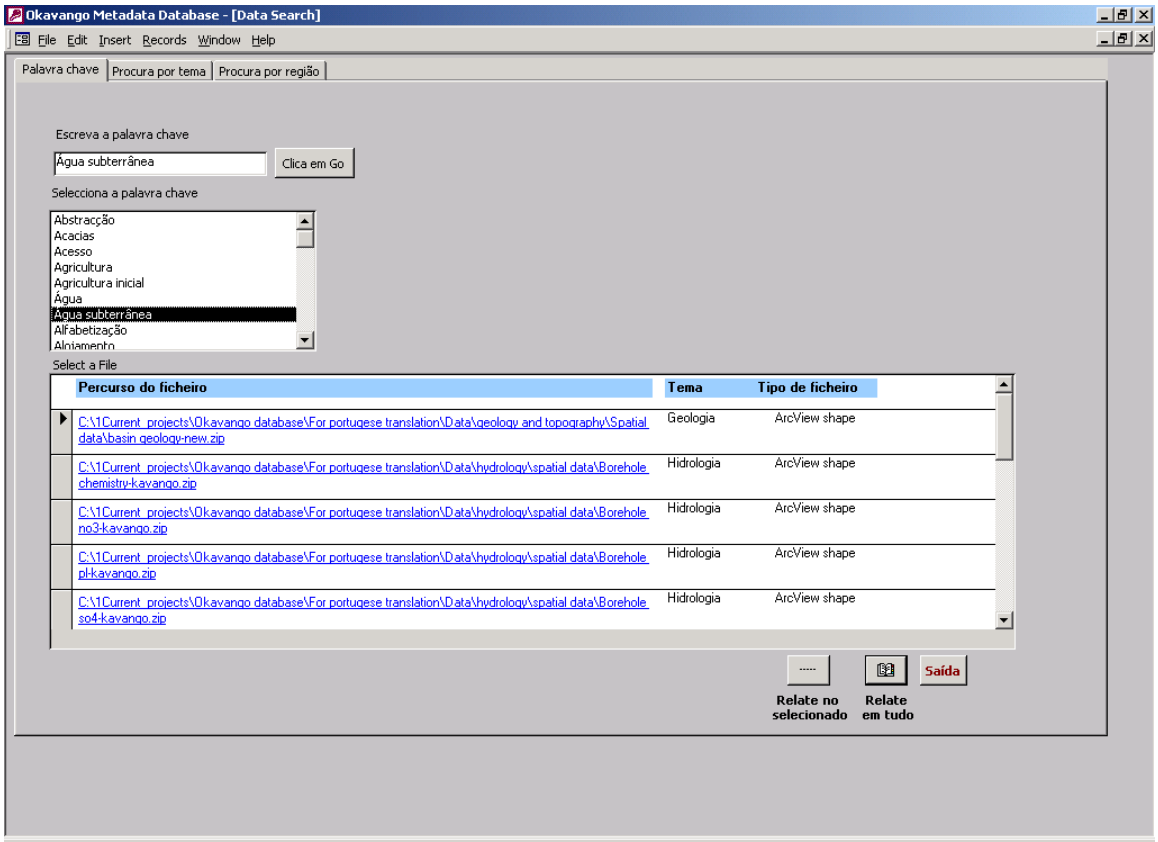


Figure 28: Screen shot of Shared Okavango/Kubango Database

In the weeks following the workshop, delegates provided additional feedback on data sets. At this time, HOORC contributed several more data sets not already included in the database. These datasets were included in the second version of the Shared Okavango/Kubango Database. Feedback from users at the workshop and in the following weeks informed changes made to Version 2, which was later distributed at the Botswana workshop (in English and Portuguese) in August 2004.

The final version of the Shared Okavango/Kubango Database includes 203 datasets provided by *Sharing Water* project delegates and project partners (described in the table below). The datasets consist of geographic datasets (e.g. population distribution) and statistical datasets (e.g. rainfall records). In addition, the database includes a bibliography of literature resources, of which over 200 are available as pdf digital files.

Figure 29: Summary of Data Sets Available in the Okavango/Kubango Shared Okavango/Kubango Database

Theme	Subtheme	Angola	Namibia	Botswana	Basinwide
Boundaries	National	■	■	■	■
Boundaries	Sub-national	■	■	■	■
Boundaries	Sub-basin	■	■	■	■
Climate	Evaporation	□	□	■	■
Climate	Rainfall	■	■	■	■
Climate	Temperature	□	■	■	□
Climate	Wind	□	■	■	□
Demography	Age pyramid	□	■	■	□
Demography	Health	□	■	■	□
Demography	Household size	■	■	■	■
Demography	Languages	□	□	□	■
Demography	People density	■	■	■	■
Demography	Population indicators	□	■	□	□
Demography	Population numbers	■	■	■	■
Farming	Crops	■	■	■	■
Farming	Livestock	□	■	■	■
Geology	-	□	■	■	■
Hydrology	Groundwater	□	■	■	□
Hydrology	Rivers	■	■	■	■
History	-	□	■	□	■
History	Landuse	□	■	■	□
Livelihood	Craft	□	■	□	□
Livelihood	Employment	□	■	□	□
Livelihood	Income	□	■	□	□
Social services	Airstrip	□	■	■	□
Social services	Education	□	■	■	□
Social services	Health	□	■	■	□
Social services	Roads	□	■	■	■
Social services	Settlements	■	■	■	■
Soils	-	■	■	■	■
Tourism	Hotel and lodge	□	■	■	□
Tourism	Hunting	□	■	■	□
Tourism	Tourists	□	■	■	□
Towns	Place names	■	■	■	■
Vegetation	Fires	□	■	□	□
Vegetation	Vegetation biomass	□	■	□	■
Vegetation	Vegetation types	■	■	■	■
Wildlife	-	□	■	■	□
□	= No data in shared database				
■	= Data in shared database				

Of note in the table above are the critical data gaps in Angola. For some data sets available in Angola, the information within is either limited to a short and now out-dated time series (in the case of hydrology), or constrained by categorization that is inconsistent with data sets elsewhere in the basin (in the case of soils). Some data for Angola, such as demography, are based on coarse estimates.

Priority data improvements that are critical for modeling in the basin include:

- Actual streamflow measurements made at various points in the catchment over extended periods of time
- Data on groundwater availability and use
- Data on water demand and use in a number of water use sectors, including irrigation, domestic water use, and industrial water use
- Refined environmental flow objectives based on consideration of actual biophysical needs
- Detailed descriptions of actual and planned water infrastructure.
- More detailed data on basin topography
- Data on actual population distribution/resettlement and related water demand in Angola

For a hydraulic model that will be used to describe the actual conditions in the river channels and floodplains, additional information is needed. This includes:

- Information on channel/floodplain geometry and topography
- Measurements of flow velocity and stage
- Information on the material that comprises the channel bed
- Information on sediment transportation
- Measurements of water quality constituents

To improve the performance of the rainfall-runoff hydrology model, additional information is required, including:

- Reliable climate records of precipitation and temperature, along with humidity, evapotranspiration and wind speed data if available
- Refined land use/land cover data
- Improved data on topography/ improved digital elevation model

Additionally, almost all existing data sets warrant further improvement in terms of the quality, the accuracy and the spatial coverage of the data.

Sharing Water recommends four general actions related to filling data gaps. First, *Sharing Water* supports GEF's efforts to expand and finalize the draft TDA. Neither the draft TDA nor *Sharing Water's* database matrix was intended as complete, authoritative data gaps analyze. *Sharing Water* agrees with recommendations made at the Kasane Workshop by project delegates that the GEF Project Management Unit complete a full data gaps analysis that expands on both GEF's earlier work and *Sharing Water's* contribution. We encourage the PMU to prioritize this effort and complete it early in the project life cycle.

Second, *Sharing Water* supports GEF's efforts to collect additional data. In its project brief, GEF states:

> The compilation of existing data and new data sets that are needed will be fast-tracked to identify the minimum data sets to initiate the preparation of basin management models and subsequent negotiation and joint management. This compilation of water resource data will be done on the basis of priority and need concentrating on the glaring data gaps in Angola. Thereafter data will be selectively

compiled on the basis of the most sensitive uses scenarios so that a realistic range of likely water management scenarios can be modelled and options prepared at later stage of project implementation.

We offer both the Shared Okavango/Kubango Database and the list of priority data improvements (above) as starting points for GEF's efforts and support their recommendation to focus on filling critical data gaps in Angola.

Third, as the PMU is ultimately a project with a limited life span, *Sharing Water* strongly encourages the expansion of data collection efforts within existing government, research, and academic institutions in all three basin states. This expansion will require the dedication of additional funding, capacity building in data collection methods, data management, and data dissemination. Very promising contacts have been established in the context of the *Sharing Water* project with institutions in Namibia and Botswana, notably with the respective departments of Water Affairs and with the Namibia Nature Foundation in Namibia and the Harry Oppenheimer Okavango Research Centre of the University of Botswana. The latter institutions have committed themselves to participate in updating and maintaining the Shared Okavango/Kubango Database.

More work is still required to establish similar contacts in Angola. HOORC has committed to serve as a central repository for data in the Okavango. It will endeavor to foster relations with data "nodes"; organizations in each basin country that will gather that countries data and transfer it to HOORC for public distribution and dissemination.

Finally, the *Sharing Water* project encourages all parties to adopt policies of open and free data sharing. *Sharing Water* has aggressively pursued a policy of sharing data freely amongst all interested parties for the benefit of joint fact-finding and improved decision-making. We anticipate that other parties in the basin will continue this policy into the future.

Website

Soon after Versions 1 and 2 were each distributed at the workshops, *Sharing Water* put English versions of the database on the *Sharing Water* website (www.sharingwater.net). The online version is, available to anyone with an Internet connection. Below is a screen shot of the web version of the Shared Okavango/Kubango Database.

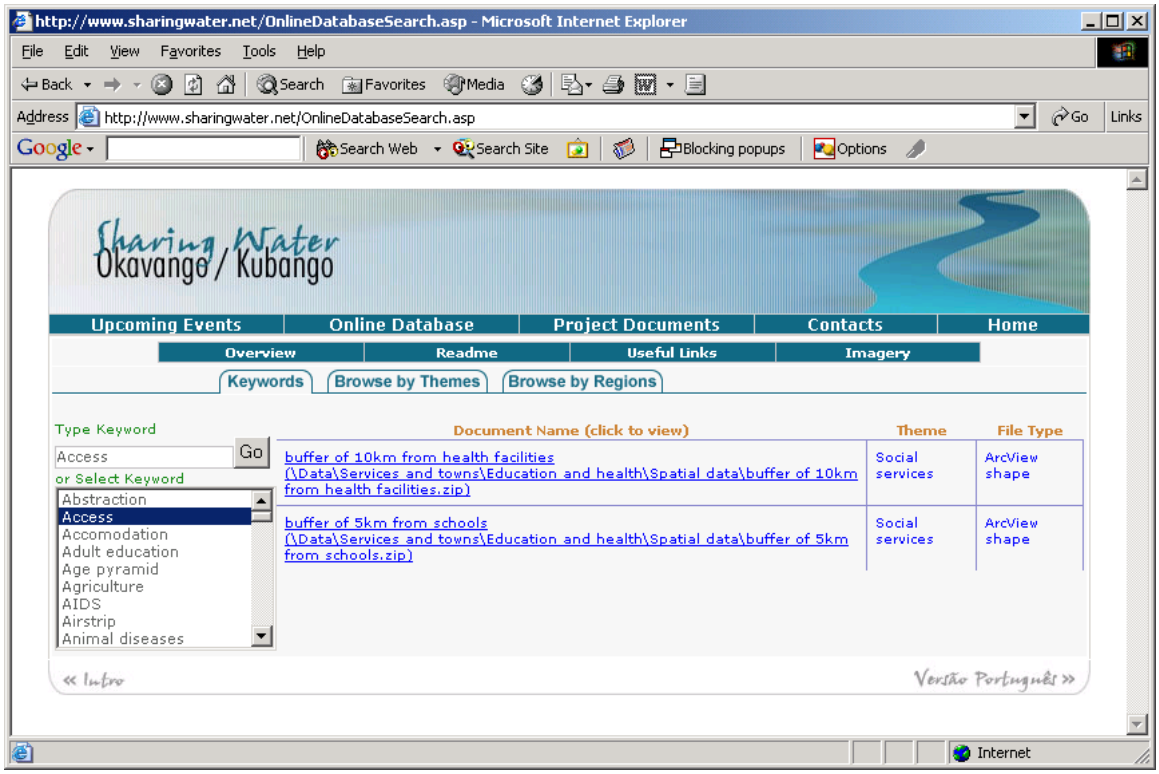


Figure 30: Screen shot of Sharing Water website www.sharingwater.net

Institutional Home

The *Sharing Water* project conducted an analysis of potential institutional homes for the Shared Okavango/Kubango Database. The selection criteria required that the hose institution:

- Have a permanent or long-term presence in the basin
- Maintain both the hardware and the technical capacity necessary to host the Shared Okavango/Kubango Database;
- Be committed to the philosophy of sharing data in the Okavango basin; and
- Be recognized as an impartial player in the management of the basin.

These criteria led the project to select the Harry Oppenheimer Okavango Resources Centre (HOORC) to house the *Sharing Water* Shared Okavango/Kubango Database. Below, we describe in more detail the technical capacity of HOORC and their mandate.

Technical Capacity of HOORC

HOORC offers a Geographic Information System/Remote Sensing (GIS/RS) laboratory with up-to-date technical facilities for the creation and maintenance of geographic and non-geographic information and related data. The laboratory is equipped with three modern servers and seven GIS workstations linked on an intranet that is also accessible from outside the Centre. The computers are also linked to the Internet through HOORC's dedicated line. In addition, a large size plotter, capable of A0 size plots, complements the facilities. Further, HOORC has a website (http//orc.ub.bw) that can be used to host selected data-sets, using ArcIMS map-serving software and facilities are kept up-to-date and regularly upgraded.

The Centre operates as an independent entity within the overall structure of the University of Botswana and has access to the University of Botswana institutional license for ESRI's ArcGIS suite of GIS software and Leica's Erdas-Imagine image processing software, permitting multiple user-

access to the software hosted on the local server. In addition, HOORC funds staff training to ensure that their system is kept up to date. For example, in November 2003 and February 2004, HOORC sent technical staff to training courses in ArcIms and ArcGIS.

HOORC's Mandate

HOORC's mandate allows its GIS laboratory to facilitate researchers involved in environmental monitoring to discover environmental change and identify threats at an early stage, using satellite imagery or other spatial and statistical data. The laboratory also provides services to government departments such as the Department of Water Affairs and the Ministry of Agriculture, as well as to OKACOM and the Okavango Delta Management Plan (ODMP).

HOORC's objectives for their GIS database function in the organization's five-year development plan are as follows:

Geographic Information System (GIS) and Remote Sensing (RS) laboratory objectives:

1. To function as a database centre for the collection, storage, analysis and dissemination of digital research and other data about wetlands and watersheds in southern Africa with emphasis on the Okavango basin
2. To provide researchers and other stakeholders with access to GIS and RS functionality, both in terms of data and data products (such as maps)
3. To maintain up-to-date GIS/RS analytical capability

Institutional Capacity

The GIS/RS laboratory is maintained through the University of Botswana/HOORC annual budget. This allows for regular software updates, repairs to equipment and acquisition of necessary consumable supplies, such as, paper and inks for the plotter, as well as additional equipment items and additional data (e.g. satellite imagery).

In terms of staffing, the GIS/RS laboratory is managed and supervised by an experienced Senior Research Fellow, a geographer with a PhD in the Social Sciences, a Postgraduate qualification in GIS and recent experience with a variety of GIS-projects and related database management. HOORC also has staff with Remote Sensing expertise.

An established post exists at the Centre for a Senior GIS/database-management technician. This position is expected to be filled within the next four months. In the interim, a temporary senior technician from the Delta Management Plan Project operates the GIS laboratory. Computer technical matters and network issues are addressed by HOORC's Senior Computer Technician.

Hosting and Updating the Shared Okavango/Kubango Database

As a permanent and independent academic institution HOORC is in a good position to ensure impartial updating of the Shared Okavango/Kubango Database and to facilitate the use of scientific data by policy makers, NGO's and the general public. These objectives are part of HOORC's research mandate.

HOORC's data policy allows for the sharing of research and other data, while offering some protection to researchers and PhD students. This open data policy is in line with *Sharing Water*'s intent for all project products to be freely and widely distributed to any interested parties.

HOORC cooperates with a number of research and applied projects in the Okavango Basin, including the WERRD project and the Every River has Its People Project. In addition, the Centre maintains good connections with a variety of international research institutes worldwide; government institutions; and NGO's in Botswana, Namibia, and now, with the advent of *Sharing Water*, Angola.

In terms of housing the Shared Okavango/Kubango Database, HOORC's aims to:

- Continue gathering data through research and collaboration with government agencies and NGO's
- Improve data processing and storage through continued updating of facilities and improved metadata
- Facilitate access to data for a variety of users
- Promote utilization of data; and
- Monitoring, and analyze activities using the database

HOORC will implement three strategies to facilitate stakeholders' access to the Shared Okavango/Kubango Database. First, as in the *Sharing Water* Project, HOORC will continue to distribute the database on CD's to individual users. This allows users without Internet access or with limited Internet access to access the data. Second, stakeholders can access the Shared Okavango/Kubango Database in the GIS laboratory at HOORC's facilities in Maun, Botswana. The Namibia Nature Foundation provides a similar service in Namibia and the Centre is hoping to develop a similar facility in Angola, where stakeholders can directly access the database. Third, stakeholders can access the database through the Internet at www.sharingwater.net until August 2005. The HOORC website at www.orc.ub.bw, once completed, will also host the database. In addition, HOORC's website will also house an Internet mapserver service as well as links to web-sites with research information, such as the website of the Okavango Research Group of the University of the Witwatersrand in South Africa.

Web-based access to data through the HOORC website is also a component of the ODMP, which intends to create a user friendly interface for the database they create for the Okavango Delta. This interface will be applied to the entire Shared Okavango/Kubango Database.

Key Results: Shared Okavango/Kubango Database

For the shared database task, the *Sharing Water* project produced the following results:

- *Sharing Water* distributed Version 1 of the Okavango/Kubango Shared Database on compact disc (CD) to approximately 70 English speaking delegates and 30 Portuguese speaking delegates, project partners, and guests. This Shared Okavango/Kubango Database contained all the digital data gathered by project partners and a selection of literature.
- *Sharing Water* distributed 90 CDs of version 2 of the Okavango Shared Database at the Kasane workshop in August, 2004
- *Sharing Water* produced a Version 2 Metadatabase, which provided brief descriptions of the data and a mechanism for searching and accessing the data and literature
- *Sharing Water* also increased knowledge of data availability; comprehensiveness; and format
- *Sharing Water* set a precedent for open and transparent data sharing in the basin
- *Sharing Water* demonstrated how data and information can be used in conjunction with river basin planning models to evaluate basin management strategies
- *Sharing Water* built capacity in data analysis amongst a core group of delegates form all three countries
- A Data Gaps Analysis, which can be used to guide future data collection efforts in the basin
- Another significant result was that the ODMP adopted this database as its own Version 1 Shared Okavango/Kubango Database and has assumed stewardship of it through HOORC
- The Kasane Statement, authored by the delegates, acknowledged that the *Sharing Water* project "produced the comprehensive Shared Okavango/Kubango Database with other partners and delegates"

- The delegates also expressed their desire "to set up a sub-working group approach to continue to research and develop [the Shared Okavango/Kubango Database] with sub-working group members being from all three basin countries"
- The Statement said, building on the collection of data performed by *Sharing Water*, the delegates would now focus on the legitimization of data and collection and analysis of additional data from Angola

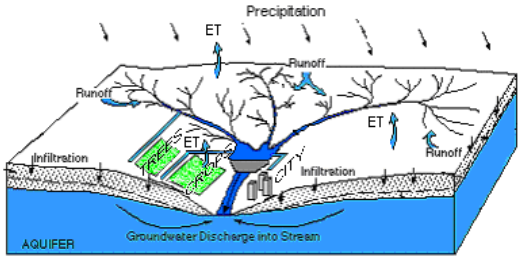
VI. RIVER BASIN PLANNING MODELS

Objectives and Methodology

River basins are characterized by a complex set of interactions between physical processes, biologic systems and human decisions and actions. In developing management plans for large river basins it is generally useful to develop and deploy models that capture these important interactions and which can be used to understand the potential ramifications of various management alternatives. There is a range of model types available in the water management arena, each designed to answer specific sets of questions.

An important step in the development of a modeling plan to support river basin planning is to identify the critical questions facing planners and to determine which models are responsive. The *first objective* of the modeling component of the Sharing Water project was to distinguish, along with the project delegates distinct roles played by various types of water resource models in the development of water management plans for systems like the Okavango River Basin (e.g. planning models, hydrology models, hydraulic models, water quality and sediment transport models, and ecosystem models) (Appendix T: Sharing Water Model Framework).

Within the range of model types, the *Sharing Water* project placed a particular focus on water resource planning models and its central role in integrating other types of water resource analytical tools. As shown in Figure 31, planning models are designed to answer questions about how water supplies should be allocated between competing uses, particularly in times of shortage. These uses include diversions for municipal and agricultural use as well as the natural services provided by rivers and associated aquatic ecosystems. These are very pertinent questions for the Okavango Basin States. In addition, there was a need for this type of tool in order to compliment existing databases and models in the Okavango Basin.



Critical questions: How should water be allocated to various uses in time of shortage?

Critical questions: How can these operations be constrained to protect the services provided by the river?

Critical questions: How should infrastructure in the system (e.g. dams, diversion works, etc) be operated to achieve maximum benefit?

Critical questions: How will allocation, operations and operating constraints change if new management strategies are introduced into the system?

Figure 31: Questions for a Water Resource Planning Model

For example, researchers in the region had developed a model describing the natural hydrology of the Okavango Basin. In addition, *Sharing Water* and other projects had begun to assemble the database needed to describe current water utilization patterns in the basin. Accordingly, *a second objective* for the modeling component was the construction of a prototype water resource planning model of the Okavango River system that could integrate existing information into an analytical platform that could be used in the region beyond the timeframe of the current project and which could be used during the project as a capacity-building tool.

As model development does not occur in isolation, the modeling component of the project also sought to demonstrate the linkages between modeling and several other project components, including database development, scenarios development, and collaborative learning (joint-fact finding). *A third objective* of the modeling component, therefore, was to demonstrate for the project delegates the necessary links between model development and other water resource planning activities and to begin to sketch out a plan for establishing these linkages.

Figure 32: Angolan Delegates, Minguel Panzo and Carla Coehlo, Sharing Water Partner, Abias Huongo, and OKACOM Commissioner, Abel Fonseca at the Namibia Workshop

For each of the three objectives stated above, the project implemented a series of activities. These are discussed below. Some of the activities responded to more than one of the component objectives and are repeated as appropriate.

Demonstrating the Roles for Water Resource Models

This step was a focus of activity at the Luanda and Windhoek workshops. At the Luanda workshop *Sharing Water* initiated sessions, which provided the project delegates with an opportunity to understand how climatic and hydrologic data are used to characterize streamflow in a river catchment. At the Windhoek workshop, we developed sessions that allowed the project delegates to use the type of information discussed in Luanda to run a rainfall-runoff hydrology model. Having

gained experience with this type of model, the project delegates also attended a session that demonstrated how rainfall-runoff hydrology models are distinct from water resource planning and hydraulic models. Specific actions pursued by the project team in response to this objective included:

1. Conducting a review of rainfall-runoff hydrology models used in southern Africa leading to the identification and selection of the Pitman Model as a suitable tool for demonstrating the role of this type of model to project delegates. The Pitman Model was chosen as a demonstration tool because it had already been developed for the Okavango River Basin as part of the WERRD project that was also active in the region. There was no apparent logic in introducing a new rainfall-runoff hydrology model to the region and in investing the time and resources needed to build and calibrate such a model.
2. Interacting with regional experts on the uses of the Pitman Model, including the South African Department of Water Affairs and Forestry in Pretoria and the Institute of Water Resources at Rhodes University in Grahamstown, South Africa to understand how the model is used in regional river basin planning initiatives.
3. Gathering basic data useful in the development of a rainfall-runoff hydrology model like the Pitman Model, such as climate data, streamflow records, and sub-catchment delineations. Much of this information had been gathered by the WERRD project and was kindly provided to *Sharing Water*.
4. Developing a training version of the Pitman Model in an Excel spreadsheet and designing it to be delivered as a training exercise for project delegates around the use of the model. This training was completed during the second *Sharing Water* workshop in Windhoek, Namibia.
5. Developing a presentation that focused specifically on the types of questions that can be answered using rainfall-runoff hydrology, water resource planning, and hydraulic models. For example, rainfall-runoff models are suited to answer questions related to how water naturally flows through a catchment in response to rainfall events while hydraulic models are configured to address questions related to the dynamics of flow (flow depth, flow velocity, flooded area) in an open channel at different discharge levels. Water resource planning models answer questions similar to those shown above in Figure 31. This was the target of *Sharing Water* model development in the Okavango River Basin.

"All models are wrong. Some are useful."

David Purkey, PhD, Natural Heritage Institute

Building a Prototype Water Resources Planning Model

Building a prototype water resource planning model was a focus activity at the Windhoek and Kasane workshops. At Windhoek, workshop sessions were prepared to outline a model evaluation process that could lead to selection of an appropriate water resources planning model platform. This Model Evaluation and Scoring Tool was built around a simple piece of software designed to guide the model evaluation process (to see the "Model and Evaluation Scoring Tool", please see www.sharingwater.net; under Project Documents/Namibia Workshop). This software, with its underlying priorities, was presented to delegates in Windhoek for their input. Their response was that a limited set of experts from the region should participate in the model evaluation process. Following the Windhoek workshop, the evaluation software was used in conjunction with various regional experts in an attempt to make recommendations on an appropriate platform for the development of a prototype model (Appendix U: River Basin Model Evaluation Process Initiated by the Sharing Water Project: Priority Attributes and Preliminary Scores).

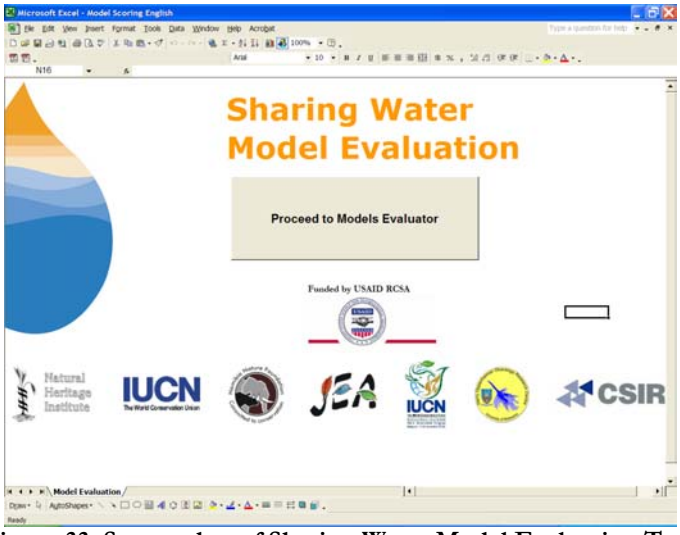


Figure 33: Screen shot of Sharing Water Model Evaluation Tool

At the conclusion of the evaluation process, one of several promising platforms, Water Evaluation and Planning System (WEAP), was selected for the development of a prototype water resource planning model. *Sharing Water* developed a prototype model in WEAP and presented the model at the third workshop held in Kasane, Botswana (Appendix V: Sharing Water Okavango Prototype Planning Model Report). This presentation included the opportunity for delegates to gain some hands on experience with the model and to develop an understanding of the role that models can play, as well as their limitations in river basin planning. Specific actions pursued by the project team in response to this objective included:

1. Designing a pre-project assessment of the skills and knowledge of delegates regarding river basin hydrology, data use, and modeling. *Sharing Water* then used this information to more appropriately design capacity-building activities.
2. Interacting with experts in the region, including government officials, consultants, and researchers involved with other projects in the Okavango River Basin to ascertain that the development of a prototype water resource planning model was the most appropriate modeling activity for the *Sharing Water* project.
3. In collaboration with regional experts, developing and applying a water resource planning model evaluation tool used to identify promising modeling platforms for systems such as the Okavango River.
4. Selecting the WEAP platform as an appropriate option for building a prototype water resources planning model based on priority attributes defined during the application of the water resource planning model evaluation tool (as described below).
5. Translation of the WEAP model into Portuguese so that it could be used easily by analysts from Angola.
6. Interacting with the Institute of Water Resources at Rhodes University in Grahamstown leading to the acquisition of the estimated streamflow data developed for the Okavango River system using the Pitman Rainfall-Runoff Hydrology Model and linking this information to the prototype planning model.
7. Interacting with the University of Witwatersrand in Johannesburg leading to the acquisition of a model of the extent of flooding in the Okavango Delta as a function of inflow to and precipitation on the Delta and linking this information to the prototype planning model.
8. Developing and demonstrating a prototype water resource planning model for the Okavango River system using the WEAP platform.
9. Presenting a hand-on training exercise using the prototype water resource planning model.

10. Preliminary modeling using the prototype model to run several scenarios developed as part of the associated scenario and management strategy development component of the project.

Demonstrating Linkages between Model Development and other Water Resources Planning Activities

At all three workshops, *Sharing Water* focused on demonstrating these linkages model development and other water resource planning activities. In Luanda, a great deal of time was spent on examining the link between data availability and the ability to run models. In Windhoek and Kasane, we focused on scenario development to help define the types of water resources scenario analysis that could be carried out with a planning model of the Okavango Basin. At Kasane, the hands on experience with the prototype model included the reformulation of several scenarios based on the results of collaborative learning (joint fact finding) exercises.

Figure 34: Delegates and Partners, Masego Madzwamuse, Tracy Molefi, Bertha Nherera, Roberto Machalo, and Cornelis Vanderpost, working on hands-on hydrology exercises

Key Results: River Basin Planning Model

The most tangible result of this sequence of activities was the prototype water resource planning model developed on the WEAP platform. WEAP was one of the promising tools that emerged from the model evaluation activity, and while we do not consider it the definitive consensus choice for a planning model platform, it is a good example of the type of modeling environment that could be used in the Okavango River Basin. WEAP is capable of processing several attributes that were deemed to be of high priority by technical experts in the region including:

1. Affordable licensing arrangements
2. Distribution of both English and Portuguese versions of the prototype model to project delegates
3. A user-friendly model interface
4. The ability to integrate rainfall-runoff calculations
5. The ability to develop and manage numerous scenarios about future water management actions
6. The ability to define individualized operating logic for a particular system

In the current version of the prototype model developed by *Sharing Water*, rainfall-runoff calculations are not integrated. Instead, the project used the streamflow values developed by Dr. Denis Hughes of Rhodes University through application of the Pitman Model. This collaboration was an important intermediate result because it created a precedent in the region for one activity in the basin to build on another rather than starting from scratch. Rather than develop an independent assessment of stream flows in the Okavango system, *Sharing Water* developed a relationship with another group of experts working on the same system.

Another intermediate result was the increased understanding of challenges inherent in building consensus around a single analytical platform, in this case a water resource planning model. While the tool developed to facilitate the model evaluation process was well conceived, and is now available for use in the region, more broadly, we learned that it is difficult to build consensus around the ranking of priority attributes for a particular analytical tool and to assign scores representing the performance of a model with respect to these attributes. This situation made it difficult to settle on a single consensus-planning model within the time available for model review. This experience demonstrated the challenges that can be anticipated with the selection of all future analytical tools employed in the Okavango River Basin.

In the end, however, a prototype model of the Okavango system is now available to all project delegates and many of them have expressed interest in receiving additional training on the use of the Okavango WEAP model (including individuals from the water departments in each of the basin states as well as several of the non-governmental project participants). The model uses data that has been gathered and assembled into the Shared Okavango/Kubango Database. The model includes many of the scenarios developed as part of the associated scenario and management strategy development of *Sharing Water* and can also accommodate a wide range of alternative scenarios that may emerge from future collaborative learning activities in the basin. The links necessary to integrate hydrologic and hydraulic analysis with the prototype planning model have been defined and are being developed through interactions with other analysts in the region.

In order to further develop the capacity of key individuals in the region to use the prototype planning model, additional training needs to be provided. With the conclusion of Phase I of the *Sharing Water* project, all interested participants will have received a license to use the WEAP model as well as the data needed to run the Okavango prototype. During the next phase of activity, a training session should be organized in English and in Portuguese for individuals in the basin states with an interest in water resource planning models. This training should be integrated with a process whereby interesting future scenarios are defined for additional analysis. This would make the training particularly relevant to ongoing activities in the region.

VII. LESSONS LEARNED

Collaborative Learning

Overall, *Sharing Water's* collaborative learning approach underscored the need to work in partnership with a range of organizations and government agencies, across sectors. Other lessons learned and key changes are described below.

Early Project Partners Workshop

Before the major activities of the project commenced, project partners convened in South Africa to clarify project objectives, roles and responsibilities, and communication protocols. The project's Cognizant Technical Officer (CTO) from USAID RCSA also attended this early workshop. Although most of the project partners knew each other, there were some new faces. This meeting allowed us to solidify these relationships, which was particularly important as much of our in-between workshop correspondence was done across borders and time zones via telephone and email. The workshop was held at the Southern Africa Wildlife College near Kruger National Park. In retrospect, we would have held this workshop either in the basin or at a location closer to Johannesburg as the travel to and from the Kruger location was time consuming.

Figure 35: Project partners at meeting in Kruger, South Africa

Incorporate Gender Training and Analysis

At the Early Project Partners Workshop in Kruger, all project staff participated in a gender sensitivity training. The intent was to carry this training further so it would be integrated into all aspects of the project. Towards this end, project partners drafted a scope of work (Appendix W: Gender Scope of Work) that we submitted to the USAID Women in Development (WID) Office at the request of USAID RCSA. The objectives of this additional gender assistance would be to: 1) further build the capacity of project staff and partners to identify and address the gender issues related to transboundary water planning and management; 2) build the capacity of project staff and partners to address gender issues at different stages in the project cycle, i.e., planning, implementation and evaluation; and 3) providing periodic technical support to project staff and partners after the initial workshop so as to reinforce the skills learned. Unfortunately the staff in the WID Office was never

able to provide this assistance. In the future, we would build this assistance into the project implementation plan, instead of looking outside the project for assistance.

Delegate Selection

Sharing Water was designed for stakeholders from a broad range of groups (government, NGOs, academics, private sector, etc), but the original intent was for all of the delegates to have a strong technical background and be involved with water or river basin planning issues. The 30 core group of delegates, however, ended up being more broadly spread in terms of their technical abilities. At first, project partners struggled because it was difficult to provide training that was not too difficult or too simplistic for some people in the group. We considered parallel sessions at the workshops with topics pitched to various skill levels, but given the cost associated with additional rooms, translators and their booths, and equipment, we decided that option was not financially feasible. In the end, we were able to adjust the curriculum and presentations so they were applicable to a broader audience, and concluded that the loss of technical depth was outweighed by the having a broader set of delegates.

From the first Luanda workshop, *Sharing Water* attracted significant interest from people beyond the selected delegates from each basin country. With each subsequent workshop, additional people, often from the hosting countries, contacted the project and asked to attend as self-paid guests. Though their presence sometimes pushed the limits of the facility's capacity, the added value of networking, further outreach, and the presence of representatives of complementary projects contributed greatly to the richness of the workshops.

Before the Windhoek workshop, *Sharing Water* received a request that a traditional leader from Botswana join the delegation as there were Angolan and Namibian traditional leaders already attending the workshops. This traditional leader also was already involved in the *Every River* project and, therefore, represented a link to that project. Project partners authorized the inclusion of an extra Botswanan delegate in order to include a balance of traditional leaders from each country. This key change not only provided the appropriate political balance but also made the traditional leaders a fully represented contingent among the delegates. In terms of number of delegates, the original project proposal aimed to include 6-7 representatives from each country. At the Kruger meeting, project partners felt that there should be at least ten delegates from each country in order to allow more people to take advantage of the training and information provided.

Angolan Portuguese Is Unique

In addition, translating the power point presentations into Portuguese, as well as providing simultaneous translation, allowed for the Angolans to participate more readily in the workshop dialogue. We learned, however, that we needed to have material translated using Angolan Portuguese. At first we were using a translator who spoke Brazilian Portuguese and we quickly realized that there are many differences between the two countries' dialects.

Workshop Presentations

Based on the workshop assessments, delegates welcomed the high quality presentations which enabled them to better understand many of the complexities that characterize effective river basin management. In addition, as the workshops progressed, we reduced the amount of material, and the pace at which it was being delivered, and allowing for more time in plenary, as well as break-out session discussions.

Building on the "lessons learned" from the Luanda workshop, project partners made several adjustments to the training approach, including:

- Shifting to a focus with more participatory teaching

- Bringing forward southern African examples, rather than relying on examples from outside the region[7]
- Creating a role simulation that required delegates to brainstorm and work as a group and that illustrated the complexity of solving an environmental dispute with multiple dimensions (moving from sharing water to sharing benefits)
- Adjusting the flow and agenda to allow for more group discussion, and create more opportunities for caucusing before simulated negotiation
- Using the simulation in both the pre-training facilitation workshop and the Plenary workshop to highlight differences in facilitator styles and tactics

Figure 36: Rich Walkling, NHI and Derek Hitchcock, NHI eating Mopane Worms, Botswana Workshop

Intensive Individualized Training Needed

We structured this project so that we would build the capacity of as many people as possible through workshop-based training. Although we believe this is an appropriate and useful approach, we have learned that additional capacity-building is needed through more intensive individualized training.

More Resources Applied to Angola

Sharing Water made significant effort to reach out to Angola and involved many Angolans for the first time in river basin planning efforts in the Basin. All future activities in the basin should continue with this approach of providing additional training and resources to Angola, particularly in terms of data collection and analysis, and also in terms of building capacity.

Role of Traditional Leaders

Project partners suggest that in the future, we more closely examine the role of traditional leaders in shaping and participating in environmental negotiation. This approach would include the role of traditional leaders when devising simulations as there are frequently situations, which place national-level planners at odds with traditional decision-making structures and institutions.

[7] During the first workshop, project partners noticed that examples from outside the region did not resonate with resource managers as well as examples from the region. As a companion recommendation, delegates' feedback suggested we develop summaries of environmental decision making from other cases to highlight different approach to negotiation and information and to examine the impact these different approaches have on results.

Tracks of Training

Project partners also recommended that we establish multiple tracks of negotiation and facilitation training keyed to the level of decisions in which trainees most often engage. These three levels were (a) international, diplomatic levels; (b) national level; (c) community level.

Roles to Fit Existing Positions

Finally, project partners recommended that we create negotiation opportunities in the training that allow delegates to take on roles similar to those they fill in their real life. While it is useful to ask delegates to take on the roles of other parties, our negotiation trainees suggested that they would find it more useful to take on a role similar to what they fill in real life. A recommendation from delegates at the meeting was that training should be aligned with the type of work people do, with different approaches used and topics covered for people from NGOs, government agencies, community organizations and research institutes. It was also suggested that these groups receive separate training as their needs are different.[8]

Figure 4: Delegate, Tracy Molefi, Kalahari Conservation Society at the Namibia Workshop

More Negotiation Training

From the full plenary group of delegates, we heard a recurring theme to the effect that "We need to negotiate. We need to negotiate better." Delegates suggested that we need to further emphasize the value of bringing negotiation skills to transboundary river basin management. That is, the idea and techniques of negotiation need to be more broadly legitimized among the delegates to the *Sharing Water* project and its successor activities.

English Classes for Angolans - Increase Communication

Although providing English language training was not part of the original *Sharing Water* workplan, the decision to fund English classes for the Angolan delegates not only moved them closer to open communication with their Nambian and Botswanan counterparts but also demonstrated that *Sharing Water* was committed to supporting the Angolan delegates in full engagement in the Okavango Basin. There was an obvious shift in the number of times delegates approached communications with the other delegates from the first to the third workshop – a shift that seemed due to increased fluency with a common language. From this experience, we learned that providing interpretation and translation services in formal settings is not enough; it is necessary to support language training so that all delegates can fully participate in the informal yet critical arenas of networking and caucusing.

Field Trips – Important Learning Tool

The field trips were a critical component of the collaborative learning associated with this project. Witnessing the large number of refugees moving home into the upper basin after decades of war, seeing agricultural diversions from the river in the Caprivi, and elephants drinking in the river in Kasane – these are just a few of the examples of on-the-ground experiences that the delegates shared

[8] We saw some interesting variants on this during the simulation exercise: (1) an OKACOM Commissioner literally "playing himself", (2) an OKACOM Commissioner alternately taking on the role of all three nations' Commissioners; and (3) an all-Angola group struggling to accurately (and convincingly) take on the interests of community representatives.

as part of the field trips. They will forever be a memorable part of our expanded and joint understanding of the basin.

Figure 5: Women welcome Sharing Water Delegates on field trip to Chobe, Botswana

OKACOM

Increased Communication with OKACOM

This project has made significant efforts to communicate with OKACOM, perhaps more than most other basin projects. But OKACOM only met once during the life of the project. In the future, with the launch of the GEF project, and more support to OKACOM, there are likely to be more meetings and more chances for communication. Despite these obstacles, the project did develop a close working relationship with OKACOM in Namibia through Shirley Bethune acting as a part-time "working secretariat" in the OKACOM offices. Perhaps this arrangement can be duplicated in Angola and Botswana.

Key Changes

The original intent of *Sharing Water* was to involve OKACOM as a Commission in the major results and decisions associated with the project. Because OKACOM met only once during the timeframe of the project (Luanda, April 2004), project partners decided to conduct more informal consultations with OKACOM Commissioners, rather than engage the Commission as a whole. During the OKACOM meeting in Luanda, *Sharing Water* presented on-going results of the project, but given the number of items on the agenda, we did not have a chance to specifically consult with the Commission regarding model selection. As a result, the *Sharing Water* project moved forward with the model and scenario selection process while consulting informally with OKACOM Commissioners in each basin state as much a possible.

Rather than select the model to be used in the Okavango Basin with OKACOM endorsement, project partners determined that the appropriate path to producing an accepted and suitable model for the basin first required NHI to work with key individuals in each basin state to produce a model "training tool". The project would then also use this tool to highlight proposed management strategies and present the package to OKACOM.

Steering Committee

As stated previously, a key change for the Steering Committee involved the inclusion of OKACOM Commissioners as members of the Steering Committee after the first workshop in Luanda. The intent of making this change was to more tightly link OKACOM to the project. In addition, initially, the Steering Committee was only scheduled to meet twice during the 18-month project but upon recommendation from the Steering Committee, partners scheduled three meetings – one at each workshop.

Basin Setting Analysis

Visioning Exercise Will be Time-Intensive

Although there was a clearly expressed need for a full-fledged Okavango Basin vision to embrace and incorporate a wider framework of issues in addition to water, harmonization of the values and visions of stakeholders from the different basin states will require protracted interactions and discussions between stakeholder groups.

In the production of the Visioning Report, *Sharing Water* found that regional and national experiences bring distinct expertise and that there is value in working in partnership with national, regional, and international organization. JEA, NNF, and IUCN Botswana brought national experiences from three basin states while IUCN ROSA, NHI, and CSIR brought resources from both regional and international levels. The partners' input on the Visioning Report demonstrates this broad spectrum of resources.

Working Across Languages

We realized that there were several terms that did not translate well across languages and it is critical to carefully define terms across language barriers. For example, at the outset of the visioning exercise, we called the process a "mock" visioning exercise. This term did not translate as "draft" into Portuguese and so the Angolans were at first not supportive of this task. However, as the term was redefined and clarified, and even renamed, *Sharing Water* was able to garner wide support for this activity.

More Informal Gathering Techniques

In addition, we learned that it is important to tailor formats to specific target groups. When gathering information from rural areas and community-based organizations, long written questionnaires may not elicit a quick or robust response. A more informal information gathering exercise is required.

Figure 6: Delegate Lapologang Magole

Visioning and Governance Documents Produced Earlier

Governance structures, especially the legal and institutional frameworks that guide and inform water resource management, are important aspects of any shared or collaborative approach to transboundary water resource management. These aspects must be examined in great detail from the earliest possible stage of any project – they provide significant insights into the feasibility and practicality of existing and proposed resource management plans and possible new institutional structures. Careful analysis of these aspects should form the core of a collaborative effort. In addition, it would have been helpful if the visioning compilation had been finished earlier in the project so that it could have helped inform and be linked to the development of future scenarios.

As a result of the language barriers between Angola (Portuguese) and Botswana and Namibia (English), synthesis of the Legal and Institutional analysis report and the Visioning report were

constrained. The project needed to translate information coming from Angola before it could be incorporated into the reports, which requires extra time built into the task schedule.

Scenarios and Management Strategies

Draw Programmatic Links between Visioning and Management Strategies Tasks

Management strategies are the pivot upon which series of desirable (or undesirable!) outcomes can be predicted for a shared river basin. In turn, the selection of appropriate and rational management strategies depends on the development priorities within each basin state and the degree to which each government or institutional structure intends to meet its responsibilities against national development objectives. It is inappropriate to simply draw up a 'theoretical' list of possible options if these are not based on the "current realities" that prevail within a river basin. This is particularly important when possible time-scales for implementation of strategies have to be considered.

Shared Okavango/Kubango Database

Ensure Legitimacy of Collected Data

In addition, we have learned that it is one thing to collect data, and it is another thing to legitimize it. We have started the first process, but need to focus on the second. To quote Peter Ashton: "Technical ingenuity generates data, but social ingenuity legitimizes data."

Trust is Necessary when Dealing with Issues Relating to Data

Even in the seemingly cut and dry task of assembling data into a searchable database, trust between parties is of paramount importance. Data is perceived as power and sharing data can be perceived as relinquishing power. Data requires significant investment to collect and maintain. Data is the foundation for specialized knowledge and many researchers, organizations, and other groups base their reputations and self-worth on the specialized knowledge they provide. To share data can be interpreted as risking one's advantage. To overcome this barrier, *Sharing Water* created processes, which built trust amongst those involved in the database tasks and demonstrated the utility of sharing data.

First, *Sharing Water* created the Database Subcommittee not only to tap the collective knowledge of those involved, but also to generate a common vision and trust among project partners. The subcommittee met in person three times and communicated extensively by email. All decisions made by the database subcommittee were made by consensus after appropriate deliberation. It is critical that enough time and appropriate resources be dedicated to generate a process that creates a sense of goodwill and trust amongst those involved in this kind of work.

Additionally, *Sharing Water* invested the necessary resources to allow RAISON and HOORC to spend significant amount of time face to face. As the primary "data-brokers" in the region, it was necessary that these two organizations understand and trust each other as they worked together to compile this Shared Okavango/Kubango Database. This investment proved worthwhile not only to the projects immediate outcomes, but also for the long-term sustainability of the Shared Okavango/Kubango Database.

Generating trust was especially critical when appealing to the project delegates. At the first workshop in Angola, some delegates perceived the data matrix exercise as an attempt by outsiders to commandeer their data and put it to some unknown and perhaps undesirable use. To overcome this, *Sharing Water* distributed version 1 of the database to project delegates (in English and Portuguese) at the Namibia workshop. It would perhaps have been simpler, or perceived as more efficient, to produce a single version of the database at the end of the project. However, it was necessary to provide delegates with a concrete representation of what their data would be used for and how it would be distributed. This exercise with version 1 of the Shared Okavango/Kubango Database not only allowed delegates to better understand the database task, but by soliciting their feedback on a

preliminary version of the database, they became invested in the creation of this tool. Because of incremental exercise, many the project partners and delegates submitted data for inclusion in the second volume of the Shared Okavango/Kubango Database.

Figure 39: Delegate Kulthoum Omari, Alfons Siyere, and Lapologang Magole doing a hands-on exercise

Due to concerns over ownership of project outputs and accessibility, it should be advertised and repeated by such projects that no copyrights apply to data because rights to pieces of data do not hold in terms of international law. *Sharing Water* repeatedly expressed the intent to make all data available in a public-access database. Advertising this intent and then demonstrating it early on with draft versions of the Shared Okavango/Kubango Database helped initiation and reinforce a culture of data sharing in the basin – perhaps one of the most important and lasting contributions of this project.

Build on Existing Work

Sharing Water was fortunate to have both HOORC and RAISON as project partners. Both organizations had invested significant amount of work in compiling data on the basin. Additionally, both organizations will remain in the region long after the end of the *Sharing Water* project. *Sharing Water* elected to shift a significant portion of the budget that had been originally allocated to NHI to HOORC and RAISON so that the final product could better take advantage of their work and momentum, as well as simultaneously building capacity in the region.

Work in Small Increments

Repeatedly throughout this task, *Sharing Water* has been faced with decisions to be either highly ambitious or methodical, incremental, and transparent. Though the project partners possessed the technical capacity to create an ambitious and technically savvy database, the database subcommittee decided that it was more important to approach the task incrementally, allowing project delegates to acclimate to the idea of a Shared Okavango/Kubango Database and to present a tool that was understandable and transparent. If the project had elected for the more ambitious alternative, the tool most likely would have failed to gain acceptance in the basin. The current Shared Okavango/Kubango Database has gained acceptance as evidenced by the ODMP's decision to adopt it as its first version of its own Shared Okavango/Kubango Database and by HOORC's commitment to continue to maintain the database after the end of the *Sharing Water* project.

Plan Extra Time to Collect Data

There are always unanticipated delays in sourcing data and information. This is particularly true for systems such as the Okavango, where the basin state of Angola has experienced a protracted period of Civil War. This also results in extensive data gaps, and inevitable inequalities in the quantity and quality of data available.

Clarify the Limitations of the Database Tool

Some stakeholders and representatives of basin states thought the database should not be started because it could not be comprehensive. It should be clarified from the beginning of such projects that databases such as this can hardly ever be fully comprehensive. Rather, the project compiled the database rapidly, to make information available as soon as possible. Such exercises should be coupled with the constant message that compilation and distribution of the resource is conducted in the spirit of making information as widely and freely available as possible and will be updated continuously over time.

Define Stakeholder Role in Gathering, Disseminating, and Interpreting Data
Further in this spirit, such projects need to make sure that stakeholders are urged to further analyze and add to the data, and then - in turn - to make copies of their new data available to others.

River Basin Planning Models
Open and Transparent Processes Are Needed to Build Agreement around the Selection of Any Analytical Platform. It is not sufficient for the choice of a model to be made in isolation without clearly identifying the attributes that make it appropriate for the basin. This process is not only important to ensure that a model be selected that fits the needs and data availability in the basin, but also to ensure that the modeling selection, development and use proceed with the understanding and cooperation of as many experts and stakeholders as possible. From our experience with *Sharing Water*, we believe that this type of open and transparent modeling process, although rarely practiced, is critical to long-term planning success.

While a complete consensus around a single model may not emerge, a transparent evaluation process will assure that the analytical tool that is ultimately selected will at least be "one of the most appropriate" options. Evaluation tools like the one built by the *Sharing Water* Project to evaluate water resource planning models should be developed and applied to the selection of all analytical tools.

Data Is of Critical Importance Because Model Uncertainties Associated With Poor or Missing Data Can Compromise the Perceived Validity of a Model. This lesson highlights the importance of jointly developing and linking a Shared Okavango/Kubango Database with the modeling activities. All parties in a river basin planning dialogue must validate the data used in a model in order for a model to be viewed as useful. The recommendations of the database component of the project should be pursued to develop a level of comfort so that future modeling work using the data is appropriate and useful.

Planning Models Must Be Complimented by Other Types of Analysis. There is recognition in the region that while planning models occupy a central place in the web of analytical tools deployed in the development of a river basin management plan, they must be complimented by other types of analyses. These include ecological, socio-economic, legal and institutional analyses. The selection of the tools needed to conduct these types of analysis must also be transparent and the integration of these analytical tools is critical. Building the necessary linkages between planning models and other analytical tools will require attention to the mechanical data transfers between models as well as the institutional linkages between analysts developing the various required tools. Both will best be achieved by developing an expert panel on model integration protocols.

Linkages Must be Forged with Other Technical Investigations Underway in the Basin. There are currently several funded projects underway which focus on water management in the Okavango River Basin. These include the continuation of USAID sponsored activity in the basin which is being lead by Associates for Rural Development (ARD, Inc.), the WERRD project, the TwinBas Project, the Okavango Delta Management Plan initiative, and most importantly the new GEF project launched by OKACOM. *Sharing Water* took a strong initiative to provide a framework for coordination by organizing a conference call of all of the projects and by inviting representatives of the various projects to participate in the third workshop in Kasane. At this workshop there was a general recognition that there are many actions that could best be accomplished by inter-project collaboration. This was the case in the decision by *Sharing Water* to use hydrologic information developed by WERRD in the development of the prototype planning model for the Okavango. Further inter-project collaboration could occur in the further development of a Shared Okavango/Kubango Database; the process for vetting the data and assumptions used in developing various models; and the process used for developing useful future scenario for the basin and the coordinated benchmarking of various modeling tools for use in the basin. Realizing the potential of collaboration in these areas will require

a commitment on the part of the project to continue the dialogue initiated by *Sharing Water* and the definition of some structure to assure coordination.

Broad Project Lessons Learned

Identifying and Developing Relationships with In-Basin Partners Is Critical, but Can Be Difficult

In the *Sharing Water* project in which we invested significant resources in identifying appropriate partners and clarifying relationships and roles and responsibilities during a project launch retreat, it has still taken almost a year to develop significant trust and levels of understanding among project partners.

We have also learned the importance of having basin partners in all basin states. Without these partners, our work in these countries would be extremely difficult and possibly, ineffective.

Consider Integrating Social and Economic Strategies that Result in Poverty Reduction into our Technical Approach

Initially, we had difficulty getting traction with the project, particularly with the Angolans, because the project focuses on technical and policy issues associated with the transboundary management of the river. The Angolans, and to some extent the other riparian countries, are understandably concerned with building the sustainable livelihoods of local people. In the future, we might consider developing broader partnerships with groups that have expertise in areas that are relatively unfamiliar to us, including groups that focus on human health, economic and socio-cultural development, good governance, etc. These partnerships would allow us to develop strategies that are implemented on a range of scales (from local to international) and that provide the necessary incentives for local communities (and national level governments) to engage in international conservation and contribute to sustainable river basin management.

It Is Important Not to Generate Unreasonably High Expectations of Quick Results among Project Partners, Funders, and Stakeholders

The *Sharing Water* project has been successful in outlining and delivering on an ambitious, but not unreasonable workplan. Our ability to deliver the project workshops and work products in the timeframe agreed upon at the outset of the project has helped anchor the project.

Set Aside Resources for Translation

It is important to set aside resources for translation of documents. If there had been no resources set aside for translation, *Sharing Water* would have had very little information on Angola. The Steering Committee documents and the final Legal and Institutional Analysis and Visioning reports were translated from English to Portuguese and this facilitated effective communication.

Develop a Good Information Base before Moving onto Policy Issues

The *Sharing Water* project, through the development of the Shared Okavango/Kubango Database has done a good job of preparing a publicly accessible joint database for the basin in advance of tackling policy and management issues.

18 Months Is Too Short a Time Period To Accomplish Some of the Activities We Set Out to Do

Given the short timeframe of this project – just 18 months – the project was fast out of the gate and accomplished a lot quickly. In particular the basin partners put a huge amount of effort into organizing the workshops. But 18 months is too short a time period to accomplish some of the activities we set out to do. In the future, we have to either convince donors that transboundary river basin management requires a longer commitment than 18 months, or else we need to scale back our ambitions and take smaller steps. In other words, finish the first step and get concurrence from the river basin community at all levels, and then take on the next step, and so on.

Increase Direct Involvement of Basin Experts

In future work associated with the Okavango, we would recommend there be more direct involvement of basin experts in the development of work products such as the database, the modeling, and the institutional and legal analysis. It would be important to set up a "working group" approach to researching and developing these work products with working group members from all three basin countries.

Grassroots Monitoring and Evaluation

Sharing Water used both quantitative and qualitative measures to capture the progress of the project. In addition to the standard monitoring and evaluation program, we would recommend that future work implement a Grassroots Monitoring and Evaluation Program (M&E) to ensure real downward accountability. One of the underlying aims of grassroots M&E is to give voice to those who are often ignored in conventional impact assessment. In addition, this type of participatory multi-stakeholder assessment asserts that the assessment process itself can contribute to empowerment and can assist in setting up a sustainable learning process to increase the long-term accountability of the development process and contribute to development itself. More specifically, Grassroots M&E provides a forum for participants to articulate their aims and goals, determine indicators of success, and with local research institutions track progress and make recommendations for project change.

Steer Clear of Politics of Implementation

Although *Sharing Water* made a significant effort to coordinate with other projects in the basin and did so effectively, we learned that various projects funded by different donors should perhaps not "co-mingle" their work plans in a way that one project needs to wait for another to proceed as the "politics of implementation" can result in shifting timelines.

VIII. NEXT STEPS

Based on Sharing Water Project Partners' experience in the Basin and the input from project delegates, below we outline several activities that we believe should follow on from *Sharing Water* to build on the success already made and to ensure the sustainability of the investment in the first 18 months of the project.

Activity 1: Continued Development and Dissemination of the Shared Database

Objective: To ensure that the Shared Okavango Database is available and functional.

Background: This task will involve continued support for the existing Okavango Shared Database developed under *Sharing Water* in collaboration with *Every River*. This shared database is a major achievement for the Basin and one that should not languish. Both the will and the institutional capacity to host the database exist at HOORC, but continued funding is necessary for an additional year to finalize the database structure and management procedures, and to ensure a user-friendly interface for broad-based use. This support will also reinforce the legitimacy and credibility of the data.

Task 1.1: Convene and organize a database workgroup in Maun (comprised of 2 representatives from each basin state) to discuss and resolve the following points:

- The final structure and functionality of the database and develop a work plan for completing necessary upgrades to the database, including adding information from the *Sharing Water* legal and institutional analysis
- The final roles and responsibilities for updating the database with new information, including expanding the database to include newly gathered data, satellite images and aerial photographs
- Coordination of database refinements with other projects interested in the further development and use of the shared database (e.g. ODMP, GEF, others)
- Draft Procedures Manual for updating the Database

Task 1.2: Develop outreach and education plans regarding the database and its use in the Okavango Basin, including finalizing web-based access to the Database, incorporating user-friendly interfaces into the Database, test-running the Database with stakeholders; making adjustments to ensure access and ease of use; and developing mechanism to transfer or link the Okavango Database to OKACOM

Task 1.3: Draft Business Plan for resources and staff needed to maintain Database over 10 years

Activity 2: Website Transfer and Development

Objective: To successfully port the *Sharing Water* website to a more general Okavango information dissemination and communication tool.

Task 2.1: Identify a new host/webmaster for the website.

Task 2.2: Coordinate with OKACOM to identify the essential elements of this information dissemination and communication tool.

Task 2.3: Update the website to make it a more useful as a general regional information dissemination and communication tool by evaluating the essential elements that need to be ported from the existing *Sharing Water* website.

Task 2.4: Transfer the updated website to the new manager.

Activity 3: Establish Database Nodes in Riparian Countries

Objective: To identify an institution in each of the riparian countries to serve as "Database Nodes" to work closely with HOORC and OKACOM and provide national-level back-up and support for the Shared Okavango Database. These nodes would ensure data quality, gather and analyze data at the national level, and other relevant tasks. These institutions would assume responsibility for providing accurate and verifiable data to the Okavango Shared Database. They would also play an outreach role by disseminating national and basin-level in their countries and across sectors.

Task 3.1 Identify Database Node in Angola, HOORC and NNF have already been identified

Task 3.2 Provide training in Database Management at each Node

Task 3.3 Establish Protocols for national-level data reporting and analysis

Task 3.4 Develop process for legitimizing and controlling data quality

Task 3.5 Coordinate with HOORC regarding data transfer

Activity 4: Fill Strategic Data Gaps, Especially in Angola

Objective: To fill strategic gaps in data collection and analysis which have been identified as part of *Sharing Water*. It is anticipated that the majority of this work will be focused on the upper basin in Angola. These gaps would be filled through both actual on-the-ground monitoring and through remote sensing strategies.

Task 4.1 Use the prototype model runs to evaluate the quality of data and identify data gaps

Task 4.2 Identify and repatriate data from Portugal to Angola

Task 4.3 Analyze existing and repatriated data and identify critical data gaps

Task 4.4 Assess training and equipment needs in terms of data collection and analysis

Task 4.5 Build and support capacity in Angola, Botswana, and Namibia to collect, store, analyze and report data and data trends through certificate and workshop training and through targeted assistance in terms of equipment, computers, software, etc.

Task 4.6 Collect and analyze data to determine actual and future water use and demand in the Basin. Use remote sensing techniques to fill data gaps when applicable.

Task 4.7 Ensure that mechanisms for transferring newly collected data into the shared Okavango Database are in place

Activity 5: Continued Development of the Okavango Prototype Planning Model and Associated Training

Objective: Continue to develop the prototype water resource planning model of the Upper Basin

Background: *Sharing Water* has completed the following steps:

- A model evaluation process leading to the identification of 2-3 promising water resource planning models for use in the Okavango River Basin.
- The definition of three plausible development scenarios in the Okavango River Basin and a set of reasonable management strategies associated with each scenario.
- The development of a prototype model based on one of the identified promising model platforms that was used to demonstrate the utility of planning models. This model included representations of the scenarios and management strategies defined in the previous step.
- The establishment of professional relationship with other modelers active in the region. These included interactions with models from the WERRD, ODMP and TwinBas Projects that lead to (1) the integration of hydrologic information for the upper basin into the prototype model; (2) linkage of the prototype to a hydrodynamic model of the Delta; and (3) integration of the Okavango model to a model of the Central Namibia water system.

Discussion with technical experts in the region have lead to the conclusion that it is difficult to prioritize the essential attributes of a water resource planning model in the abstract and that it would be helpful to develop a test case that could assist in defining critical questions and responsive model attributes. The thought is that this test case should be developed with the input of technical experts from the three basin states.

The prototype model has been constructed to be a transparent decision-making tool. Nonetheless it contains a great deal of information and additional training is needed to build the comfort level of all parties in the river basin planning dialogue in navigating and manipulating the data and assumptions included in the model. Training was initiated through *Sharing Water* and should continue on at least three levels. First, training for policy makers should continue so that they can understand the basic assumptions underlying a planning model. Second, more detailed training of technical experts should occur so that future model development can occur in the region without significant input from outside experts. Third, stakeholders who are engaged in discussions about the future of the basin need to understand the role that models can play in framing management issues, and be able to determine whether their interests (and visions for the basin) are represented in the models.

Task 5.1: In coordination with the GEF Project PMU, convene a workshop in Angola. The workshop will cover the following items.

- Finalize a set of critical scenarios and associated management strategies for the Okavango Basin
- Assemble the critical scenarios and management strategies into a test case that could be the subject of evaluation using a water resource planning model for the basin.
- Consider including scenarios based on climate change, and perhaps integrating economic dimensions.
- Configure the prototype model for the test case, the extent possible, in order to identify critical model attributes (it is not necessary that the prototype model successfully capture all elements of the test case as even a failure to do so will assist in identifying critical planning model attributes).
- Develop a new list of critical planning model attributes.

Task 5.2: Build capacity for the use of the water resource planning model of the Okavango River Basin. Many *Sharing Water* delegates requested further training on the use of the prototype model. Training on the use of the expanded model would be critical in developing this capacity and could occur in the US or in the basin through NHI.

Task 5.3: Collaboration with the developing modeling community in the basin trained in Task 5.2 in the continued refinement and application of the model in support of a policy dialogue.

Activity 6: Evaluation of Analytical Tools

Objective: Complete the process of evaluation and selection of a water resource planning model initiated during *Sharing Water* and develop a process and methodology for evaluating and selecting other types of analytical tools for the basin.

Background: *Sharing Water* has initiated a process to evaluate potential water resource planning models for the Okavango Basin. This process has been based around the application of a simple piece of model evaluation software developed by the *Sharing Water* project. This software allows the user to rank model attributes in terms of priority and score models against these attributes. The regional experts involved in the planning model review process identified some useful software upgrades. These include:

- The ability to identify critical model attributes where the model must achieve a top score in order to be considered.
- The ability to more seamlessly introduce new models and model attributes to the software system.

Task 6.1: Upgrade the evaluation software to include the abilities described above

Task 6.2: In a workshop setting, re-evaluate the range of river basin planning models using the attributes identified in Task 5

Task 6.3: Make recommendations to OKACOM regarding the optimal river basin modeling approach

While this tool has been applied to the evaluation of planning models during the *Sharing Water* project, the same approach can be pursued in developing a consensus around any other analytical tool that is need for the basin.

Activity 7: Support OKACOM through a "Working Secretariat"

Objective: Create a "Working Secretariat" for OKACOM that would precede the establishment of a formal Secretariat.

Background: This task would involve supporting OKACOM through funding a dedicated coordination person to be based in government offices in close proximity to OKACOM Commissioners in each of three riparian countries. This approach has worked well in Namibia as part of the *Sharing Water* project and thus could be extended to the other riparian countries.

Task 7.1: Confirm overall approach with OKACOM in each of three countries

Task 7.2: Develop Scope of Work for each Coordinator, identify and contract with each Coordinator, establish Coordination Offices, and joint workplans

Task 7.3: Implement coordination activities, and draft and finalize Review of Working Secretariat approach

Activity 8: Incorporate Instream Flow Requirements (IFRs) into River Basin Modeling

Objective: Integrate IFR into the river basin planning model and build on progress made under the IWMI-funded Okavango Fisheries Study. In addition, this activity is aimed at building capacity in the basin to analyze and consider quantitative approaches to incorporating environmental services into basin planning. Towards this end, this activity will be undertaken using a workgroup process with individuals in the basin identified to participate in each subtasks listed below:

Task 8.1 Working with delegates from each country, determine critical ecological services beyond fisheries, such as sediment transport, wildlife habitat, including instream flow requirements needed to meet the ecotourism potential in Angola

Task 8.2 Identify available data associated with these services and include in the Okavango Shared Database

Task 8.3 Draft IFRs with working group based on available data and link these IFRs to the river basin planning model

Task 8.4 Run "what if" scenarios in a participatory setting with working group and other stakeholders with these IFRs in place

Task 8.5 Draft and finalize report describing process, including a "next step" strategy

Task 9: Further Legal and Institutional Analysis

Objective: To provide analyses and recommendations regarding the legal instruments and institutional structures that have been used successfully in other international river basins around the world.

Background: Joint management of transboundary water resources has been one of the most fruitful and productive areas of bilateral and multilateral agreements. Lessons and models will be derived from these governance frameworks—some of which have been operating for over a century—that could be adapted to the Okavango context. In addition, the analyses under this task will draw upon the text of the Convention on the Non-Navigable Uses of Shared River Basins that has recently been proposed by the U.N. General Assembly. This task will provide an empirical analysis of this operating history, identifying the structures and processes that have worked well and what it would take to replicate them successfully in the Okavango context, providing a basis on which the OKACOM Commissioners could draw, in their discretion, in constructing an Integrated Management Plan and implementing laws and institutions. This task will be undertaken using a workgroup process with individuals in the basin identified to participate in each subtasks listed below:

Task 9.1: Itemize the types of management mechanisms that OKACOM and the three national governments may find useful in developing an integrated management plan for the Okavango basin. This list would be compiled through consultations with the OKACOM Commissioners and basin stakeholders. Examples might include:

- A mechanism to assess the impacts of water development proposals on downstream biophysical processes and water availability and quality.

- A mechanism for dissemination of such information to, and for consultations with, the potentially affected stakeholders either through their government representatives or directly.
- A mechanism through which affected stakeholders, through their national governments, can register their concerns or opposition to such proposals, if any.
- A mechanism by which such concerns would be taken into account by the project proponent and satisfactory mitigations or modifications would be undertaken.
- In default of such adjustments, a mechanism for conflict reduction, resolution or compensation
- Mechanisms for benefit sharing.
- Mechanisms for continuous monitoring of the bio-hydrologic system and its responses to anthropogenic perturbations

Task 9.2 Conduct a global survey of transboundary water resource management agreements to identify the successful examples of each of these mechanisms. The work group would utilize the data base that has been created by Oregon State University and also conduct interviews with other international natural resource law and institutional experts.

Task 9.3 Study successful cases to ascertain the features/attributes/processes that account for their success. The work group would conduct detailed analyses of these regimes, review the relevant literature, and interview the key management officials.

Task 9.4 Analyze the changes that would be needed in the national laws and institutions of the Okavango basin states to implement such successful models (using the data collected in the Sharing Water Project). This would give the three national governments a basis for deciding whether the necessary changes are politically feasible and desirable.

Task 9.5 Obtain peer review of the findings and conclusions. Before finalization, the report of the work group would be disseminated to government and academic legal experts within the basin for review and comment.

Task 9.6 Prepare final report. The final product would be a report to the OKACOM Commissioners in English and Portuguese which includes the views of the peer reviewers. The report would be accompanied by a detailed briefing for OKACOM Commissioners and interested national officials.

Task 10: To Promote Negotiated Agreements in the Basin

Objective: To continue to build capacity in the basin in negotiation and facilitation skills

Background: Based on our workshop evaluations and group discussions, project partners identified a series of potential topics for future negotiation and facilitation training:

- Planning, designing & convening facilitated meetings
- Mediating disputes between parties, including breaking deadlocks
- Dealing with difficult people and difficult situations
- Dealing with competing models and interpretations of scientific information
- Linking models and interpretations to resource management policy
- Collaborative modeling of hydrology and environmental conditions to increase stakeholder participation and management transparency
- Getting and using negotiating power to attain positive-sum outcomes
- Cultural, political, ethnic and religious factors in collaborative management
- Bring trainees more intensive, sustained training in their respective nations

Task 11: Support Okavango Basin Technical Working Group

Objective: To support the Okavango Basin Technical Working Group as described in the Kasane Statement.

Background: This group was called for as part of the Kasane Statement and derives its strength from its diversity, but this same diversity can make it difficult to delve into specific topics. Delegates recommend that subgroups be established from the within the Technical Working Group based on sector expertise. These subgroups should focus on the development of best management practices (BMPs) for each sector as they apply to the Okavango Basin, and then report back to the full Working Group.

Task 11.1: Convene Working Group, finalize membership, charge, and identify Sector Subgroups

Task 11.2: Work with Sector Subgroups to research and develop BMPs

Task 11.3: Reconvene Working Group as needed to provide feedback to Basin-level management issues and provide link between OKACOM, technical group, and communities

Appendix A.

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Appendix B.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Monitoring and Evaluation Report

September 2004

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Award Year: 2003

Sharing Water Result 1.1: Participants Recruited and Assembled

SW 1.1 Monitoring and Evaluation

Process Indicators	
Selection criteria for participants finalized:	First draft of selection criteria generated Selection criteria for participants finalized
Draft list of potential participants generated:	Draft list of potential participants started List of potential participants generated
Participants endorsed by OKACOM and SADC:	Participants were endorsed by the OKACOM national focal points in the three countries.
Invitation letters drafted and sent out:	Invitation letters were drafted and sent out by IUCN ROSA and the national partners.
Letters of confirmation received from participants:	Confirmation received from participants by letter, e-mail, or fax.
Confirmation of Steering Committee members:	Confirmation of all 6 Steering Committee members Confirmation of an additional 2 Steering Committee members
Agendas for SC finalized:	Agenda for SC finalized for Oct. 27th, 2003 meeting Agenda for Steering Committee finalized for March 31st 2004 meeting
Output Indicators	
# of committed participants:	30 32
Project Brief drafted and circulated:	Project Brief drafted and circulated Sept. 15th, 2003.
Steering Committee meetings conferred:	Steering Committee meeting conferred for Oct. 27th, 2003 meeting. Steering Committee meeting held Oct. 27th, 2003 in Luanda, Angola. Steering Committee meeting held on March 31st 2004 in Windhoek, Namibia. Steering Committee meeting held on August 11th 2004, Kasane, Botswana.
Impact Indicators	
Increase in # of people involved in technical aspect of OKACOM:	With the launch of Workshop #2 in Angola, 30 new people from the Basin became more involved in the technical aspects of river basin management. With *Sharing Water* workshop #3 in Namibia the 32 participants, as well as many guests including OKACOM representatives received additional training in the technical aspects of river basin management. This training provides stakeholders with necessary background to engage with OKACOM in the process of working toward a sustainable management plan for the Okavango Basin. For example, as OKACOM moves forward in modeling the Basin, as a result of training in hydrological processes and model selection criteria, project delegates have increased capacity to provide input to future modeling in the Basin. Again, the Botswana workshop involved all 32 participants, Steering Committee members and several OKACOM Commissioners, increasing the number of people who are becoming more familiar with the technical aspects of OKACOM.

Sharing Water Result 1.2: Legal and/or Institutional Arrangements Analyzed

SW 1.2 Monitoring and Evaluation

Process Indicators	
Area of focus determined	Areas of focus were determined and circulated for comments. Pending review at Luanda Workshop in October-03 Variables and indicators that could be monitored were discussed with delegates at the SW workshop #2. There is a clear need to expand the list of variables to include a wider suite of benefits beyond water. Project partners continued to refine the focus of the analysis. Incorporating input from partners, the process of determining the focus of the legal and institutional analysis was finalized
Date legal and/or institutional analysis complete:	The Basin Governance Report was completed and presented at the Kasane Workshop August 2004
Draft report completed	The draft analysis of legal and institutional aspects is incomplete and needs to be revised and expanded. The preliminary legal and institutional analysis report was completed and distributed to project partners for review.
Output Indicators	
Report finalized:	Basin Governance Report finalized
Report presented	The first draft of the Legal & Institutional Analysis was presented at *Sharing Water* workshop #3 as a work in progress.
Impact Indicators	
Legal and/or institutional arrangements for equitable water sharing identified and communicated:	The Basin Governance Report highlights complementary institutional and legal policies between nations, which can be capitalized on to stimulate communication concerning arrangements for equitable water sharing.

Sharing Water Result 2.1: Participants Trained to Use Shared Data Management System

SW 2.1 Monitoring and Evaluation

Process Indicators	
Dates of workshops:	Oct. 27-30, 2003, Luanda, Angola March 29 - April 1, 2004, Windhoek, Namibia August 8-13, 2004, Kasane, Botswana
Output Indicators	
# of participants trained on use of database:	32
Use of web-based database:	*This will track the number of visits (and downloads if appropriate) at the database website (compiled quarterly).*
Impact Indicators	
Trends in data understood at basin and sub-basin levels:	Presentations about data and the Okavango Basin Wide Profile and corresponding book at *Sharing Water* workshop # 3 helped to enhance participant's understanding of natural resource management issues in the basin. Discussion among participants has enhanced their understanding of each other's data and data requirements.
Knowledge gaps identified in all three countries:	At *Sharing Water* workshop #1 in Angola this process was initiated. At *Sharing Water* workshop # 2 in Namibia the shared Okavango database was presented and a handout was given to delegates to solicit

	information on data gaps. This input will be compiled. Version 2 of the database was presented at workshop #3 in Botswana and all delegates were given copies to further identify knowledge gaps. The Kasane Statement, which formed a Technical Working Group of all Sharing Water delegates started to address the continuation of the need to address gaps in all three countries. A Data Gaps Analysis was finalized at the end of the project.

Sharing Water Result 2.2: Participants Trained in Conflict Management and Negotiation

SW 2.2 Monitoring and Evaluation

Process Indicators	
RFP released:	RFP was released in April 2003 and then re-issued in June 2003. Deadline for responding is July 11, 2003.
Detailed comments on the responses to the RFP received:	IUCN ROSA provided detailed comments on the submitted proposals.
Output Indicators	
Training partner selected:	AWIRU/CONCUR selected as Training partner.
Curriculum complete (%):	75%; 100%
# of participants trained:	All 30 participants in attendance at SW Angola Workshop were trained All 32 participants in attendance at SW Namibia workshop were trained All 32 participants in attendance at SW Botswana workshop were trained.
Key demographic characteristics of trainees identified (gender, profession, age, etc):	Information on the demographic characteristics of trainees was collected at the *Sharing Water* workshop #1, and compiled.
Impact Indicators	
Impact on participants' conflict management and negotiation skills:	Based on post project assessments and qualitative reactions from delegates, the project successfully improved delegates' conflict management and negotiation skills.

Sharing Water Result 2.3: Participants Trained in Facilitation Skills

SW 2.3 Monitoring and Evaluation

Process Indicators	
Curriculum designed:	Curriculum designed for *Sharing Water* workshop in Angola
Facilitators in training identified:	Project partners have identified the institutions that will be represented in the facilitator training. A group of 16 trainees for the facilitation training was identified. The trainees are from IUCN ROSA, JEA, NHI, NNF, IUCN Botswana and representatives from some government departments in the three countries.
Output Indicators	
# of participants trained:	16 participants trained at *Sharing Water* workshop in Angola 12 participants trained at *Sharing Water* workshop in Namibia 12 participants trained at Sharing Water workshop in Botswana
Impact Indicators	

Impact on participants' facilitation skills:	Post facilitation training assessments demonstrated improvement of facilitation skills for trainees and interest in further improving those skills.
Facilitators assuming facilitation role in *Sharing Water* workshops:	At the Angola workshop, those involved in the facilitation training acted as rappoteurs during the workshop and as facilitators during the negotiation simulation exercises. At the Namibia workshop, facilitation trainees acted as session chairs and facilitators during the plenary workshop, and as facilitators to the break out groups. . At the Botswana workshop, facilitation trainees took on even more facilitation responsibilities in a pre-plenary strategy meeting.

Sharing Water Result 2.4: Preliminary Visions for the Basin Compiled

SW 2.4 Monitoring and Evaluation

Process Indicators	
Guidelines for reviewing reports drafted:	
National level draft reports produced:	Basin partners drafted informal national level reports for IUCN ROSA on the legal and institutional setting in each basin country, in addition, to a desktop study of any visioning documents concerning the basin's management.
Basin level draft report produced:	IUCN ROSA produced the basin level reports on Visioning and Basin Governance including the legal and institutional analysis of the basin.
Mock visions produced and revised:	Under review by project partners. A collection of mock visions will no longer be executed during this phase of Sharing Water due to our limited timeframe. Instead, the project will present a compilation of existing visions. Compilation of existing national and basin visions compiled by IUCN ROSA.
Presentation of draft vision at workshop:	IUCN ROSA presented the draft Visioning Report at the SW Workshop in Botswana in August 2004.
Endorsed draft visions produced from ground-truthing:	
Output Indicators	
Draft and final report produced:	The final Visioning Report was produced by IUCN ROSA and included in the project's Final Report to USAID RCSA.
Impact Indicators	
Management scenarios linked to vision statements:	In the absence of full on the ground visioning statements that have some degree of acceptance / legitimization by basin stakeholders, this task will be only partially implemented under Phase I. Instead of linking management scenarios to a complete mock visioning analysis, CSIR will more broadly link existing visioning compilations with potential management scenarios in the Botswana Workshop. CSIR presented the links between existing visioning compilations with management scenarios in August 2004 at the Botswana Workshop.

Sharing Water Result 2.5: Management Strategies for Basin Identified

SW 2.5 Monitoring and Evaluation

Process Indicators	
Interviews completed:	Provisional list of essential persons for interview on national and organizational needs/aspirations for management strategies. CSIR discussed implications of selected management strategies and water allocation choices with delegates at *Sharing Water* workshop in Angola. CSIR discussed the implications of selected management strategies, in terms of their consequences for water allocation choices, with delegates at *Sharing Water* workshop in Namibia. Discussions were held between HOORC and Botswana based participants about management issues within and beyond Botswana's borders.
Memo of possible management strategies by country produced:	CSIR compiled provisional list of most likely management strategies for the entire Okavango basin, prepared formal PowerPoint presentation of management strategies, and presented list of strategies at *Sharing Water* workshop #2, as part of overall approach to the development of a catchment management plan for the Okavango basin. CSIR has prepared a draft list of the most likely management options that could be selected for the Okavango basin. The compilation of existing basin visioning conditions and/or the legal and institutional analysis is necessary to drive this task to completion. The existing list of (theoretical) management options and scenarios can continue to be expanded, to serve as a guide to a range of options, which will later be fleshed out and legitimized with the firm contextual reference of the basin the legal and institutional analysis and a full-fledged visioning process in the future.
Output Indicators	
Management strategies compiled into final report:	The draft document will be finalized and then circulated to project partners for comment, before it is sent to the relevant OKACOM representatives. Final Report on merging scenarios and management strategies.
Impact Indicators	
A wide range of management strategies articulated for the basin:	The set of management strategies selected / described so far includes almost every possible situation likely to occur within a twenty-year timeframe, including disaster management options (for flood and drought scenarios). Dr. Peter Ashton, CSIR, presented a wide range of management strategies for the basin at the Botswana workshop in August 2004.

Sharing Water Result 2.6: Participants Trained on Modeling Software

SW 2.6 Monitoring and Evaluation

Process Indicators	
Framework model developed:	*Sharing Water* developed a prototype Okavango decision support tool using the Water And Evaluation Planning model (WEAP). The model is to be presented as a demonstration model, which will further introduce the utility and limitations of modeling to the *Sharing Water* participants.
Output Indicators	
# of participants with access to modeling software:	Seven members of OKACOM and modeler stakeholders with WEAP licenses were sent the prototype model for the Okavango River Basin.
# of participants trained on use of software:	All 32 participants trained in the use of a model evaluation and scoring tool at *Sharing Water* workshop in Namibia. All 32 participants trained in the use of the prototype WEAP model at the Botswana Workshop
Impact Indicators	
Increase in participants capacity to manipulate software:	The training on river basin modeling familiarized the delegates with a range of modeling software, their attributes, and strengths and weaknesses. In addition, hands-on training directly increased the delegates' capacity to understand and explore the resources and limitations of river basin models.

Sharing Water Result 2.7: Responsibility for Data Management Transferred to Participants

SW 2.7 Monitoring and Evaluation

Process Indicators	
Proposal drafted to raise funding for additional participants:	An initial draft of this proposal has been prepared. Initial draft finalized and potential sources of funding are being evaluated. Due to constraints in the capacity of the venue that is hosting the final workshop in Botswana, and an increase in the overall number of delegates attending workshops (including OKACOM representatives) from what was originally anticipated, *Sharing Water* will not invite additional participants from the SADC region to the final workshop.
List of possible regional participants produced:	We began to identify other delegates from across the SADC region to attend the last Sharing Water Workshop in Kasane, but curtailed the effort when we learned that the RCSA would not be able to reimburse us for the approxinmately $50,000 spent on logistics for the OKACOM Conference in Maun, Botswana in May 2003. Therefore, our budget would be limited. In addition, as stated above, the venue for the Botswana Workshop limited the number of participants to our core delegates.
Assessment of basin institutions completed:	The assessment of basin institutions was completed and incorporated into the Final Basin Governance Report
Data collection responsibilities articulated:	At the Namibia workshop, project partners agreed HOORC would house the database and continue updating it through the Sharing Water Technical Group as established by the Kasane Statement.
Draft follow-on proposal	In the Sharing Water Final Report, HOORC outlined its institutional

completed:	and technical capacity to house and manage the Shared Okavango Database and accompanying website.
Output Indicators	
# of participants attending workshop:	32 participants attended the Botswana workshop.
Impact Indicators	
Transfer of responsibility to participants:	*A qualitative analysis of the transfer or responsibility for planning and management to regional participants (compiled at end of project).* The SW Final Report includes a section on the Future of the Shared Okavango Database.

Sharing Water Result 3.1: Data Collected and Shared Data Management System Built

SW 3.1 Monitoring and Evaluation

Process Indicators	
Memo describing national-level data collection efforts completed:	National partners draft memos on research on national-level data collection efforts. CSIR contributed to the detailed discussion on the type, availability, accessibility and compatibility of different available data sets.
Appropriate data base determined:	The Database Subcommittee will make a final decision at the Luanda Workshop in October. Project partners decided that RAISON will prepare the data that underpins the Okavango Basin profile in accessible format, so that it can form the basis of a database on the Okavango system for the *Sharing Water* project. Project partners chose a database system for the *Sharing Water* project
Wish list generated	A wish list has been generated for distribution and use.
Output Indicators	
Functioning database constructed:	*Sharing Water* contracted RAISON to build the structure of the *Sharing Water* shared database and populate it with existing data from the Okavango Basin Profile. This product will be completed and made available to project partners in February 2004. In addition, a reference list of 270 reports and publications has been prepared, and the least accessible material has been scanned in PDF format and will be made available via the database. Version I of the Database was constructed, using an MS-Access interface. Version II of the database, with additional functionality and more data, is under development. Version II of the Shared Okavango Database was produced, presented, and disseminated at the Botswana Workshop in August 2004.
# of data sets collected and transferred to data base:	The project requested and received an electronic copy of the AquaRAP 27 Report from Conservation International's Washington office, including agreement allowing access to the CI database when it has been finalized. Version I of the database has 182 datasets included. Additional data, collected from delegates and other sources, are added to Version II of the database.
Data base available to be	Version I of Database available on CD, and a copy was provided to

shared on web or CD:	each delegate attending *Sharing Water* workshop in Namibia. Version II of the Shared Okavango Database was distributed on CD at the Botswana Workshop in August 2004.
Impact Indicators	
Conflict over type and location of available data decreased:	

Sharing Water Result 4.1: Hydrologic Planning Model Selected

SW 4.1 Monitoring and Evaluation

Process Indicators	
Existing modeling efforts described:	A matrix describing existing modeling efforts in the Basin and the region has been started. The matrix describing existing modeling efforts continues to be developed. Meetings were held with the modelers associated with the WEERD project, and a commitment was given on the part of Angolan delegates to share information on the Cunene River model. With the information on the Cunene River model described, this task will be complete.
Meetings with other modelers scheduled:	Peter Ashton, CSIR, and C. Vanderpost, HOORC, have conducted interviews with modelers. Discussions with modellers and stakeholders demonstrate a need to broaden the focus of this task beyond water issues only. Meetings were held between NHI and the WEERD project (modeling in the Okavango Basin) in Delft in March 2004. In addition, discussions between Dr David Purkey (NHI) and Professor Denis Hughes at Rhodes University regarding modeling were held in March 2004. Meetings between the HOORC and the ODMP representatives were conducted to discuss the modeling effort planning by the ODMP. Meetings with Angola OKACOM Commissioner Da Silva and Minguel Panzo scheduled for August to discuss modeling.
Output Indicators	
Model parameter document:	Proposed Modeling Framwork Memo produced
Recommendations for river basin planning model made:	
Impact Indicators	
River basin planning model selected:	Preliminary Report on Okavango Modeling produced
Model parameters defined:	

Sharing Water Result 5: Project Management and Reporting

Administrative and Project Start-up Monitoring and Evaluation

Process Indicators	
Meeting with OKACOM members to discuss workplan:	Made presentation to OKACOM members at Maun conference in May 2003. Followed-up this presentation with one-on-one meetings with OKACOM Commissioners in Botswana and Angola. D. Hitchcock, NHI, and Abias Huongo, JEA, met with Mr. Isidro Pinheiro, OKACOM Commissioner Angola. NNF consulted with Stefan de Wet, OKACOM OBSC Namibia. Masego Madzwamuse, IUCN Botswana, has met with Gabaake Gabaake, OKACOM OBSC Botswana. NHI met with Angolan OKACOM Commissioners Mr. Da Silva and Mr. Pinheiro to discuss project goals and issues specific to Angola. NNF met with OKACOM Commissioners in Namibia to discuss the legal and institutional analysis and the visioning process components of the *Sharing Water* project. An introduction and general discussion of the *Sharing Water* project is on the agenda of the OKACOM meeting to take place in Luanda 27-29 April, 2004. *Sharing Water* project representatives attended the OKACOM meeting in Luanda from April 27-29, 2004 and made the first official presentation of the *Sharing Water* project to OKACOM since the project commenced, and received feedback from OKACOM on the development of Phase II of the project.
Post-award briefing with USAID RCSA:	E. Soderstrom had a post-award meeting with the RCSA in March 2003.
Meet with SADC to discuss project:	L. Thamae and C. Brown met with SADC to discuss project. Director of SADC Water Division, Obenetse Masedi attended all three workshops as a Sharing Water Steering Committee member.
Meet with possible Angolan partners and participants:	One-week trip to Angola to meet with possible participants, OKACOM, and identified two Angolan project partners: JEA and ACADIR. NHI spent a week in Luanda, Angola, meeting with Angolan partners and participants, as well as government officials.
Provide logistics for May OKACOM workshop in Maun:	Logistics successfully performed for OKACOM workshop.
Output Indicators	
Workplan completed:	Workplan drafted and finalized
Monitoring and Evaluation Plan completed:	Monitoring and Evaluation Plan drafted and finalized
Subcontract completed between NHI and IUCN/ROSA, HOORC, and CSIR:	Subcontracts drafted between project partners NHI and IUCN ROSA, NNF, IUCN Botswana, and JEA contracts complete. NHI and CSIR, HOORC and RAISON contracts complete All subcontracts closed out.
Subcontracts completed between IUCN ROSA and NNF, JEA, and IUCN Botswana:	Subcontracts completed between IUCN ROSA and NNF, JEA, and IUCN Botswana.

Roles and responsibilities between project partners articulated:	Roles and responsibilities drafted Roles and responsibilities articulated within contracts and subcontracts. CONCUR/NHI drafted a document, reviewed by the project partners, of the *Sharing Water* Angola Workshop roles and responsibilities Partner's outlined roles and responsibilities at *Sharing Water* workshop in Namibia and projected roles for the Botswana workshop in August 2004
Communication protocols drafted and agreed upon:	Communication protocols drafted Communication protocols redistributed and revisited at partners meeting for Sharing Water workshop in Namibia.
Gender elements incorporated into project:	Gender elements under discussion, but partially incorporated into indicators Gender Scope of Work finalized.
Workshop completed:	SW Workshop 1 in Kruger successfully completed
Workshop report completed:	SW Workshop 1 Report completed; SW Workshop 2 Report completed; SW Workshop 3 Report completed
Impact Indicator	
Project successfully launched:	Project successfully launched!

Sharing Water Result 5.2: Sharing Water Workshop #2 in Luanda, Angola
Sharing Water Result 5.3: Sharing Water Workshop #3 in Rundu, Namibia
Sharing Water Result 5.4: Sharing Water Workshop #4 in Kasane, Botswana

SW 5.2, 5.3, and 5.4 Monitoring and Evaluation

Output Indicators	
Logistics for Angola workshop successfully completed	Logistics for Angola workshop begun with pre-workshop trip by D. Hitchcock, NHI to meet with A. Huongo, JEA to Luanda, Angola. Logistics for Angola workshop completed.
Logistics for Namibia workshop successfully completed	Logistics for Namibia workshop initiated with development of a workplan and choosing of dates for the workshop. Logistics for Namibia workshop completed.
Logistics for Botswana workshop successfully completed	Logistics for Botswana workshop initiated with the choosing of dates for the workshop at the project partners meeting in Windhoek on 31-March, 2004. As well, the goals and objectives of the workshop were discussed by project partners, and a preliminary list of potential agenda items developed. Logistical planning for the workshop began in earnest, and the location of the workshop was determined (Kasane, Botswana). Logistics completed.
Active participation at three workshops	Active participation by all partners at project launch and all three workshops.

WORKPLAN OUTLINE AND TIMELINE

Included below is the outline of the workplan for *Sharing Water*. It includes results, task, and subtask descriptions, as well as a rough time line and implementing partner. The workplan is organized by result in the same order as presented above.

Tasks	**Due date**	**Lead**	**Support**	**% Complete**
1.1. Participants recruited and assembled				
a) Consult with OKACOM and SADC WSCU and others to develop list of participants	June-03	IUCN-ROSA	IUCN-B, JEA, NNF	100
b) Outreach to potential participants regarding *Sharing Water*	July-03	IUCN-ROSA	IUCN-B, JEA, NNF	100
c) Draft invitation letters and letters of commitment	July-03	IUCN-ROSA	NHI	100
d) Confirmation of intent to participate in the implementation of Sharing Water	August-03	IUCN-ROSA		100
e) Identify and confirm steering committee members	July-03	IUCN-ROSA	IUCN-B, JEA, NNF	100
f) Discussion of the workplan proposed for *Sharing Water*	October-03	NHI		100
g) Convene steering committee	October-03/July-04	IUCN-ROSA		100

1.2. Legal and/or Institutional Arrangements Analyzed				
a) Determine focus of analysis	June-03	IUCN-ROSA	CSIR, NHI, NNF	100
b) Conduct legal & institutional analysis	September-03	IUCN-ROSA	NHI, NNF	100
c) Prepare draft report and present at March workshop	October-03	IUCN-ROSA	NHI, NNF	100
d) Distribute report for comments	March-04	IUCN-ROSA	NNF	100
e) Prepare final report	January-04	IUCN-ROSA	NHI, NNF	100

2.1. Participants trained to use shared data management system				
a) Assess computer skills of participants	October-03	NHI	HOORC	100
b) Hands on demonstration of data-sharing software	October-03	NHI	HOORC	100
c) Begin to train participants in use of shared Okavango Basin Data-Base	October-03	NHI	HOORC	100
d) Understand existing trends in data	October-03	NHI		100
e) Identify knowledge gaps	December-03	NHI		100
f) Use database as a collaborative learning tool	February-04	NHI		100
g) Discuss data collection needs and assign data collection responsibilities	July-04	NHI	HOORC	100

2.2. Participants trained in conflict management and negotiation training				
a) Release RFP to solicit negotiation partners	May-03	NHI		100
b) Review responses to RFP and contract with partners	June-03	NHI	IUCN-ROSA	100
c) Decide on training curriculum	August-03	CONCUR Inc./AWIRU	NHI	100
d) Design pre- and post-evaluation materials	August-03	CONCUR Inc./AWIRU	NHI	100
e) Implement training at workshop #2	October-03	CONCUR Inc./AWIRU	NHI	100
f) Implement training at workshop #3	February-04	CONCUR Inc./AWIRU	NHI	100
g) Implement training at workshop #4	July-04	CONCUR Inc./AWIRU	NHI	100
h) Evaluate overall training results	July-04	CONCUR Inc./AWIRU	NHI	100

2.3. Participants trained in facilitation skills				
a) Identify small group of facilitators in training	September-03	NHI	IUCN-ROSA	100
b) Design curriculum for facilitators	September-03	CONCUR Inc./AWIRU	NHI	100
c) Distribute reading material and assignments	September-03	CONCUR Inc./AWIRU	NHI	100
d) Design pre and post evaluation materials	September-03	CONCUR Inc./AWIRU	NHI	100
e) Implement training at workshop #2	October-03	CONCUR Inc./AWIRU	NHI	100
f) Implement training at workshop #3	February-04	CONCUR Inc./AWIRU	NHI	100
g) Implement training at workshop #4	July-04	CONCUR Inc./AWIRU	NHI	100
h) Evaluate overall training results	July-04	CONCUR Inc./AWIRU	NHI	100

2.4. Preliminary visions for the basin compiled				
a) Compile written statements of core values, priorities, and visions from existing documents	July-03	IUCN-ROSA		100
b) Develop "draft" visions *	July-03	IUCN-ROSA		100
c) Internal review of "draft" visions	July-03	IUCN-ROSA	CSIR, IUCN-B, NHI, NNF	100
d) Groundtruth visions with stakeholders	September-03	IUCN-ROSA	IUCN-B, JEA, NNF	100
e) Prepare draft report	October-03	IUCN-ROSA		100
f) Prepare final report	December-03	IUCN-ROSA		100

* As described in the Sharing Water Final Report, project partners decided to compile value and vision statements and consult with stakeholders about these instead of implementing a full visioning exercise.

2.5. Management strategies for basin identified				
a) Interview basin participants to understand management constraints and opportunities	August-03	NHI	CSIR, IUCN-ROSA, IUCN-B, JEA, NNF	100
b) Define scenarios to be analyzed *	August-03	NHI	CSIR, HOORC	100
c) Distill scenarios and synthesize management strategies	October-03	NHI	CSIR, HOORC	100
d) Present draft management strategies at SW Workshop #3	October-03	NHI		100
e) Solicit comments and incorporate them in report	December-03	NHI	CSIR, HOORC	100
f) Finalize management report	February-04	NHI		
g) Evaluate the need for additional data to model prioritized management strategies	February-04	NHI	CSIR, HOORC	100
h) Assign additional data collection responsibility	February-04	NHI	CSIR, IUCN-ROSA, IUCN-B, JEA, NNF	100

* WEAP software was provided to those delegats and OKACOM representatives that requested a license.

2.6.Participants trained on modeling software				
a) Develop framework model of basin	February-04	NHI		100
b) Download software to the individual computers of participants	April-04	NHI		100
c) Travel throughout the region to assist with downloading the software *	June-04	NHI		0
d) Provide individualized training in software manipulation	June-04	NHI		100
e) Assess capacity of participants' ability to manipulate the software	July-04	NHI		100
f) Draft plan for additional training	July-04	NHI		100

* Assistance was provided as part of the workshop but time wasn't available for individual assistance.

2.7. Responsibility for data management transferred to participants				
a) Identify participants from the region to invite to the workshop;	April-04	IUCN-ROSA	IUCN-B, JEA, NNF	N/A
b) Raise additional funding for their participation;	May-04	NHI		N/A
c) Conduct a formal river basin planning training exercise	July-04	NHI		100
d) Conduct a formal training on using the website	July-04	NHI		100
e) Divide responsibility for carrying out data updates among participants	July-04	IUCN-ROSA	CSIR, HOORC, IUCN-B, JEA, NHI, NNF	100
f) Draft follow-on plan	July-04	IUCN-ROSA	CSIR, HOORC, IUCN-B, JEA, NHI, NNF	100
g) Meet with OKACOM and WSCU to discuss results and next steps	July-04	IUCN-ROSA	NHI	100

3.1. Data collected and shared data management system built				
a) Review existing data and methods of data collection/storage/retrieval/presentation	July-03	NHI	HOORC, NNF	100
b) Review existing data-base management systems	July-03	NHI		100
c) Generate data wish list	July-03	NHI	CSIR, HOORC	100
d) Determine appropriate database system for use in the basin	September-03	NHI	HOORC, NNF	100
e) Identify and meet with those assigned data collection responsibility	February-04	NHI	HOORC, NNF	
f) Using available data, build database	On going	NHI	HOORC	100
g) Set up website for project and database	February-04	NHI	HOORC	100
h) Ensure compatibility with model	August-04	NHI		100

4.1 Hydrologic planning model selected				
a) Meet with those involved with modeling in the basin	July-03	NHI	CSIR, HOORC	100
b) Describe past, present, and on-going modeling activities in the basin	July-03	NHI	CSIR, HOORC	100
c) Analyze river basin planning tools in terms of suitability for application	September-03	NHI		100
d) Outline all potential modeling parameters	October-03	NHI	CSIR, HOORC	100

e) Conduct interviews to determine controlling parameters	October-03	NHI	CSIR, HOORC	100
f) Draft document outlining modeling parameters	October-03	NHI		100
g) Distribute document for comments	November-03	NHI	CSIR, HOORC, IUCN-ROSA	100
h) Finalize document	December-03	NHI		100
i) Recommend a specific river basin planning model	December-03	NHI		100
j) Work with OKACOM to decide on the most appropriate planning tool *	January-04	NHI	CSIR, HOORC, IUCN-ROSA	100
k) Purchase and begin to install software **	February-04	NHI		100

* Although we presented information on the range of river basin planning models at the OKACOM meeting in Angola, there was not enough time in their agenda to have a full discussion on this topic. Instead, we pursued individual discussions with the modeling experts that OKACOM identified.

** WEAP software made available free of charge to all delegates and OKACOM Commissioners who requested it.

5. Project management and reporting				
a) Convene all project partners and staff	May-04	NHI		100
b) Finalize roles and responsibilities for all partners	August-04	NHI		100
c) Draft and finalize MOU's and subcontracts between all partners	August-04	NHI		100
d) Agree on communication protocols	September-04	NHI		100
e) Determine financial and project status reporting	July-04	NHI		100
f) Gender sensitivity training for all project staff	May-04	NHI		100
g) Finalize workplan, monitoring plan, and timeline	June-04	NHI		100
h) Meet with OKACOM PMU to discuss workplan *	October-04	NHI		100
i) Meet with USAID to confirm overall approach	May-04	NHI		100
j) Brief SADC WSCU on project	October-04	NHI		100
k) Outreach to Angolan partners and participants	May-04	NHI		100
l) Provide logistics for May OKACOM workshop in Maun	May-04	NHI		100

5.2. Workshop (Luanda)	October-03	NNF	IUCN-ROSA, IUCN-B, JEA, NHI	100
5.3. Workshop (Windhoek)	February-03	JEA	IUCN-ROSA, IUCN-B, NHI, NNF	100
5.4. Workshop (Maun)	July-04	IUCN-B	IUCN-ROSA, JEA, NHI, NNF	100

* Although the GEF OKACOM PMU was not established during the life of the project, partners met and consulted with OKACOM repeatedly (see Section II).

Appendix C.

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***Sharing Water* Pre-Project Assessment**

Please take a few minutes to complete this brief questionnaire. The intent is to measure our ability to teach and transfer skills and knowledge over the course of the *Sharing Water* project. **This is not a test**.

Your responses are **anonymous**. However, to link your responses to the post-project assessments next year, we ask that you create a code. To create your personal confidential code number, please write the following:

The first letter of the village/town/city where you were born: _____

The first letter of your mother's name: _____

The year that you started to work: _____

For example, a participant born in **O**puwo from a mother first named **M**oena, and who began work in 19**85** would have the code **O-M-85**.

If an answer to any of the above questions is unknown, please write "XX"

It is important that you write the same code on each questionnaire that requests it. We will include the same reminder questions every time we request your code.

Joint Fact-finding Questions (Circle the correct answer)

1) Which of the following are disadvantages of traditional adversary models?
   a) Only scientists participate
   b) Each side seeks to undermine the other side
   c) Someone forced to pick a winner
   d) Scientists entrusted with policy decisions
   e) I don't know

2) Which one is not an advantage of joint fact-finding?
   a) All interested parties all pool information
   b) All interested parties share costs for technical experts equally

c) All interested parties determine questions to be addressed
d) All interested parties help map areas of agreement/disagreement
e) I don't know

3) In which situation would you not want to use joint fact-finding?
   a) When there is much scientific uncertainty
   b) When there are very significant power imbalances
   c) When there is much disagreement about the quality of the data
   d) When there is much disagreement about the appropriateness or reliability of the methodology proposed for use
   e) I don't know

4) Which of the following is not a principle of joint fact-finding?
   a) Stakeholders should drive the data collection
   b) Stakeholders should have equal access to information
   c) Stakeholders should review technical findings before they are published
   d) Decisions should integrate all kinds of knowledge
   e) I don't know

5) A "Terms of Reference" should include which of the following?
   a) A list of possible candidates
   b) The candidates' education and credentials
   c) A list of selection criteria
   d) All of the above
   e) I don't know

6) In a joint fact-finding process, who selects the team of experts?
   a) The responsible government agency, informed by the stakeholders
   b) The organization(s) paying for the experts, informed by the stakeholders
   c) The stakeholders themselves
   d) Any of the above
   e) I don't know

Mutual Gains Bargaining Questions (Circle the correct answer)

7) What of the following is not true about mutual gains bargaining?
   a) It is based on the idea of creating value and then making strategic tradeoffs across issues so that all negotiators can claim some value
   b) It is typically accomplished by reframing a previously monolithic issue as multiple sub-issues, and then creating options for each of these sub-issues
   c) It allows negotiators to claim what they value most, and trade away what they value less
   d) It guarantees that no party will be left out
   e) I don't know

8) What is your BATNA?
   a) Your "bottomline" or least acceptable alternative
   b) Your aspiration for the negotiation
   c) Your best alternative if the negotiation fails
   d) A secret piece of information you withhold in a negotiation
   e) I don't know

9) In what case does a structured negotiation not make sense?
   a) In a politically and technically complex setting with many competing agendas or shifting regulatory climate
   b) When issues are not clearly identified
   c) When pending regulatory changes pose uncertainty
   d) When stakeholders are relatively well-organized
   e) I don't know

10) What is meant by negotiating parties' "positions"?
   a) The underlying, fundamental goals of the organizations involved
   b) The publicly stated views of the way an issue or set of issues should be resolved
   c) A negotiating party's bottomline on how an issue should get resolved
   d) None of the above
   e) I don't know

11) What is meant by distributive bargaining?
   a) The idea that everyone deserves to have a "piece of the pie"
   b) The idea that everyone deserves to have a fair share of "the pie"
   c) The idea that resolving a problem will yield a winner and a loser
   d) The idea that a mediator or neutral decides who gets what outcome
   e) I don't know

12) A set of ground rules can include which of the following?
   a) Mission Statement
   b) Guidelines on people's behavior
   c) Timetable and work products
   d) All of the above
   e) I don't know

Hydrologic Analysis Questions (Circle the correct answer)

13) Land use changes can affect flows in the river by:
   a) Changing the interception storage of the vegetation
   b) Changing the amount of evapotranspiration occurring on the land
   c) Changing the amount of runoff from the land
   d) All of the above
   e) I don't know

14) A storm with a 5% probability of occurring in any year has a recurrence interval of:
   a) 1 year
   b) 5 years
   c) 20 years
   d) 50 years
   e) I don't know

15) Groundwater pumping can impact stream flows by:
   a) Raising the water table
   b) Attenuating flood peaks during storm events
   c) Reducing the baseflow into a river
   d) Groundwater pumping does not impact stream flows
   e) I don't know

16) Precipitation in the Okavango/Cubango Basin is generally:
    a) Fairly equally distributed across the basin
    b) Significantly greater in the east than in the west
    c) Less in the headwaters and increasing downstream
    d) Greater in the headwaters and less downstream
    e) I don't know

17) Interception loss is greatest when?
    a) At the end of a storm when the available interception storage is largest
    b) At the beginning of a storm when the available interception storage is largest
    c) At the end of a storm when the available interception storage is smallest
    d) At the beginning of a storm when the available interception storage is smallest
    e) I don't know

18) Lumped hydrologic models like the Pitman Model:
    a) Are statistical relationships between rainfall and runoff.
    b) Track the actual movement of water thought a watershed.
    c) Aggregate variable properties of a watershed into an aggregated representation.
    d) Are useful in evaluating the impact of hydraulic structures such as dams and diversions.
    e) I don't know

Transboundary River Management Questions (Circle the correct answer)

19) The primary focus when negotiating transboundary water management should be on:
    a) Gaining access to each state's equitable share
    b) Determining future access based on prior use
    c) Thinking in terms of "benefit-sharing' – of which water is but one of a variety of benefits made possible by the river
    d) All of the above
    e) None of the above

20) International water agreements:
    a) Infringe on the sovereign status of independent states and should not take precedence to national laws
    b) Are likely to lead to increased rivalry between basin states
    c) Lead to a greater degree of regional integration and can spill over into cooperation over other issues
    d) Are not likely to have an impact on relations between states – the most powerful state will always be able to exercise its will over the other basin states
    e) None of the above

21) The water resources of the Okavango River are:
    a) Sufficient for each of the basin states to satisfy their anticipated future water needs, including local food production
    b) Sufficient to cover present water uses, but not enough to cover an increase in demand
    c) Already under severe pressure with ecological damage likely if water use is not reduced
    d) Reduced because of climate change
    e) C & D above

Three Extra Questions for Facilitators (Circle the correct answer)

1) Which one is <u>not</u> the purpose of a stakeholder assessment?
   a) To assess the zone of agreement and whether it makes sense to proceed
   b) To ensure parties feel adequately informed and represented
   c) To vet possible packages of agreements
   d) To build relationships
   e) I don't know

2) Which of the following is considered best practice for flipchart recording?
   a) Stick to only one flipchart if possible to maintain focus
   b) Use many different colors to provide visual interest
   c) Encourage corrections and clarifications while writing
   d) All of the above
   e) I don't know

3) Which of the following is not considered best practice for framing an agenda?
   a) Develop a sequence of issues based on feedback from stakeholders
   b) Review sequence with participants
   c) Frame agenda to tackle major issues first
   d) Frame items as issues to be resolved and interests to be reconciled, not positions
   e) I don't know

Appendix D.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Workshop Evaluations

October 2003, April 2004, August 2004

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SHARING WATER:
NAMIBIA WORKSHOP
EVALUATION SUMMARY REPORT
January 8, 2004

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I. General Themes: Positive and Areas for Improvement
II. Key Questions
III. Summary of Ranking for Individual Presentations.

Introduction:

The following document includes a summary analysis of the Post Angola Workshop Evaluations. The document is divided into three sections:

1. General Themes
2. Key Questions Culled from Evaluations
3. Summary of Individual Presentations

I. General Themes: Positive and Areas for Improvement

Based on a qualitative survey of participant responses[1] to the October Sharing Water Workshop in Angola, we were able to surmise general themes, including both positive themes and areas for improvement. These are as follows:

Positive Themes:

- Participants greatly **appreciated the hands-on exercises** that took place (e.g. Three-Party Water, Model Exercise). Although, it should be noted that there was a range of opinion regarding the effectiveness of the modeling exercise, as dependent on technical background.
- All participants **appreciated the chance to interact with one another**, and share experiences.
- There were a significant number of extremely positive reviews for specific presentations, most notably: Tony Turton's, Peter Ashton's and Tamar Ron's.
- In general, participants seemed to **appreciate presenters from the region** (e.g. from Southern Africa).

Areas for Improvement:

[1] Twenty-three English-speakers (Namibians, Botswanans, and perhaps South Africans) and thirteen Angolans filled out the evaluations. Not every respondent answered every question.

- Participants not only want **more practical exercises**, they want more time allotted to these exercises.
- A number of participants stressed the importance of **"knowing your audience"**. This would ensure that presenters are presenting the correct/adequate level of information and training. These comments were made with particular reference to CONCUR's presentations, and the Pitman exercise. In particular several participants felt that the level of CONCUR's presentations and the Pitman exercise was pitched too low. Others felt they needed more background (for the Pitman model).
- A number of participants wanted **more time to work on the Data Matrix/Data Base**. Several participants expressed the importance of this exercise, and the disappointment they felt at not focusing on the topic enough.
- A significant number of **Angolans noted their disadvantage**, due to language barriers and translation problems and/or errors.
- Several Angolans made mention of wanting **more practical information** on basin management. This could point to differences in background, but it is important to consider for future workshop planning.
- The majority of participants had a strong opinion regarding the **choice of accommodations and conference site**. Although some appreciated the switch to the Hotel Alvalade, a few people noted the hassle in terms of commute and the sensitivity one must have with project partners in terms of decision-making.

II. Key Questions:

Reflecting on the aforementioned themes, it is necessary to consider how to incorporate them into useful planning for future workshops and project developments. Specifically, the themes raise a series of questions that should be addressed in subsequent debriefing meetings, partner meetings, and planning sessions. These questions could include:

1. How can future workshops be structured so as to include more active/participatory learning and hands-on training?
2. To what extent was the past workshop "outsider"-heavy, and how can future workshops incorporate the opinions expressed (directly or indirectly) of wanting more involvement by people from the region?
3. How can future workshops be structured so as to meet the needs of participants with different technical backgrounds, areas of interest, and skill sets?
4. In what manners will we ensure that Angolans feel equally included in future workshops, both in terms of language barriers and technical training?
5. How can logistical efforts be improved so as to provide the conference facilities and accommodations that are in line with participant needs and make the learning and exchange of information and knowledge as stellar as possible?

III. Summary of Ranking for Individual Presentations.

The Post-Workshop evaluation provided participants with the opportunity to rank each presentation (from 1-5) based on the following attributes: relevance, stimulation, informative, effectiveness and pace. An average of all five ranks was taken for each presentation. English and Portuguese responses were considered separately at first, and then combined, so as to consider whether differences could be found between the two groups. In comparing the overall averages for both groups, there appear to be significant differences (if we look to the first decimal place).

Average for Each Presentation:

English Responses

Presentation	**Organization**	**Overall Avg**

Transboundary	AWIRU	4.4
Basin Overview	CSIR	4.3
Data Matrix	NHI	3.9
Pre-Communication	NHI	3.9
3 Party	CONCUR	3.8
Sharing Water	NHI	3.8
Visioning, Tabeth	IUCN	3.7
Mutual Gains	CONCUR	3.6
Pitman	IUCN/NHI	3.6
JFF	CONCUR	3.4

Portuguese Responses

Presentation	**Organization**	**Overall Avg**
Mutual Gains	CONCUR	4.4
Basin Overview	CSIR	4.2
Sharing Water	NHI	4.1
Pitman	IUCN/NHI	4.0
Transboundary	AWIRU	4.0
Data Matrix	NHI	4.0
3 Party	CONCUR	4.0
Visioning	IUCN	4.0
JFF	CONCUR	3.8
Pre-Communication	NHI	3.5

Combined Responses

Presentation	**Organization**	**Overall Avg**
Basin	CSIR	4.3
Transboundary	AWIRU	4.2
Sharing Water	NHI	4.0
Data Matrix	NHI	4.0
Mutual Gains	CONCUR	4.0
3 Party	CONCUR	3.9
Visioning	IUCN	3.9
Pitman	IUCN/NHI	3.8
Pre-Communication	NHI	3.7
JFF	CONCUR	3.6

Comment on English Ranking:

- The Botswanan and Namibian responses rank AWIRU and CSIR at the top. This seems to reflect the general theme of both appreciating and asking for increased Southern African participation at the workshop.
- The Data Matrix activity, and the 3-Party Sharing were among the next highest. This seems to reflect two things: 1) Most participants found that the Data Sharing was a critical part of the workshop and the project (see below for more details). Secondly, the 3-Party Water Sharing exercise was an active-learning, activity-based exercise that a majority of participants desired more of.

- The fact that the lowest ranking presentation was Joint Fact-Finding could reflect the opinion that many participants expressed of wanting "less theory" and more hands-on practice.

Comments on Angolan Rankings:

- There was less clear of a distinct gradient in ranking. CONCUR's Mutual Gains exercise and CSIR's overview of the Basin received the highest ranking. It should be noted that the mutual gains exercise seems to be understood as the "Three Party Water" exercise (hands-on).
- The majority of presentations received a similar ranking.
- The lowest ranking was the pre-workshop communication and CONCUR's Joint Fact-Finding. Comments on pre-workshop communication seemed to indicate that there was a delayed invitation process in Angola. This could be part of the reason the Pre-workshop communication ranked lowest. The lower ranking for CONCUR's JFF could be the same as explained above.

Comments on Combined Ranking (English-speaking and Angolan responses):

- CSIR and AWIRU rank highest
- The data matrix receives a high ranking, for reasons discussed previously (though see additional comments below)
- CONCUR's mutual gains and 3 Party Water exercises fall in the middle tier—likely reflecting that participants liked the hands-on components.
- A likely reason for the Pitman exercise's low ranking is two-fold: Though participants appreciated the hands-on aspects, several participants felt the exercise was too basic. Another cohort felt not enough time was allotted to this exercise.

Organizational Comparison

- It is worthy to note that overall, AWIRU and CSIR ranked higher than NHI, IUCN and CONCUR

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Delegate Evaluations: Summary

Introduction:

The following document includes a summary analysis of the Post Namibia Workshop Evaluations. The document is divided into four main sections:

4. General Themes
5. Key Questions and Specific Changes for Future
6. Summary of Individual Presentations
7. Summary of Answers to General Questions about Workshop

I. General Themes: Positive and Areas for Improvement

Based on a qualitative survey of delegate responses[2] to the March *Sharing Water* Workshop in Namibia, we were able to surmise general themes, including both positive themes and areas for improvement. These are as follows:

Positive Themes:

- In general, the workshop was reviewed very positively, and the majority of presentations and exercises received positive reviews (Average Overall of 4.29 out of 5.00).
- The majority of delegates felt the level of material was relevant to their professional duties, and had continuity with the first *Sharing Water* workshop in Luanda, Angola.
- The majority of delegates felt they had sufficient time to interact with one another, and adequate opportunity to express their views and opinions.
- There were a significant number of extremely positive reviews for specific presentations, most notably: John Mendelsohn's Okavango Profile, Peter Ashton's Draft Management Strategies, and David Purkey's Model Evaluation and Selection Criteria.
- Delegates unanimously acknowledged that the workshop was well organized, and the accommodation of appropriate quality.
- Delegates were satisfied with the English / Portuguese translation and interpretation.

Areas for Improvement:

- Delegates wanted **more time for discussion** on the specific issues raised following plenary presentations, and **more time allotted to the hands-on exercises.** This was the most consistent feedback contained in the evaluations.
- A number of delegates requested that more specific background **information be provided in advance of the workshop** so that they could arrive at the workshop better prepared to comprehend and assimilate the subject matter.
- With specific regard to the hands-on computer exercises, several delegates requested that the break out groups be selected according to profession and background rather than nationality so that **specialists in each field could interact**

[2] Fourteen English-speakers (Namibians, Batswana, and perhaps South Africans) and five Angolans filled out the evaluations. Not every respondent answered every question, in particular the Angolan respondents.

directly. (Note: these nationality-based groups were a byproduct of the way that delegates choose to sit at the workshop, as computers were distributed to the seated delegates).

- Angolan delegates indicated that presentations were **presented too rapidly**, in particular presentations involving new concepts or inherently complex subject matter.
- Delegates were **disappointed** with the presentation of the Legal Analysis (legal bias seen as overriding policy, not thorough enough), Institutional Analysis (needed more analysis of the function and effectiveness of institutions), and the Exercise Driven Training on the use of the Shared Database (not all questions posed for exercise functional with existing database).
- One delegate mentioned that the workshop would have been more valuable if **more contact between the three delegations** could have been incorporated into the programme and activities.
- One delegate expressed interest in seeing **more presentations made by members of the three Basin States.**

Suggestions for Future Questionnaires:

- There is a strong need to get more workshop evaluation forms filled out and submitted by project delegates, and a structure should be put in place to ensure that this happens. Project delegates should be required to hand in an evaluation form to an individual waiting at the exit at the conclusion of the workshop.
- In the evaluation forms ask for country of origin to track responses by different countries.

II. Specific Changes for the Future and Key Questions:

Reflecting on the aforementioned themes, it is necessary to consider how to incorporate them into useful planning for future workshops. Specifically, the themes are a mandate for specific changes in the next workshop, and raise a series of questions that should be addressed in subsequent debriefing meetings, partner meetings, and planning sessions. These questions could include:

Changes

6. The next workshop must be less packed with new subjects or topics, allowing more time for discussion following presentations, and more time for each break-out discussion and hands-on exercise.
7. Specific technical and conceptual information should be distributed to delegates prior to the next workshop so that they can adequately prepare themselves. Recommend a "pre-workshop packet" be put together by project partners and distributed 7-10 days prior to the workshop.
8. If the content of a presentation is new or complex, presenters should take special care to slow the pace of their presentations, in particular to allow adequate time for translation.

Questions

9. How can the next workshop be structured so that members of the three Basin States take on a more active role?

10. How can future workshops be structured so as to encourage more interaction between the three delegations?
11. How can presentations and exercises be structured so they are "ground truthed" with activities in the Basin?
12. How can the project make sure that each and every delegate (specifically those with a minimum of technical expertise) understands the role of information and technical tools in transboundary river basin management?

III. Summary of Ranking for Individual Presentations.

The Post-Workshop evaluation provided delegates with the opportunity to rank each presentation and exercise (from 1-5) based on the following attributes: relevance, stimulation, informative, and effectiveness, with 5 being the highest rank. An average of all four ranks was taken for each presentation and exercise. English and Portuguese responses were considered separately at first, and then combined, so as to consider whether differences could be found between the two groups.

Several of the Portuguese speaking respondents did not select a rank on all four of the attributes, and therefore the actual impact of their opinion on the overall average is smaller than expected based on the fact that they constitute over ¼ of the respondents. For this reason, the data distinguishing the English from Portuguese speaking respondents is not strong enough to merit more than cursory analysis (see raw data).

Average for Each Presentation & Exercise:

Presentation	Organization	English Average	Port. Average	Overall Average
Draft Management Strategies	CSIR	4.79	3.92	**4.60**
Workshop Goals & Objectives	NNF	4.61	4.48	**4.59**
Sharing Water to Sharing Benefits	AWIRU	4.61	4.42	**4.58**
Model Eval. & Selection Criteria	NHI	4.54	4.52	**4.53**
Okavango Profile	RAISON	4.46	4.35	**4.44**
Sharing Water & Progress Report	NHI/ IUCN	4.43	4.48	**4.43**
Manzini Lake Simulation	AWIRU	4.43	4.42	**4.43**
Shared Okavango Database	RAISON	4.43	4.33	**4.42**
Pre-workshop Communication	NNF	4.30	4.88	**4.39**
Parallel National Action (PNA)	AWIRU	4.38	4.17	**4.35**
Exercise Shared Database	RAISON	3.85	4.38	**4.25**
Hydrological Processes	NHI	4.15	4.54	**4.21**
Scenario Development PNA	AWIRU	4.21	4.13	**4.21**
Workgroup Discussion Profile	RAISON	3.85	4.17	**3.94**
Institutional Arrangements	IUCN	3.79	3.75	**3.78**
Legal Framework	IUCN	3.56	4.17	**3.66**
Average for all presentations	**ALL**	4.30	4.28	**4.29**

Comments on Rankings:

- Draft Management Strategies (CSIR), Workshop Goals and Objectives (NNF), Sharing Water to Sharing Benefits (AWIRU) and Model Evaluation and Selection Criteria (NHI) received the highest rankings.
- The Legal Framework (IUCN ROSA), Institutional Arrangements (IUCN ROSA), and the Workgroup Discussion for the Okavango Profile (RAISON) rank substantially lower than the other presentations and exercises. This lower ranking is likely due to less comprehensive preparation invested into these presentations and exercise. Concerning the Legal Framework, the low ranking is also likely due to the fact that many delegates disagreed with some fundamental points made in the presentation, specifically related to the issue of whether policies were higher order instruments than laws.
- The average ranking for all presentations was nearly identical for the English speaking versus the Portuguese speaking respondents. The Portuguese speaking rankings, however, are less extreme in both positive and negative directions.

IV. Pace of Individual Presentations

Delegates were asked to rank the pace of each presentation with 1 being too slow, 5 being too fast, and 3 ideal.

Average Pace Each Presentation & Exercise (3 is ideal):

Presentation	Organization	English Average	Port. Average	Overall Average
Sharing Water & Progress Report	NHI/ IUCN	3.31	3.67	**3.38**
Workshop Goals & Objectives	NNF	3.29	4.33	**3.47**
Water Sharing to Benefit Sharing	AWIRU	3.43	3.75	**3.50**
Okavango Profile	RAISON	3.14	3.67	**3.24**
Workgroup Discussion O. Profile	RAISON	3.00	4.00	**3.20**
Shared Okavango Database	RAISON	3.21	4.33	**3.41**
Exercise shared Database	RAISON	3.25	4.00	**3.44**
Manzini Lake Simulation	AWIRU	3.14	4.33	**3.35**
Legal Framework	IUCN	3.00	3.50	**3.07**
Institutional Arrangements	IUCN	3.36	4.00	**3.44**
Hydrological Processes	NHI	3.54	4.67	**3.75**
Parallel National Action (PNA)	AWIRU	3.43	3.50	**3.44**
Scenario Development PNA	AWIRU	3.45	4.00	**3.54**
Draft Management Strategies	CSIR	3.25	3.67	**3.33**
Model Eval. & Selection Criteria	NHI	3.46	4.50	**3.71**
Average for all presentations	**ALL**	3.28	3.99	**3.42**

Comments on Pace:

For English speaking respondents the pace was near to ideal at an average of 3.28. Portuguese speaking respondents indicated that presentations were more rapid than they would prefer with an average of 3.99. The ranking of certain presentations as "too rapid" may have less to do with the speed of the speech of the presenter and more to do with the content of the material presented. Presentations that included concepts that were entirely new to many delegates or complex by nature (Hydrological Processes, Model Evaluation and Selection Criteria, Manzini Lake Simulation, and the Okavango Profile) received average ratings that indicated they were too rapidly presented, in particular among Portuguese speaking respondents.

V. Summary of Specific Comments on Individual Presentations

1. **Monday Morning: Sharing Water Project Goals & Objectives and Progress Report: (Elizabeth Soderstrom, NHI & Tabeth Chiuta, IUCN ROSA)**
    - Please provide copies of this information in advance.
    - Very good.
    - This presentation was very valuable and it is clear we have gained a lot in Angola through this project.

2. **Monday Morning: Goals and Objectives of the Workshop, the Agenda, and Practical Issues (Chris Brown, NNF)**
    - Allocate more time.
    - Allow delegates the opportunity before the workshop to provide feedback on the goals and objectives, so this input can be assimilated into the programme.

    Delegates were then asked the following question:
    Following the first two presentations, was the context of the project and workshop adequately defined?
    - Delegates unanimously answered "yes" to this question.

3. **Monday Morning: Keynote Address - From Water Sharing to Benefit Sharing (Tony Turton, AWIRU)**
    - There was some repetition of the presentation given in Luanda.
    - The presentation should include specifically outlining the benefits, especially in Botswana.
    - Keep the same form and presentation - excellent.
    - The presentation was very fast.

4. **Monday Morning: Presentation & Discussion of the Okavango Profile (John Mendelsohn, RAISON)**
    - More time should be allowed for thematic discussion.
    - Presentation too long.
    - It was too detailed – always provide salient points.
    - Good information.

5. **Monday: Workgroup discussion on issues raised by the Okavango Profile (John Mendelsohn, RAISON)**
    - Not sufficient time for discussion.
    - Too short – recommend thematic rather than country groups to allow specialists in each field to interact directly.
    - Not an effective session – facilitation was weak, and little discussion.
    - Clear questions should be provided.

6. **Monday Afternoon: Presentation of the Okavango Database (John Mendelsohn, RAISON)**
    - Good information.
    - The database needs to be updated – the presentation was OK.
    - Needed more time to familiarize with database.

7. **Monday Afternoon: Exercise Driven Training in the Use of the Shared Database (John Mendelsohn, RAISON)**
    - The presentation was too fast – therefore the message that was transmitted was in a certain way only partially understood.
    - Missing data sets.

8. **Tuesday Morning: Manzini Lake Simulation: From Sharing Water to Sharing Benefits on Manzini Lake (Anton Earle, AWIRU)**
    - Good, but initially confusing. Too controlled – less information would allow more scope for innovation by players.
    - Needed to spend more time, since this is a practical exercise and teaches skills needed for us stakeholders.
    - Not enough time – too much information to absorb. Hydrology data could have been presented more clearly.
    - Would prefer to use the Okavango for the simulation and group discussion. Include members of different countries to make discussions lively.
    - Provide more guidance on issues to be negotiated.

9. **Tuesday Morning: Defining the Legal Framework for the Shared Okavango Basin (Ms. Nyasha Chishakwe, IUCN ROSA)**
    - Speaker had a legal bias that was seen as overriding policy. Needs much more discussion.
    - Not done well at all – should not have been presented at all.
    - All legislation must be read thoroughly to familiarize with all the policies and acts of all countries.
    - Check existing instruments in the Basin states - what are the types of existing laws?
    - There needed to be better context and detail to allow for more clarity and understanding.

10. **Tuesday Morning: Institutional Arrangements Options for the Effective Development and Management of the Okavango Basin (Ms. Tabeth M. Chiuta, IUCN ROSA)**
    - Not sufficient time for discussion.
    - Needed more analysis of the function and effectiveness of institutions. This presentation was mostly a list of different groups.
    - OK as interim report, but needs improvement.
    - Please present the practical aspects of the matter.

11. **Tuesday Afternoon: Understanding Hydrologic Processes: A Hands-On Exercise Using the Pitman Model (David Purkey, NHI)**
    - More time should be allocated.
    - Give background on model and its parameters rather than guessing and black box.
    - Should not be billed as "training" in hydrological modeling but as demonstration of the use of one of the potential tools as well as an exploration of concepts introduced.
    - Take into account the educational background of the delegates – needs to be slower to accommodate some of those who are not professionals in this area.
    - Good presentation.
    - Would like to have been provided with a CD of the Pitman model to be able to study beforehand, and also after the workshop in our home country.

12. **Tuesday Afternoon: Parallel National Action (PNA) adapted to the Okavango Basin (Tony Turton, AWIRU)**
    - More time should be allocated.
    - This is a need for the Basin and a core issue of the workshop.
    - Good example of collaborative work by states.

13. **Wednesday Morning: Exercise: Scenario Development Associated with PNA (AWIRU)**
    - Allow enough time to achieve something meaningful.
    - No overnight break would be better.
    - More practice is needed.

14. **Wednesday Morning: Presentation of Draft Management Strategies (Peter Ashton, CSIR)**
    - Good presentation – applicable beyond Basin Management and the Okavango.
    - More time to be allocated.
    - Provide handouts in color.

15. **Wednesday Morning: Criteria for Model Evaluation & Selection (David Purkey, NHI)**
    - Good work.

- For the presentation to be more valid, it would be necessary to have more time available for practical exercises, so that the audience can relate to the different models.
- Add local examples. Keep in mind that this is one option and one aspect of that option – this demonstration as a tool that may be used that OKACOM may consider, not what should be done/will be done. Stress this in any future presentations in this line.
- Needs to be linked to broader decision support system that evaluates economic benefits – i.e. "sharing benefits" needs to be included, not just "sharing water."

16. Pre-Workshop Communication

- Much better than first workshop.
- Organize workshop committee which must be multidisciplinary.

VI. Summary of Main Themes of Answers to General Questions

Note: The following attempts to summarize the main points presented in the answers to each of the general questions. Given the fact that not all delegates answered each question, and that one person could comment on more than one aspect of the question, the summary is presented in a qualitative, rather than quantitative format (although quantitative information is available with regards to certain questions). In cases where there was a clear divide between Angolan vs. Batswana and Namibian responses, the two language groups are considered separately.

1. What part of the workshop did you think was most effective?

Summary of Key Points:

- Group discussions and facilitation of dialogue between delegates (mentioned four times)
- Model Evaluation and Hydrological Processes (mentioned four times)
- Draft Management Strategies (mentioned four times)
- Okavango Profile and database (mentioned four times)
- Hands-on exercises (mentioned three times)
- Negotiations about sharing water and benefits (mentioned once)
- Legal & Institutional Analysis (mentioned once)

2. How could the workshop be improved?

Summary of Key Points:

- More time allotted for discussions and questions
- More time for practical / hands-on exercises
- The schedule was too ambitious and gave brief introductions to many concepts

- The objectives of the workshop could have been more valid/applicable if the contact between the members of the three delegations could be more related.

Less noted, but important to note were the following comments:

- Involve more presenters from the three Basin states
- Presentation of more practical materials as opposed to theoretical/academic matter
- Following each break, encourage delegates to move and sit next to someone else and introduce themselves to break down barriers and improve interaction.
- Using the plenary room for break-out sessions is not optimal

A number of people also noted that the workshop went exceptionally well and did not need improvements.

3. Was the level of material presented relevant to your professional duties?

Summary of Key Points:

- Twelve of fifteen respondents answered "yes" to this question. Several explicitly stated how beneficial the material was and that they would definitely use the information in their professional duties.
- The three respondents that did not answer "yes" answered that some of the material was relevant, and some was not.

4. Was the daily workshop agenda active and full enough? Too much information or activity? Not enough information or activity?

Summary of Key Points:

- The majority of delegates answered "yes" to the question of whether the agenda was full enough (nine of thirteen).
- Several delegates mentioned that their was too much information provided in too short a period of time, and that if they were provided with material beforehand to prepare then this overload of information could have been prevented.

5. Did you feel like you had sufficient opportunities to meet and exchange experiences with other delegates?

Summary of Key Points:

- The majority of respondents felt they had sufficient opportunities to meet and exchange experiences with other participants (ten of twelve).
- One respondent stated "mostly" and one "no."

6. Were you provided with adequate opportunity to express your views and opinions?

Summary of Key Points:

- There was an overwhelmingly positive response to this question, with fourteen of fifteen respondents stating that they were provided with adequate opportunity to express their views and opinions.

7. Was the English/Portuguese translation adequate? Clear? Prompt?

Summary of Key Points:

- Three of Four Portuguese speakers answered "yes" to this question. One Portuguese speaking respondent mentioned that not all the written material was translated, but that it was much better than the first workshop.
- All ten English speakers responded "yes" to this question.

8. Do you have a better sense of the role of data and databases in transboundary river basin management?

Summary of Key Points:

- Nine respondents answered affirmatively to this question, and four respondent's answers indicated that the were still unclear about the role of data and databases in transboundary river basin management

9. Did you feel that the workshop had continuity with the first Sharing Water workshop in Luanda, Angola?

Summary of Key Points:

- Ten of eleven respondents answered that they felt the workshop had continuity with the first *Sharing Water* workshop.

10. Please comment on workshop accommodations and logistics.

Summary of Key Points:

- The vast majority of delegates were very positive about the accommodation and logistics.
- The only complaint was concerning delegates who had to share rooms.

Evaluations of Facilitation and Negotiation Training

I. Introduction

On March 27-28, CONCUR and AWIRU conducted a training course on "Facilitating in the Context of Collaborative Natural Resource Planning and Joint Fact-Finding" as a component of the second *Sharing Water* workshop held in Windhoek, Namibia. This course is the second in a series, and is a core component of the *Sharing Water* Project. The aim is to present to a select group of facilitators specialized training at each of the three workshops focused on facilitating complex, multiparty negotiations and technical joint fact-finding processes. The goal is to build capacity in the region and create opportunities for local facilitators to gradually assume increasing responsibility for facilitating future dialogues and deliberations.

This course featured a combination of brief presentations, lecture, class discussion, and simulation exercises, and debriefing. There were about 9-12 participants altogether, including designees from each of the three Basin States, and 2-3 representatives from each of the following organizations: NHI, IUCN-ROSA.

Staffing of the course was an intensive team effort carried on between CONCUR and AWIRU. Scott McCreary, Tony Turton, and Anton Earle teamed as instructors in the design, development and refinement of specific curriculum modules. Tony Turton and Anton Earle took the lead in presenting the course on Day One; on Day Two they worked as a team alongside Scott McCreary.

II. Refinement of the Facilitation Training Curriculum Based On Feedback from Luanda Workshop

Based on careful consideration of feedback from participants, as well as internal discussion with NHI, and among AWIRU and CONCUR, we introduced several important changes. First, the team of instructors made a concerted effort to organize the training around southern Africa examples. Second, we shifted the teaching emphasis from one that emphasized lectures to a stronger emphasis on elicitive methods and discussion. Third, CONCUR and AWIRU jointly designed each curriculum module—in some cases working through much iteration of materials. Fourth, we shifted the teaching emphasis to AWIRU, with Tony Turton and Anton Earle taking a lead role the course on Day One; Scott McCreary teamed with Anton and Tony in team teaching on Day Two.

At the conclusion of the course for Workshop 2, we asked participants to evaluate the training. To guide them in that process, we provided them with a 7-page evaluation form. We solicited both quantitative and qualitative comments on the overall course, each simulation exercise, and each instructor. Specifically for each component, we requested feedback on the level of organization, as well as the degree to which it was stimulating, informative, responsive, effective, and/or relevant. We also requested feedback regarding the pace of each presentation or simulation exercise. Additionally, we asked participants how the course could be improved, and how the simulation exercises could be made more

valuable to them. Their responses to these questions are incorporated by reference, but not repeated here in detail.

III. Key Highlights

Our overarching finding from the evaluations is that the systematic effort to adapt the curriculum was recognized and appreciated. A second overarching finding is that every single respondent indicated that the material presented was directly relevant to his or her work in southern Africa.

Each Training Module, Simulation, and Instructor was rated on a scale of one to five, five being the highest. In almost all cases, the ratings for the overall class presentation and the quality of the simulations was high. In general, the average score for each of the components was 4.

The approach to overall class organization was well received, as evident from an increase in the average ranking from 4.08 in Luanda to 4.67 for the Namibia workshop. As for how stimulating the course was, it received an average ranking up 4.33, up from 3.97 in Luanda. It was scored very high as being informative (an average of 4.44 as contrasted with to 3.77 in Luanda).

Simulations were also very well received. AWIRU and CONCUR jointly crafted two new simulations. The Mzuki Wetland simulation created a scenario in which class members were to team to develop a strategy for local consultation on a proposed RAMSAR site designation. The exercise was framed as an opportunity for a consultative activity. One respondent noted "Mzuki provided issues I could relate with."

The Manzini Lake simulation built on the basic structure introduced in the Three Way Water negotiation in Luanda, but added complexity with more parties, more issues, and an effort to reframe “sharing water” to “sharing benefits.” Based on the experience gained in the facilitation course, we then asked the trainees to serve as the facilitators for this exercise in the main *Sharing Water* workshop.

Following the training, participants served as facilitators and session chairs during the main plenary workshop. In this process facilitators learned strategies for managing the complexity inherent in building consensus on complex natural resource issues. These challenges are both logistical (rounding up participants, managing time effectively) and conceptual (finding potential "zones of agreement" among multiple issues; how best to track progress toward building agreements, as in how to structure "straw votes.") In particular, facilitators saw that as issues are linked, it is often not possible to resolve one issue at a time.

Interestingly, the average scores for the simulations were very close to the rankings for the simulation exercises we presented in Luanda. With respect to “relevance”, the Mzuki wetland was ranked at 4.67; the relevance score for the first simulation we ran in Luanda was 4.63. Ratings for “stimulating, informative, and effective were also quite close—though overall a bit higher at the Namibia workshop

- Every student commented that the content material was directly relevant to his or her work and the region, and as many commented that the level of information was also very relevant to their duties
- As we saw in Luanda, many respondents stated that the most effective part of the workshops were the training simulations and practical exercises.
- Several students noted that the Modules that involved a mix of short presentations and elicitive discussions were very informative.
- More than half of the students noted that the changes implemented were noticeable and effective.
- Multiple students commented that they will be able to adapt the skills learned to their daily work, and one student noted that s/he felt that the workshop has helped them become a better and more skilled facilitator.
- One student expressed great appreciation for being able to attend the workshop, which "provided knowledge and skills to improve the quality of our country and community".

IV. Additional Findings and Preparations for Workshop Three

Continued Focus on Southern Africa Region: Building on the focus on southern Africa cases, we see opportunities to bring forward still more examples from the region. This can take the form of both real world experiences with environmental decision making, as well as simulated scenarios that are set directly in the Okavango Basin. We agree with the suggestion of encouraging others in the course to share their experiences and then using the expertise in the class to consider other possible options him or her.

Potential Topics for Workshop Three: To address the needs of the participants, at the next workshop we have identified several candidate topics. These include (1) how to plan and structure a stakeholder workshop; (2) techniques for conflict resolution in the context of multistakeholder collaboration; (3) dealing with difficult stakeholders, (4) how to target efforts to different types of stakeholder groups, and (5) bridging local and transboundary institutional arrangements and dealing with cultural / institutional issues in this transboundary context. We are mindful of the need to make choices so as not to overload our next two-day session; we will be in touch with trainees and invite them to help shape the next curriculum.

Creating Still Greater Opportunities for Trainees. Based on the comments we heard informally after the workshop, we see opportunities for facilitation trainees themselves to step up and exert greater leadership in the course and in the plenary workshop. This approach has several dimensions. One goal, which CONCUR and AWIRU intend to implement in the next training, is to create an opportunity for Mapule Kgomomgoe to take the lead in presenting one or more modules. As one student noted, "She has the capabilities and she can perform well given the chance." A second concept is to have trainees themselves introduce short modules.

Pacing of the Training Workshop: A major lesson reinforced is to plan for a moderately paced schedule of activities; that is, we should not try to overload the schedule course time with too many modules. We need to budget in ample time for each participant to share their insights and experiences. This sharing is one of the most powerful elements not only in terms of building skills through the knowledge-sharing, but also in terms of building relationships between the participants from each of the Basin states who may be called upon to work together in the future.

Timing and Scheduling Issues: We had intended to create a shortened schedule on Day Two—with a later start time, and an ending time in the mid-afternoon. In practice, we did start a bit late on Day Two, but continued until nearly 5 pm. This timing seemed to work relatively well, but afforded a very small break before the pre-workshop Partners meeting

Recruitment and Participation Issues: Given the slight attrition we have already experienced in the ranks of our facilitation trainees, and the strong likelihood that at our third workshop some of our Botswana colleagues may be very focused on preparation for the main workshop, we would like to recruit 1-3 new participants. We suggest that the selection criteria include such considerations as (1) trainee has a professional position with an important national ministry, NGO or Project Partner; (2) trainees possess basic familiarity and experience in facilitation, (3) trainees commit to review the materials from the first two courses, and commit to attend the entire Facilitation Training session in Botswana.

Appendix I.
Sharing Water Project Facilitation Training Course II Evaluation Written Comments

This appendix documents all written comments received and is organized according to the questions asked on the evaluation form. The confidential evaluations were lettered A through I. The letters here correspond to the excel spreadsheet as well. For those evaluations that did not have written comments under various topics, we simple deleted those letters under those headings.

OVERALL COURSE PRESENTATION AND DISCUSSION

A	Use more examples and slide pictures e.g. from Tony's presentation
H	More time could be provided to develop the thoughts presented further and enrich them with real experiences.

MODULE #1: THE FRAME: COLLABORATION IN THE CONTEXT OF NATURAL RESOURCE MANAGEMENT

E	So far it's good; Needs more time for planning exercises
H	not present when this was done but quite a good compilation of relevant expectations

MODULE #2: FACILITATING INFORMATION SHARING AND JOINT MODEL DEVELOPMENT; FACILITATING DEVELOPMENT OF MANAGEMENT OPTIONS: REGIONAL CASE STUDIES

E	Try to find more examples in the countries that are involved

MODULE #3: RISING TO THE CHALLENGE: STRATEGIC PLANNING, DEALING WITH DIFFICULT PEOPLE AND PROCESS BREAKDOWNS

There were no written comments for Module #3.

MODULE #4: RELATING SIMULATIONS TO PROFESSIONAL PRACTICE

H	Mzuki provided issues with I could relate with.

SIMULATION #1: MIZUKI WETLAND SIMULATION: DEVELOPING A STRATEGIC PLAN FOR INVOLVEMENT OF TRADITIONAL LEADERS AND OTHER LOCAL STAKEHOLDERS

E	Give more time.
H	More time needed to understand the issues and work and implications across different sectors.

SIMULATION #2: MANZINI LAKE SIMULATION: MULTIPARTY SIMULATION O MOVING FROM SHARING WATER TO SHARING BENEFITS

F	Give more time.
H	• Guide the process a bit more, esp. the facilitation • Assign roles according to background training and experience to generate meaningful discussion.

INSTRUCTOR COMMENTS:

There were very few comments about individual instructors.

	Scott McCreary COMMENTS
H	Came in to direct the process.

	Tony Turton COMMENTS
H	Quick response to issues and has "living" examples.

	Anton Earle COMMENTS
H	Good team player and has good facilitation abilities.

	Mapule Kgomongoe COMMENTS
F	She has capabilities. Can perform well given the chance.
H	Was more of a participant than resource person.

RECRUITING AND PRE-WORKSHOP COMMUNICATION

	Recruitment and Pre-Workshop Communication
H	Could be improved.

COURSE SCHEDULING

	Course Scheduling
C	The time was good enough
E	In the beginning seems to be no body knows where to start
F	Start at 8:30 and end at 4:30/5 pm
H	Closed day 2 rather late which means that facilitation training needs more time - maybe 3 days
I	Two full days is reasonable to carry on the activities

General Question #1: Were the efforts to respond to feedback received after the first course noticeable? If so, what stood out for you?

A	Met the expectations
B	Yes - localizing the examples to make exercise relevant
C	The explanation was more clearer than before
E	I'm from the international (?)
F	Yes, getting us speak more than listen.
G	Instructors listened more.
I	More is improvements on tools

General Question #2: Is the curriculum relevant to your work in resource management in Southern Africa?

A	Yes
B	yes
C	yes
E	yes
F	yes
G	yes definitely especially with the presentations/simulations we could easily identify with.
H	very
I	yes

General Question #3: What part of the course do you think was most effective?

A	Bridging International - Manzini lake treaties and local treaties
B	Mizuki wetland exercise
C	Module 1 and 2
E	Exercising and facilitating
F	all
G	The exercises were not abstract made it easier for us to learn and understand the module more
H	the group discussions and report back provided useful comments
I	• on water sharing and management of resources. cooperation of stakeholders and traditional leaders (?) as well as political agency • please improve in practical explanation handout prepare for activities

General Question #4: How could the course be improved?

A	Raising the challenge for the participants and more days for the course
E	More time, exercises well framed (simple to understand)
I	materials

General Question #5: Was the Level of Material relevant to your professional duties?

A	yes
B	yes
E	more or less
F	yes
G	yes
H	yes
I	yes - only the strategy method must be improved

General Question #6: How will you implement the skills or use the information you have learned?

A	Apply them at our working place.
E	All the activities I am involved; work with communities, government, and donors
G	Build and adapt these skills into the facilitation work that I am involved in through my job. This will help me become a better and more skilled facilitator.
H	As coordinator this is relevant to my everyday work.
I	through discussion on group work.

General Question #7: What additional training would be beneficial? What specific topics or modules to you think we should cover in the final workshop?

A	Involving local stakeholders in decision making process
F	1. organizing workshop as facilitator 2. Clear cut skills of facilitator
I	Expectation of facilitators

Other Comments:

A	Expertise (experts?) should involve themselves with local people to be able to understand the logic to the situation. The facilitator training was stimulating and informative, but we need more to it not only during the workshop time. We need that separate on its own.
I	We are very much appreciative for this course will improve our knowledge and skills to improve the quality of our country and (our) communities.

SHARING WATER:
BOTSWANA WORKSHOP
EVALUATION SUMMARY REPORT

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Delegate Evaluations: Summary

Introduction:

The following document includes a summary analysis of the Post Botswana Workshop Evaluations. The document is divided into four main sections:

8. General Themes
9. Key Questions and Specific Changes for Future
10. Summary of Individual Presentations
11. Summary of Answers to General Questions about Workshop

I. General Themes: Positive Feedback and Areas for Improvement

Based on a qualitative survey of delegate responses[3] to the August *Sharing Water* Workshop in Botswana, we were able to pick out general themes, including both positive feedback and areas for improvement. These are as follows:

Positive Themes:

- In general, the workshop was reviewed positively, and the majority of presentations and exercises received positive reviews (Average Overall of 4.18 out of 5.00).
- The majority of delegates felt the level of material was relevant to their professional duties, and had continuity with the previous *Sharing Water* workshops in Luanda and Windhoek.
- The vast majority of delegates felt they had sufficient time to interact with one another, and adequate opportunity to express their views and opinions. The comments indicated that this aspect of the workshop had improved from previous workshops.
- Delegates unanimously acknowledged that they were given adequate opportunity to express their views and opinions. Again, this indicated an improvement from previous workshops in this category, and reflects well on the performance of the session chairs and facilitators.
- The majority of delegates felt that the workshop agenda was appropriately active and full enough.
- There were a number of positive reviews for specific presentations, most notably: How to Build a River Basin Planning Model (Dr. David Purkey, NHI).
- The majority of delegates felt that the workshop was well organized and the accommodation of appropriate quality.
- Nearly every presentation was mentioned at least once within the pool of responses by delegates as the most effective part of the workshop, indicating that the variety of subject matter suited the variety of backgrounds and interests of the delegates.
- There was an increase in the number of presenters from the Basin states.

Areas for Improvement:

[3] Thirty one English-speakers (Namibians, Batswana, and regional and international delegates) and eight Angolans filled out the evaluations. Not every respondent answered every question.

- Delegates felt that more effort should have been made to make advance bookings so that the **workshop could have been held in the Basin.**
- A number of delegates requested that more specific background **information be provided in advance of the workshop** so that they could arrive at the workshop better prepared to comprehend and assimilate the subject matter.
- Angolan delegates indicated that presentations were **presented too rapidly**, in particular presentations involving new concepts or inherently complex subject matter.
- Several delegates called for an element of the programme that acknowledged the **incorporation of indigenous knowledge** into the management of the Basin.
- Several delegates expressed that they would have appreciated being **notified of the workshop date and location more promptly**, so that they could more easily allow for the time away from their professional duties.
- Several delegates were **disappointed** with the presentation of the Institutional and Legal Analysis.

II. Considerations for Future Workshops:

Reflecting on the aforementioned themes, it is necessary to consider how to incorporate them into useful planning for future workshops.

Recommendations

13. As recommended following the Namibia workshop, specific technical and conceptual information should be distributed to delegates prior to future workshops so that they can adequately prepare themselves. A "pre-workshop packet" should be put together by project partners and distributed 7-10 days prior to future workshops.
14. Delegates should be given more advanced notice of the date and location of the workshop, including travel times.

Challenges

1. To continue to try to satisfy the interests of the varied technical backgrounds of delegates.

III. Summary of Ranking for Individual Presentations.

The Post-Workshop evaluation provided delegates with the opportunity to rank each presentation and exercise (from 1-5) based on the following attributes: relevance, stimulation, informative, and effectiveness, with 5 being the highest rank. An average of all four ranks was taken for each presentation and exercise. English and Portuguese responses were considered separately at first, and then combined, so as to consider whether differences could be found between the two groups.

Average for Each Presentation & Exercise:

Presentation	Organization	English Average	Port. Average	Overall Average
Providing a Foundation for an Okavango River Basin Vision	IUCN ROSA JEA / NNF IUCN Botswana	4.28	4.42	**4.31**

Accomplishments and Lessons Learned	NHI	4.31	4.20	**4.29**
From Visions to Management Strategies	CSIR	4.29	4.08	**4.26**
Playing out Scenarios: Hands on Manipulation of a River Basin Planning Model	NHI IUCN ROSA	4.32	4.01	**4.26**
How to Build a River Basin Planning Model	NHI	4.24	4.11	**4.22**
Sorting it Out: Panel on Opportunities for Collaboration	NHI / HOORC ODMP / ERP / Dept. Water Affairs Botswana	4.16	4.13	**4.16**
Evaluation of River Basin Planning Models – Is There Consensus?	NHI	4.19	3.83	**4.15**
Basin Futures: Exercise in Refining Scenarios and Management Strategies	CONCUR AWIRU	4.14	4.13	**4.14**
Discussion panel on Future Basin Activities	OKACOM reps	3.93	4.15	**3.97**
Pre-Workshop Communication	IUCN Botswana	3.99	3.88	**3.97**
Results of Institutional and Legal Analyses	IUCN ROSA	3.91	4.13	**3.94**
Average for all presentations	**ALL**	4.20	4.32	**4.18**

Comments on Rankings:

- Providing a Foundation for an Okavango River Basin Vision (IUCN ROSA; JEA; NNF; IUCN Botswana), Accomplishments and Lessons Learned (NHI), From Visions to Management Strategies (CSIR) Playing out Scenarios: Hands on Manipulation of a River Basin Planning Model (NHI; IUCN ROSA) and How to Build a River Basin Planning Model (NHI) received the highest rankings.
- Discussion panel on Future Basin Activities (OKACOM reps) and the Results of Institutional and Legal Analyses (IUCN ROSA) rank substantially lower than the other presentations and exercises. This lower ranking is likely due to less comprehensive preparation invested into these presentations and exercise. Concerning the Results of Institutional and Legal Analyses the low ranking is also likely due to the fact that many delegates felt that many aspects of this presentation were repetitive from presentations on the same subject matter at the previous two workshops.
- The lower rank of Pre-Workshop Communication was primarily due to lower scores in the category of promptness.
- The average ranking for all presentations was higher for the Portuguese speaking versus the English speaking the respondents.
- Upon careful review of the raw data, the measure of effectiveness ranks markedly lower than the other attributes. The reasons for this are unclear, but could indicate a general increase in the expectation levels of the delegates as this is the third project workshop.

IV. Pace of Individual Presentations
Delegates were asked to rank the pace of each presentation with 1 being too slow, 5 being too fast, and 3 ideal.

Comments on Pace:
The overall average pace of the different presentations did not vary significantly, which all presentations averaging a slightly fast 3.72. One main trend is the difference between English speaking and Portuguese speaking respondents. As in previous workshops the Portuguese speaking delegates felt that the majority of presentations were too fast (average 4.32), while the English speaking delegates felt that the presentations were close to ideally paced (3.58). This most, undoubtedly due to the increased difficulty and delays involved in listening to a translated version of a presentation versus directly from the speakers mouth. The majority of presentations were given in English.

V. Summary of Specific Comments on Individual Presentations
In response to question "How can we make this presentation a more valuable exercise for you?"

17. **Monday Morning: Accomplishments and Lessons Learned: (Dr. Elizabeth Soderstrom, NHI)**
    - A very good, clear presentation.
    - Actually it would be interesting to track satisfaction with the respective tracks of the project – models, visions, negotiation/facilitation, and institutions – across the three workshops.
    - Add introduction of objectives of delegates; difficulties or challenges of delegates; state what the delegates have learned through the workshops.
    - Lessons should be articulated at various periods within project life.

18. **Monday Morning: Discussion panel on Future Basin Activities (OKACOM Commissioners, Isidro Pinheiro, Shirley Bethune (in place of Piet Heynes), and Stevie Monna)**
    - Presentations could have been more specific on the anticipated planned activities – giving exactly what is intended and the time frames.
    - More information is needed on the functions of the OKACOM and on the participation of the major stakeholders – communities, government.
    - A very useful and valuable session, although understandably, perhaps less real solid information provided than we might have hoped for. Little real solid "fact" on which future scenarios could be built.

19. **Monday Morning: Providing a Foundation for an Okavango River Basin Vision (Bertha Nherera, IUCN-ROSA, Abias Huongo, JEA, Chris Brown, NNF, Masego Madzwamuse, IUCN Botswana)**
    - Required more time.
    - Good work.
    - The stakeholders that will actually come up with a vision exercise should be given this information to read and use it for decision making. It should

not be to OKACOM to accept or reject because they are not the only stakeholder who wants to see the basin properly managed.
- Highlighting areas of divergence, convergence and next steps would make it more informative.

20. Monday Morning: From Visions to Management Strategies: Linking Values with Choices (Dr. Peter Ashton, CSIR)

- Excellent presentation with lots of information for visioning and future work programs.
- This presentation needed more time for us to effectively understand the objectives behind.
- An explicit link from the vision presentation to this one, and then from this presentation to the models.

21. Monday Afternoon: Sorting it Out: Panel on Opportunities for Collaboration

- Very Good.
- A guiding model of collaboration should be suggested requiring input from partners, though not binding, but incentive packed!
- Too little time to do justice to some of the presentations - otherwise interesting and informative.
- The panel discussion on the opportunities for collaboration was not completely covered during the discussion.

22. Monday Afternoon: Evaluation of River Basin Planning Models – Is There Consensus? (Dr. David Purkey, NHI)

- Required more time.
- Appreciate David's candor, and the care he took in explaining steps.
- Always have these technical presentations in the morning!
- The topic of modeling is a new phenomenon to most participants. There is a need to scale down and simplify some of the technical information presented, e.g. for the benefit of community representatives.

23. **Tuesday Morning: How to Build a River Basin Planning Model (Dr. David Purkey, NHI)**

- Well organized.
- Much clearer. Well paced presentation – thank you.
- Possibly send out a "refresher" in a pre workshop packet. Maybe have a list of starting assumptions and data sources.
- A very good well presented session. It was at the level where everyone should have been able to grasp the principles of a planning model though I suspect many did not!
- A practical and hands on exercise that was quite informative and educational.

24. **Tuesday Morning: Playing out Scenarios: Hands on Manipulation of a River Basin Planning Model (Dr. David Purkey, NHI, Dr. Eben Chonguica, IUCN-ROSA)**

- This was interesting. The simulation was very good and informative.
- Required more time.
- A well planned practical exercise. There were adequate computers for the exercise.

25. Tuesday Afternoon: Basin Futures: Exercise in Refining Scenarios and Management Strategies (Dr. Scott McCreary, CONCUR, Anton Earle, AWIRU)

- Informative in the way that the scenarios and management were clear and relevant.
- Real issues with real data should be addressed to be able to conceptualize real live concerns. This would be long term process and can be developed with time.
- More time required to formulate answers to plenary to allow for concise presentation of highlights as requested.
- People seemed very engaged, got into their roles, but having the full block of time would have helped.

26. Wednesday Morning: Results of Institutional and Legal Analyses (Tabeth Chiuta, IUCN-ROSA)

- Not clear what is to be achieved.
- Good information was given.
- Highlighting more analytical findings; avoid repetition; taking questions such as "How does the existing framework constrain or shape real world decisions?"
- If the presentation was made available in advance there would have been more input/comments.

27. **Pre-Workshop Communication:**

- More time should be allocated.
- More information on content of workshop desseminated to interested parties prior to workshop.
- Need to be on site within the Basin.

VI. Summary of Main Themes of Answers to General Questions

The following attempts to summarize the main points presented in the answers to each of the general questions. Given the fact that not all delegates answered each question, and that one person could comment on more than one aspect of the question, the summary is presented in a qualitative, rather than quantitative format (although quantitative information is available with regards to certain questions). In cases where there was a clear divide between Angolan vs. Batswana and Namibian responses, the two language groups are considered separately.

What part of the workshop did you think was most effective?

Summary of Key Points:

- Planning Model development (mentioned eight times)
- Exercise in refining scenarios and management strategies/role playing (mentioned five times)
- Results of Institutional and Legal Analysis (mentioned four times)
- All parts of workshop equally effective (mentioned three times)
- Sorting out opportunities for collaboration (mentioned three times)
- Visioning (mentioned three times)
- Group discussion (mentioned three times)

How could the workshop be improved?

Summary of Key Points:

- Incorporate indigenous knowledge
- Hold the workshop in the Okavango Basin
- Send out invitations and notification of workshop more in advance
- More time and space given to facilitated discussion

Was the level of material presented relevant to your professional duties?

Summary of Key Points:

- Nineteen respondents answered "yes" to this question.
- Eight respondents answered that some of the material was relevant, and some was not.
- Only one respondent answered no.

Was the daily workshop agenda active and full enough? Too much information or activity? Not enough information or activity?

Summary of Key Points:

- The majority of delegates felt the agenda was appropriately active and full enough (twenty one of twenty seven).
- Two delegates felt there was too much information.

Additional comment: "Too full for a workshop, OK for a Conference. Which was it?"

Did you feel like you had sufficient opportunities to meet and exchange experiences with other delegates?

Summary of Key Points:

- The vast majority of respondents felt they had sufficient opportunities to meet and exchange experiences with other participants, and many mentioned this as one of the best aspects of the workshop.

Were you provided with adequate opportunity to express your views and opinions?

Summary of Key Points:

- Delegates unanimously answered yes to this question.

Do you have a better sense of the role of models and scenarios in transboundary river basin management?

- The results of the delegate response to this question were mixed. Fifteen delegates answered that they did have a better sense of the role of models and scenarios in TBRBM. Three delegates felt they had derived incomplete understanding of these concepts, while eight delegates responded that they did not have a better sense of the role of models and scenarios in transboundary river management.

Comment: It is important to note that it was clear from the raw evaluations that 6-8 respondents had not attended previous Sharing Water workshops. This would most certainly affect comprehension of these more technical aspects of the workshop proceedings.

Summary of Key Points:

Did you feel that the workshop had continuity with the first two Sharing Water workshops in Luanda and Windhoek?

Summary of Key Points:

- Delegates unanimously responded that they felt the workshop had continuity with the first two Sharing Water workshops, with several specific comments articulating satisfaction with this aspect of the workshop.

Please comment on workshop accommodations and logistics.

Summary of Key Points:

- The majority of delegates were positive about the accommodation and logistics.
- A few delegates complained about sharing rooms.
- Several delegates once again expressed that the workshop should have taken place in the Okavango Basin

Appendix E.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Kasane Statement

August 2004

Funded by USAID
Cooperative Agreement 690-A-00-03-00126
Award Year: 2003

The Kasane Statement
Kasane, Botswana
August 2004

Acknowledging the following major accomplishments of the Sharing Water project:

- Advanced the dialogue associated with management of the Okavango/Cubango River Basin
- Produced the comprehensive Shared Okavango/Cubango Database with other partners and delegates
- Developed a data gaps analysis and strategy for filling the gaps
- Evaluated river basin planning models and produced a prototype river basin planning model for training exercises
- Drafted basin scenarios and management strategies and evaluated them using prototype model
- Drafted a legal and institutional analysis and compiled written information which can be used as a springboard to launch a full fledged visioning process
- Presented approaches to transboundary river basin management, including Joint Fact Finding and Parallel National Action
- Built capacity in key skill areas, including negotiation, hydrological analysis, and facilitation
- Increased understanding through site visits in each of the basin countries
- Broadened awareness of the sets of special circumstances and needs that characterize each basin state
- Built professional transboundary relationships across interests and across borders
- Developed an understanding of the complexities associated with Transboundary Water Resources Management

Understanding the following lessons that we have jointly learned in implementing the Sharing Water project:

- There is a need to take smaller steps and not be so ambitious in terms of work products. It is better to do a small job well, than a big job not so well.
- We have learned that additional capacity-building is needed through more intensive individualized training in addition to the workshop-based training.
- There needs to be more direct involvement of basin experts in the development of work products such as the database, the modeling, and the institutional and legal analysis. It would be important to set up a sub-working group approach to researching and developing these work products with sub-working group members being from all three basin countries.
- In addition, we have learned that it is one thing to collect data, and it is another thing to legitimize it. We have started the first process, but need to focus on the second.
- Also, in the future, we believe that there needs to be significantly more attention given to Angola, in terms of data collection and analysis, and also in terms of building capacity.
- In addition, there is a need for this working group to capture and recognize lessons learned from other basin projects and initiatives.
- Further we believe that all projects in the basin need to address the relationship between social and water issues, particularly in Angola.

Recognizing that the Sharing Water Project has brought together a broad array of interests and expertise in the delegates, who now respectfully **request** OKACOM to consider the formation of the **Okavango Technical Working Group.**

This proposed Working Group will be committed to maintaining and deepening the professional relationships that have been established and strengthened as part of the Sharing Water project, and will communicate with the Basin-Wide Forum to provide a link between the community and technical committees and OKACOM.

Further, this proposed Working Group affirms the underlying value put forth by the Sharing Water project – to share in an open and transparent manner all information, data, and understanding across borders and between disciplines in pursuit of shared visions and benefits for the Okavango/Cubango Basin.

In addition, this newly formed Working Group, **recommends** that follow-on activities that occur in the basin take into account the lessons-learned described above, and respectively **requests** that additional funding be provided to support the Working Group and associated sub-committees to continue these roles of professional exchange, capacity building, basin exchange visits, and project and institutional coordination.

We, the delegates and Sharing Water project partners sign below requesting the establishment of the Okavango Technical Working Group, giving thanks for the support to date, acknowledging lessons-learned, and committing ourselves to professional relationships across borders:

	Name	Country	Institution
1.	Raymond M. Kwerepe	Botswana	Ministry of Agriculture
2.	Othusitse Lekoko	Botswana	AWF
3.	Dorothy Wamunyima	Namibia	Namibia Nature Foundation
PP. 4.	Hon. M.P Sthiwameni	Namibia	Namibia Government Member of Parliament
P.P. 5.	Chris Brown (Dr.)	Namibia	Namibia Nature foundation (Executive Directore)
6.	Mwazi Mwazi	Namibia	Namibia Nature Fo-
7.	Damian Nchindo	Namibia	Min of lands, Resettlement, + Rehabilitation
8.	Christophorus Kusumo	Namibia	BWF - Namibia
9.	Mafila Richard Malesu	Botswana	NWDC
10.	Kabo Hendrick Mosweu	Botswana	TOCaDI
11.	Stephen Ramalepa	Botswana	Dept. of Tourism
12.	Andrew Pitse	Botswana	Tawana Land Board
13.	Shirley Bethune	Namibia	Namibia Nature Foundation
14.	[illegible]	Namibia	Department Water Affairs
15.	[illegible]	South Africa	CSIR-Environmentek
16.	Elly Taylor	Botswana	IUCN - ODMP
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18.	[illegible]	USA	Natural Heritage Institute
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23.	ONTLOGETSE DIKGOMO	BOTSWANA	DWA.
24.	MAPULE KGOMONGOE	SOUTH AFRICA	CSIR
25.	Carla Coelho	Angola	Universidade Agostinho Neto
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27.	FILIPE SABINO	ANGOLA	GOVERNO DO K. KUBANGO
28.	MATEUS MANDANDI; BALA	"	AUTORIDADE TRADICIONAL
29.	KERILENG PHUTHEGO	BOTSWANA	BASINWIDE FORUM
30.	Miguel [illegible]	ANGOLA	Ministry water AFFAIRS
31.	Robert Machado	Angola	ACADIR - ANGOLA
32.	ANTÓNIO CHIPITA	ANGOLA	ACADIR
33.	Nascimento Antonio	Angola	Min. Urban and Environment
34.			
35.			
36.			
37.			
38.			
38.			
39.			

Appendix F.

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20	Ms Tlotlego Rampha	Tawana Land Board	BOTSWANA	267 539-0231	267 686 0603	
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Appendix G.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Descriptions of Simulation Exercises

September 2004

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This document includes the full set of final simulations prepared by CONCUR Inc. and AWIRU for the Sharing Water project:

1. Three-Way Water Simulation presented at Angola Workshop (English)

2. Three-Way Water Simulation presented at Angola Workshop (Portuguese)

3. Manzini Lake Simulation presented at Namibia Workshop (English)

4. Mkuzi Wetland Simulation presented at Namibia Workshop (English)

5. Okavango Simulation presented at Botswana Workshop (English)

1. Three-Way Water Simulation presented at Angola Workshop (English)

Three Party Water Allocation Negotiation
Prepared by CONCUR Inc.

Groups A, B and C are three independent organizations in an African country called Umoja. They are comprised of individuals and interests located within the watershed of Umoja's highest mountain, Mount Kiva. Group A is the Agricultural Water Users' Association, Group B is the Ranch and Reserve Alliance, and Group C is the Safe Drinking Water Coalition. Each has assigned a delegate to represent them in a three-way negotiation to allocate water from the relatively new Mount Kiva Reservoir, which has previously bought and stored surplus water. **The delegates are empowered to commit their organizations.**

Over the last five years, drought has reduced the water in the Reservoir to levels that have been insufficient to meet all agricultural, environmental, and drinking water needs. While some weather analysts had predicted the drought to continue in this area, it now appears that oceanic weather conditions this year will generate a small surplus for this year only. Based on the improved hydrological outlook, the first increment of surplus water has just been made available by the Reservoir.

In Umoja, agricultural production has boomed with investments in horticulture, which is now one of its fastest expanding industries. Eco-tourism, however, is its top foreign exchange earner. Umoja's population is also growing at more than 3% annually, and is urbanizing rapidly. Therefore, water needs in Umoja are growing by the day.

Negotiations for the potential surplus water in the Reservoir are being facilitated by the Umoja Environmental Fund (UEF), a national conservation group which has developed a reputation as a strong proponent of market-based approaches to environmental management. Recently, the UEF received a $5 million grant from the Global Environmental Facility (GEF) to support its work in creating agreements on complex environmental issues. The Mount Kiva Reservoir is looking to the UEF to help deliver a fair, creative solution.

To promote a consensual agreement, the three organizations have been told by the Reservoir that there are benefits to be had - if they work together. Indeed, the available benefits are quite explicit: If A, B and C can agree to work together, they can allocate 1500 million cubic meters of water. However they want to divide up those allocate 1500 million cubic meters is up to them, but **they must agree upon the exact allocation before any water is made available.** If only two of the groups work together, there are fewer benefits (i.e. less water) available (see schedule below). Again, any groups that decide to work together must provide an explicit allocation plan before the benefits will be granted.

Only one agreement is possible. That is, either the groups agree to a three-way allocation or two of the groups decide to work together, leaving the third group with nothing. **If the groups agree to a three-way allocation, then the 1500 million cubic meters can be allocated according to any split** agreeable to all three groups.

Schedule of Allocation Options

A alone gets	**0**
B alone gets	**0**
C alone gets	**0**
Just A and B together	**1450 million cubic meters**
Just A and C together	**1000 million cubic meters**
Just B and C together	**630 million cubic meters**
A, B, C together	**1500 million cubic meters**

Each delegate's goal as he or she enters these negotiations is to **get the largest quantity of water possible** in the time allotted. Each organization believes it has a strong case for greater allocations. Group A (Agricultural Water Users' Association) points out that farmers have suffered greatly from the drastic cuts in contracted Reservoir supplies as a result of the drought. Group B (Ranch and Reserve Alliance) points out that a bill recently passed in Umoja's Parliament requires that increased flows to the Mount Kiva watershed be part of the continued operation of the Reservoir. The Alliance also asserts that agriculture has historically used 80% of the developed water in the watershed, an amount that pastoralists and environmentalists feel exceeds agriculture's rightful share. Group C (Safe Drinking Water Coalition) argues that although its constituents have been employing conservation measures, population growth and expanded development will require more water for human consumption.

The three delegates will be convened by a facilitator from the Umoja Environmental Fund. Once negotiations begin, you will have 40 minutes to reach an agreement. If two of the three delegates wish to speak privately, the third delegate may not interrupt for two minutes, although he or she may listen to what the others are saying. If any agreement is reached, it must last for at least three minutes before negotiations can conclude. Two of the three delegates can conclude the negotiations.

In addition to these instructions, you will also receive confidential instructions for your role in this simulation exercise.

Reporting the Results of the Negotiation

Was agreement reached: Yes:_____ No:_____

What was that agreement: A's allocation was _____ million cubic meters

B's allocation was _____ million cubic meters

C's allocation was _____ million cubic meters

CONFIDENTIAL INSTRUCTIONS
Delegate from the Agricultural Water Users' Association

You represent a coalition of large and small-scale farmers, ranging from large horticultural concerns to small income-earning crop producers. You have members throughout Umoja.

In this negotiation, you should point out that historically, agriculture has used close to 80% of developed water in Umoja. Your members have really suffered during the five years of drought, and you need as much of the 1500 million cubic meters as possible.

You respect the Umoja Environmental Fund's analytical skills, but given their history of environmental activism, you are a bit skeptical about their ability to broker negotiated solutions to environmental problems. They are also new to mediation work, so you are unsure of their ability to successfully accomplish this mediation.

You also have some concerns about the Safe Drinking Water Coalition. Their membership is very diverse. The water providers are focused on the needs of the wealthier communities and industrial areas, while the NGOs are focused on sanitation, hygiene and water supply in urban slum areas. Given the range of interests, so how can one delegate possibly speak for such a diverse constituency? The same concern applies to the Ranch and Reserve Alliance: many of their constituents are in conflict with each other over other environmental issues. The ranchers and game park owners say they want to protect wildlife and yet some of them have fences that restrict the movement of wildlife. Still, the Alliance represents many powerful interests in Umoja.

Despite these reservations, you are willing to bargain in good faith. Based on your reputation as an articulate advocate, your membership has voted to send you as their delegate. You have the power to commit your organization.

Negotiation Advice

Beware of "anchoring" too low: Don't discuss a figure for an agreement before you know something about the interests of the other negotiating groups.

Consider the benefits of a two-way agreement: Are you better off proposing a two-way agreement with one of the groups?

Ask questions: What are the interests of the other negotiating groups? Can a solution be found that addresses both your interests and theirs?

Use objective criteria: In making the case for a healthy allocation, try to use objective criteria, especially the dramatic loss of water from drought over the last few years.

Consider an agreement that creates a good precedent: This allocation is for one year only. But does it create a good precedent for future water policy decisions?

Propose "side agreements": The main focus of the negotiation is simply to allocate the surplus water, but you might consider proposing side agreements that would extend the good precedent you hope to set here. These agreements might include commitments to investigate potential conservation actions, to monitor compliance with the agreement, to consider releasing water at seasonally appropriate times for wildlife needs, or to meet again. For example, the Ranch and Reserve Alliance might agree to a larger allocation for you now if you would agree to future conservation.

CONFIDENTIAL INSTRUCTIONS
Delegate from the Ranch and Reserve Alliance

You represent a coalition of grassroots interest groups, ranging from small ranching communities to large game reserves. Your members include the Umoja Cattle Ranchers Association, the African Wildlife Society, communities that depend on both traditional pastoralism and wildlife tourism, and 20 other groups.

In this negotiation, you should point out that historically, agriculture has used close to 80% of developed water in Umoja, and the expanding horticulture industry is threatening to take even more. While horticulture is growing, eco-tourism continues to be the top foreign exchange earner. Your members have really suffered during the five years of drought, during which the Mount Kiva watershed has lost close to 40% of its normal water supply, so you have ample justification for seeking as much of the 1500 million cubic meters as possible. After all, studies in other similar watersheds have shown that dramatic ecological decline occurs if more than 25% of an ecosystem's water supply is diverted.

You respect the Umoja Environmental Fund's analytical skills, but they are new to mediation work, so you are unsure of their ability to successfully accomplish this mediation. Especially given their history of environmental activism, you are a bit skeptical as to whether your other negotiating partners will be willing to trust them.

You also have some concerns about the Agricultural Water Users' Association. Agriculture is such a large and diverse economic sector in Umoja, so how can one delegate possibly speak for such a diverse constituency? In regard to the Safe Drinking Water Coalition, you have been pleased with their recent campaigns to promote water conservation in urban areas, but you are concerned that many growing towns do not have a serious commitment to conservation.

Despite these reservations, you are willing to bargain in good faith. Based on your reputation as an articulate advocate, your membership has voted to send you as their delegate. You have the power to commit your organization.

Negotiation Advice

Beware of "anchoring" too low: Don't discuss a figure for an agreement before you know something about the interests of the other negotiating groups.

Consider the benefits of a two-way agreement: Are you better off proposing a two-way agreement with one of the groups?

Ask questions: What are the interests of the other negotiating groups? Can a solution be found that addresses both your interests and theirs?

Use objective criteria: In making the case for a healthy allocation, try to use objective criteria, especially the dramatic loss of water from drought over the last few years.

Consider an agreement that creates a good precedent: This allocation is for one year only. But does it create a good precedent for future water policy decisions?

Propose "side agreements": The main focus of the negotiation is simply to allocate the surplus water, but you might consider proposing side agreements that would extend the good precedent you hope to set here. These agreements might include commitments to investigate potential conservation actions, to monitor compliance with the agreement, or to release water at seasonally appropriate times for wildlife needs. For example, you might want to request that an outside group of experts assess how much water and at what

times is required to sustain current wildlife levels. Similarly, you might want to explore whether the delegates from the agriculture and drinking water groups might be willing to commit to future conservation which would have long term benefits for the environment.

CONFIDENTIAL INSTRUCTIONS
Delegate from the Safe Drinking Water Coalition

You represent a coalition of water suppliers, NGOs and community leaders concerned about safe and adequate drinking supplies in urban areas. You have members throughout Umoja, and the majority of them rely on water from the Mount Kiva watershed.

In this negotiation, you should point out that Umoja's Parliament has recently released a plan to promote new urban development to alleviate overcrowding in its cities. You should also point out that light manufacturing, which could help diversify Umoja's economy, requires less water per dollar of foreign exchange earned than agriculture.

You respect the Umoja Environmental Fund's analytical skills, but given their history of environmental activism, you are a bit skeptical about their ability to broker negotiated solutions to environmental problems. They are also new to mediation work, so you are unsure of their ability to successfully accomplish this mediation.

You also have some concerns about the Agricultural Water Users' Association. Agriculture is such a large and diverse economic sector in Umoja, so how can one delegate possibly speak for such a diverse constituency? The same concern applies to the Ranch and Reserve Alliance: many of their constituents are in conflict with each other over other environmental issues. Still, the Alliance represents many powerful interests in Umoja. Also, there are signs that pesticides from some of the farms may be contaminating the streams that flow into the Reservoir, which is a concern both for wildlife interests and safe drinking water.

Despite these reservations, you are willing to bargain in good faith. Based on your reputation as an articulate advocate, your membership has voted to send you as their delegate. You have the power to commit your organization.

Negotiation Advice

Beware of "anchoring" too low: Don't discuss a figure for an agreement before you know something about the interests of the other negotiating groups.

Consider the benefits of a two-way agreement: Are you better off proposing a two-way agreement with one of the groups?

Ask questions: What are the interests of the other negotiating groups? Can a solution be found that addresses both your interests and theirs?

Use objective criteria: In making the case for a healthy allocation, try to use objective criteria, especially the dramatic loss of water from drought over the last few years.

Consider an agreement that creates a good precedent: This allocation is for one year only. But does it create a good precedent for future water policy decisions?

Propose "side agreements": The main focus of the negotiation is simply to allocate the surplus water, but you might consider proposing side agreements that would extend the good precedent you hope to set here. These agreements might include commitments to investigate potential conservation actions, to monitor compliance with the agreement, to consider releasing water at key times, or to meet again. For example, the Ranch and Reserve Alliance might agree to a larger allocation for you now if you agree to future conservation. Or, you might consider giving the agricultural interests a larger share of the water if they agree to take steps to address the pesticide run off issue.

CONFIDENTIAL INSTRUCTIONS
Facilitator from the Umoja Environmental Fund

You are excited about the prospect of UEF's involvement in this ground-breaking negotiation. You know the stakes are high, and you are confident that you, with the help of your organization, are ready for the task. After all, as a member of Umoja's delegation to the most recent round of global climate change talks, you received praise from Umoja's Ministry of the Environment for your knowledge and skill.

This is your first assignment as a mediator. In the past, you have acted as an advocate for the environmental community. In this case, you want to make sure that the environmental community's interests are well understood, but you are equally concerned that agriculture and urban interests are represented fairly and equally. You cannot afford to choose favorites or you will lose the trust of the parties.

The objective is straightforward: To mediate the first three-way negotiation that involves allocation of water in Umoja. There is a range of possible outcomes.

In order to create an incentive for a three-way agreement, the Mount Kiva Reservoir has agreed that 1500 million cubic meters of water will be available if all three groups can agree. However, if only two groups can agree, less water will be made available. The various options are shown on the General Instructions.

Advice for Convening the Dialogue

- **Ask each party to introduce him or herself** and to briefly state his or her interests in the allocation negotiation.

- Try to get parties to **focus on underlying interests** rather than taking a hard line with a single position.

- **Consider yourself the "guardian" of the negotiation process.** Are parties being treated fairly? Do they base their proposals on sound information? Is the result likely to be implemented?

- **Help the parties focus on the problem,** not on the persons with whom they are negotiating.

- **Consider the style you will adopt as a mediator.** Will you focus on the process, or will you adopt a more active role, proposing possible agreements?

- **Consider helping the parties invent side agreements.** The main focus of the negotiation is simply to allocate the surplus water, but you might consider proposing side agreements that would extend the good precedent you hope to set here. These agreements might include commitments to investigate potential conservation actions, to monitor compliance with the agreement, to consider releasing water at key times, or to meet again.

- Can you get the parties to **sign a short written agreement**? Do they want to issue a joint press release?

2. Three-Way Water Simulation presented at Angola Workshop (Portuguese)

Uma Negociação sobre a Alocação de Água Entre Três Partidos

Os Grupos A, B e C são três organizações independentes num pais Africano que chama-se de Umoja. As organizações tem indivíduos e interesses que estão localizados dentro da bacia hidrográfica na montanha mais grande de Umoja, Monte Kiva. Grupo A é a Associação de Usuários Agrícolas de Água, o Grupo B é a Aliança de Fazendas e Reservas, e o Grupo C é a Coalizão de Água Potável que é Segura para beber. Cada grupo tem designado a um delegado para os representar numa negociação entre os tres grupos para alocar água da nova Reservatório/Represa Monte Kiva, que previamente comprou e armazenou água em excesso. **Os delegados tem o poder de comprometer às suas organizações.**

Nos últimos cinco anos, uma seca tem reduzido a quantidade de água no reservatório a níveis que não são suficientes para satisfazer todas as necessidades dos sectores agrícolas, ambientais, e para água potável. Embora que alguns analistas de clima tem pensam que a seca vai continuar nesta área, agora parece que as condições climáticas oceanográficas vão gerar um pequeno excesso só para este ano. Baseado na predição hidrologica melhorada, o primeiro incremento de excesso de água recentemente foi aberto pelo reservatório.

Em Umoja, a produção agrícola tem explodido com inversões na horticultura, que agora é uma das industrias que está crescendo mais rápido. O eco-turismo, embora, é o melhor ganhador de intercâmbios estrangeiros. A população de Umoja está crescendo a uma taça de mais de 3% anualmente, e está-se urbanizando rapidamente. Portanto, as necessidades de água em Umoja estão crescendo cada dia.

As negociações para o excesso potencial estão sendo facilitadas pelo Fundo do Meio Ambiente de Umoja (UEF), um grupo de conservação nacional que tem desenvolvido uma reputação como um proponente forte de usar mecanismos do mercado para a gestão do meio ambiente. Recentemente, o UEF recebeu uma bouças de $5 milhões do *Global Environmental Facility (GEF)* para apoiar o trabalho de criar acordos para assuntos ambientais que são complexos. O reservatório do Monte Kiva está olhando fazia UEF para ajudar a dar uma solução justa e criativa.

Para promover um acordo consensual, as três organizações foram ditas pelo Reservatório que vão existir benefícios—se eles trabalham colectivamente. Os benefícios são bem explícitos: Se A, B e C podem trabalhar juntos, eles podem alocar 1500 milhões de metros cúbicos de água. Porém, como dividir estos metros cúbicos e uma decisão que eles tem que decidir, mais **eles tem que ter um acordo do alocação exacto antes que qualquer quantidade de água seja disponível.** Se só dois dos grupos trabalham juntos, os benefícios são menores (e.g. menos água) disponível (ver horário em baixo). De novo, qualquer grupo que decide trabalhar colectivamente tem que prover um plano explicito antes que os benefícios são dados.

Só um acordo é possível. Isso é, o os grupos decidem ter um alocação para três, o dois dos grupos decidem trabalhar juntos, deixando o terceiro grupo com nada. **Se os grupos decidem ter um alocação para três,** então os 1500 milhões de metros cúbicos podem ser divididos de qualquer forma entre os três grupos.

Horário das Opções de Alocação

Só A recebe	**0**
Só B recebe	**0**
Só C recebe	**0**
Só A e B juntos	**1450 milhões de metros cúbicos**
Só A e C	**1000 milhões de metros cúbicos**
Só B e C	**630 milhões de metros cúbicos**
A, B e C juntos	**1500 milhões de metros cúbicos**

A meta de cada delegado, a medida que ele o ela entra nas negociações é de **obter a maior quantidade de água possível** no tempo dado. Cada organização acha que ela tem uma boa razão de receber mais água. Grupo A (Associação de Usuários Agrícolas de Água) diz que os agricultores tem sofrido muito dos recortes em água como resultado da seca. Grupo B (a Aliança de Fazendas e Reservas) diz que a lei que recentemente foi aprovada no Parlamento requere que um aumento no fluxo à bacia hidrográfica seja parte da operação do reservatório. A Aliança também diz que a agricultura historicamente usava 80% da água na bacia, uma quantidade que as pessoas que fazem pastoreio e os ambientalistas sentem que excede a proporção e justa para a agricultura. O Grupo C (Coalizão de Água Potável) argumenta que embora que os seus constituintes estão usando medidas de conservação, o crescimento da população e do desenvolvimento vai requerer mais água para o consumo humano.

Os três delegados vão ser convocados por um facilitados do Fundo do Meio Ambiente de Umoja. Uma vez que as negociações comecem, você vai ter 40 minutos para chegar a um acordo. Se dois dos três delegados desejam falar em privado, o terceiro delegado não pode interromper por dois minutos, mas ele o ela se pode ouvir o que os outros esta dizendo. Se chega-se a um acordo, tem que durar por dois a três minutos antes que a negociação se concluía. Dois dos três delegados podem concluir a negociação.

Adicionalmente a estas instruções, você vai receber informação confidencial sobre o seu papel no exercício de simulação.

Reportando os Resultados da Negociação

Chegou-se a um acordo: Sim _____ Não _____

O que foi o acordo: O alocação para A foi _____ milhões de metros cúbicos

O Alocação para B foi _____ milhões de metros cúbico

O alocação para C foi _____ milhões de metros cúbicos

INSTRUCÇÕES CONFIDENCIAS
Delegado da <u>Associação de Usuários Agrícolas de Água</u>

Você representa uma coalizão de grandes e pequenos agricultores, que trabalham em áreas como a horticultura extensa a agricultura de pequena escala. Você tem membros por todo Umoja.

Nesta negociação, você tem que sublinhar que historicamente, a agricultura usava 80% da água desenvolvida em Umoja. Os seus membros tem sofrido muito durante os últimos anos da seca, e você precisa a maior quantidade dos 1500 milhões de metros cúbicos que for possível.

Você respeita a capacidade que tem o Fundo do Meio Ambiente de Umoja, mas dado a historia deles no activissmo ambiental, você está com um pouco de duvida sobre a habilidade de eles em ajudar a negociar soluções a estos problemas ambientais. Eles também são novos na área de trabalho de mediação, então você não tem certeza que eles vão poder ter sucesso nesta mediação.

Você também tem algumas preocupações sobre a Coalizão de Água Potável que É Segura. Os membros que eles tem são muito diversos. Os provedores de água enfocam-se nas necessidades das comunidades mais ricas e nas áreas industrias, enquanto as ONGs enfocam-se em coisas como higiene e a quantidade de água nas áreas de favelas urbanas. Dado a diversidade de interesses, como pode um delegado falar em nome de uma constituinte tão diversa? A mesma preocupação aplica-se para a Aliança de Fazendas e Reservas: muitos dos constituintes estão em conflito sobre os assuntos ambientais. Os fazendeiros e os donos dos parques de caça dizem que eles querem proteger aos animais selvagens mais alguns deles tem cercas que restringem o movimento desta vida silvestre. Mesmo assim, a Aliança representa muitos interesses poderosos de Umoja.

Embora estas preocupações, você esta aberto a negociar com boa vontade. Baseado em sua reputação como alguém que é bem articulado, os seus membros votaram para lhe mandar como o delegado. Você tem o poder de comprometer à sua organização.

Conselhos para a Negociação

Atenção em chegar muito rápido a um resultado que é menos desejável: Não fale de um número para o acordo até você compreender algo dos interesses dos outros grupos.

Considere os benefícios de um acordo entre dois partidos: Você estaria numa melhor posição propondo uma acordo com só um dos dois grupos?

Pergunte perguntas: Quais são os interesses dos outros grupos? Uma solução pode-se encontrar que considere os seus interesses e os interesses dos outros?

Use um critério objectivo: Quando você faça um argumento para um certo tipo de alocação, tente usar critérios objectivos, especialmente como a perdida dramática de água devido à seca nos últimos anos.

Considere um acordo que cria um bom precedente: Este alocação é só para um ano. Mas, ele vai criar um bom precedente para decisões futuras sobre as políticas de água?

Você pode propor "acordos feito num lado": O enfoque principal da negociação é simplesmente de alocar o excesso de água, mas você poderia considerar propor "acordos feito num lado" que poderiam estender o bom precedente que você espera estabelecer aqui. Os acordos poderiam incluir compromissos de investigar acções de conservação potências, monitorar a submissão com o acordo, considerar soltar água durante épocas apropriadas para as necessidades dos animais selvagens, o se reunir de novo. Por exemplo, a Aliança de Fazendas e Reservas poderia estar de acordo em lhe dar mais água agora, se você se compromete a fazer mais conservação no futuro.

INSTRUCÇÕES CONFIDENCIAS
Delegado da a <u>Aliança de Fazendas e Reservas</u>

Você representa uma coalizão de grupos de interesses locais, de comunidades de fazendas pequenas até reservas grandes de caça. Os seus membros incluem a Associação de Fazendeiros de Gado de Umoja, a Sociedade dos Animais Selvagens Africanos, comunidades que dependem no uso pastoral tradicional e turismo dos animais selvagens, e mais vinte grupos.

Nesta negociação, você deveria dizer que historicamente, a agricultura tem usado 80% da água desenvolvida em Umoja, e a industria da horticultura que está crescendo está ameaçando usar até mais. Enquanto a horticultura está crescendo, o eco-turismo continua a ser o melhor ganhador de intercâmbio estrangeiro. Os seus membros tem sofrido muito nos últimos 5 anos da seca, quando a bacia de Monte Kiva tem perdido quase 40% da quantidade normal de água, então você tem muita justificação em procurar a maior parte dos 1500 milhões de metros cúbicos que for possível. Os estudos em outros casos similares tem demostrado que uma diminuição dramática pode acontecer ecologicamente se mais de 25% da água da bacia é divertida.

Você respeita a habilidade analítica do Fundo Ambiental de Umoja, mas eles são novos em fazer mediações, então você não tem certeza que eles podem ter sucesso nesta mediação. Dado o activissmo deles na área ambiental, você tem um pouco de dúvida se os seus parceiros na negociação vão ter confiança neles.

Você também tem algumas preocupações com a Associação de Usuários Agrícolas de Água. A agricultura é um sector económico que é grande e diverso em Umoja, então como pode um só delegado falar em nome dum constituinte tão diverso? Em termos da Coalizão de Água Potável que É Segura, você está contento com as suas recentes campanhas em promover a conservação de água em áreas urbanas, mas você está preocupado que muitas cidades não tem um compromisso o suficientemente serio com fazer conservação.

Apesar das suas preocupações, você esta disposto a negociar com boa vontade. Baseado na sua reputação de ser uma pessoa que é bem articulada, os seus membros votaram que você fora o delegado. Você tem o poder de comprometer à sua organização.

Conselho para a Negociação

Atenção em chegar muito rápido a um resultado que é menos desejável: Não fale de um número para o acordo até que você compreenda algo dos interesses dos outros grupos.

Considere os benefícios de um acordo entre dois partidos: Você estaria numa melhor posição propondo uma acordo com só um dos dois grupos?

Pergunte perguntas: Quais são os interesses dos outros grupos? Uma solução pode-se encontrar que considere os seus interesses e os interesses dos outros?

Use um critério objectivo: Quando você faça um argumento para um certo tipo de alocação, tente usar critérios objectivos, especialmente como a perdida dramática de água devido à seca nos últimos anos.

Considere um acordo que cria um bom precedente: Este alocação é só para um ano. Mas, ele vai criar um bom precedente para decisões futuras sobre as políticas de água?

Você pode propor "acordos feito num lado": O enfoque principal da negociação é simplesmente de alocar o excesso de água, mas você poderia considerar propor "acordos feito num lado" que poderiam estender o bom precedente que você espera estabelecer aqui. Os acordos poderiam incluir compromissos de investigar acções de conservação potências, monitorar a submissão com o acordo, considerar soltar água durante épocas apropriadas para as necessidades dos animais selvagens, o se reunir de novo. Por exemplo, você

poderia pedir que um grupo de expertos externos avaliem a quantidade de água e em quais momentos é necessário para manter os níveis actuais dos animais selvagens. Similarmente, você poderia explorar quais dos delegados dos grupos de agricultura e de água para beber estariam dispostos a se comprometer a uma futura conservação, a qual teria benefícios de longo-prazo para o meio ambiente.

INSTURCÇÕES CONFIDENCIAS
Delegado da Coalizão de Água Potável que É Segura

Você representa uma coalizão de provedores de água, ONGs e lideres da comunidade que estão preocupados com quão seguro e quão adequado são as quantidades de água para beber nas áreas urbanas. Você tem membros por todo Umoja, e a maioria dependem da água da bacia de Monte Kiva.

Nesta negociação, você deveria dizer que o Parlamento de Umoja recentemente divulgou um plano para promover um novo desenvolvimento urbano para melhorar o abarrotamento de pessoas nas cidades. Você também deveria sublinhar que a fabricação de luz, que poderia diversificar a economia de Umoja, requere de menos água por cada dólar de intercâmbio que ganha a agricultura.

Você respeita a habilidade analítica do Fundo Ambiental de Umoja, mas eles são novos em fazer mediações, então você não tem certeza que eles podem ter sucesso nesta mediação. Dado o activismo deles na área ambiental, você tem um pouco de dúvida se os seus parceiros na negociação vão ter confiança neles.

Você também tem algumas preocupações sobre Associação de Usuários Agrícolas de Água. A agricultura é um sector económico tão grande e diverso em Umoja, como pode só um delegado falar em nome duma constituinte tão diversa? A mesma preocupação aplica-se à Aliança de Fazendas e Reservas: muitos dos constituintes estão em conflito entre eles sobre os assuntos ambientais. Mesmo assim, a Aliança representa muitos interesses poderosos em Umojo. Também, existem senhas que pesticidas de algumas fazendas podem estar contaminando a ribeira que entra no reservatório, isto é uma preocupação para os animais selvagens e para ter água que é segura para beber.

Apesar das suas preocupações, você esta disposto a negociar com boa vontade. Baseado na sua reputação de ser uma pessoa que é bem articulada, os seus membros votaram que você fora o delegado. Você tem o poder de comprometer à sua organização.

Conselho para a Negociação

Atenção em chegar muito rápido a um resultado que é menos desejável: Não fale de um número para o acordo até que você compreenda algo dos interesses dos outros grupos.

Considere os benefícios de um acordo entre dois partidos: Você estaria numa melhor posição propondo uma acordo com só um dos dois grupos?

Pergunte perguntas: Quais são os interesses dos outros grupos? Uma solução pode-se encontrar que considere os seus interesses e os interesses dos outros?

Use um critério objectivo: Quando você faça um argumento para um certo tipo de alocação, tente usar critérios objectivos, especialmente como a perdida dramática de água devido à seca nos últimos anos.

Considere um acordo que cria um bom precedente: Este alocação é só para um ano. Mas, ele vai criar um bom precedente para decisões futuras sobre as políticas de água?

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compromete-se a uma futura conservação. O, você poderia considerar dar-lhe aos interesses agrícolas uma maior parte da água se eles se comprometem a fazer algo sobre o assunto de escoamento dos pesticidas.

INSTURCÇÕES CONFIDENCIAS
Facilitador do Fundo Ambiental de Umoja

Você esta muito contento do envolvimento de UEF nesta negociação tão importante. Você sabe que existem riscos muito altos, e você tem confiança que, com a ajuda da sua organização, você está pronto para o dever. Especialmente, porque como membro da delegação de Umoja que participou nas reuniões sobre o cambio climático mundial, você recebeu muitos elogios do Ministro do Meio Ambiente de Umojo sobre a sua sabedoria, conhecimento e habilidades.

Este é a primeira vez que você tem um trabalho como mediador. No passado, você actuava como patrono para a comunidade ambiental. Neste caso, você quer-se assegurar que os interesses da comunidade ambiental estão bem compreendidas, mas você está igualmente preocupado que os interesses da agricultura e das áreas urbanas vão ser representadas de formas justas e equitativas. Você não pode dar-se ao luxo de escolher favoritos o você vai perder a confiança dos partidos.

O objectivo é fácil: Mediar a primeira negociação entre três partidos sobre o alocação de água em Umoja. Existem muitos resultados possíveis.

Para facilitar a criação dum acordo entre três partidos, o Reservatório de Monte Kica tem-se comprometido que 1500 milhões de agua cubica estarão disponíveis se os três grupos podem estabelecer um acordo. Embora, se só dois grupos estabelecem um acordo, menos água vai estar disponível. As várias opções estão nas Instruções Gerais.

Conselho para Começar um Dialogo

- **Perguntar que cada pessoa em cada partido se introduza** e que ele o ela expliquem brevemente os seus interesses nesta negociação.
- Tentar ajudar aos partidos de **enfocar-se nos interesses implícitos** e não tomar uma só posição dura.
- **Considere-se o "guardião" do processo de negociação.** Os partidos estão sendo tratados de forma justa? Eles baseiam as suas propostas em informação sana? O resultado tem uma probabilidade de ser implementado?
- **Ajude aos partidos de enfocar-se no problema,** e não nas pessoas com as quais eles estão negociando.
- **Considere o estilo que você vai adoptar como mediador.** Você vai-se enfocar no processo, o você vai adoptar um papel mais activo, propondo possíveis acordos?
- **Considere ajudar aos partidos a inventar "acordos feito num lado".** O enfoque principal da negociação é simplesmente de alocar o excesso de água, mas você poderia considerar propor "acordos de lado" que poderiam estender o bom precedente que você espera estabelecer aqui. Os acordos poderiam incluir compromissos de investigar acções de conservação potências, monitorar a submissão com o acordo, considerar soltar água durante as épocas apropriadas para as necessidades dos animais selvagens, o se reunir de novo.
- Você pode fazer que os partidos firmem um **pequeno acordo escrito**? Eles gostariam ter um artículo para os médios de comunicação?

3. Manzini Lake Simulation presented at Namibia Workshop (English)

Multiparty Collaborative Planning Simulation Exercise:
Water Resources and Benefit Sharing
The Manzini Lake Simulation
Prepared by CONCUR, Inc. and AWIRU
for the Windhoek, Namibia Sharing Water Workshop
General Instructions

Introduction:

Manzini Lake is dying. One of the few high desert lakes in Southern Africa, Manzini Lake is slowly but surely being drained and becoming more saline. Since the start of colonial-era record keeping in 1912, water levels have fallen almost 50 metres. Projections for the coming years are no better.

Once a vibrant body of water, the lake is no longer able to sustain a healthy fish population. As a terminal saline-alkaline lake, falling water levels mean more total dissolved solids, increased alkalinity, decreased oxygen levels and eventual death for any fish living in the water. The Tigerfish and African Pike are already gone. Now the Tilapia (Bream), Catfish and Minnow are at-risk, with biologists saying they may be killed off in as little as two years.

For years, Manzini Lake's plight went unnoticed. Not anymore. Environmental groups are rallying to save the lake; though it hosts no threatened or endangered species, environmentalists consider it a rich ecosystem worth preserving. Even more vocal are the urban communities surrounding Manzini Lake, which count on the Manzini Lake-related tourism industry to provide 40% of the area's tax base. Mining income and the textile industry have declined and the community leaders are determined to preserve Manzini Lake as an important fishing and eco-tourism destination. The District Governor, the region's Member of Parliament (MP) and other government officials are fully engaged in the issue, and they want the problem solved!

The problem -- and the solution -- is water. The Vukavuka River, which feeds into Manzini Lake, is in great demand. Upstream commercial farmers are draining the river so heavily that little, if any, water actually drains into Manzini Lake anymore (refer to Map in Appendix). (Currently, farmers use 540 million m^3 of Vukavuka River water per year to irrigate their lands.) In fact, historical water allocations to farmers, the Tembe Tribe and others total more than 130% of the river's average annual flow. Climatic variability due to the El Nino Effect over the past decade has further exacerbated the problem.

Currently, less than 96 million m^3 of water actually reaches Manzini Lake each year. With the lake losing roughly 150 million m^3 per year to evaporation, water flows to Manzini Lake must increase at least 50% merely to maintain current levels and sustain the existing fish population. The following chart, prepared by national water officials, outlines water flows needed to reach varying lake levels under differing temporal scenarios.

Annual Water Flows Needed to Reach Varying Target Lake Levels

	Year to Achieve Implementation: 2003	**Year to Achieve Implementation: 2008**	**Year to Achieve Implementation: 2018**
Target Reference Year - 1998 water levels	150 million m^3	150 million m^3	150 million m^3
Target Reference Year - 1983 water levels	270 million m^3	240 million m^3	210 million m^3
Target Reference Year - 1953 water levels	420 million m^3	360 million m^3	300 million m^3

(Note: Once 1983 levels are reached, maintenance water flows of 180 million m^3 */year are needed. Once 1953 levels are reached, maintenance water flows of 210* million m^3 */year are needed.)*

District and national officials have convened earlier dialogues to try and resolve the Manzini Lake issue. To date, however, these talks have only served to crystallize the various stakeholders' positions. In fact, several groups are threatening legal action if the dispute is not resolved in their favour, including: the Tembe Tribe (seeking to reallocate water rights in its favour); commercial farming interests (seeking to block water transfers); and local council officials (seeking to create a "public trust" for water to reach Manzini Lake). The lake is of traditional significance for the Tembe and features in their religious and cultural ceremonies. Most threateningly, some members of the Tembe tribe have been talking of embarking on an accelerated programme of land reform. Although, as yet, there have been no land invasions, members of both the district and the national governments are well aware of the political pressure being placed on them to find an equitable solution to the Tembe's predicament.

The Ministry of Conservation and Natural Resources has decision making authority over the water management regime in the region, and could make a unilateral decision. The Ministry has done so in the past, and come in for sharp criticism and does not want to risk more political-volatility in an election year. In the Minister's view, a collaborative approach is more likely to foster stable implementation, Realistically, the Ministry needs the other parties as partners in a long term water management regime Hoping both to stave off the threatened lawsuits and land invasions and to move forward with a plan forged collaboratively, the Minister of Conservation and Natural Resources is convening this dialogue in one last attempt to address the Manzini Lake issues before they become a highly contentious dispute. One of the Minister's most senior Special Assistants -- an individual respected by all parties will be facilitating the collaborative planning effort. You and the other stakeholders around the table are being asked to put together a series of recommendations to guide the Minister's ultimate decisions on this issue. The Minister has said the group's preferred approach will be given great weight in her final decision.

Parties to the Negotiation:

There are six participants in today's negotiations:

- a representative of the Nkosi of the Tembe Tribe representing the interests of the 8000-member Tembe Tribe. The Nkosi is primarily interested in maintaining and expanding the Tribe's water allocations to support its agricultural development to provide a sustainable livelihood for local people. Some community members are pushing to use these talks to settle long-standing water rights and land rights claims. There are other community members, however, committed to saving Manzini Lake – mainly those employed in the tourism industry. The Nkosi is also concerned about the deteriorating state of the health-care and education facilities available to the community and generally wants to see an improvement in the tribe's low standard of living.

- a representative of Save the Desert Lakes (SDL), a coalition of regional environmental NGOs committed to protecting Manzini Lake's high-desert ecosystem. SDL wants the government to buy up enough water rights to restore Manzini Lake to 1953 levels. And they want it done as quickly as possible. Ideally, they would like the Manzini Lake declared a Ramsar site of international importance, though it is unlikely that they will receive enough local support to achieve this.

- a representative of the Water Users Association (WUA), a collection of irrigation districts that rely on Vukavuka River water to irrigate tobacco, pasture, maize and other agriculture. The Association strongly defends commercial farmers' existing water rights and is opposed to water rights transfers/buyouts to save Manzini Lake. They view threats to their water rights as part of a larger plan to force them from their land - land that they have owned and worked for several generations, since their ancestors arrived from Europe.

- a representative of Manzini Lake Trust, a group of concerned businesses, community leaders and urban residents determined to save Manzini Lake and the region's economic livelihood: tourism. The Trust wants the lake restored to 1953 levels and, like SDL, they want it to happen fast. They enjoy support principally from the urban communities around Manzini lake.

- a representative of the National Division of Water Planning (NDWP), a government agency that has been striving to encourage the competing water users to make well-informed planning decisions. As NDWP is currently drafting the new national water management plan, the Division wants to see a solution that sets a wise precedent for balancing competing water users' demands nationally.

- a representative of the National Division of Wildlife (NDOW), the government agency that sounded the first warning bells of impending fish die-offs and has pressed ever since for more water for the lake. NDOW is the strongest voice within the Government pressing to return the lake to levels that will support a wide range of fish species.

Additionally, the Special Assistant to the Minister of Conservation and Natural Resources will be serving as a neutral facilitator.

Other Interested Parties:

There are a number of other important stakeholders and interested parties not at the table. Most importantly, both the District Governor and the state's MP are closely monitoring the talks. Both have been committed to resolving water disputes in the district, and they are eager to see this group reach consensus. They've had a hand in personally selecting the negotiators at the table, choosing individuals they believe will negotiate in good faith. The negotiators are aware of this and have pledged to do their best to work collaboratively and reach a consensus position.

Other relevant stakeholders who are watching the outcome of this preliminary negotiation are fish and game officials, and district and national environmental and land-use agencies. Government, private and nonprofit groups in the neighboring districts are also keeping a close watch on the talks.

Issues to Be Negotiated:

This negotiation centers on resolving three key issues related to restoring Manzini Lake:

- **determining a preferred strategy for increasing water flow** into Manzini Lake
- **setting target water levels** for Manzini Lake
- **deciding the number of years it will take to implement target water levels** for Manzini Lake

If you wish, you may also offer advice about the (a) monitoring of implementation and (b) nature of the Ministry's future consultation with these stakeholders over management of Manzini Lake.

Options, Preferences and Trade-offs:

For each issue, there are three or four options, or solutions. Each party's confidential instructions lists the same issues and options. However, each stakeholder has different preferences with respect to the options.

The options are designed to be mutually exclusive (that is, you must choose just one option for each issue.) However, if all six parties agree, you may invent hybrid options. In addition, side agreements (between, say, two parties) are both permitted and encouraged
To complete this agreement, you must build a package of solutions that addresses all three issues. For some parties, an option may be acceptable only if another specific option is chosen for another issue. In other

words, there may be trade-offs across issues. You'll need to ask questions of the other parties to locate these trade-offs.

.As noted above, you may also jointly develop suggestion as to how stakeholders might offer advice to the in Ministry's future collaborative efforts over Manzini Lake issues,

Mechanics of the Negotiation:

Caucusing: Before the negotiations begin, you will have 10 minutes to caucus with colleagues from the same organization to plan your strategy.

Timing: You will have a total of 1 3/4 hours to complete this exercise. All parties must agree to and ratify a written, formal agreement on a joint recommendation to the Minister to complete for there to be a successful resolution.

Straw Voting to Monitor Progress: As the aim of the collaborative process is to produce a consensus agreement on a recommendation,to the Minister of the Department of Conservation and Natural Resources, she has requested periodic reports of progress. As well, the facilitator's experience shows that taking periodic straw votes helps move deliberations along. Accordingly, three formal voting rounds -- all to be led by the facilitator -- are scheduled for the meeting. The first will take place 30 minutes after the meeting begins, the second after an hour and the third after 1 1/2 hours. (The final 15 minutes is allocated to writing up and ratifying the formal agreement.) Additional votes may be taken at any point during the meeting, but at least three voting rounds must take place. There is, of course, one exception: If a solution for each of the three issues receives unanimous approval early in the meeting, the parties may choose to forgo subsequent voting rounds.

Writing the Final Agreement: The facilitator is to work with the parties to prepare and post a written, formal agreement on a recommendation to the Minister, which all parties must then ratify.

Multiparty Collaborative Planning Simulation Exercise:
Water Resources and Benefit Sharing--The Manzini Lake Simulation
Jointly Prepared by CONCUR, Inc. and AWIRU
for the Windhoek, Namibia Sharing Water Workshop

Option Sheet for the Representative of the Nkosi of the Tembe

ISSUE	OPTION	DESCRIPTION OF OPTION	PREFERENCE RANKING
Preferred Strategy for Increasing Water Flow into Manzini Lake			
	1	Primary reliance on buy out of existing water rights; extensive removal of papyrus and other non-native plants from stream channel.	3rd choice
	2	Minimal reliance on buy out of existing water rights; comprehensive conservation/efficiency measures, including: ditch lining, crop substitution, scheduled irrigation, upgraded distribution system, limited river channel lining; limited removal of papyrus, other non-native plants.	2nd choice
	3	Renegotiate existing water rights agreements; extensive removal of papyrus and other non-native plants from stream channel.	1st choice
Manzini Lake Target Water Level			
	1	Keep lake at existing level, providing enough water to offset evaporation and maintain current populations of Tilapia, Catfish and Minnow.	1st choice
	2	Raise lake to 1983 levels, providing enough water to offset evaporation and improve viability of Tilapia, Catfish and Minnow.	3rd choice
	3	Raise lake to 1953 level, providing enough water to offset evaporation, improve viability of Tilapia, Catfish, Minnow, and reintroduce Tigerfish and African Pike.	4th choice
	4	Set no target; permit lake to rise/fall without intervention.	2nd choice
Years to Implement Manzini Lake Target Water Levels			
	1	Implement target level within 5 years.	3rd choice
	2	Implement target level within 10 years.	2nd choice
	3	Implement target level within 20 years.	1st choice

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Confidential Instructions to the Representative of the the Nkosi of the Tembe

You've been sent to these negotiations with strong instructions from the Nkosi: It's time for the Tembe to be dealt with fairly.

The Tembe feel they've been mistreated for years. Historically dependent on fishing as a way of life, the Tembe have been forced to rely primarily on agriculture ever since their traditional lands along Manzini Lake were taken away during colonial times. After independence the national government kept the lakefront land, compelling the Tembe to farm the land further upstream. The Tribal Council believes they've been denied their legitimate land and water rights and they've gone to court to assert those claims.

Over time, the Tembe have developed a series of successful communal irrigation schemes and supply fruit and vegetables to nearby urban centres. As the Tribal economy is heavily dependent on farming, the Tribal Council wants to use these negotiations to maintain and expand its existing water rights so it can irrigate more land. In fact, the strongest voices within the Council hope to use these talks as a strategy to renegotiate 50-year-old water rights agreements that they say unfairly deprived the Tribe of its historical water rights. You do, however, recognize that there is a small but vocal minority within the Council that believes the Tribe should not turn its back on Manzini Lake -- a lake that connects the Tribe with its past and for some, provides a source of tourism-related jobs.

As much as possible, the Tribal Council wants you to press for a solution that spreads the burden among all water users. (The Tembe Tribe irrigates just 840 hectares. By contrast, Water Users Association members irrigate 32,000 hectares.) You have another goal, as well: Some Tribal Council members think this negotiation also offers a chance for the Tribe to regain lakefront land taken away from it under colonial rule.

In past meetings around this issue, the Tribal Council has found itself in uneasy alliances with others around the table. While it shares the Water Users Association's (WUA) concerns that water for Manzini Lake will severely undermine the viability of farming as a way of life, some in the Tribal Community also have links with the environmental community. In fact, Save the Desert Lake has been funding recent Tribal Council efforts to drill for groundwater on its communal land to alleviate the agricultural water levies.

For Issue 1, **Strategies for Increasing Water Flow**, you **favour Option 3** -- renegotiating existing water rights agreements -- as this will allow you to address past grievances and shift the burden among the larger water users. As a second choice, you favour Option 2, since this will increase water flowing to Manzini Lake without compromising the Tribe's farming operations. You will not support Option 1, but will accept it as your fallback position.

For Issue 2, **Manzini Lake Target Water Level**, you **strongly support Option 1**, as this will allow you to preserve existing farming operations, yet minimally satisfy those Tribal members wanting to protect the lake. You strongly oppose either Option 2 or Option 3, as you are certain these higher levels will translate into the demise of farming operations on the Tribe's land. Your fallback -- Option 4 -- isn't attractive to you, but is, in your opinion, your next best choice.

For Issue 3, **Years to Implement Target Water Levels**, you **prefer Option 3**, as it gives the Tribe time to implement changes as slowly as possible. Your second choice is Option 2; your third, Option 1. You are, however, willing to accept a more accelerated timeline if some of your other demands -- fixing the Tribe's reservoir and/or regaining traditional lakefront lands -- are met.

Both the specific options and your preferences are explained in greater detail on the reverse side.

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Option Sheet for Manzini Lake Trust

ISSUE	OPTION	DESCRIPTION OF OPTION	PREFERENCE RANKING
Preferred Strategy for Increasing Water Flow into Manzini Lake			
	1	Primary reliance on buy out of existing water rights; extensive removal of papyrus and other non-native plants from stream channel.	1st choice
	2	Minimal reliance on buy out of existing water rights; comprehensive conservation/efficiency measures, including: ditch lining, crop substitution, scheduled irrigation, upgraded distribution system, limited river channel lining; limited removal of papyrus, other non-native plants.	3rd choice
	3	Renegotiate existing water rights agreements; extensive removal of papyrus and other non-native plants from stream channel.	2nd choice
Manzini Lake Target Water Level			
	1	Keep lake at existing level, providing enough water to offset evaporation and maintain current populations of Tilapia, Catfish and Minnow.	3rd choice
	2	Raise lake to 1983 levels, providing enough water to offset evaporation and improve viability of Tilapia, Catfish and Minnow.	2nd choice
	3	Raise lake to 1953 level, providing enough water to offset evaporation, improve viability of Tilapia, Catfish, Minnow, and reintroduce Tigerfish and African Pike.	1st choice
	4	Set no target; permit lake to rise/fall without intervention.	4th choice
Years to Implement Manzini Lake Target Water Levels			
	1	Implement target level within 5 years.	1st choice
	2	Implement target level within 10 years.	2nd choice
	3	Implement target level within 20 years.	3rd choice

Multiparty Collaborative Planning Simulation Exercise:
Water Resources and Benefit Sharing--The Manzini Lake Simulation
Jointly Prepared by CONCUR, Inc. and AWIRU
for the Windhoek, Namibia Sharing Water Workshop
CONCUR Multiparty Negotiation Simulation Exercise
The Manzini Lake Simulation

Confidential Instructions to the Representative of the Manzini Lake Trust

It's now or never. For decades, local communities have watched in panic as the waters of Manzini Lake receded. It was bad enough when the region's mining and textiles industries went belly up, but now the lifeblood of the area -- tourism -- is at risk. Manzini Lake is the big draw in the area, with regional and international visitors coming to fish for Tilapia and enjoy the desert lake. If the lake recedes any further, the fish won't be the only ones gasping for air; 40% of the area's revenue comes from activities directly tied to Manzini Lake.

A Regional Task Force was formed several years ago to address the issue and, while it helped heighten awareness of the region's plight, the Task Force was unable to convince national regulators to take any actions to improve the situation. Now your group, Manzini Lake Trust -- a group of concerned businesses, community leaders and residents -- is at the negotiating table and you are determined to save Manzini Lake and the region's economic livelihood. Ideally, you would like to shift the thinking away from a rights-based approach of water sharing and towards benefit-sharing. In this way, the maximum benefit can be derived from the system and distributed equitably. There are plans for various large-scale tourism resorts on the lake – these would bring jobs and prosperity to the region, but depend on the lake having enough water. You know that tourism adds more value to every cubic metre of water used than any other activity – your challenge is to convince the other parties of the merits of this approach.

You've got some strong allies around the table. Save the Desert Lakes is as committed to saving Manzini Lake as you are, and your two groups have already met several times in advance of today's session to chart a coordinated strategy. The Tembe Tribal Council is a bit more complex. While the Tribal Council strongly supports maintaining water rights for its farms, you think you might be able to use the Tribe's historical and traditional connection with Manzini Lake to win their backing for increased water flows. In earlier talks, you have made it clear to the Water Users Group and others that any agreement must ensure enough water reaches Manzini Lake to improve the health and viability of the fish species and general ecosystem. You have threatened to sue, and you mean it.

For Issue 1, **Strategies for Increasing Water Flow**, you **favor Option 1**, a buyout of existing water rights. While this is an expensive option, you're convinced that this is the best way to ensure that water reaches Manzini Lake. Your second choice is Option 3: to renegotiate existing water rights agreements. Though certain to be resisted by farmers, this option would almost likely be supported by the Tribal Council, which has long felt mistreated by existing water rights. Option 2 is your third choice, as you've seen little hard science to prove that it really will increase the flow of water into Manzini Lake.
For Issue 2, **Manzini Lake Target Water Level**, you **back Option 3**. Manzini Lake has suffered enough, and your group is committed to ensuring that any agreement reached does far more than merely maintain current water levels. Your fallback positions are Option 2, then Option 1. You've been told to walk out of the talks if Option 4 is selected.
For Issue 3, **Years to Implement Target Water Levels**, you **want Option 1**, since you want to get lake levels back up to healthy levels as quickly as possible. Your economy depends on it. Your second choice is Option 2, and you've been told by members of your group that Option 3 is simply not a viable alternative. Of course, you recognize that there are important trade-offs to be made; you might, for example, be willing to accept a less ambitious timeline if others are willing to return the lake to 1953 levels.
Both the specific options and your preferences are explained in greater detail on the reverse side.

Multiparty Collaborative Planning Simulation Exercise:
Water Resources and Benefit Sharing--The Manzini Lake Simulation
Jointly Prepared by CONCUR, Inc. and AWIRU
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Option Sheet for Save the Desert Lakes (SDL)

ISSUE	OPTION	DESCRIPTION OF OPTION	PREFERENCE RANKING
Preferred Strategy for Increasing Water Flow into Manzini Lake			
	1	Primary reliance on buy out of existing water rights; extensive removal of papyrus and other non-native plants from stream channel.	1st choice
	2	Minimal reliance on buy out of existing water rights; comprehensive conservation/efficiency measures, including: ditch lining, crop substitution, scheduled irrigation, upgraded distribution system, limited river channel lining; limited removal of papyrus, other non-native plants.	2nd choice
	3	Renegotiate existing water rights agreements; extensive removal of papyrus and other non-native plants from stream channel.	3rd choice
Manzini Lake Target Water Level			
	1	Keep lake at existing level, providing enough water to offset evaporation and maintain current populations of Tilapia, Catfish and Minnow.	3rd choice
	2	Raise lake to 1983 levels, providing enough water to offset evaporation and improve viability of Tilapia, Catfish and Minnow.	2nd choice
	3	Raise lake to 1953 level, providing enough water to offset evaporation, improve viability of Tilapia, Catfish, Minnow, and reintroduce Tigerfish and African Pike.	1st choice
	4	Set no target; permit lake to rise/fall without intervention.	4th choice
Years to Implement Manzini Lake Target Water Levels			
	1	Implement target level within 5 years.	1st choice
	2	Implement target level within 10 years.	2nd choice
	3	Implement target level within 20 years.	3rd choice

Multiparty Collaborative Planning Simulation Exercise:
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Confidential Instructions to the Representative of Save the Desert Lakes (SDL)

It's time to set another precedent. You have watched as other environmental groups have put together a string of impressive victories in the name of the environment, from the protection of the Mkuzi wetlands to the formation of the Kgalagadi Transfrontier Park. Now it's your turn. You are committed to saving Manzini Lake, a rare desert lake that supports a rich ecosystem of fish and birds as well as the Vuke River – the lake's main inflow. If you can get the lake declared a Ramsar site you will have the full weight of international opinion behind efforts to save the lake.

As representative of Save the Desert Lakes, a coalition of environmental interests, you believe that these negotiations are your best chance to save Manzini Lake. You're well aware that there are no historical allocations for in-stream environmental benefits, but you're convinced that the environmental movement's growing support in the province and elsewhere puts you in a strong negotiating position. You've got a strong ally in the Manzini Lake Trust, although you do not support their plans for the construction of large-scale tourism resorts on the shores of the lake. This would detract from the natural beauty of the lake, limiting the attraction to select eco-tourists. You're pretty sure the Division of Water Planning doesn't want Manzini Lake or the Vuke River to die on its watch. Your alliance with the Tembe Tribal Council is a bit dicier; though there are some in the Tribe who want to see Manzini Lake restored to its previously healthy state, you also know that the farming voices within the Tribal Council carry a great deal of weight. You've tried to build a bridge with the Tribal Council by supporting their efforts to sink wells on their land.

Your biggest problem, as you well know, is you don't have a strong legal hook. Manzini Lake supports no endangered or threatened species, so you can't play that card. Still, you think you've got public opinion on your side. As you move into these negotiations, you're committed to increasing water flows into Manzini Lake but not at the expense of other environmentally sensitive issues. You're concerned, for example, that the plans to remove all non-native plants from stream channels might negatively impact native habitat. You're equally concerned about proposals you've heard that would line a portion of the river channel -- effectively turning it into a canal. You are also interested in ensuring that any agreement is accompanied by good science -- gauging current water use, rating land and water rights for purchase, understanding ground/surface water connections, etc.

For Issue 1, **Strategies for Increasing Water Flow**, you have some concerns with each option. You **lean towards Option 1**, since that relies primarily on water rights buyouts/transfers -- an approach your group believes is the surest way to get water into Manzini Lake. But you have serious concerns about the plans to eradicate papyrus and other non-native. You want to press for this option, but only if plant eradication is minimized or at least studied before carried out. Your next best choice is Option 2, though you have serious misgivings about the plans for river channel lining. Your third choice is Option 3. You clearly see the potential gains to be realized by renegotiating existing water rights, but you question the political feasibility of this approach. You also have concerns, as you did under Option 1, with the intensive removal of papyrus and other non-native plants.

For Issue 2, **Manzini Lake Target Water Level**, you **back Option 3**. Manzini Lake has suffered enough, and your group is committed to ensuring that any agreement reached does far more than merely maintain current water levels. Your fallback positions are Option 2, then Option 1. You've been told to walk out of the talks if Option 4 is selected.

For Issue 3, **Years to Implement Target Water Levels**, you **want Option 1**, since want lake levels back up to healthy levels as quickly as possible. The lake's ecosystem depends on it. Your second choice is Option 2, and you've been told by members of your coalition that Option 3 is simply not a viable alternative. Of

course, you recognize that there are important trade-offs to be made; you might, for example, be willing to implement target water levels more slowly if others are willing to return the lake to 1953 levels.

Both the specific options and your preferences are explained in greater detail on the reverse side.

Multiparty Collaborative Planning Simulation Exercise:
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Option Sheet for Water User Association (WUA)

ISSUE	OPTION	DESCRIPTION OF OPTION	PREFERENCE RANKING
Preferred Strategy for Increasing Water Flow into Manzini Lake			
	1	Primary reliance on buy out of existing water rights; extensive removal of papyrus and other non-native plants from stream channel.	2nd choice
	2	Minimal reliance on buy out of existing water rights; comprehensive conservation/efficiency measures, including: ditch lining, crop substitution, scheduled irrigation, upgraded distribution system, limited river channel lining; limited removal of papyrus, other non-native plants.	1st choice
	3	Renegotiate existing water rights agreements; extensive removal of papyrus and other non-native plants from stream channel.	3rd choice
Manzini Lake Target Water Level			
	1	Keep lake at existing level, providing enough water to offset evaporation and maintain current populations of Tilapia, Catfish and Minnow.	2nd choice
	2	Raise lake to 1983 levels, providing enough water to offset evaporation and improve viability of Tilapia, Catfish and Minnow.	3rd choice
	3	Raise lake to 1953 level, providing enough water to offset evaporation, improve viability of Tilapia, Catfish, Minnow, and reintroduce Tigerfish and African Pike.	4th choice
	4	Set no target; permit lake to rise/fall without intervention.	1st choice
Years to Implement Manzini Lake Target Water Levels			
	1	Implement target level within 5 years.	3rd choice
	2	Implement target level within 10 years.	2nd choice
	3	Implement target level within 20 years.	1st choice

Multiparty Collaborative Planning Simulation Exercise:
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Confidential Instructions to the Representative of Water Users Association (WUA)

The commercial farming community is once again under attack and your group, the Water Users Association, is committed to fending off any attempted raid on your water.

The Association -- a collection of irrigation districts that rely on Vukavuka River water to irrigate tobacco, maize, pasture and other agriculture -- is not insensitive to the plight of Manzini Lake. Many WUA members are friendly with the owners of tourism businesses likely to suffer if Manzini Lake loses its fish. Others share a genuine concern for the lake's overall health. But -- and it's a big but -- the WUA is convinced that the bid to save Manzini Lake is going to hurt farmers and drive them off their land. The WUA wants to do what it can to save Manzini Lake, but not at the expense of losing the farming way of life.

Your membership is adamant about its right to the water. National law is quite clear on this issue; so, too, the existing water rights agreements. Accordingly, most WUA members oppose widespread water rights buyouts and/or transfers. They've done the maths and can see that 30% of their existing water rights would need to be bought out just to keep Manzini Lake at its current level. Instead, they prefer putting irrigation efficiency improvements in place as the primary way to ensure Manzini Lake gets more water. This group notes that Manzini Lake has gone dry three times in the past 5,000 years; while it's unfortunate that it seems to be going for number four, the majority of WUA members say farming shouldn't be the scapegoat for what is clearly a natural cycle. There are concerns amongst the farming community that the loss of water rights is a deliberate ploy to force commercial farmers off their land and redistribute it to landless communities. There are a handful of WUA members -- owners of particularly marginal lands -- who are somewhat open to water rights buyouts and/or transfers.

All WUA members agree on one key point: farmers must be adequately compensated for any costs associated with water rights buyouts/transfers and/or irrigation efficiency efforts.
For Issue 1, **Strategies for Increasing Water Flow**, you **prefer Option 2**, though you'd like to strike any mention of water rights buyouts/transfers. Your second choice is Option 1, but it's a distant second; you are convinced the WUA membership will simply not accept an agreement that relies primarily on water rights buyouts/transfers. At a minimum, you need to make sure this option is phased in over time and accounts for seasonal water flows. Option 3 is a non-starter. You've been instructed to walk out of the negotiations if this becomes the preferred path.
For Issue 2, **Manzini Lake Target Water Level**, you **prefer Option 4**, though you recognize that pressing for it may give the WUA a bad reputation in the local papers and with key state officials, who are looking for solutions that balance the needs of the farmers and Manzini Lake. Your fallback position is Option 3 -- keeping the lake at current levels. You simply cannot see how you could possibly accept either Option 1 or 2.
For Issue 3, **Years to Implement Target Water Levels**, you **prefer Option 3**, as it minimizes the impact on WUA members. Your second choice is Option 2; your third, Option 1. You are, however, willing to implement target water levels more quickly if the final package incorporates some of your other demands, such as a primary reliance on water conservation efforts and lower target water levels.
Both the specific options and your preferences are explained in greater detail on the reverse side.

Multiparty Collaborative Planning Simulation Exercise:
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Option Sheet for National Division of Water Planning (NDWP)

ISSUE	OPTION	DESCRIPTION OF OPTION	PREFERENCE RANKING
Preferred Strategy for Increasing Water Flow into Manzini Lake			
	1	Primary reliance on buy out of existing water rights; extensive removal of papyrus and other non-native plants from stream channel.	2nd choice
	2	Minimal reliance on buy out of existing water rights; comprehensive conservation/efficiency measures, including: ditch lining, crop substitution, scheduled irrigation, upgraded distribution system, limited river channel lining; limited removal of papyrus, other non-native plants.	1st choice
	3	Renegotiate existing water rights agreements; extensive removal of papyrus and other non-native plants from stream channel.	3rd choice
Manzini Lake Target Water Level			
	1	Keep lake at existing level, providing enough water to offset evaporation and maintain current populations of Tilapia, Catfish and Minnow.	2nd choice
	2	Raise lake to 1983 levels, providing enough water to offset evaporation and improve viability of Tilapia, Catfish and Minnow.	1st choice
	3	Raise lake to 1953 level, providing enough water to offset evaporation, improve viability of Tilapia, Catfish, Minnow, and reintroduce Tigerfish and African Pike.	3rd choice
	4	Set no target; permit lake to rise/fall without intervention.	4th choice
Years to Implement Manzini Lake Target Water Levels			
	1	Implement target level within 5 years.	3rd choice
	2	Implement target level within 10 years.	1st choice
	3	Implement target level within 20 years.	2nd choice

Multiparty Collaborative Planning Simulation Exercise:
Water Resources and Benefit Sharing--The Manzini Lake Simulation
Jointly Prepared by CONCUR, Inc. and AWIRU
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Confidential Instructions to the Representative of the
National Division of Water Planning (NDWP)

You just got a directive from the Minister of Conservation and Natural Resources: she is convening talks to resolve the Manzini Lake dispute, and your agency -- the National Division of Water Planning (NDWP) -- has been requested by the Governor to be at the table.

You've been waiting for this chance. As the Division responsible for planning water use across the country, you've been quite involved in the dispute in the past. Most notably, for the past few years you've been convening an expert working group in order to encourage and facilitate the exchange of information regarding this long-standing dispute. You're a big believer that good information can do much to resolve contentious disputes such as this one.
But, until now, you haven't actually been a negotiator at the table. You see this negotiation as a precedent-setting process that will do much to shape water-use policy in the nation for years to come. This case embraces virtually all the issues you've been saying the country needs to consider when putting together its sectoral water-use plan, including: the environment; agricultural needs, local economies -- both jobs and tax base; the use of good science; long-term viability; climatic variability, flood planning; equitable share and watershed planning.

As you prepare for the negotiation, you have several overriding concerns. First, you want to see some solid scientific backing for any decision that's reached; solutions are being discussed without precise knowledge about existing water usage, links between ground and surface waters, and other vital pieces of information. Second, you recognize that this decision may set important precedents for other water-use issues around the state. As you move into the final stage of drafting a national water plan, you want a solution that sets a wise course for future planning efforts. Finally, you need to come out of these talks with your own connections to the various interest groups intact. You've got lots of selling ahead of you with the soon-to-be-released national water plan, and you can't afford new enemies right now.

For Issue 1, **Strategies for Increasing Water Flow**, you **prefer Option 2**, as it seems to offer an opportunity to satisfy both the farming and Manzini Lake advocates. Option 1 is your second choice. For both Options 1 and 2, you want to press for more scientific studies to guide the group's deliberations. The Governor's told you that Option 3 is unacceptable.
For Issue 2, **Manzini Lake Target Water Level**, your **preference is for Option 2,** since Manzini Lake fish are barely limping along at the current water levels. Nonetheless, you recognize Option 1 may be far more attainable and you're willing to accept this -- provided there's a trigger mechanism for reopening the issue if fish populations continue to falter. You don't support Options 3 or 4.
For Issue 3, **Years to Implement Target Water Levels**, you **prefer Option 2**, as it seems to put in place a timeline that balances the needs of both the farmers and Manzini Lake. Your second choice is Option 3, since you think the five-year timeline stepped out in Option 1 is to harsh for the farming interests. Of course, if the target lake levels outlined in Issue 2 are set fairly low, you are willing to support a more aggressive timeline.
Both the specific options and your preferences are explained in greater detail on the reverse side.

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Water Resources and Benefit Sharing--The Manzini Lake Simulation
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Option Sheet for National Division of Wildlife (NDOW)

ISSUE	OPTION	DESCRIPTION OF OPTION	PREFERENCE RANKING
Preferred Strategy for Increasing Water Flow into Manzini Lake			
	1	Primary reliance on buy out of existing water rights; extensive removal of papyrus and other non-native plants from stream channel.	1st choice
	2	Minimal reliance on buy out of existing water rights; comprehensive conservation/efficiency measures, including: ditch lining, crop substitution, scheduled irrigation, upgraded distribution system, limited river channel lining; limited removal of papyrus, other non-native plants.	2nd choice
	3	Renegotiate existing water rights agreements; extensive removal of papyrus and other non-native plants from stream channel.	3rd choice
Manzini Lake Target Water Level			
	1	Keep lake at existing level, providing enough water to offset evaporation and maintain current populations of Tilapia, Catfish and Minnow.	3rd choice
	2	Raise lake to 1983 levels, providing enough water to offset evaporation and improve viability of Tilapia, Catfish and Minnow.	2nd choice
	3	Raise lake to 1953 level, providing enough water to offset evaporation, improve viability of Tilapia, Catfish, Minnow, and reintroduce Tigerfish and African Pike.	1st choice
	4	Set no target; permit lake to rise/fall without intervention.	4th choice
Years to Implement Manzini Lake Target Water Levels			
	1	Implement target level within 5 years.	1st choice
	2	Implement target level within 10 years.	2nd choice
	3	Implement target level within 20 years.	3rd choice

Multiparty Collaborative Planning Simulation Exercise:
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Confidential Instructions to the Representative of the National Division of Wildlife (NDOW)

Since the early 1980s, your agency -- the National Division of Wildlife -- has been warning that Manzini Lake is in trouble. Though the issue has gotten lots of attention in recent years, there is still no solution in place. Lake levels continue to fall, and the fish living in Manzini Lake are at risk. You are also concerned that the in-flow stream requirement of the Vukavuka River is not being met.

Now, you've just learned that the Minister of Conservation and Natural Resources is convening a round of talks to try and resolve the Manzini Lake dispute. The Division has been directed by the Governor to be at the table. You are to represent the Division.

Your position is very clear. You are there to represent the fish slowly being choked to death in Manzini Lake. Yet you cannot alienate the rural communities dependant on water from the Vukavka River for their livelihood – they are an important constituency and this is an election year. You recognize that you have some strong allies around the table, particularly the Manzini Lake Trust and Save the Desert Lakes. You know the negotiators for both groups and get along well with them. At the same time, you know that your boss has been told that the Division needs to support options that don't put the farmers out of business. You're not thrilled with this directive -- as far as you're concerned, the farmers are wasting water by raising marginal crops and employing inefficient irrigation techniques -- but you recognize that you will need to modulate your position somewhat.

For Issue 1, **Strategies for Increasing Water Flow**, you **prefer Option 1.** It is, you are convinced, the only sure way to get water into Manzini Lake. While you personally think Option 3 is the next best way to get water to Manzini Lake, you know the Governor does not support this approach. Accordingly, your second choice is Option 2. You have serious doubts that this option will, in fact, prove effective, so you want to press for a side agreement that would reopen the negotiations if water levels do not rise as anticipated.

For Issue 2, **Manzini Lake Target Water Level**, while you're **first choice is Option 3**, you recognize that this is a tough position for your Division to sell politically, so you're willing to shift quickly to Option 2 -- returning Manzini Lake to 1983 levels. Option 1 is a distant third choice for you; you know that some around the table believe that this option -- maintaining current levels -- is good enough, but your biologists say fish in the lake today are barely surviving. The Division adamantly opposes Option 4.

For Issue 3, **Years to Implement Target Water Levels**, you **want Option 1**, since your biologists tell you the ecosystem is at-risk and needs to be restored to healthy levels as quickly as possible. Your second choice is Option 2, while Option 3 is a distant third. You and the Division Administrator agree, however, that this is an area rich with potential trade-offs. If a final package incorporated higher lake levels, you would be willing to agree to a less aggressive implementation schedule.

Both the specific options and your preferences are explained in greater detail on the reverse side.

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Jointly Prepared by CONCUR, Inc. and AWIRU
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Confidential Instructions to the Facilitator

After much internal debate, the National Government has finally agreed to let your Ministry, the Ministry of Conservation and Natural Resources, convene this negotiation. Your boss, the Minister, has tasked you (her senior Special Assistant) to serve as a neutral facilitator for the session.

Fortunately, you have a lot of experience in this kind of situation. You have obviously been chosen to facilitate the Manzini Lake talks because you know the subject well and you have a superb reputation as a process manager.

You know that some people see this as a hopeless situation. They've seen other Manzini Lake groups convened over the years without success. But from your standpoint, there is potential for a solution. You recognize that it takes a lot of time for people used to adversarial situations to get into a "joint problem-solving mode." You know there are some significant differences around the table, but you have confidence that the group will work smoothly at this session, seeking ways to share the benefits of the system instead of purely focussing on water rights.

Your first priority will be to ask each representative to summarize his/her most important concerns. Be sure to put these up on a sheet of paper or blackboard. Then, try to get the negotiators to focus on specific options or packages of options. Remember, the group only has 1 3/4 hours to reach agreement on a final package. It's your job to keep them on track. It's also your job to make sure they take straw votes, as required, at 30 minutes, one hour and 1 1/2 hours.
Be careful about becoming too closely identified with any particular option or issue. You must preserve your neutrality and maintain the confidence of all the parties. At the same time, it is appropriate and may be necessary, in fact, for you to help the parties see potential trade-offs Encourage the groups to discuss trade-offs among the three key issues:

- determining a preferred strategy for increasing water flow into Manzini Lake
- setting target water levels for Manzini Lake
- deciding the number of years it will take to implement target water levels for Manzini Lake

(The accompanying sheet outlines the three or four options available for resolving each of the issues listed above. Each negotiator has the same list of options, plus a column that ranks his/her preference for the various options.)

There may be side agreements that can help the group reach consensus. You should encourage groups to explore such agreements. It's okay to suggest that some members of the group caucus if you think there are moments when private discussions would be helpful. This may not be necessary, though, if they are working well together.

Once a final agreement is reached, be sure that everyone interprets the final package in the same way. It is not uncommon for negotiators to interpret terms of an agreement differently. It is important that you make sure this does not happen.

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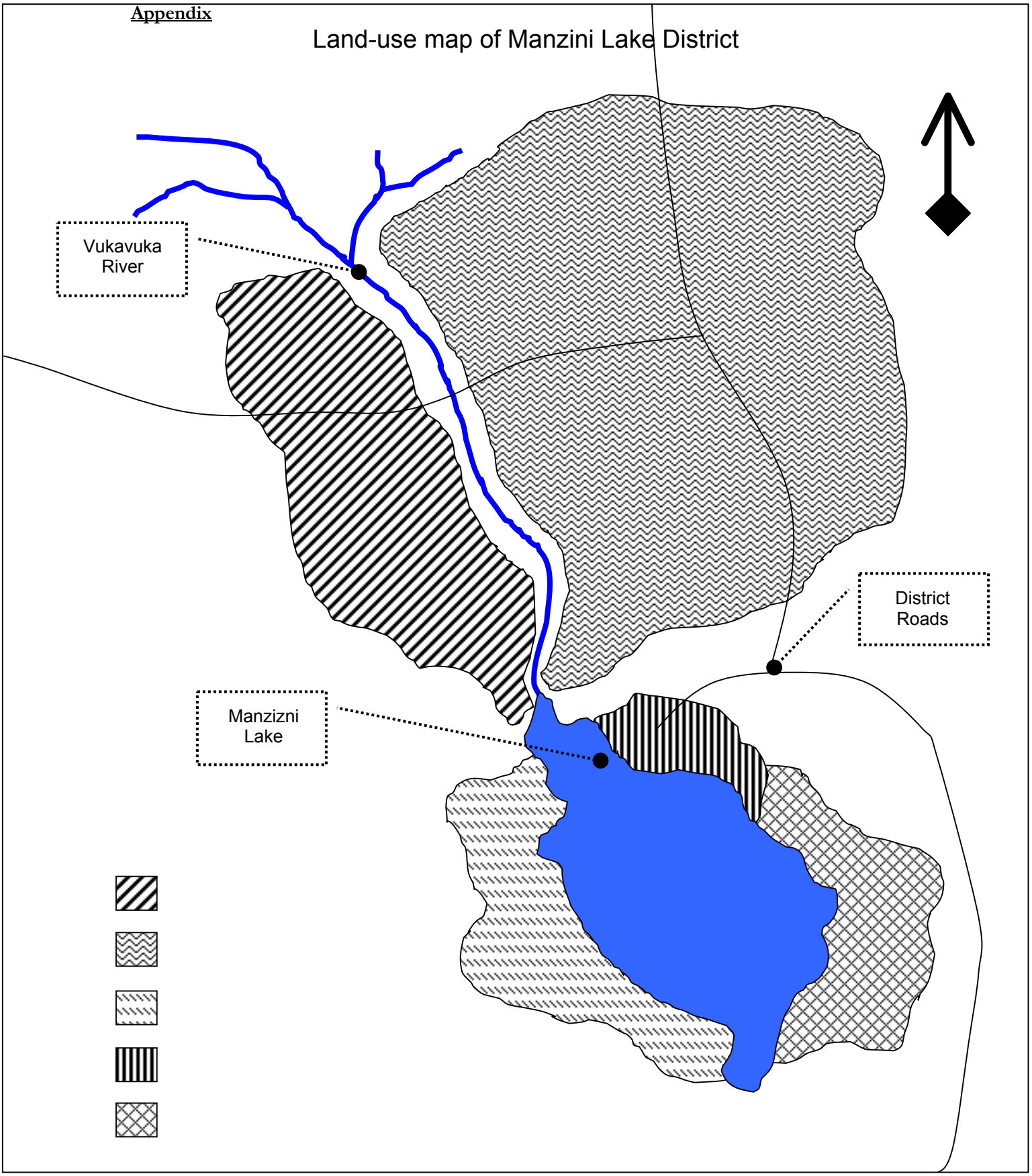
The Manzini Lake Simulation

Option Sheet for Facilitator: Note This tool is provided as a reference for the Facilitator; the Facilitator has no preference with respect to the issues, other than helping parties reach a well informed, stable agreement.

ISSUE	OPTION	DESCRIPTION OF OPTION
Preferred Strategy for Increasing Water Flow into Manzini Lake		
	1	Primary reliance on buy out of existing water rights; extensive removal of papyrus and other non-native plants from stream channel.
	2	Minimal reliance on buy out of existing water rights; comprehensive conservation/efficiency measures, including: ditch lining, crop substitution, scheduled irrigation, upgraded distribution system, limited river channel lining; limited removal of papyrus, other non-native plants.
	3	Renegotiate existing water rights agreements; extensive removal of papyrus and other non-native plants from stream channel.
Manzini Lake Target Water Level		
	1	Keep lake at existing level, providing enough water to offset evaporation and maintain current populations of Tilapia, Catfish and Minnow.
	2	Raise lake to 1983 levels, providing enough water to offset evaporation and improve viability of Tilapia, Catfish and Minnow.
	3	Raise lake to 1953 level, providing enough water to offset evaporation, improve viability of Tilapia, Catfish, Minnow, and reintroduce Tigerfish and African Pike.
	4	Set no target; permit lake to rise/fall without intervention
Years to Implement Manzini Lake Target Water Levels		
	1	Implement target level within 5 years.
	2	Implement target level within 10 years.
	3	Implement target level within 20 years.

Appendix


Land-use map of Manzini Lake District
Vukavuka River
District Roads
Manzizni Lake

4. Mkuzi Wetland Simulation presented at Namibia Workshop (English)

The Mkuzi Wetland Simulation
Integrating Local Needs and International Agreements:
The Role of Traditional Institutions

Jointly Prepared by CONCUR, Inc. and AWIRU
for the Windhoek, Namibia Sharing Water Workshop

Objectives

Gain experience in working in a team settting to develop a strategic plan for consultation in natural resource management. In particular, develop and refine technique for engaging traditional leaders and other local interests in initiatives associated with international agreements.

Instructions

- Divide into groups of 3 or 4.
- Read the exercise.
- Allocate the roles between your group members (roles 3 & 4 can be amalgamated).
- Discuss the issues between yourselves, trying to adopt the point of view of your designated role. You have 30 minutes for this.
- Appoint a person in the group to record the key recommendations of the group. That person will also report to the plenary.
- Each group has 5 minutes to report their findings in plenary.
- Discussion by the whole group.

Introduction to the Problem

After many years of indecision, it looks like the Mkuzi wetland, on the eastern coast, is going to be declared a Ramsar site. The wetland is an important habitat for waterfowl, several dozen fish species and a variety of mammals. Mkuzi is an estuary, open to the ocean at high tide, supporting an important mix of freshwater and saltwater species. The primary source of inflow is the Thupa river draining the interior highlands before meandering through the coastal plains and flowing into the Indian Ocean through Mkuzi. In addition, Mkuzi contains the country's largest plantation of Mangrove treas. A decade ago plans were proposed to start a mining operation in the wetland – the alluvial soils are rich in titanium. The overwhelming public outcry led to the withdrawal of the mining permit by the government. Since that time, various groups have been pushing to formalise the conservation status of the wetland. The greatest environmental threats are:

- Salt water intrusion – as freshwater inflows to Mkuzi have dropped over the years the relative amount of salt water entering from the ocean has increased. This poses a threat to various animal and plant species. The Mangrove trees are at particular risk, as they need to be flushed out with pure water at regular intervals. With the construction of dams upstream on the Thupa river and the drop in runoff, the quantity and timing of freshwater flow has been disrupted. Average yearly inflow to the wetland has decreased from 800 million m3 a decade ago to roughly 500 million m3 today. Although this quantity is not yet below the critical environmental threshold stipulated as part of the in-stream flow requirement (IFR) it is now being delivered

at a constant rate throughout the year, with little of the natural variation of before. The two dams constructed to supply irrigation water to the commercial sugar plantations in the lowlands have prevented the annual floods reaching Mkuzi – instead, the water flows in at a constant rate throughout the year, reducing the freshwater flushing effect of the estuary.

- Nutrient build-up – runoff from the commercial farms and the small-scale subsistence farms upstream contains nitrates, phosphates and various other nutrients and chemicals. These are starting to have an adverse affect on the water quality of the wetland. Algal blooms are becoming more frequent, followed by a drop in oxygen levels in the water due to a decrease in the amount of sunlight reaching the leaves of underwater aquatic plants. There are fears that if the oxygen levels in the water continue to drop at the present rate the water will be unable to support life within a decade. This would make the water of Mkuzi dead – unable to support any of the complex ecosystems dependant on it.

- Sedimentation – As soil erosion becomes more of a problem in the Thupa valley the quantity of sediment in Mkuzi has increased. The deep-water channels served as breading ground for the Tilapia and African Pike. The populations of these fishes have dropped substantially as breading areas come under threat of sediment build-up. In addition, the increase in sediment has slowed the flow of water through the wetland system leading to an increase in the snails carrying the bilharzia parasite, as well as providing a breeding ground for the Anopheles mosquito – carrying malaria. This has had a negative impact on the health of the communities surrounding the wetland.

People affecting and affected by the Ramsar Site

The principle driver behind the environmental threats to the Mkuzi wetland is agriculture. The commercial sugar plantations in the lowlands have been increasing steadily since 1950. The two small dams on the Thupa river supply irrigation water to the commercial farmers. With the recent cancellation of sugar quotas by the EU and the US there has been a glut in the local sugar production industry. This has led to a drop in environmental standards with several farmers being accused of applying cheaper, non-biodegradable, fertilisers and pesticides to their crops. Many of the farmers have indicated that they would take part in a state assisted programme to convert their commercial farms into a nature reserve as part of the Ramsar site. They estimate that with the low international sugar prices they will make a better living by getting eco-tourists to visit the region. They have also proposed various partnership deals with the Thlapo community, but none have yet been successful. The commercial farmers are supportive of the proposal to declare Mkuzi a Ramsar site and are willing to fulfil the necessary requirements, but only if the other water users also comply. They have asserted their intention to carry on farming and increase their operation to compensate for the low world sugar prices if the Ramsar conservation effort falls through.

The Yao tribe recently won a large portion of their ancestral land back. This land, taken from them under the old Apartheid government is located in the highland areas. The small-scale farmers do not rely on irrigation, as the rainfall in the region is high (about 800mm annually). The problem is that as the tribe's population has increased dramatically in the years since it lost its land there is greater pressure on the land available. Marginal land on the steep slopes is being farmed, with an increase in soil erosion clearly visible. This is the major contributing factor to the sedimentation of the wetland. Unfortunately there is a history of mistrust and animosity between groups in the area. The Yao believe that efforts by the government and NGOs to convince them not to farm on the steepest slopes are driven by the interests of the commercial farmers. The Yao are proudly defendant of their recently won land and are suspicious of any perceived attack on their rights. They are united behind their Nkosi when she stated at a recent council meeting that "we were here long before this government and long before the government who stole our land. We do not need to be told how to manage our land".

There is also the Thlapo community living on the shores of the Mkuzi wetland. They are descendant from the Neolithic peoples who populated the area thousands of years ago, and are the regions' first inhabitants. They have traditionally been dependent on the resources of the wetland. They use fish traps in the channels to catch African Pike and Tilapia. They also hunt animals, such as the bushbuck, in the area as well as harvesting reeds and other plants to use as building materials. Over the past century, they have also relied increasingly on flood-irrigated farming in the wetland, producing cassava, millet and maize as staple foods. Initially they were supportive of conservation efforts involving the wetland. They have seen fish stocks decrease over the past decade and know that the freshwater flow from the Thupa river is getting less. However, a government official recently informed them via a letter to their headman that once the wetland is declared a Ramsar site they would not be allowed to continue most of their traditional livelihood activities. Hunting will be banned altogether and fishing will be severely curtailed. The area they will be allowed to use for the production of crops will also be much smaller and they will not have any means of keeping animals out of their fields. They feel that their whole livelihood and existence is threatened. The headman sent a message to the local magistrate informing him that the Thlapo would never give up their livelihood. He went on to state that "we may have been mistreated by the previous government, but never was our ability to forge a livelihood from our environment threatened in such a fundamental way. We will resist such plans with every means at our disposal".

Your assignment in this case:

Objective: to develop a strategic plan to guide the way local communities are brought into the planning and decision making process with regards to international agreements.

Your team consists of three or four experts from a variety of backgrounds, including social anthropology, agricultural development, environmental resource management, tourism economics and institutional development. You are all senior researchers at the Department of Environmental Affairs and Tourism (DEAT). The DEAT is leading the proposal to declare Mkuzi a Ramsar site and has conducted various feasibility studies to determine the best mix of economic development and nature conservation. They have opted for a model of community tourism initiatives run by the Thlapo in and around the wetland in combination with the large nature reserve to be formed by the commercial farmers. The farmers have indicated that if the Thlapo are not on board the nature reserve is not likely to be viable. It will not draw enough visitors if the Mkuzi wetland is not a protected Ramsar site.

The Director General of the DEAT commissioned your team to develop a strategy to engage the Thalpo and Yao tribes in a consultative process leading to a Ramsar designation.. This is imperative, as the commercial farmers have threatened to increase their farming operations should the Ramsar site not gain support. Additionally, the Minister of the DEAT has instructed that she wants such a strategy to be a generic "blue print" of how to deal with integrating local needs with international commitments in the future. As the representative of the country who signed the Ramsar convention two years ago, she knows that it is likely that the DEAT will run into situations such as this in other areas. She wants to avoid a repeat of the ugliness and threats of the past few months. The department will adopt the strategic plan as official policy to guide the way it brings local communities and traditional leaders into the planning and decision-making process.

Roles

1. *Social Anthropoligist*

You have spent a lot of time with the Thlapo community. Your research described their ancient traditions, building techniques and hunting methods. You do not want the social-fabric of the tribe to disintegrate and fear that one of the oldest cultures in the region may be threatened with extinction.

2. *Agricultural Development Specialist*

It was partly due to your tireless campaigning and lobbying that the Yao won their land back in a landmark case a few years ago. You have since then put a lot of energy into developing farming operations on their land. You understand the need to conserve the highland slopes and prevent soil erosion, but you also sympathise with the Yao. After reclaiming their land they are proud and territorial about their rights.

3. *Tourism Economist*

Tourism is the fastest growing industry in the world today. You are convinced that if the Mkuzi wetland can be declared a Ramsar site and the land of the commercial farmners can be convertied into a nature reserve that the surrounding communities will benefit from the jobs created.

4. *Environmental Resource Manager*

You need to guide the process of the Ramsar site declaration and realise that it is a contentious issue. But the international obligations are clear and you know the importance of adhering to them.

Possible points to look at:

1. Traditional leaders have a responsibility towards their communities, mandated to look after their local interests, sometimes in opposition to national or international plans and agreements. What possibility is there for officially incorporating the role of traditional leaders in natural resources management?
2. How are local knowledge systems and skills to be used more effectively in determining conservation strategies?
3. What are the pitfalls encountered in community based natural resources management and tourism initiatives and how can these be overcome?
4. There are situations where local communities stand to loose from their land and resources being declared internationalised conservation areas (such as Ramsar). There may be greater benefits for the country as a whole as well as the ecosystem. What long-term sustainable methods can be used to compensate communities for their loss of access rights?
5. How should the RAMSAR proposal be framed? What are the purposes and benefits of the designation?
6. What incentives might be suggested to gain the support of the Thalpo and Xao tribes, respectively?
7. What approach would be used to carry out consultative process with traditional leaders? What steps would you take, and in what order? Whom would you contact first? What recommendations do you have about a local liaison? What timeline do you forecast for the consultative process?
8. What other elements would you include in the Strategic Plan?

The above points will help guide your deliberations. Please feel free to add or omit points as your group wishes.

Plenary Discussion:

What are the commonalities and differences among the Strategic Plans devised by the various teams?

Of the "Point for Consideration" what issues, listed above, present the greatest challenge?

Consider Next steps – what should we do with the methodology? How we make make the transition from simulation to practical application. Should it be written-up and become an output of Sharing Waters & distributed to people involved in the project? Should the team outputs be incorporated in the Meeting Summary from the Windhoek Workshop?

5. Okavango Simulation presented at Botswana Workshop (English)

Okavango Basin
Scenario Building and Model Development
Simulation Exercise: Articulating Interests to Support
Prepared by CONCUR/AWIRU for the Kasane, Botswana Sharing Water Workshop

Purpose of this Simulation Exercise

In this simulation, delegates will have an opportunity to simulate a dialogue in which interests regarding use and sustainable development of water resources in the Okavango Basin are articulated.

Key Themes Presented in the Simulation

This simulation will emphasize four important themes, which build upon the past negotiation training and simulation exercises presented in plenary at the Luanda and Windhoek workshops. They are:

- Distinguishing underlying interests from fixed positions
- Framing issues clearly and identifying information sharing and fact finding needs
- Discovering potential zones of agreement among apparently divergent interests
- Determining, which interests lend themselves well to representation in models

Context of the Simulation

We assume in this simulation, that the OKACOM Commission is now in the early stages of developing future scenarios to guide planning and management of the Okavango basin.
To kick off this process, they have asked a regional team of hydrologists to prepare a prototype planning model. Their goal in doing so is two-fold. First, they wish to illustrate the value of water resource planning models. Second, they want to help government agencies and other stakeholders to more clearly articulate their interests and demonstrate how these interests might be reflected in the planning model.

The hydrologists have already provided key government agencies and stakeholders an initial briefing on the preliminary results of the prototype model. This model is developed on the WEAP platform, which was one of the models considered in the model evaluation process initiated following the Windhoek workshop. This platform was selected because the project team has prior experience with the tool and because the model conforms with the priority attributes that are emerging from a model evaluation process.

We also assume in this simulation that OKACOM has convened key government agencies and stakeholders in the basin, and charged them with developing a summary of interests to be reflected or considered in developing additional scenarios and associated management strategies as the prototype model is refined.

Logistics

- All delegates will read these general introductions. There are no supplemental confidential instructions
- Delegates will meet in 8-member teams
- There will be a total of 6 to 8 breakout groups
- Once in breakout groups, facilitators will assign roles that are found in the general introductions
- Team members will work collaboratively to consider a series of questions to help illuminate their interests
- With the help of facilitators, each group will report back a concise statement of interests to be considered in scenario development. This report may be made by the designated facilitator or another representative
- Time permitting, there will then be a brief plenary discussion of the interests presented.

The Participants on your Planning Team

1. **OKACOM representative from Angola**: as the country is emerging from almost three decades of civil war there is an emphasis on reconstruction and development. Many people fled the Angolan portion of the basin to avoid the fighting, settling in regional towns or in the capital, Luanda. If some of these people are to be encouraged to return to the Okavango basin there needs to be infrastructure in place to allow them to generate sustainable livelihoods. Additionally, there are several possible sites for hydropower dams on the headwaters of the river. However, your government is cognisant of the need to conserve the downstream ecosystems and the eco-tourism industry around the delta. You are particularly interested in incorporating the concept of "benefit-sharing" within the modelling scenarios to show possible options for spreading tourism and other benefits associated with the river upstream to Angola.

2. **OKACOM representative of Namibia**: as an arid country in the process of industrialisation you have to balance the expanding urban water needs with the natural variations of climate your country typically experiences. Various water provision alternatives have been implemented or investigated – wastewater reclamation, desalination, artificial aquifer recharge and water transfers (the latter possibly as far as from the Congo River). As well as needing to increase the reliability of water supply to the city of Windhoek, allowing water storage schemes to be operated at greater efficiency, there is a growing need for water among communities engaged in agriculture on the banks of the Okavango River in Namibia. The development of these agricultural schemes hold out the potential to generate income for the riverine communities, but your government also recognises that the northern Namibian tourism industry is reliant on the Okavango delta as a regional attraction and is thus committed to the preservation of the delta ecosystem. As one of the countries which has signed & ratified the UN Convention on the Law of the Non-Navigational Uses of International Watercourses (1997), Namibia has committed itself to the "obligation not to cause significant harm" (to downstream riparians). It is your belief that modelling water management scenarios can aid your country to observe this obligation while still generating the necessary development.

3. **OKACOM representative of Botswana**: the revenues generated from tourism in the Okavango delta area are an essential part of your country's GDP, supporting many incomes and livelihoods. Your government has long since been a proponent of conservation of the delta, but has had to balance this with the need for water by delta communities (using it for small-holder irrigation and stock watering) as well as for the diamond mines (another large contributor to the country's GDP). Additionally, as a county in favour of the UN Convention on the Law of the Non-Navigational Uses of International Watercourses (1997) Botswana is aware of the right of upstream riparians to "equitable and reasonable utilisation" of water from the river. You hope that modelling the various possible scenarios will contribute to defining what this level of utilisation is and what form it should take (benefits or actual water).

4. **Angolan basin community representative**: water supply is but one of many services which the people of your region need developed. Much of the infrastructure was either destroyed or allowed to deteriorate during the war and people now rely on drawing water directly from the river. You would like to see the general social development of your community, allowing people to generate sustainable livelihoods from a variety of sources including, but not limited to, agriculture and ecotourism. You are aware of some of the possible development plans which have been spoken of by the basin states (construction of hydropower and/or irrigation dams, water transfers out of the basin, creation of transfrontier parks etc). You would like the model scenarios to provide more clarity on the possible costs, benefits and responsibilities these plans would hold for your people.

5. **Namibian basin community representative**: your people have been intimately involved with the Okavango River for many centuries, as the river provides them with a source of food, water, building materials, income as well as possessing important spiritual dimensions. At present water is abstracted along the banks of the river in an uncontrolled way and used in various irrigation schemes, with access to water implicit in the ownership of land with river frontage. The government has spoken of various

development initiatives which will formalise rights of access to water and allow greater areas to be brought under irrigation through the provision of water transport and storage infrastructure. Your concern is that much of the proposed developments will be aimed at taking water to the capital city – outside of the basin. The implications of where water is used within Namibia need to be investigated through the modelling of various scenario options. You have a responsibility to make sure your people receive a fair deal from any future development plans.

6. **Botswana basin community representative:** over the years you have watched as the extent of the flood waters have varied from being high at times to low at other times. You realise that the system is fundamentally adapted to this variation, but are concerned that any upstream development could drop the amount of water reaching your community in the delta and have a negative impact on the ecotourism industry which provides many jobs in the region. The government of Botswana has been supportive in ensuring that sufficient water reaches the delta, but you feel that they are being overly prescriptive in not allowing an expansion of local small-scale irrigated agriculture. The development of such agriculture would increase the food scrutiny of households who do not have a member employed in the surrounding tourist lodges. You would like to know two things from the modelled scenarios – what would the impact of upstream infrastructure development be on your part of the delta and what amount of water can be used (either from groundwater or from direct abstraction from the delta) for increased agricultural development in your community.

7. **A representative of a regional NGO concerned with the sustainable development of the basin –** for the benefit of the basin communities, taking into account the need to protect the basin ecosystem. You realise that one of the greatest challenges faced by the region is poverty – to different degrees in each of the basin states there are communities whose immediate needs are for ways to improve food security and livelihood sustainability – through any possible means. You do however believe that the development of ecotourism throughout the basin holds out promise to generate incomes for basin communities, as long as they can be made part of the process of operating the associated businesses. At present, too much of the income generated through ecotourism leaves the basin and does not benefit the communities and you are sceptical of developing the industry further along current business lines. You believe that there needs to be a combination of ecotourism development and irrigated agriculture development throughout the basin to improve the food security of vulnerable households and would consider interbasin transfers from neighbouring rivers such as the Congo or the Zambezi. You would like to see the various options modelled in the scenarios include the specific benefits which will accrue to these basin communities and view it as a process of empowering them to take part in management decisions on the river.

8. **A representative of an international environmental NGO focussed on protecting the eco-system of the delta.** As the Okavango Delta has been declared a Ramsar site of international importance you believe that it should be conserved in as pristine a state as possible. You are however aware of the development needs of the basin states and the various communities relying on the resources of the delta. You believe that the best way to address these development needs is through the stimulation of ecotourism centred on the delta. In your opinion the delta is of such international importance as an ecosystem with a unique biodiversity that it should not be made to compete with other economic sectors for water. All Okavango River water over and above basic domestic household needs should be made available to the delta. Furthermore, you do not support plans for interbasin transfers to the Okavango River as this may introduce alien species into the bio system with unpredictable consequences for the biodiversity of the delta.

Your Assignment: Articulate and Summarize Concise Statements of Interests.

Convening the Parties

A facilitator will convene each of the eight parties, restate the charge, and assign roles to persons within your group. At his or her discretion, the facilitator may elect to invite you to self select roles. You are to take on a role different from the one you have in real life.

Once convened, you are to consider and respond to the following five questions, all with an eye towards informing future refinement of the hydrologic planning model.

While the 8 parties are to work cooperatively as a team, the convenors do not assume team members will have a completely unified set of interests. They do expect, however, that you will discover some significant convergence of interests. It is up to the facilitator to elicit and record those points.

Key Questions to Address

Each participant will be asked, from the standpoint of his or her interest group, to consider and develop brief answers to the following five questions. The description of interests listed above under each role should be used only as a starting point; you are encouraged to bring forward your own knowledge and experience

1. What kinds of **resource users/beneficiaries** needs may be anticipated in the future? An example would be continued increases in water demand in Central Namibia and an associated decrease in supply reliability.

2. What are some **specific water needs** that will emerge for these future resource users/beneficiaries? An example would be increased reliance on water from the Okavango River by communities both inside as well as outside of the basin.

3. What **water management strategies** should be used or considered in order to meet and balance potentially competing water needs? An example would be the development of an Okavango River diversion to improve reliability in Central Namibia.

4. What **indicators** might be used to guide the evaluation of potential management strategies? Examples might be the improvement in water demand coverage in Central Namibia and the associated change in hydrologic conditions (flood extent and duration as well as sediment transport) in the Delta.

5. Over the long term, how should **benefits and impacts of water diversion or abstraction be monitored and measured**? Examples might be improved monitoring of flood plain conditions downstream of any significant river diversion. Are there ways to incorporate benefit/cost sharing in planning models?

Summarizing Results in Your Team: **Your group facilitator will be responsible for recruiting a recorder from within the group, and then working with your team to distil and summarize the advice.**

Reporting Back to the Full Plenary Group: The group facilitator or another designee of your team will then report the most important findings back to the full plenary group.

Follow up Report of the Hydrologic Modellers and Implications of This Simulation. Project facilitators and hydrologists will consider the results of this simulation. Later in plenary, if time permits, they will illustrate how a **selected** set of interests will be included in the prototype model and the results of these modifications will be demonstrated. The convenors expect that this will in turn generate additional discussion on the prospects and possibilities for incorporating interests in refined hydrologic planning models. As well, the project team will consider to what extent interests can be reflected as direct inputs to models, or to what extent a summary of interests should be considered in supporting analytical tools and approaches.

Summarizing Interests

You might find it useful to summarize interests using this template

Articulating Interests	Users/ Beneficiaries	Specific water needs	Water management strategies	Indicators to guide the evaluation	How to measure benefits and impacts
OKACOM representative from Angola					
OKACOM representative of Namibia					
OKACOM representative of Botswana					
Namibian basin community representative					
Botswana basin community representative					
Regional NGO concerned with the sustainable development of the basin					
International environmental NGO focussed on protecting the delta eco-system					

Appendix: Overview of the Okavango Basin Context

The Okavango River basin is home to about 600,000 people, over half of whom live in the Angolan portion of the basin. Namibia is home to 160,000 people in the basin, with the remainder living in and around the Okavango Delta in Botswana. The two main tributaries, the Cubango and the Cuito, rise on the Bie Plateau in central Angola, where average annual rainfall is over 1000 mm a year, and flow south towards Namibia. The Cubango (Kavango in Namibia) forms the border between Angola and Namibia and joins the Cuito after about 300 kilometres. Shortly after this the unified river traverses Namibia's Caprivi Strip – becoming Namibia's only perennial river wholly within its territory. The Okavango River does not flow into the sea, terminating instead in Botswana as the Okavango Delta (average annual rainfall of about 400 mm a year) where it is swallowed up by the sands of the Kalahari Desert and "lost" to evapotranspiration.

About 10 cubic kilometres of water drain into the Okavango Delta every year. At present very little of this flow is taken out of the river as there are no dams or major water pumping schemes on the river – yet. As such it is the one of the last relatively pristine rivers in Africa, giving it an internationalised character as there are many stakeholders interested in the sustainable management of the river other than those found in the three riparian states.

Currently the largest economic value in the system is in water in the Delta where it contributes to a unique biodiversity that sustains a large tourism industry. Revenues from tourism in the Delta exceed US$ 250 million annually, or roughly 10 percent of the Botswana GDP. Current activities using water from the river in Namibia include municipal and domestic water supply, small to medium-scale irrigation projects, fishing and fish farming. As the Okavango is Namibia's only perennial river, there has been talk of transferring some water from the system to Windhoek for industrial and domestic use. The other potential increase in water use from the river is in Angola. The end of the Angolan civil war will accelerate development in the basin, probably requiring additional water development.

The Okavango River is a resilient system, which responds and adapts to the various changes and "threats" it has encountered over time. However, it is important that the resilience of the system is protected and that any future development is planned in such a way that it does not deprive the system of its ability to respond to change. Southern Africa is characterised by temporal as well as spatial climatic variability – droughts and floods follow on from each other with relatively few years of what can be called "average" rainfall. The Okavango Basin is no exception. Since records of inflows to the delta began in the early 1930s flows have varied from -45% to +60% of the mean annual flow.

Since the 1980s there has been a downward trend in flow volumes into the delta, although the 2004 season is set to be one of the biggest flow events in the past 35 years. These variations appear to be natural, but anthropogenic factors cannot be ruled out as part of global climate change.

All three basin states have high rates of unemployment with a high reliance on rain-fed subsistence agriculture, making people vulnerable to the cycles of droughts and floods the region experiences. Urbanisation is highest in Namibia and Botswana with many people moving out of the basin to seek work in the larger cities. During the Angolan civil war people moved to the urban areas, frequently outside of the basin. For the people returning there are not many available economic opportunities as much of the infrastructure was destroyed. The prime need for people returning to the basin is to be able to generate sustainable livelihoods.

The Challenge

In response to the development needs in the three basin states there have been several infrastructure development projects, such as hydropower dams and water transfers, proposed on the river. When considering the impact of dams on the river and the Delta ecosystem some consider that the actual volume of water abstracted is less important than the method used to capture it. This is largely because of the low volumes proposed –which are considerably less than the annual variation of inflow to the Delta. What is perhaps more important is that the flow of sand to the Delta is not disturbed. It is this sand flowing into the

Delta as bed-load from the upper reaches of the river which raises the channels of the delta above the surrounding terrain, allowing it to fan out. Stop the flow of sand and the channels will become deeper, rapidly diminishing the size of the delta.

OKACOM has determined that the time has now come to start considering possible future scenarios and associated management strategies to guide allocation the resources of the river between the three basin states in an equitable, fair and sustainable way. This will include the water in the river as well as the various benefits associated with the river, such as the revenues generated from ecotourism. The first step is to develop scenarios of how conditions in the basin will change and to assess the likely impacts, costs and benefits of a variety of proposed management strategies associated with these scenarios. As the representatives of the basin states have committed themselves to a collaborative management approach based on joint fact finding and the sharing of data the scenarios and associated management strategies will be explicitly developed to incorporate a range of interests expressed by representatives each of the states.

It is reasonable to assume that benefits will not accrue symmetrically for each basin state. As well, scenarios will likely reflect regional and sectoral differences within the states as to where those benefits would accrue. For example a transfer of water from the river to a capital city would bring greater benefits to the residents of the capital city than to the basin population in other regions of the country. These benefits will then have to be assessed in terms of the costs to other stakeholders as well as taking into account the impact to the ecology of the river and Delta. Several mitigating actions, such as water transfers from other rivers into the Okavango and technologies such as desalination are possible, but these too hold costs and impacts of their own

Appendix H.

"Refining and Testing Joint Fact-Finding for Environmental Dispute Resolution: Ten Years of Success"

Published in *Mediation Quarterly, Volume 18 (4*).

Scott McCreary, John Gamman and Bennett Brooks

Scott McCreary and John Gamman are Principals and Co-Founders of CONCUR, Inc. and Bennett Brooks is an Associate in CONCUR's Berkeley office. The authors can be contacted 1832 Second Street, Berkeley, CA 94710.

Based on our own experience mediating complex, multi-party environmental policy and planning disputes, our research focuses on the application of specific mediation techniques and strategies to help stakeholders make wise and stable decisions despite their competing interests and values. Scott McCreary has a longstanding interest in methods to increase the effectiveness of science advising for environmental management. He is co-author of *Institutional Arrangements for Managing Coastal Resources* (1991) and contributed a chapter to the *Consensus Building Handbook* (1999). John Gamman is particularly interested in the implementation of environmental policy. He is the author of *Overcoming Obstacles to Environmental Policy Implementation* (1994). Together, the authors have also collectively published several articles on the application of mediation techniques to environmental policy making. Since completing their doctorates at MIT, the authors have designed and lead mediations of over 30 complex environmental policy issues and regularly teach courses in negotiation and mediation.

REFINING AND TESTING JOINT FACT-FINDING FOR ENVIRONMENTAL DISPUTE RESOLUTION: TEN YEARS OF SUCCESS

Published in **Mediation** *Quarterly, Volume 18 (4*).

Scott T. McCreary Ph.D., John K. Gamman Ph.D. and Bennett Brooks[1]

For the past decade, we at CONCUR have been mediating complex environmental disputes and have used the technique of joint fact-finding as a cornerstone of our model of practice. In this paper, we present and reflect on this body of experience with the goal of better informing both our colleagues in the field and other potential users of alternative dispute resolution (ADR) about the elements and preconditions for successful use of joint fact-finding. We also aim to contribute actively to the current initiatives on "Best Practices."

INTRODUCTION

Resolving a complex public policy dispute requires that interested parties share an understanding of the technical dimensions of the problem they face. Whether the challenge is reducing pollution of the marine environment or cleaning up a toxic waste site, the very best scientific information must be collected and utilized. This paper highlights techniques used in CONCUR's professional practice to compile and pool relevant information and to "translate" it into a form that can be used by decision-makers and others to create the foundation for broad-based consensus. We call this set of procedures **joint fact-finding.**[3]

The balance of this working paper is organized into four sections. In the second section, we explain the key features of joint fact-finding and contrast this approach with two more traditional styles of science advising for public policy: the technical "blue ribbon panel" and the model of opposing scientific experts ("adversary science") common in administrative hearings and litigation. The third section presents three case studies of joint fact-finding based on our first-hand experience as facilitators and mediators. The cases are the TBT Dialogue, the New York Bight Initiative, and the CALFED Bay-Delta Program's Independent Review Panel on Agricultural Water Conservation Potential. The fourth section presents a framework for characterizing joint fact-finding processes and outcomes, looking across CONCUR's work in this area over the past ten years. Finally, the fifth section concludes by presenting advice for putting joint fact-finding into practice.

JOINT FACT-FINDING: A NEW WAY TO INTEGRATE SCIENCE AND DECISION-MAKING

Joint fact-finding rests on a few key ideas. The first is that rather than withholding information for strategic advantage, **the interested parties pool relevant information.** A second feature is that joint fact-finding involves **face-to-face dialogue between technical experts, decision-makers, and other key stakeholders**. Usually, a nonpartisan facilitator or

mediator assists in orchestrating this dialogue. Third, this process places considerable emphasis on "**translating**" **technical information**--text, graphics, videos, web-based information and oral presentations--into a form that is accessible to all participants in the dialogue. Another significant aspect of the process is that while joint fact-finding is geared to building consensus, it tries clearly to "**map**" **areas of scientific agreement and to narrow areas of disagreement and uncertainty**. A fifth idea is to **use a single negotiating text** to record the results of the joint fact-finding process. The concept of a single text, borrowed from the arena of international diplomacy, simply means that participants in negotiation use a single document to focus discussion, rather than arguing over competing versions of facts and recommendations. Usually this document is revised through several working drafts (and may be expanded into a full technical report, as was the case for the New York Bight Initiative project as described in Section III) and produces a tangible record that brings the joint fact-finding effort to closure.

Focussing on sharing of information and inclusion of key parties, joint fact-finding stands in contrast to two more traditional methods of bringing science to environmental decision making: "adversary science" and the "blue ribbon panel". Table 1 summarizes these differences.

Table 1: A Comparison of Three Models of Science Advising for Public Policy: "Adversary Science," the Blue Ribbon Panel and Joint Fact-Finding

	Blue Ribbon Panel	Adversary Science	Joint Fact-Finding
Host Auspices[11]	Scientific Organizations	Courts or Administrative Agencies	Neutral, credible organizations with strong access to the scientific community
Convenor	Senior Scientist	Judge or Hearing Officer	Scientist or research administrator teamed with a non-partisan facilitator
Participants	Scientific experts	Experts aligned with each side and guided by attorney	Experts as group are not aligned with parties, decision makers, other stakeholders
Methods of Introducing Information	Written reports and group discussion	Depositions and interrogatories, testimony, and cross-examination	Various oral briefings, memos, short reports, facilitated dialogue
Extent of Information Sharing	Information is shared mostly within the panel; often strong emphasis on peer-reviewed findings or academic research	Information is strategically withheld to bolster argument. Choice then is between two information packages.	Information is pooled; may be mix of peer reviewed and non-peer reviewed studies as well as other documents.
Technical Level of Discussions	Comparable to a scientific conference	Translated to language of decision-makers – judge, jury, legislator.	A strong effort is made to "translate" technical information and make it policy-relevant
Emphasis on Policy Implications	Moderate; may be more of a focus on methods	Strong emphasis	Strong emphasis
Level of Effort Devoted to Seeking Consensus	Strong effort to produce consensus; minority reports are sometimes issued	Seeking technical consensus is incidental to deciding the issue	Emphasis on clarifying areas of technical disagreement and uncertainty

[1] Auspices refers to the patronage, support, and guidance by an institution or supporter who lends their reputation to the process, usually to increase its legitimacy — for example, good science and neutrality — and accountability — for example, to the scientific community and key stakeholders.

Shortcomings of Blue Ribbon Panels: The Port of Oakland Case

Under the blue ribbon panel, scientists with expertise in a field gather to review relevant information and seek to generate consensus on the relevant science, or at least to summarize the current state of knowledge. The National Academy of Sciences, for example, routinely convenes expert panels to render advice on complex policy issues. Other organizations enlist the blue ribbon panel model when they convene separate citizens' advisory committees and technical advisory committees.

This model can yield valuable insights, but it suffers from several disadvantages as well. One problem is that when stakeholders – grass-roots interests and other resource users with a stake in a policy decision – are denied access to the deliberations of an expert panel, the panel may overlook valuable information or ask the wrong questions. Moreover, scientists, left to their own devices, may become bogged down in discussions over methods rather than focusing on the policy implications of their findings. Still another problem arises when those affected by a decision cannot observe or understand the deliberations of the scientists. Because they are excluded, do not understand the science, think the panel is using the wrong information or believe the panel is asking the wrong questions, these people may calling into question the legitimacy of the process. Distrusting or disbelieving the advice of the panel, they are unlikely to support the scientists' policy recommendations. For all these reasons, scientists working alone may not produce information that can be used by decision-makers.

A case study of an earlier effort to use a blue ribbon panel highlights some of the shortcomings of the blue ribbon panel model (McCreary, 1989a, McCreary, 1989b). In the late 1980s, a blue ribbon panel was convened to help select a suitable site for disposal of sediments dredged from the Port of Oakland, California. Two sites near San Francisco were actively considered. One, known as the 1-M site, was located just off of Pacifica, south of San Francisco. A second, known as the B-1 site, was located further south, off of the small fishing town of Half Moon Bay.

Having reached an impasse about which site to propose, senior staff of the lead agencies, the Corps of Engineers and the Environmental Protection Agency (EPA), decided to convene a Technical Review Panel (TRP). While the deliberations of this TRP represented a potentially useful supplement to the standard Environmental Impact Statement process, the standard methods and process of a blue ribbon panel used for TRP produced flawed results.

First, in some areas, the panel faced either significant information gaps or outdated information (i.e. ten-year-old fisheries data). Second, the meeting was closed to all but EPA and Army Corps panelists and selected resource agency staff. In fact, even one lead EPA staff member from the San Francisco region was excluded. Without adequate preparation and consultation with the excluded stakeholders, the panel had no opportunity to close

information gaps during its two-day existence. Accordingly, there were many issues that the panel did not resolve.

Third, although resource agency speakers may have attempted to advocate the fishermen's interests, they could not speak for fishermen directly. Consequently, since they were not party to the expert deliberations, Half Moon Bay interests lost an opportunity to be briefed on or inform the rationale behind the panel's conclusions. Fourth, the meeting was held very late in the decision-making process, literally days before the final document (a Supplemental Environmental Impact Statement) was released. Thus, panel members had no opportunity to recommend research that could have closed the data gaps they identified.

In hindsight, limiting the review to agency staff and existing agency data proved to be an undesirable, exclusionary strategy. Local interests had no way to introduce their more up-to-date fisheries information into the decision-making process. Partly as a result of this exclusionary protocol, local fishing interests were motivated to pursue a legal strategy to block the siting of the disposal site.

Shortcomings of the "Adversary Science" Model

Another model of science advising is one in which contending interests appeal to or contract experts to bolster their own positions. This leads to "adversary science", which is most clearly manifested in litigation's "battle of the expert witnesses" (Jasanoff, 1990, 1997), and may also occur in public hearings associated with setting standards or reviewing major projects. Wherever the venue, it is not uncommon for opposing counsel to attempt to undermine both the credibility of the other's expert witnesses and the data or conclusions they are putting forward. Often, this process does little to clarify the scientific issues at stake.

This system of adversary science has been evident in the United States in public policy debates over acid rain, the role of chloroflourocarbons in ozone depletion, and the effects of second hand tobacco smoke. In California, the lengthy Bay-Delta hearing process saw hydrologists aligned with agricultural water users and hydrologists and biologists aligned with environmental groups advance competing models to explain the consequences of reduced Delta outflow on the Estuary.

While competing models often cause scientific uncertainty, it is important to realize that sometimes scientists don't really disagree; they simply miscommunicate. For example, sometimes scientists use different words to explain the same phenomenon. In other cases, they use different starting assumptions, data sets, or methods of interpretation and presentation of their data. All of these variations can lead to apparent disagreement when in fact they are framing and answering different questions. Too often, lay decision-makers and citizens are left puzzled by the apparent inability of the scientific community to produce a consensus on areas within their expertise. At worst, disagreements among scientists may persuade lay people that science has no useful role to play in shaping policy.

Moreover, groups with fewer resources often cannot afford to hire expertise or may not have access to top-caliber scientists. In such a situation, even the presence of the most neutral scientists might not create legitimate policy advice, especially if a group of stakeholders do not feel that their view is directly represented in the scientific deliberations or that they have had the resources to reliably interpret and vet information and methods of analysis generated by the deliberations.

The Advantages of Joint Fact-Finding

Joint fact-finding anticipates and avoids the shortcomings inherent in the blue ribbon panel and adversary science models. Its fundamental premise is that supervised, direct interaction among scientists, decision makers, and other key stakeholders can bring forth innovative public policies which all interested parties can support. Unlike the blue ribbon panel or adversary science models, it seeks to include as many stakeholders as possible, thereby striving to create the broadest understanding of a problem while generating legitimacy to the results of the process.

The emphasis on inclusion in the joint fact-finding approach provides those stakeholders with less experience or education in the field with the technical understanding of the issues they will need to negotiate on more equal footing (Ehrmann and Stinson, 1999). In addition, it also ensures that the technical experts have the depth of understanding of the specific issues of a case as well as the direction necessary to contain and focus their work. Stakeholders should play an instrumental role in determining the types of questions to be addressed, to what depth and under what timeline (Adler et al., 2000). The stakeholders, with the help of a mediator should also guide the process of generating, compiling, analyzing and determining the ultimate use of the information gathered. By reviewing the findings and developing a solution together, the process encourages the development of options that are in general more appropriate, creative, as well as more durable as they are built on the input and buy-in of all interested and affected parties.

This approach can be employed in a day-long seminar or in a consensus-building project with a year-long scope. It can yield a short list outlining areas of agreement and disagreement or a technical document of several chapters. In some cases, the participants in the process formally ratify the results while in others a staff member or convening organization carries them forward.

There is also great adaptability regarding the selection of experts. In some cases, parties to a dispute may agree to pool their technical expertise, giving their specialists new terms of reference that move them away from "adversarial" science. Other times, parties might prefer to rely exclusively on neutral, non-aligned experts. There is also the potential to create a hybrid approach, where aligned experts opt to select mutually agreeable non-aligned outside specialists to work with them on joint fact-finding.

Regardless of the format, the goal is to marshal the most relevant, reliable information and analysis to create technically sound public policies, and to elevate the level of understanding of technical issues among responsible agencies and members of the public. In the remaining portions of this paper, we will present you with three examples of successful joint fact-finding drawn from our research and professional practice, and we will explain our methods for putting joint fact-finding into practice.

THREE EXAMPLES OF SUCCESSFUL JOINT FACT-FINDING PROCESSES

In order to relate the rationale and sequence of a joint fact-finding process to tangible projects, we present three "success stories." The subjects we address are: 1) "The TBT Dialogue: A Technical Consensus Helps Catalyze Policy Reform"; 2) "The New York Bight Initiative: Joint Fact-Finding Creates the Basis for Innovative Policy Options"; and 3) "CALFED Bay-Delta Program: Independent Review Panel Helps Break Impasse Over Agricultural Water Conservation Potential." These initiatives integrated an ongoing process of consensus-building with a joint fact-finding process. Their successes demonstrate the flexibility and versatility of the joint fact-finding approach.

TBT Dialogue: A Technical Consensus Helps Catalyze Policy Reform

A one-day dialogue hosted by the Bodega Marine Laboratory, a University of California facility, produced a consensus on risks to the marine environment posed by tributyl tin (TBT), a constituent of boat paint (McCreary, 1987). In this case, the objective of the meeting was to review the most up-to-date information about the risks of TBT to the marine environment and consider possible next steps. The format for the meeting consisted of three briefings by top researchers, a question-and-answer period, and a period devoted to crafting a consensus summary.

The meeting began with an introduction by Dr. Paul Siri, Assistant Director of the Bodega Marine Laboratory, who set the context for the meeting. Next, three leading scientists presented the findings of both peer-reviewed studies in the U.S. and Europe *and* their own ongoing research. Then, Scott McCreary, the facilitator, asked participants to imagine that they had ten minutes to present a compelling brief to the State Senate Environment Committee covering the current understanding of TBT and the need for future monitoring or research. Recognizing that legislators are not inclined to absorb lengthy scientific presentations, McCreary urged participants to come up with concise "one liners." He helped participants translate highlights of the day's discussions into two short lists: "Areas of Scientific Agreement" and "Areas of Scientific Disagreement or Uncertainty." Then he asked scientific panelists to offer one or two statements to which other participants responded. If an individual proposed a statement for the list of "Areas of Scientific Agreement" and another scientist challenged it, the statement went under "Areas of Disagreement and Uncertainty."

Next, McCreary asked participants to use "Areas of Disagreement and Uncertainty" to frame a research agenda. He posted a series of ideas and requested that the group rank the top five issues. Finally, he had participants turn their energy toward developing policy options. The group listed several alternative strategies, including a ban on TBT-based paints. The outcomes of the facilitated dialogue are displayed in Table 2.

Less than one month after the workshop, Dr. Siri met with a group of legislators from six western states and reviewed the findings line by line. The legislators agreed the issue was important and asked why the scientific community hadn't brought TBT to their attention sooner. The legislators then proceeded to pass three resolutions. One asked Congress to enact "an immediate ban on the use of TBT-based bottom paints or derivatives of organotin." Lawmakers went on to introduce specific statewide legislation that anticipated federal regulations by one full year.

Table 2: Outcomes of Facilitated Dialogue on the Effects of TBT in the Marine Environment[2]

Areas of Scientific Agreement	Areas of Scientific Disagreement and Uncertainty	Priority Research Agenda
· Fouling is a biological phenomenon; TBT is the most effective anti-foulant. · Alternate formulations of TBT paint have different levels of effectiveness. · Elevated TBT levels are documented in water and sediment of California marinas (10 to 1000 nano-grams (ng) per Liter (L)). · UK researchers recommend 20 ng/L or less as a target. · Mollusks appear to be the most TBT-sensitive phylogenic group. · Damage to bivalves has been documented in California waters. · Halting paint use in a French oyster fishery has resulted in the recovery of that fishery. · Maguire's work documents significant concentrations of TBT in the microlayer. · Pacific Coast Federation of Fisherman's Association (PCFFA) has supported a voluntary ban on paints containing TBT. · Higher release rates of TBT result in greater toxicity. · Existing California laboratories have the capability to do expanded TBT research	· The relation between exposure to and dose of TBT needs to be accurately assessed in the food chain. · It is not certain which compartment(s) — water, sediment, or biota — become(s) the ultimate TBT depot. · The overall impact of TBT on marina and estuarine ecosystems needs to be assessed: problems of causality vs. correlation. · TBT concentrations in biota (especially birds and mammals) need clarification. · Since the adequacy of EPA methods of gauging leach rates of paints has been questioned, new studies need to be done. · Paint-use data are needed. · "Standing crop" vs. persistence in sediment and water column needs to be assessed. Is there a "purging phenomenon"? · Analytical methods are needed to evaluate TBT levels in tissues, sediment and water. Inter-calibration studies are needed. · Human health risks need to be assessed—market has been documented to contain significant levels of TBT. · TBT impacts on freshwater systems.	· Assess impact on marina and estuarine ecosystems. · Abundance of dominant biota vs. TBT. · Analyze biomagnification in birds and mammals. · Examine socioeconomic consequences in the fishing industry (using oysters as a barometer) in Humboldt and Tomales Bay. · Develop and refine analytical methods

[2] University of California Bodega Marine Laboratory, 1987.

The New York Bight Initiative: Joint Fact-Finding Creates Basis for Innovative Policy Options

The New York Bight Initiative (McCreary, 1988, 1989a,b, 1999) used a much more in-depth process of joint fact-finding that was carried out under the auspices of the New York Academy of Sciences (NYAS). The NYAS, as the institutional home for the dialogue, has strong scientific credentials and a reputation for neutrality. The joint fact-finding focused on the question of how to better manage polychlorinated biphenyls (PCBs) in the waters, sediment, and biota of the estuarine and ocean system known as the Hudson/Raritan Estuary and the New York Bight. A portion of this system, the New York Bight Apex, has been described as "one of the most stressed marine ecosystems" in the United States. Although only one of many contaminants present in the Bight system, PCBs have been the focus of attention due to a variety of factors, including evidence showing their persistence in the environment, carcinogenicity *in animals, and health effects in humans.*

The NYAS's Science and Decision Making Policy Program hosted the Bight Initiative. Twenty-two groups participated, including ten agencies and twelve private organizations ranging from Clean Ocean Action to the Chemical Manufacturers Association. The core of the process was a series of ten mediated sessions convened monthly at the NYAS's Manhattan headquarters. Specialists in subjects such as cancer risk assessment, aquatic toxicology, and sedimentology were recruited from universities in the New York metropolitan area and from other institutions such as Woods Hole Oceanographic Institution and Texas A&M University. In all, over twenty scientists participated as panelists to the process. Typically, three to five technical experts were present at each meeting.

In the first three sessions, scientific panelists played several roles: they provided briefings on technical issues, prepared short memoranda based on selective literature searches, participated in question-and-answer sessions, and drafted portions of the final report. In one of the most productive sessions, several scientists prepared a PCB "budget" showing the movement of this chemical from the Upper Hudson River, down through the Lower River, and out into the adjacent ocean region. The budget was organized into inputs, reservoirs, and losses of PCBs in the system. Another key accomplishment during this session was developing consensus on working definitions of technical terms. These working definitions created a "common language" for all participants and helped non-technical negotiators participate on a more equal footing with scientists.

After three initial meetings devoted exclusively to fact-finding, participants in the Bight Initiative turned to the task of developing options for improving the management of PCBs. Here again, the technical experts played several roles. For instance, one engineer presented a status report on emerging technologies for decontamination, while an aquatic toxicologist prepared a seven-page memorandum on the effects of PCBs on marine invertebrates and vertebrates. Similarly, a scientist from the National Marine Fisheries Service presented his

views on improving the coordination of sampling and monitoring among the states of New York and New Jersey. Additionally, some panelists commented on the likelihood that various management options would succeed, and they helped to draft the language of the final recommendations.

The final meetings were devoted to hammering out consensus on the specific language of the text – a task that eventually required five successive drafts. The Bight Initiative generated a strong synthesis of scientific information. With the help of the Academy mediators, the negotiators prepared a concise summary of PCB sources, fates, effects on human health and biota, applicable regulations, and socioeconomic impacts[4].

The process of fact-finding and single-text negotiation produced an unusually high degree of consensus given the complexity of issues involved and the history of contentious relations among interest groups and agencies in the New York metropolitan area. Using the findings of the process, negotiators representing the full spectrum of interests with a stake in the use and management of the New York Bight reached consensus on twenty-six management recommendations, including strategies to: reduce overall levels of biologically available PCBs; improve source reduction; and sample environmental status and trends (New York-New Jersey Harbor Estuary Program, 1996). They also decided to investigate emerging decontamination technologies, and, finally, they agreed on an agenda for short-term and long-term research. In the end, representatives from eighteen of the participating organizations signed the report.[5]

CALFED Bay-Delta[3] Program: Independent Review Panel Helps Break Impasse Over Agricultural Water Conservation Potential

Our third example– drawn from our work with the ambitious CALFED Bay-Delta Program – demonstrates the potential for joint fact-finding to inject broadly supported, creative, and science-driven information and analysis into longstanding policy disputes.

Water-use is always near the top of California's public policy agenda. With the state's sprawling urban areas, farming interests and environmental advocates competing for already overtaxed water supplies, an acceptable solution has been elusive. A team of 16 federal and state agencies – known as the CALFED Bay-Delta Program – began working in 1995 to broker a deal to create a long-term solution for the Delta. In the summer of 1998, with a critical deadline approaching, CALFED asked CONCUR to help build agreement around one of the

[3] The Bay-Delta system is an intricate web of waterways created at the junction of San Francisco Bay, the Sacramento and San Joaquin Rivers, and the watershed that feeds them. The Bay-Delta is the largest estuary on the west coasts of North and South America, and home to many unique plants and animals including migratory birds and endangered fish. More than 22 million Californians rely on the Bay-Delta system for all or some of their drinking water, and water supplies from this region are critical to the productivity of the agriculture and high-tech industries.

thorniest and most heavily criticized elements of the Program: agricultural water use efficiency.

Building on its past work with CALFED, which included convening an expert panel to review the Ecosystem Restoration Program, CONCUR staff co-designed and facilitated the Independent Review Panel on Agricultural Water Conservation Potential. The Panel brought together five nationally recognized scientists who collectively provided the following expertise: on-farm and district conservation practices; hydrologic and hydraulic connections between the CALFED solution and problem areas; and aquatic ecology. It also included the involvement of in-state technical advisors aligned with various constituencies and interested stakeholders. Convened for two-and-a-half days in December 1998, the Panel had a significant, real-time impact on CALFED's approach to this issue and provided the foundation for growing stakeholder support.

Despite the relatively brief duration of the Panel deliberations themselves, the Panel brought an unusually rigorous level of analysis to its work. The Panel challenged CALFED staff and California's water managers to work through a detailed process to calculate the different types of agricultural water loss. Then, using the resulting analytic framework, the Panel urged that agricultural water managers move away from a more traditional Best Management Practices (BMP) strategy to an objective-driven, incentive-based approach. The Panel went on to identify a series of quantification and research needs, which it asserted could be carried out in concert with the development of the agricultural Water Use Efficiency Program (CONCUR and the CALFED Bay-Delta Program, 1999).

Drafted primarily by CONCUR but with contributions from and review by all panelists, the single text document, "Summary Report: Independent Review Panel on Agricultural Water Conservation Potential (December 14-16, 1998)" was well received by the water stakeholder community and became a key source for the ongoing deliberations of the 14-member Program Steering Committee. The Steering Committee, in turn, has been a critical sounding board in shaping an innovative agricultural Water Use Efficiency Program that can be supported by the diverse range of stakeholders and policy makers.

Based on CONCUR's involvement with this effort, it is our view that the Panel's success was linked to four key elements:

- **Thorough Preparation.** The pre-Panel process was extremely comprehensive – from drafting the initial terms of reference and developing recruitment criteria, to selecting the venue, briefing with influential stakeholders and supporting and involving important decision-makers. This last point is particularly important. From the outset, CONCUR staff coordinated closely with key policymakers to ensure that the results of the Panel's deliberations would be delivered in an appropriate time-frame and format to help shape CALFED's design of the Water Use Efficiency Program.

- **One-Day Scoping Session.** Based on last-minute requests from stakeholders, CALFED convened a one-day Scoping Session that was attended by panelists and interested stakeholders. This proved essential, providing an opportunity for stakeholders and panelists to: 1) better understand the purpose of the Panel's deliberations; 2) identify some of the key issues to be resolved; and 3) work together to reshape the questions posed to the Panel. Other opportunities for stakeholder involvement included: nominating technical advisors to contribute to the Panel's deliberations; providing names of possible Panel candidates; and participating in strategic planning teleconferences.

- **Real-Time Synthesis.** The Panel's deliberations were structured to provide several opportunities for – and layers of – real-time synthesis. After each question, Scott McCreary synthesized the Panel's deliberations, highlighting key points covered and conclusions reached. In our view, this synthesis was crucial in helping both the Panel and stakeholder observers recognize and incorporate lessons as they emerged. Additionally, after its public deliberations, the Panel met separately to further synthesize its discussions, crystallizing two days of deliberations into a single text of ten overarching recommendations. Shared with the public the following day – this set of recommendations was essential in helping summarize the value of the Panel's overall deliberations.

- **CALFED-CONCUR Team Work.** Undoubtedly, the smooth interactions between CALFED and CONCUR as co-convenors were essential in helping shape the Panel's successful deliberations. In every facet of the project – from strategic planning and logistics, to meeting facilitation and report preparation – CONCUR and CALFED WUE Program Manager Tom Gohring worked as a seamless team. Specific areas of cooperation included: 1) sharing and critiquing documents; 2) conducting strategic planning teleconferences – at times, on a daily basis – to ensure tasks were being identified, assigned and carried out; and 3) working collaboratively on both planning and facilitation. The team proved an excellent blend of process expertise and technical know-how.

LOOKING ACROSS TEN YEARS OF JOINT FACT-FINDING EFFORTS

Beginning with our involvement on the New York Bight project ten years ago, we at CONCUR have been striving to systematically refine and test our theories and models related to the resolution of science-intensive disputes.

In this section of the working paper, we look across the range of our involvement in past joint fact-finding efforts. Specially, the matrix on the following pages summarizes elements of joint fact-finding processes (Table 3) and outcomes (Table 4) related to 11 CONCUR projects over the past ten years.

Table 3: Process Attributes: A Preliminary Survey of CONCUR Projects Using Joint Fact-Finding

Process Attribute	New York Bight Initiative	Louisiana Comparative Risk Project	Independent Review Oil and Gas Exploration Ecuadorian Oriente	Lower American River Task Force	CALFED Ecosystem Recovery Plan Scientific Review	Crane Valley Federal Energy Regulatory Commission Negotiations	San Diego Emergency Storage	South Bay Copper Dialogue	Guadalupe River Flood Control Project	CALFED Water Use Efficiency Independent Review Panel	Guadalupe Oil Joint Fact-Finding Process
Convene Process Under Neutral Auspices	X		X								
Mediation Team Possesses Dual Expertise	X	X	X	X	X	X	X	X	X	X	X
Compile Roster of Candidate Experts	X				X			X	X		X
Establish and Apply Selection Criteria	X				X	X	X	X		X	X
Recruit Significant Expertise Beyond Policy Negotiators	X			X	X	X	X	X	X	X	X
Aim to Produce New Synthesis of Findings	X	X	X	X	X	X	X	X	X	X	X
Recruit Technical Experts to Assist Negotiators	X	X		X	X	X			X	X	X
Distinguish Goals of Joint Fact-Finding Process from Other Efforts	X	X	X	X	X	X	X	X	X	X	X
Some Tech Experts Also Serve as Negotiators	X	X		X		X	X	X	X		
Impose Standards for Inclusion of Information	X	X	X	X	X	X		X			X
Technical Experts Present Briefings	X	X	X	X	X	X		X	X	X	X
Mediators Coach Experts on Tech Presentations	X	X	X	X		X					X
Experts Evaluate Consequences of Policy Choices	X	X	X	X	X	X	X		X	X	X
Negotiators Debate Burden of Proof for Including Findings	X			X		X					X

Sources: CONCUR, 1992; CONCUR and CALFED Bay -Delta Program, 1999; Crane Valley Project Committee, 1997; CONCUR, 2001; Guadalupe River Flood Control Project, 1998; Louisiana Department of Environmental Quality, 1991; McCreary, 1987; McCreary , 1999; McCreary , 1995; New York-New Jersey Harbor Estuary Program, 1996.

Table 4: Outcome Attributes: A Preliminary Survey of CONCUR Projects Using Joint Fact-Finding

Outcome Attribute	New York Bight Initiative	Louisiana Comparative Risk Project	Independent Review Oil and Gas Exploration Ecuadorian Oriente	Lower American River Task Force	CALFED Ecosystem Recovery Plan Scientific Review	Crane Valley Federal Energy Regulatory Commission Negotiations	San Diego Emergency Storage	South Bay Copper Dialogue	Guada-lupe River Flood Control Project	CALFED Water Use Efficiency Independ-ent Review Panel	Guadalupe Oil Joint Fact-Finding Process
Joint Fact-Finding Produces New Synthesis of Information	X		X	X	X	X	X	X	X	X	X
Narrow Areas of Disagreement	X		X	X	X	X	X	X	X	X	X
Report a Range of Interpretations for Most Contentious Issues	X				X						X
Work Products Illustrate Cause and Effect Relationships	X				X					X	X
Findings Presented in Mix of Prose and Graphics	X		X	X	X		X		X	X	X
Single Text Document Produced	X	X	X		X	X	X	X	X	X	X
Single Text Document Includes Technical Findings	X	X			X	X	X	X	X	X	X
Single Text Document Ratified by Negotiators	X	X		X	X	X	X	X	X		X

Sources: CONCUR, 1992; CONCUR and CALFED Bay -Delta Program, 1999; Crane Valley Project Committee, 1997; CONCUR, 2001; Guadalupe River Flood Control Project, 1998; Louisiana Department of Environmental Quality, 1991a, 1991b; McCreary, 1987; McCreary , 1999; McCreary , 1995; New York-New Jersey Harbor Estuary Program, 1996.

Several observations stand out upon review of this initial summary. One is the striking extent to which the various joint fact-finding efforts rely on similar process actions or techniques. Among the techniques most commonly employed are:

- Assemble a mediation team with dual substantive and process expertise;
- Recruit independent scientific expertise beyond that possessed by policy negotiators;
- Aim to produce a new synthesis of findings;
- Explicitly distinguish the goals and structure of the joint fact finding process from other efforts;
- Coach technical experts in making the style of their presentations and contributions more accessible;
- Present policy choices to experts for their evaluation;
- Link fact finding with creation of a single text document.

A second observation revolves around whether neutral auspices are needed. Early on in our practice, we had expected that successful joint fact-finding necessitated convening the process under the auspices of a neutral. In fact, this has not proved necessary in most our work. In fact, we only used neutral auspices in the New York Bight case and in our independent review of oil and gas in the Ecuadorian Oriente (McCreary, 1995). We suspect that part of the reason is that the presence of a neutral mediator and/or organization can often reassure parties that deliberations will be credible enough that a neutral auspice is not required.

A third observation is that while a few core features of the joint fact-finding process are steadily consistent – holding face-to-face dialogues among scientists, summarizing the most up-to-date information, and recording and documenting deliberations – the package of details for each fact-finding process must be customized. One cannot assume, for example, that a completely new pool of scientists need be recruited for each case, or that negotiators will need to debate what burden of proof findings must meet to be included. Each fact-finding effort demands its own unique design.

A fourth and final observation focuses on consistencies in outcomes. In virtually all the joint fact-finding efforts convened by CONCUR, a handful of outcomes are repeatedly seen. These outcomes include:

- New synthesis of information
- Concise list clearly identifying areas of scientific disagreement
- Work products that illustrate cause and effect relationships
- Presentation of findings in accessible format using a mix of prose and graphics
- Technical findings incorporated in a single text document
- Ratified single text document

PUTTING JOINT FACT-FINDING INTO PRACTICE

Based on our reflections on the three case studies described above, we outline in this section the key steps in a joint fact-finding process. This list of steps is organized into three major phases: 1) start-up and preparation; 2) fact-finding process; and 3) translation of fact-finding results to the development of options.

We stress that the exact tasks under each step must be tailored to the needs of each specific project. Usually, the services of a professional mediator or mediation team are required to ensure that the fact-finding process works smoothly. We also recommend that a mediation team be employed that has dual expertise in both the process and substance of the issues under discussion. This typically requires that at least one member of the mediation team be trained in the relevant technical disciplines and that at least one member be trained in public policy analysis.

Start-Up and Preparation

One of the first tasks for the mediation team is to work with the convenor to design the broad outlines or strategy of the joint fact-finding initiative. This process involves, among other things: 1) addressing the duration of the joint fact-finding effort; 2) determining whether experts will be drawn from the parties to the dispute or solicited from neutral, outside organizations; and 3) designing the process so that interested stakeholders and policy makers can interact with the joint fact-finding effort. We stress again that joint fact-finding is a flexible approach that should be tailored to meet each situation's unique needs.

A second essential precondition for a successful fact-finding process is that a suitable institutional "home" be found. Such a home must have strong administrative capabilities, excellent access to the scientific community, and a neutral reputation with regard to the issues under debate.

Once these essential start-up tasks are completed, the mediation team and convenor should begin to create the conditions for an effective dialogue among scientists, decision makers, and other stakeholders. The mediation team, working with a representative of the host institution, would normally undertake the steps outlined below to set the stage for the joint fact-finding. In some cases, a steering committee drawn from the interested parties may assist as well.

- Identify the key decision makers and stakeholders.[6]
- Clearly frame the problem under investigation.
- Identify the expertise needed (including both disciplinary training and suitable credentials).
- Prepare a roster of candidate experts.
- Prepare a detailed draft of the terms of reference and scope for the investigation.
- Recruit the experts and finalize the terms of reference and scoping for the investigation.
- Prepare groundrules and set the agenda for the fact-finding process.[7]

Fact-Finding Process

The joint fact-finding process itself relies on a series of steps – conducted by the facilitation team and, at times, the co-convenor – to ensure the deliberations are coherent, relevant, transparent, and accurately recorded and summarized, including:

- Technical staff and mediator brief the panelists on their responsibilities; they may also provide guidance on how they would like to scientists to format their presentations.

- Scientists prepare presentation.
- Technical advisers deliver oral briefings with appropriate graphics.
- Facilitation team chairs question-and-answer session, summarizing key findings in real-time, immediately after each issue has been deliberated.
- Working group (a subset of the full group of negotiators) drafts and revises text to summarize key findings in a single text document.
- Facilitation team and working group package a single text document in an appropriate format (text and graphics).
- Facilitation team and convenor arrange for appropriate distribution of the document.
- Stakeholders ratify document.

Linking the Fact-Finding Process to the Development of Options and Securing a Final Agreement

The next set of steps will vary depending on the overall goals of the fact-finding effort. As stated earlier, a single, negotiated text speeds and focuses the fact-finding process. The single text frequently begins with an outline or memorandum. Often the mediation team serves as the "secretariat" for development of the document, taking responsibility for collating comments on the interim drafts and producing a revised draft for review of the negotiating terms. When complete, the single text captures the areas of agreement and strives to summarize divergent views accurately.

If the objective is simply to clarify technical uncertainty and package information in a useful form, as was the case with the TBT dialogue and the Louisiana Comparative Risk Project (Thompson et al, 1994), we suggest that the mediation team lead these steps working again in concert with the host institution:

- Prepare a final document.
- Link the findings to policy development – for example, by preparing a memo or delivering a briefing to a relevant policy-making body or agency.

If, on the other hand, the goal is to develop management options and secure an agreement, as was the case with the New York Bight Initiative, we recommend that the mediation team work with the parties to complete these tasks:

- Develop management options based on findings.
- Package a draft agreement for deliberation.
- Prepare a draft final document.
- Circulate the draft final document for the signatures of the participants, thus securing ratification.
- Translate informal agreements to binding agreements.

Of course, the level of effort needed to accomplish these tasks and the relative weight each one deserves will vary with the complexity of the issue under discussion.

CONCLUSION

CONCUR is committed to furthering our discipline's understanding and use of joint fact-finding. To that end, we believe that the three case studies we explored here, as well as the other cases synthesized in our summary matrix, represent a rich data set for better understanding how joint fact-finding functions in practice. We suggest that the framework presented in Table 3 for identifying and classifying the attributes of joint fact-finding is a strong starting foundation for developing more systematic tools for analyzing these important processes.

In our view, continued research in this area is essential. We believe that the joint fact-finding process we have outlined here, and successfully led in our professional practice, holds promise to help resolve a wide array of environmental policy issues. They might be used for site-specific issues (such as a proposed timber harvest plan, development near a sensitive wetland area, or a siting a landfill) or to assist setting regulatory standards (such as establishing targets for selenium or mercury in important bays and estuaries). Still another application of joint fact-finding is setting broad policy priorities and approaches, as demonstrated by the CALFED panel that deliberated on agricultural water conservation potential.

It is our further contention that joint fact-finding offers a flexible approach that can be adapted easily and successfully to meet the needs of each particular situation. Based on thorough preparation and proactive process design, a joint fact-finding effort can be structured to accommodate constraints and concerns ranging from timeline pressures to funding limitations. It can be shaped to involve parties' existing experts or draw on neutral third-party experts. It can take as little as a day or be structured to support long-term, ongoing deliberations. The crucial task, in our view, is to build a process that fosters the pooling and analysis of the best available technical information and then translates the results in forms that lead to productive public policy deliberations.

ENDNOTES

1. Scott McCreary and John Gamman are Principals of CONCUR, Inc.; Bennett Brooks is an Associate. We also acknowledge Cornelia Tietke, a former CONCUR Research Assistant, who contributed to an earlier paper on this topic, as well as Rebecca Bryson, a fellow at CONCUR, who critically reviewed the paper to prepare it for publication.
2. Auspices refers to the patronage, support, and guidance by an institution or supporter who lends their reputation to the process, usually to increase its legitimacy — for example, good science and neutrality — and accountability — for example, to the scientific community and key stakeholders.
3. Several other authors, notably Connie Ozawa and Lawrence Susskind (1985), Susskind and Jeffrey Cruikshank (1987), Ozawa (1990), and Harvey Brooks (1984) (no relation to B. Brooks), have provided commentary on joint fact-finding and science advising for policy. We acknowledge their valuable contributions in helping to develop these ideas.
4. This was one of several roles performed by the mediators in this case. Others included managing the flow of discussion, structuring the sequence of negotiating sessions, and recruiting panelists.
5. Although EDF and three chemical manufacturers declined to ratify the document, they expressed support for the overall effort and for the individual recommendations.
6. Depending on the overall objectives of the fact-finding process, this may require a thorough stakeholder analysis. Usually, this involves conducting a series of structured interviews with key parties, geared toward determining their backgrounds, interests in the dialogue, and needs for technical information.
7. Groundrules typically address such issues as: the total time allotted for the process and anticipated work products; the sequence in which issues are discussed; protocols about types of information that are presented (i.e. must be published in peer-reviewed journal or be presented directly by the principal investigator); rules to handle sharing of confidential or sensitive information; whether the document will be ratified as a single text; and the format for presentation and release of the final products.

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Appendix I.

OKACOM

PERMANENT OKAVANGO RIVER BASIN WATER COMMISSION

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Enquiries: **K Kahuure**

Reference: **7/2/10/3** **Date: 03 October 2002**

Mr Morse Nanchengwa
TBNRM Activity Manager
USAID/RCSA
P O Box 2427
GABORONE
Botswana

Dear Mr Nanchengwa

SHARING WATER: TOWARDS A TRANSBOUNDARY CONSENSUS ON THE MANAGEMENT OF THE OKAVANGO BASIN BY NATIONAL HERITAGE INSTITUTE AND IUCN REGIONAL OFFICE FOR SOUTHERN AFRICA (Sharing Water).

1. The attached e-mail dated 21 September regarding the above project has reference.

2. The previous decision by the OKACOM to put a decision about the endorsement of the proposed Sharing Water Project on hold until the Project Management Unit (PMU) has been established, was discussed and reconsidered by the Commissioners at the Biennial GEF Conference on Water, held in Dalian, China because it was felt that the project will indeed contribute to the goals and objectives of the OKACOM GEF Project and needs to start as soon as possible. It was also agreed that Namibia will convey this decision in writing to the USAID/RCSA.

3. This decision is conditional to the understanding that the Sharing Water Project should closely co-operate and liase with the PMU to be in step with the OKACOM GEF Project. OKACOM will also rely on the PMU with its Project Management and other experts for the evaluation of the technical merit of the respective options and before deciding on the model that will best meet the needs of the Basin. It is also important for the OKACOM that the Basin States should have ownership and full participation in the development, execution and use of the outputs of the project. In this regard capacity building will be essential and regional expertise should be used in the project. The need to enter into a memorandum of understanding between the NHI and IUCN/ROSA and OKACOM should be considered as soon as possible to deal with issues such as data access, intellectual property rights and the other issues mentioned above.

4. In summary, the OKACOM would like to congratulate the NHI and IUCN/ROSA through you with the proposal of the Sharing Water Project and the initiatives to obtain the funding. The OKACOM therefore offers its full support to the project and believes it will be to the mutual benefit of the Okavango Basin States.

Yours faithfully,

K KAHUURE
CO-CHAIRPERSON OKACOM NAMIBIA

md/NHI-OKACOM-3 Oct 2002

Appendix J.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Draft

Sharing Water - OKACOM
Memorandum of Understanding

April 2004

Funded by USAID
Cooperative Agreement 690-A-00-03-00126
Award Year: 2003

This Memorandum of Understanding (MOU) is entered into by the Namibia Nature Foundation on behalf of the *Sharing Water* Project Partners:

International Union for the Conservation of Nature Regional Office for Southern Africa
Juventude Ecologica Angolana
Natural Heritage Institute
International Union for the Conservation of Nature Botswana
Harry Oppenheimer Okavango Research Centre
Counsel for Scientific and Industrial Research

and

The Permanent Okavango River Basin Water Commission

I. Purpose of Memorandum of Understanding

The purpose of this Memorandum of Understanding (MOU) is to formalize the working relationship between the *Sharing Water* Project and the Permanent Okavango River Basin Commission (OKACOM). The collaborative association between *Sharing Water* and OKACOM will lead to a more effective process of realizing our joint goal, namely the sustainable management of the Okavango River Basin. This MOU defines a communication and coordination strategy to promote a cooperative relationship.

II. Background

Sharing Water is an initiative that recognizes the complexity of the Okavango/Kubango Basin in terms of its international status, its cultural and economic diversity, its ecological importance, the expectations and possible pressures on the system to support local and national development, and the uncertainties associated with future management of a highly variable system. *Sharing Water* offers a platform, called Collaborative Learning**,** for collective resource inquiry, and for negotiation about sharing water and related ecological resources. This approach is designed to build the commitment and knowledge base needed to manage ecological complexity and uncertainty (Project Brief Appendix B).

The OKACOM Commissioners at the Biennial GEF Conference on Water, held in Dalian, China discussed the *Sharing Water* project and concluded that it would contribute to the goals and objectives of the OKACOM GEF Project (See Appendix A for a letter from the OKACOM Co-Chair from Namibia). In this letter, it was requested that the Sharing Water Project develop an MOU with OKACOM to address issues related to data sharing and intellectual property rights.

III. Establishment of a Cooperative Relationship

In order to establish a cooperative relationship with OKACOM, *Sharing Water Project* Partners have taken the following steps:

- Presented the overall project and its proposed methodology to OKACOM at several OKACOM meetings and gatherings, including in Windhoek, July 2002, and in Maun, May 2003;

- Sought endorsement for the project from OKACOM;

- Established a Steering Committee and invited a representative from OKACOM from each of the basin countries to participate in the Steering Committee;

- Invited a representative from the GEF project as a Steering Committee member in order to receive input from GEF and align the OKACOM GEF project activities with the objectives of the *Sharing Water* Project;

- Consulted with OKACOM regarding the ten key participants from each country who should participate in the *Sharing Water* project;

- Invited OKACOM members to attend the *Sharing Water* workshop in Angola in October 2003 and in Namibia in March 2004;

- Coordinated with OKACOM/Angola and OKACOM/Namibia regarding the venue, agenda, and field trip for the *Sharing Water* Angola workshop; and

- Invited OKACOM/Angola and OKACOM/Nambia to give presentations at the *Sharing Water* Angola and Namibia workshops.

In addition, through this MOU, *Sharing Water* Project Partners commit to the following actions to further our cooperative relationship with OKACOM:

- Coordinate with OKACOM/Botswana in the planning and implementation for the next workshop in Botswana;

- Coordinate with OKACOM regarding all subsequent meetings and workshops in the basin, including inviting OKACOM members to attend each event;

- In-Basin Partners (IUCN-Botswana, NNF, and JEA) will report quarterly to OKACOM members in their respective countries regarding project progress and future plans, including providing OKACOM with quarterly progress reports; and

- *Sharing Water* will request opportunities at the next OKACOM Meeting and all subsequent OKACOM meetings throughout the life of the project in order to brief all OKACOM Commission and to respond to suggestions, questions, and concerns.

IV. *Sharing Water* Work Products

This MOU commits the Sharing Water Partners to making all work products available to OKACOM and the general public in both electronic format and in print. These work products will include the following:

- Legal & Institutional Analysis

  This analysis will include legal and/or institutional issues associated with the management of the Okavango River Basin.

- Preliminary Vision Statements

  Sharing Water will compile background material for an analysis of basin stakeholders' ideas of how they would like to see the basin managed.

- Database of the Okavango/Kubango Basin

  This database will be built by the Sharing Water Project, using a coordinated workshop and field support capacity-building method, and will be housed at the Harry Oppenheimer Okavango Research Centre. The database will also be downloaded to *Sharing Water* participants' computers to widen accessibility.

- Analysis of hydrological models for Okavango/Kubango Basin

  Sharing Water will analyze the range of hydrologic planning models available for use in river basin planning. The project will focus on providing this analysis and making recommendations for an OKACOM planning model based on the particular needs in the Basin, the hydrology and ecology of the Basin, and potential linkages with other modeling efforts in the Basin and/or the region.

- Recommendation to OKACOM

Sharing Water participants and partners will make a recommendation for a specific river basin planning tool to be used in designing the transboundary management system for the Okavango/Kubango basin. This recommendation will be based on analysis of hydrological models for Okavango/Kubango Basin.

During the life of the project, the static database, once created, will be available on the project website, www.sharingwater.net. In the future, it is the intent of the project that the *Sharing Water* database will be housed at the Harry Oppenheimer Okavango Research Center (HOORC) and made available via the World Wide Web.

V. OKACOM Communication

This MOU commits OKACOM to the following communications with the *Sharing Water* project:

- Nominate a contact person to be a liaison between the *Sharing Water* project and OKACOM. This contact person should avail him/her self to meet with *Sharing Water* representatives on a regular basis;
- Keep *Sharing Water* project informed of OKACOM meeting schedule and agenda;
- Allow a place for *Sharing Water* project presentations in OKACOM meeting agendas;
- Keep the *Sharing Water* project informed of other projects being planned, approved, and implemented in the Okavango/Kubango basin; and
- Review *Sharing Water* documents and provide input on an as needed basis.

VI. Intellectual Property Rights

The *Sharing Water* Project commits to making all its products available to the public. No *Sharing Water* Project Partner or participant can claim sole ownership of the database or river basin planning model produced. Information created will be and remain in the public domain and available for access and use. In the evaluation of river basin planning models, which is part of the *Sharing Water* project, we will include selection criteria for identifying whether model licenses allow for access to all interested parties.

VII. Selection of a River Basin Planning Model

As stated in OKACOM's endorsement of *Sharing Water,* in order to decide on a river basin planning model that will best meet the needs of the Basin, OKACOM will rely on the GEF PMU, with its Project Management and other experts, for the evaluation of the technical merit of the respective options.

VIII. Modification

This is an agreement of convenience and cooperation and is subject to revision and extension by the mutual written consent of the Natural Heritage Institute, on behalf of the Project Partners, and the Permanent Okavango River Basin.

IX. Entire Agreement

The MOU constitutes the entire agreement between and among the parties with respect to OKACOM and the *Sharing Water* Project and supersedes any prior written or oral agreements or understandings between the parties, their employees, agents or representatives.

X. Effective Date, Duration

This MOU will become effective upon signatures of the approving officials of all of the participating parties and will remain in effect until August 31, 2006. Any party may end its participation in this MOU with a 30-day advance written notice.

IN WITNESS WHEREOF, the Parties have caused this Memorandum of Understanding to be effective with the approval of their representative on the dates indicated below.

OKACOM Co-Chair
On behalf of
The Permanent Okavango River Basin Commission

By_____

Date_____

Namibia Nature Foundation

By_____

Date_____

Appendix K.

Steering Committee Contact List

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Appendix L.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Steering Committee Minutes

Angola, Namibia, and Botswana Workshops

October 2003, April 2004, August 2004

Funded by USAID
Cooperative Agreement 690-A-00-03-00126
Award Year: 2003

Minutes of the 1st Steering Committee meeting for the Sharing Water Project

Date: 27 October 2003

Time: 2.15pm - 4.30 pm

Venue: Hotel Complexo Madiba- Luanda Angola

Present:

Committee Members
Ms Akiko Yamamoto (UNDP, Namibia)
Ms Patricia Skyer (NACSO, Namibia)
Mr Antonio Chipita (ACADIR, Angola)
Mr Obonetse Masedi (SADC Infrastructure and Services: Water Division, Botswana) **Chairperson**
Mr Steve Monna (Ministry of Environment, Wildlife & Tourism, Botswana)

Ex-officio Members
Ms Tabeth Matiza Chiuta (IUCN ROSA)
Ms Bertha Nherera (IUCN ROSA) **Secretary**
Ms Elizabeth Soderstrom (NHI)

Observers
Chris Brown (NNF, Namibia)
Masego Madzwamuse (IUCN Botswana),
Tracey Molefi-Mbui- (KCS, Botswana)
Abias Huongo (JEA, Angola)
Eben Chonguica IUCN ROSA **(Translating**)

1. Welcome and Introductions
Tabeth welcomed all the participants and informed the meeting that Namibia Nature Foundation (NNF), IUCN Botswana, Kalahari Conservation Society (KCS) and Juventude Ecologica Angolana (JEA) were attending the meeting as observers with IUCN- Regional Office for Southern Africa (ROSA) and Natural Heritage Institute (NHI) attending as Ex- officio members.

Mr Masedi was nominated to be the chairperson for the Committee.

2. Apologies
All members according to the TOR were present. A USAID/ Regional Centre for Southern Africa (RCSA) representative who is supposed to attend the meeting as an Ex-officio member was absent. Elizabeth indicated that NHI could not get anyone from USAID/RCSA to attend the meeting, as there had been so many changes in staffing at USAID/RCSA.

Apologies were also received from NHI's two staff members, Julie Leimbach who was supposed to present the financial report and Rich Walking who was supposed to present the project as both were attending to an NHI colleague who was in hospital in Luanda.

3. Approval of the Agenda

The agenda item on "Brief overview of the project by NHI" was omitted from the agenda as this had already been covered during the overall workshop presentation that was held that morning.

4. Implementation arrangements

Presentation about the implementation arrangements was also covered earlier that morning during the overall workshop presentations. However Tabeth highlighted that the Steering Committee is there to provide overall strategic guidance and any other issues that needs to be addressed by the project. NHI is the main contractor with USAID/RCSA who are funding the project. NHI subcontracted IUCN ROSA who in turn subcontracted basin partners (JEA, IUCN Botswana and NNF). NHI also subcontracted CSIR and HOORC to provide technical support. CONCUR/AWIRU were also contracted by NHI to provide facilitation and training at the three workshops. Overall reporting to USAID/RCSA is done by NHI and delivery on the ground is undertaken by the basin partners.

The committee requested clarification regarding accountability of the project to OKACOM. It was clarified that in terms of processes and the products from the project, the project is accountable to OKACOM and the governments of the basin countries. It terms of contractual arrangements the project is accountable to USAID/RCSA who are funding the project. The project sought endorsement from OKACOM. In terms of reporting it was clarified that the basin partners submit their reports to IUCN ROSA who in turn compile and submit their reports to NHI. NHI compiles the reports and submit them to USAID/RCSA. The basin partners are supposed to closely liase with the OKACOM commissioners in their countries in undertaking the activities on the project.

Clarification was also sought regarding what will happen to the technical support to OKACOM beyond the 23 months of the project so that it does not fall off after August 2004. Elizabeth explained that the project was planned as a 3-yr project but was constrained with the USAID funding whose funding for its old Strategy ends in 2004. The current framework is for 23 months, and technical support will be expected to continue under the 2nd phase if it materialises.

The committee also requested clarification regarding the formal processes in place to update OKACOM on project activities and progress. It was explained that the plan was to update OKACOM when they meet and when they do not meet to update the individual commissioners and also to draw up an MOU with OKACOM.

The committee recommended that the project should work out a reporting schedule to target the heads of delegations of OKACOM instead of waiting for a meeting which might take 12 months to materialise so that redirecting can be done timeously if required. The basin partners will do the updates. It was agreed that the scheduling for reporting to OKACOM should be on a 3-month basis and this should be included in the MOU to be drawn up with OKACOM. Should OKACOM meet during the life of the project a formal request should be made to OKACOM for an agenda item to update them on the project. The Steering Committee should endorse this report before it is presented to the OKACOM meeting.

Action 1: Elizabeth to include in the MOU between OKACOM and the project, the official reporting schedule that will be used for official reporting to OKACOM.

5.Terms of Reference for Project Steering Committee

Comments:

The following comments were made by the Committee regarding the TOR.

Preamble

i) 2 year period to be replaced with the specific 23 months period.

ii) If the project is to add value it has to extend beyond 2 years- the extension will depend on funding and the USAID/RCSA strategy.

Membership

i) Replace GEF- with UNDP-GEF so that it is specific since there are a number of GEFs.

Purpose

i) **shall** provide guidance…… should be replaced with - **will** provide guidance…..

Functions

The following statement should also be added on the terms of reference "The Steering committee will take on board any other issues as may be deemed necessary".

Number of meetings

Only two meetings had been planned for, during the life of the project for this phase. However it was felt that the 2nd meeting that was planned to be held in July 2004 is almost towards the end of the project and that it would be better for the Steering Committee to meet at the next workshop in March 2004 as well. The meeting agreed to this suggestion and the need to work out the additional budget that would be required for that meeting.

It should be added in the terms of reference that if there is need to have an emergence meeting, this can be called for.

General

i) The Steering Committee documents in future will be translated from English to Portuguese to allow for maximum participation by the Angolan committee members. Also adequate modalities for translation will be put in place when conducting the meetings. There are resources for that and there is equipment that had already been hired for simultaneous translation for the workshop participants. The same equipment can also be used for the Steering Committee meetings with proper scheduling of the meetings.

ii) It was clarified that the implementing partners will deal with the issues relating to contracting institutions and the PSC will not be expected to have input at that lower level, however in future phases implementing partners will liase with the Steering Committee, for them to endorse chosen partners.

Action 2: IUCN ROSA to revise the TOR for the Steering Committee as per their comments and circulate them.

6. Project Progress report (March 2003- September 2003) NHI/IUCN ROSA

Bertha presented the progress that had been achieved by IUCN ROSA and the basin partners for the above reporting period. Elizabeth also highlighted progress that had been achieved by NHI and the other partners for the reporting period.

NHI apologised to the committee that it had not managed to provide its progress report to the committee prior to the meeting. Elizabeth highlighted the main activities that had been implemented by NHI, i.e. mainly project management activities, the May 2003 Partner's planning meeting that was held in Kruger, contracting with USAID and contracting with IUCN ROSA. In terms of technical work NHI had started collecting information for the database.

Comments on Progress report

i) Identification of Facilitation trainees

Facilitators are being trained from the implementing organisations and some government departments from the three countries. The purpose of the training is to enhance the capacity of the facilitators to do their work better. It was also recommended that the list for the facilitators should be compiled and made available so that those who would want to access their services or would want the assistance of the facilitators can do so.

Action 3: A list of the facilitation trainees will be compiled at the end of the project and circulated.

ii) All the sections in the report, which refers to Water division, should be replaced by SADC Water Sector

7. Draft Project Workplan (Oct 2003- Dec 2004) (NHI/IUCN ROSA)

Bertha presented the main highlights for the IUCN ROSA and basin partner's workplan for the remaining period of the project with Elizabeth presenting the highlights for the NHI and other partners workplan. Tabeth highlighted the proposed process and workplan for undertaking the Visioning exercise.

Comments on the Workplan

i) Budget constraints

- The issue of review of budgets and financial reports for the project should also be added as part of the terms of reference for the steering committee.
- There was a concern that a budget cut of approximately 30% of the initial budget submitted by IUCN ROSA and basin partners could compromise the visioning exercise as well as the legal and institutional analysis. To address this concern NHI had already discussed with the partners and requested them to rework their budgets and indicate the additional financial resources required for the activities.

Action 4: IUCN ROSA, JEA, IUCN Botswana, NNF to work out the additional resources required to undertake the visioning and the legal and institutional analysis and submit these to NHI by 1 December 2003.

ii) Visioning

- The Visioning exercise should not be compromised, as there is a danger of coming up with something that is not representative. If there is need to cut on activities, it is better not to develop the vision/s and just concentrate on reviewing visions that are available nationally. There should be no compromise on local consultations. Most of the resources will be required for Angola as NNF and IUCN Botswana have some mechanisms with the Every River project that can be used for the local consultations.
- OKACOM is not expected to rubber stamp the vision/s it will be provided with options by the project. OKACOM will also provide their comments on the process for the Visioning exercise. The work under the project will be complimentary to OKACOM work. The consultations should not just concentrate on stakeholders along the main river but also those stakeholders along the tributaries.

- Approval of workplan will be done when the workplan timeline has been combined together with NHI one.
- The reports of the project should also be submitted to the OKACOM Project Management Unit (PMU) when it gets established in January 2004. It should be part of the mandate of the PMU to discuss the project.
- The meeting expressed some reservations with the project sharing information with individual OKACOM commissioners as one part can indicate that they were not informed well enough or that there was some bias.
- The reports for the project should also be submitted to the Okavango Basin steering Committee (OBSC), which is a technical arm for OKACOM. The need to meet for the committee is determined by the technical issues to be discussed. The OBSC can be used to clear activities of the project and it can recommend to OKACOM what needs to be done. It was agreed that the OBSC will be used as the clearing agency by the project. The current chair is Angola and the chair rotates. The next meeting is to be held in Botswana. There is need to first check when they are planning to meet and if they are not meeting anytime before March 2004 then invite a representative from each country at the March 2004 meeting.

Action5 : NHI to check when the OBSC will be having their next meeting and request for an agenda item to present the activities of the project. Before requesting for an agenda item with OBSC, Elizabeth will first draft a letter for this request and circulate it to Steve Monna, Chris Brown and Antonio Chipita for comments.

Financial report

Elizabeth presented the overall budget for the project which is USD 2.1 million and indicated that about USD 600 000 has already been spent but most of it has been sent out as advance.

Comments

i) There is need to provide information on breakdown of the budget for the project, indicating how much is allocated for each task and how much of the budget each organisation is managing.
ii) Present information for financial reports indicating % spent versus planned.
iii) The budgets for hosting the workshops should be allocated to the partners who will be hosting the next workshops.

Action 6: NHI to provide detailed budgets and financial reports.

Any Other Business

There was no other business that was discussed.

Date of next meeting

The next meeting will be in March 2004 and the specific dates for the meeting will be circulated by NNF when they have been set.

Closing of meeting

The meeting was closed at 4.15 pm with the Chairperson expressing that Sharing Water is an important project supporting the OKACOM process. Those working with people on the project should continue doing so.

Action list

Action	By Who	By When

Action 1: Include in the MOU between OKACOM and the project, the official reporting schedule that will be used for official reporting to OKACOM.	NHI	28 November 2003
Action 2: Revise the TOR for the Steering Committee as per their comments and circulate them.	IUCN ROSA	31 December 2003
Action 3: Compile a list of the facilitation trainees and circulate the list.	IUCN ROSA	15 August 2004
Action 4: Work out the additional resources required to undertake the visioning and the legal and institutional analysis and submit these to NHI by 1 December 2003.	IUCN ROSA, JEA, IUCN Botswana, NNF	1 December 2003
Action 5: Check when the OBSC will be having their next meeting and request for an agenda item to present the activities of the project. Before requesting for an agenda item with OBSC, first draft a letter for this request and circulate it to Steve Monna, Chris Brown and Antonio Chipita for comments.	NHI	31 December 2003
Action 6: Provide detailed budgets and financial reports.	NHI	31 December 2003

Secretary

Name…….Signature……Date……..

Chairperson

Name…….Signature…… Date……..

Minutes of the 2nd Steering Committee Meeting for the Sharing Water Project

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Date: 31st March 2004

Time: 2:30 – 4:30pm

Venue: Windhoek Country Club Resort, Windhoek, Namibia

Present:

Committee Members
Ms. Patricia Skyer (Nasco, Namibia)
Mr. Piet Heyns (Dept of Water Affairs Namibia (MAWRD), OKACOM Commissioner
Dr. Sephen De Wet (Secretariat to OKACOM Commissioners in Namibia)
Mr. Felix Monggae (KCS, Botswana)
Mr. Isidro Pinheiro (OKACOM Commissioner, Angola)
Mr. Antonio Chipita (ACADIR, Angola)
Dr. Akiko Yamamoto (UNDP, Namibia)

Chairperson
Mr. Obonetse Alfred Masedi (SADC Infrastructure and Services: Water Division, Botswana)

Ex-officio Members
Ms. Tabeth Matiza Chiuta (IUCN ROSA)
Ms. Kulthoum Omari (IUCN Botswana) **Secretary**
Dr.. Elizabeth Soderstrom (NHI)
Ms. Deborah Kahatano (USAID/RCSA)

Observers
Dr. Chris Brown (NNF, Namibia)
Ms. Masego Madzwamuse (IUCN Botswana)
Dr. Ebenizario Chonguica (IUCN ROSA)
Mr. Abias Huongo (JEA, Angola)
Mr. Greg Thomas (NHI)
Mr. Lenka Thamae (IUCN ROSA)
Mr. Rich Walkling (NHI)

1. Welcome and Introductions
The chairperson welcomed all the participants to the meeting. He urged the project partners to be very transparent among themselves and steering committee members for the process to be effective. He went on to say that transparency is a fundamental lubricant throughout the process and that the steering committee members have to be well informed about the key processes before they can make an input.

2. Apologies
Apologies were received from Mr. Steve Monna of the National Conservation Strategy Agency (NCSA) under the Ministry of Environment, Wildlife and Tourism Botswana.

3. Approval of the agenda
The agenda was approved

4. Approval of Minutes of 1st Steering Committee meeting
Minutes were approved without any corrections.

5. Matters Arising

Action List
ACTION 1: Elizabeth indicated that the MOU between OKACOM and the project has been drafted and is awaiting feedback from partners to be finalized. It also includes components regarding communicating with OKACOM on a regular basis. This MOU shall then be presented at the OKACOM meeting in Luanda.

ACTION 2: Tabeth informed the meeting that the terms of reference for the Steering Committee were revised and were circulated to SC members for further comments. The Steering Committee members adopted and endorsed the TOR as final.

ACTION 3: Tabeth informed the meeting that the list of the facilitation trainees was completed and circulated. There is now a solid list on building capacity and a growing confidence among the group of facilitators.

ACTION 4: Tabeth stated that the revised visioning budget has been completed and submitted to NHI. There are some aspects that are still pending that need to be finalized.

ACTION 5: This item was put off until finalized with OKACOM

ACTION 6: This item is included in the agenda as item 8.

Revised Terms of Reference for Steering Committee members
The meeting endorsed the terms of reference for the steering committee.

6. Project Progress Report (March – December 2003)
NHI:
NHI highlighted that the areas that would to be helpful for SC input are those which focus around training elements, facilitation, joint fact-finding and hydrological modeling. Elizabeth was seeking advice from the committee on these areas.

ACTION 1: If funding is available, basin partners to establish a small group for the database from each basin state. This group would then go to HOORC in Maun before the Botswana workshop and meet to discuss the protocol for future management of the database.

Elizabeth highlighted that since Luanda workshop, the project has moved forward with the legal and institutional analysis. The project would therefore like to get advice from the SC on the conceptual framework and controversies. The project needs feedback from the SC on the legal and institutional analysis as well as the visioning exercise. A question was posed to the steering committee on the best way to move forward with these two exercises, considering the timelines. It may not be feasible to undertake an entire visioning exercises given the fact that the timeline is short and such an exercise will need the mandate of OKACOM. Elizabeth then suggested gathering the background information for a full-fledged visioning exercise to carried with OKACOM endorsement at a later date.

ACTION 2: Basin partners to gather background information on visions from the different basin states and compile.

The first version of the database is available on CD. The data is now publicly available on CD as well as the Sharing Water website. The Sharing Water Project Internet site could possibly be transfered and adapted for the GEF project.

Comments on Progress report

Facilitation training
Mr. Pinheiro suggested that training should expand to University level with the collaboration of other partners. He felt that the training needs to include long-term, degree-level database training, as this would be beneficial for the basin members. Ms. Skyer raised a concern about the assessment of the training needs and the level at which the training is done. It was recommended that training should be done for those that need the training and not to train trainers[ES1], as it is a waste of resources and time. There is also a need to get trainees from outside the workshop participants.

The legal and Institutional analysis:
The legal analysis raised gaps and NHI was asked to give a conceptual framework for the analysis. The SC members were urged to give input as individuals and partners. The timelines for both the legal and institutional analysis is constraining and it was therefore recommended that the partners should consult and get guidance on the legal analysis.

The Visioning Exercise
The budget and the timelines for the visioning exercise need to be revised. Timelines for the visioning exercise is constraining and will not be feasible to do a full-fledged visioning exercise. It was recommended that timelines are important, as there is need for stakeholder consultation. In order to come up with that shared aspiration, it was recommended that the project could get a compilation of the visions so that it may form a foundation of the second phase. NHI stated that a full-fledged visioning exercise could not proceed without the direction of OKACOM.For Phase I, basin partners should continue with collection of baseline information relevant to a future visioning exercise. The timeline of this activity will be revised. The meeting was asking the SC members to endorse the partners to collect data and develop a case study.

Scope of the Legal and Institutional Analysis
Tabeth clarified that the scope of the legal and institutional analysis is to do an inventory at provincial, district, community, country and basin level – to determine the mandate of the institution, the roles and the actual activities. Based on that inventory and literature review the analysis would then identify the gaps, constraints and come up with a basket of recommendations and then make a case study. It was also recommended to add to the list of the achievements of each institution and also look at how those institutions have helped on the achievement of the basin objectives. There is a need for a comparative analysis by also looking at other policies that are not water related.

Sharing Water Website
NHI indicated that one possible idea is to transfer the information from Sharing Water website to OKACOM GEF website, only if the project management takes off before the end of the Sharing Water project. This would then help support OKACOM. A question was posed with regard to capacity to maintain the website at OKACOM and it was further suggested that one of the partners maintain the website. It was decided that this decision would be taken up at the partners meeting.

Action 3: NHI to facilitate the decision regarding maintaining the website.

8. Project Financial Report (From Inception to December 2004)

NHI stated that the original budget had to be revised as the project moved forward. It had to be revised for several reasons, one being to involve other partners such as HOORC to provide their expertise in the database development. The large trends and issues on the budget include the costs of the web design, added 10 more delegates, the considerable drop of the dollar, adding an additional steering committee meeting, and additional steering committee members, and the underestimated costs of holding a workshop in Luanda. Elizabeth went on to say that the overspent budget would offset itself.

It was recommended that the project managers should consider subcontracting basin partners to develop the website. Angola urged the partners to give priority to basin members and institutions that are within the basin. The company that is now developing the website is located in South Africa. He also urged the partners to look at subcontracting basin members before looking elsewhere. It was recommended that a footnote on the revised budget should be given.

ACTION 4: NHI will distribute the corrected budget and give a footnote on the budget

Any Other Business
The chair suggested that we could learn from SADC, that whenever there are SADC wide meetings, the chair should coincide with the host country. The current chair, will however, continue chairing until the end of phase 1 of the project.

Sharing Water Phase II
The committee felt that phase II of the Sharing Water project was necessary so that the project is not left hanging. A question was asked as to the kind of resources that might be available. NHI indicated that they are interested in putting up a proposal, designed as a three-year project. It was recommended that the project should not rely entirely on USAID and should look more broadly for other donors. KCS expressed its interests in the project and wanted to formalize collaboration.

Date of next meeting
The next meeting will be held in Botswana, Kasane, during the third and final Sharing Water workshop 9th – 13th August 2004.

Closing Remarks
Dr. De Wet of OKACOM thanked the chair and all the SC members for coming and commended the organizers for a job well done. The chair thanked all for coming.

Action List

Action	By Who	By When
Action 1: Basin partners to establish a small group for the database from each basin state. This group would then go to HOORC in Maun and meet to discuss the protocol on the database over time, before Botswana workshop.	IUCN Botswana NNF JEA	
Action 2: Basin partners to gather a basket of visions from the different basin states and compile.	IUCN Botswana NNF JEA	
Action 3: Facilitate the decision regarding the partner that will maintain the website.	NHI	
Action 4: NHI will distribute the corrected budget and give a footnote on the budget	NHI	

Minutes of the 3rd Steering Committee Meeting for the Sharing Water Project

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Date: 11 August 2004

Time: 3.30- 5.30 pm

Venue: Chobe Marina Lodge, Kasane Botswana

Present:
Committee Members
Mr. Obonetse Alfred Masedi (SADC Infrastructure and Services: Water Division, Botswana **Chairperson**)
Mr. Felix Monggae (KCS, Botswana)
Mr. Isidro Pinheiro (OKACOM Commissioner, Angola)
Mr. Antonio Chipita (ACADIR, Angola)
Mr. Steve Monna (OKACOM Commissioner- NCSA Ministry of Environment, Wildlife and Tourism Botswana.

Ex-officio Members
Ms. Tabeth Matiza Chiuta (IUCN ROSA)
Dr. Elizabeth Soderstrom (NHI)
Ms Bertha Nherera (IUCN ROSA) **Secretary**

Observers
Ms. Masego Madzwamuse (IUCN Botswana)
Ms. Kulthoum Omari (IUCN Botswana)
Mr. Abias Huongo (JEA, Angola)
Mr. Lenka Thamae (IUCN ROSA)
Ms Shirley Bethune (NNF)
Mr. Rich Walkling (NHI)
Mr Pete Ashton, (CSIR)

1. WELCOME AND INTRODUCTIONS

The chairperson welcomed all the participants to the meeting. In his welcoming remarks he indicated that the Steering Committee had come a long way since commencement of the Sharing Water project and indicated that this was the last meeting of the Phase 1 of the Sharing Water project. He indicated that from SADC's point of view the project had been very instrumental in adding value to the expected broad mandate of OKACOM. SADC believes that River Basin Organizations (RBOs) such as OKACOM should go beyond endorsing an initiative but should own such projects and demonstrate that ownership. SADC believes in a participatory and consultative process as the key foundation for consensus building. He also highlighted that the project had made an impact on the collaborative processes among stakeholders, as the communities from the three riparian states are increasingly becoming aware that no single state can claim unilateral ownership of the Okavango River.

After the opening remarks the Chairperson requested all participants in the meeting to introduce themselves.

2. APOLOGIES

Apologies were received from Ms. Patricia Skyer (NASCO, Namibia), Mr. Piet Heyns (Dept of Water Affairs Namibia, OKACOM Commissioner), Dr. Stephan de Wet (Secretariat to OKACOM Commissioners in Namibia) Dr. Chris Brown (NNF, Namibia), Dr. Akiko Yamamoto (UNDP-GEF, Namibia) and USAID Regional Centre for Southern Africa

UNDP-GEF's participation at the 3rd meeting was affected by the new arrangement where UNDP-GEF was supposed to fund its own member to the meeting. UNDP-GEF indicated that they did not have funds earmarked to attend the Sharing Water project Steering Committee meeting. They were of the understanding that the project was supposed to cover their costs for attending the meetings. In response, NHI indicated that USAID could not fund UNDP-GEF representative using the USAID/RCSA funding, as this is government funding. **Therefore, if there are to be any further meetings in future, there would be need for UNDP-GEF and USAID/RCSA to clarify this.**

3. APPROVAL OF THE AGENDA

The agenda was approved without any additions.

4. APPROVAL OF MINUTES OF THE 2ND STEERING COMMITTEE MEETING

A correction was made on Dr Sephen De Wet's name to read Dr **Stephan de** Wet. With that correction the minutes were passed as a correct record. Mr Steve Monna proposed for their adoption and Mr Isidro Pinheiro seconded him.

5. MATTERS ARISING

Action list

Action 1: Basin partners to establish a small group for the database from each basin state. This group would then go to HOORC in Maun and meet to discuss the protocol on the database over time, before Botswana workshop.

In Botswana the group was established but it did not go to HOORC but had an electronic discussion with the database team. A group from Namibia (RAISON) went to HOORC. HOORC will be responsible for hosting and updating the database. HOORC will engage other partners such as ODMP to get information to update the database.

The meeting recommended that OKACOM can invite HOORC at the level of the Okavango Basin Steering Committee (OBSC) to be updated on the database.

Action 2: Basin partners to gather a basket of visions from the different basin states and compile.

The Vision statements were gathered and presented at the Kasane workshop. **IUCN ROSA will compile the Visions statements and the report will be presented to OKACOM as one of the products of the project.**

Action 3: Facilitate the decision regarding the partner that will maintain the website.

The website will be presented to OKACOM as one of the products of the project and OKACOM will indicate to NHI where they would want the website to be hosted after one year.

Action 4: NHI will distribute the corrected budget and give a footnote on the budget

NHI apologized to the committee that this was not done but that this report was to be presented at the meeting under the agenda item on "Financial report".

Action 5: NHI to present to OKACOM an MOU between the Sharing Water project and OKACOM which will also include components regarding communication with OKACOM on a regular basis.

The MOU was presented in Luanda at the OKACOM meeting that was held in April 2004. The MOU was not accepted mainly because the Commissioners were not happy with the way the project had proceeded. Given that there will not be a second phase of the project the Steering Committee felt that the issue of the MOU was now redundant, but that this was a lesson for the project in terms of how it should engage OKACOM in planning projects. **As what had been already been agreed in the Kasane workshop, the products of the Sharing Water project will be presented to OKACOM who will decide how they would like to use the products of the project**

Action 6: At the first Steering Committee meeting, the Committee requested that a list of facilitation trainees should be compiled and circulated.

Elizabeth indicated that short biographies of the people who were trained as facilitators during the project will be posted on the web site by 30th of September 2004.

5. DISCUSSION ON PHASE I ACCOMPLISHMENTS AND LESSONS LEARNT

Elizabeth presented what the project had accomplished in the 18 months of its implementation and the lessons that had been learnt.

The major accomplishments of the project were that the project:

- Brought together delegates from all three-basin countries resulting in more than 80 attendees at three workshops to discuss the management of the Okavango/Cubango River basin.
- Interacted with OKACOM to ensure that the project was supportive of OKACOM
- Co-ordinated with other basin projects such as Every River Has its People project, ODMP.
- Established a Steering Committee that provided strategic guidance for the project.
- Built tools for managing the Okavango/Cubango River Basin such as the Shared database, Training model and Website.
- Provided analyses for managing the Okavango/Cubango River basin, under the Legal and Institutional analysis, Documentation of Visioning statements, providing information on Basin conditions, Data gap analysis, production of a project matrix of other projects being implemented in the Basin and production of information on Scenarios and Management Strategies.
- Built capacity for managing the Okavango/Cubango River Basin through training in Negotiation, Hydrological analysis and Facilitation.
- Undertook site visits in the river basin in Angola and Namibia, which helped to enhance understanding issues in the basin.
- Overall the project managed to build relations in all these interactions.

In terms of lessons learnt, Elizabeth highlighted the following

- When planning and implementing projects, there is need to take smaller steps
- Workshop based training is not enough

- Sometimes there is need for intensive training
- There is need for more direct involvement of basin experts
- Better communication and liaison with OKACOM
- Need to legitimatize data
- There is need to pay more attention to Angola.

Comments

The major comment from the Committee was that whilst it is important to co-ordinate and create synergies amongst projects the need to clearly attribute outputs of one project from another project is very important. This was raised as some Committee Members had observed some confusion as to the distinction of some of the outputs of the Sharing Water project from those of the Every River Has its People project.

6. PHASE 1 FINANCIAL REPORT

Rich Walking presented the financial report and highlighted that USAID reduced the original budget of the project from USD 2,115 000 to USD 1,960 000. USAID also requested NHI to pay USD 61 000 for a May 2003 OKACAOM workshop that NHI had not budgeted for on the understanding that USAID would reimburse NHI which they never did. In addition the costs for the Angola and Namibia workshops were higher than what had been budgeted for. To address these changes some of the costs associated with the Namibia and Botswana workshops were compensated for by the use of the Chemonics funding mechanism and NHI had to cut some budgets to accommodate the changes.

Comments

- It was clarified that the unspent balance as was indicated in the report would be spend as the project is expected to have all the final invoices for the project by the 3rd of September 2004 with the project closing by the 30th of September 2004.
- It was also clarified that USAID has a special way for Partners to account for interest accrued on project funds.

7. POSSIBLE NEXT STEPS

Elizabeth informed the meeting that Sharing Water project was not likely to proceed into second phase in its present form. She indicated that USAID who are funding the Sharing Water project are still interested in supporting activities in the Okavango River Basin.

USAID/RCSA put a call for proposals open to American firms only. Only three organizations were legible to apply and one organization, Association of Rural Development (ARD), responded. ARD already contacted some of the Sharing Water partners. Support by USAID will mainly cover support to OKACOM, some of the activities that had been proposed under the Sharing Water Phase 2 and work at community level related to water resources management. It is not clear what the ARD bid looks like but this will be reviewed by OKACOM.

At the Partners meeting, Partners agreed to communicate as things proceed. Elizabeth hoped that there will not be much confusion with ARD now taking the lead. It would be important if ARD can have a workshop again of all activities in the basin.

The delegates indicated that they wanted to form a technical working group similar to the Basin Wide Forum established by Every River Has its People project and, Elizabeth hoped that this is something ARD might want to support and build on.

8. ANY OTHER BUSINESS

Elizabeth thanked the Committee for their guidance through out the project. She indicated that NHI will present the final products of the project to OKACOM and also copy the Steering Committee members. NHI will also recommend to USAID that a Steering Committee be convened with the same make up as the Sharing Water project as it proved very useful.

9. CLOSING REMARKS

Mr Steve Monna closed the meeting. In his closing remarks he highlighted that Sharing Water project had played a complimentary role in the basin. It brought other usually passive stakeholders to actively participate in the issues to do with management of the River Basin. OKACOM will be expecting a presentation of the products of the project and in future it will be assuming a more regulatory role. He hoped that the comments that were made on the model were taken in good faith and that these would be used to deal with various scenarios. He expected Namibia and Botswana to be considerate of Angola and that Angola should also not hold to ransom the other states so that the countries can portray the benefits that will accrue not just to the countries but globally. When these benefits are portrayed at a global level, the countries can also be augmented in covering incremental costs and avoid disparities amongst the countries.

The Chairperson thanked all the participants and indicated that SADC will be supportive to initiatives that strengthen RBOs. RBOs should demonstrate ownership, and share best practices. What has been learnt in this project should also benefit the subregion.

Bertha Nherera, IUCN ROSA, August 2004.

[ES1]Is this what she said? It does not seem to make sense as we are not training trainers.

Appendix M.

Natural Heritage Institute

Issue 1 March 2004

OKAVANGO RIVER BASIN SHARING WATER PROJECT

Welcome to the first Sharing Water Newsletter. This newsletter is designed to keep the SADC water community informed of the activities of the Sharing Water project.

SHARING WATER EXPLORES ANGOLA'S OKAVANGO / KUBANGO HEADWATERS

For the first time, on October 30, 2003, an international group of Okavango / Kubango basin stakeholders traveled together to Menongue and Caiundo, Angola to explore the previously inaccessible headwaters of the Okavango / Kubango River. The group, comprised of representatives of non-profits, civil servants, and government officials from the three Okavango / Kubango basin states, visited the Angolan headwaters as part of the *Sharing Water* project's workshop in Angola.

After three days of training in international river basin management, the workshop participants embarked on their journey to the upper catchment. Participants flew from Luanda to Menongue where the Governor of the Kuando Kubango province, Sr. Joao Baptista Tchindandi welcomed the *Sharing Water* group at his house. In a bus and caravan of trucks, the group set out along the heavily pitted road to the Kubango River and a village called Caiundo. Peter Ashton, with South Africa's Counsel on Scientific and Industrial Research, said, "I've been studying this basin my entire life and have never been able to get into this area because of the war. This is a dream come true."

Twisted remnants of land-mined tanks studded the roadside and served as reminders of the only too recent end of Angola's civil war. In contrast, as thousands of refugees resettle their homeland, newly thatched houses stood as beacons of hope.

The war, which was primarily fought in Angola's rural provinces, made the Okavango / Kubango headwaters virtually inaccessible for 30 years. Besides its devastating effects on the Angolan people, the civil war also disrupted data collection in the headwaters. In many cases, the last data sets known to *Sharing Water* date back to 1970's studies.

Visiting the catchment underscored the urgency to resume data collection in the headwaters so as to develop baseline information for the entire river basin. Despite its long inaccessibility, the visit into the headwaters inspired hope that scientists and other basin stakeholders could reenter the upper catchment to collect data and learn about the basins' hydrology and the needs and culture of the headwaters communities. *Sharing Water's* visit to the headwaters will facilitate an understanding of the basin that had been long inaccessible.

- Julie Leimbach, NHI

Inside this issue:

Sharing Water explores Angola's Okavango / Kubango Headwaters	1
Sharing Water: Supporting OKACOM in the Basin; Project Partners	2
Sharing Water Current Actions; Coordination with other projects in the Basin	3
Sharing Water Workshops	4

Abandoned military hardware, Kuando Kubango Province, Angola

Kubango River at Caiundo, Kuando Kubango Province, Angola

Visit to the village of Caiundo, Kuando Kubango Province, Angola

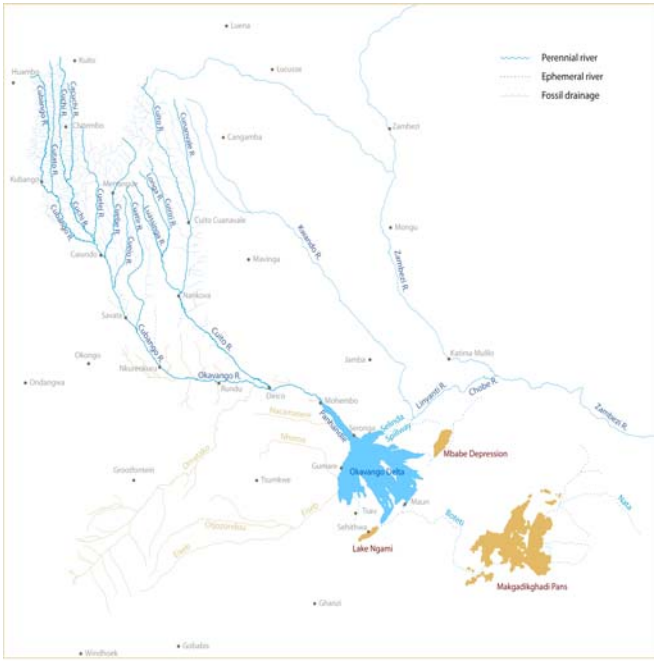
Sharing Water: Supporting OKACOM in the Okavango / Kubango Basin

Beginning in the mountainous highlands of central Angola, then coursing through arid Namibia and Botswana, before terminating in the vast and biologically abundant and diverse inland wetland known as the Okavango Delta, the Okavango / Kubango River Basin represents one of the most ecologically unique river systems in the world. In addition, the Okavango / Kubango River Basin remains unaltered by large scale human disturbance.

The riparian countries, Angola, Namibia, and Botswana formed the Permanent Okavango River Basin Commission (OKACOM) in 1994 to work toward the future sustainable management of the Basin. However, despite the strong foundation of regional cooperative spirit and the international attention and resources generated from the high profile of the ecology of the Basin, the process of moving toward a sustainable management plan and eventual treaty between Basin States has been slow to develop. As Angola, the basin State where 95 percent of the water flow originates, settles into its first period of peace in some 30 years, it is likely that pace towards the development of a management plan, and ultimately a treaty between the three countries will accelerate.

Within this complex social, environmental, and political milieu an initiative was launched in 2003 entitled *Sharing Water: Towards a Transboundary Consensus on the Management of the Okavango River Basin*. This initiative focuses its efforts on moving the overall process of basin wide collaboration, cooperation, and sustainable management forward, with a strong emphasis on providing sound technical tools to aid in this process.

Sharing Water is funded by the United States Agency for International Development Regional Office for Southern Africa (USAID/RCSA) in support of the objectives of the Permanent Okavango River Basin Commission (OKACOM).



Map of the Okavango / Kubango Basin

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SHARING WATER CURRENT ACTIONS

Website:

The *Sharing Water* project has recently launched at website at **www.sharingwater.net.** The site is in both English and Portuguese, and includes project documents, upcoming events, and a discussion forum. By April, 2004 the website will include the initial version of the *Sharing Water* online database.

Shared Database:

The *Sharing Water* project is in the process of building a user friendly repository for hydrological, ecological, and social data relevant to the Okavango / Kubango River Basin. The initial structure is being developed by project partner Research & Information Services Namibia, and the mature database will be housed at the Harry Oppenheimer Okavango Research Center based in Maun, Botswana, and available to the general public.

Legal & Institutional Analysis:

The purpose of the legal and institutional analysis is to assist in the development of an effective institutional and regulatory framework for the shared Okavango / Kubango river basin that provides for the equitable sharing of costs and benefits. The **legal analysis** will determine congruency in the laws and policies and provide for the harmonization of such laws and policies (if necessary). The **institutional analysis** will determine the specific roles played by institutions in the management of the Okavango / Kubango River Basin (rules and roles at local, national and regional levels) and identify possible gaps and shortfalls in the institutional arrangements.

River Basin Planning Model:

One of the outputs of Phase I of the *Sharing Water* project is a set of recommendations on appropriate analytical tools to deploy in support of the multi-stakeholder dialogue envisioned by the project. This recommendation will be based on several considerations: the specific questions posed, the sufficiency of data, and transparency and flexibility. To date work on this activity has involved an evaluation of an array of potential modeling tools, including several that have been developed in the southern Africa region. Next, the characteristics of individual models will be compared with the model attributes needed to describe the suite of management strategies that emerge from discussions between project participants. A final filter will be an examination of the sufficiency of available data. An automated model evaluation software system is being developed to accomplish these tasks.

- David Purkey, NHI

Management Strategies:

An important component of the *Sharing Water* project focuses on the development of a clear understanding of the different types of management strategies that each basin state (Angola, Botswana and Namibia) could deploy, either individually or collectively, to manage the water resources of the Okavango / Kubango basin. These strategies will then be incorporated into an appropriate model of the Okavango / Kubango system, which will then be used to evaluate the possible outcomes and consequences of different management strategies, in terms of meeting people's needs for water and ensuring that the aquatic ecosystems remain in a healthy state.

The term "management strategy" is a collective term that includes all of the normal management functions in a cyclical fashion (plan, implement, control, evaluate, re-design). As a result, the development of one or more management strategies for a river basin or portion of a river basin is a complex process and depends on the different "choices" that must be made by water resource managers. Typically, these choices revolve around their efforts to reach a sustainable, long-term balance between meeting the needs of people for water from a river system, and ensuring that the system remains in a sufficiently good state of "health" that is able to deliver the benefits (e.g. water for human consumption, agricultural use, hydropower generation, etc.) that people rely on. Here, it is important to remember that management strategies have to consider the potential for cumulative effects to occur as the consequences of a decision or set of actions is transmitted and transformed along the length of the river basin.

The information and understanding that will be developed by the *Sharing Water* project is designed to complement and enhance the experience and understanding of individual water resource managers in the three basin states, stakeholders who are engaged in the decision-making process, and formal institutional structures that are engaged in the Okavango / Kubango basin. - Peter Aston, CSIR

Headwaters of the Okavango / Kubango Basin, Kuando Kubango Province, Angola

EARLY FLOODING OF THE OKAVANGO "EXCEPTIONAL"

As of February 13th, 2004, water levels at Mohembo—where the Okavango River enters Botswana from Namibia– were reported at 3.135 meters, discharging at 661 cubic meters per second. Piotr Wolski, a hydrologist at the Harry Oppenheimer Okavango Research Center in Maun, said the early flooding of the Okavango River was "exceptional."
-Ngami Times Feb, 13-20, 2004 (p. 3)

Coordination of *Sharing Water* project and existing projects in the Okavango / Kubango River Basin

OKACOM, financed by the United Nations Global Environment Facility (GEF), is working toward a final Integrated Management Plan (IMP) for the Basin. An **OKACOM/GEF project** representative sits on the *Sharing Water* Steering Committee in order to provide guidance to the implementation and management of the *Sharing Water* project. Dr. Akiko Yamamoto (UNDP), gave a presentation on the OKACOM/GEF project at the *Sharing Water* workshop in Luanda in October 2003.

Sharing Water coordinates its activities closely with the ***Every River has its People*** project (ERP—www.everyriver.net) and the ***Water and Ecosystem in Rural Development*** project (www.okavangochallenge.com). A representative of the ERP sits on the *Sharing Water* Steering Committee. Project leaders from the three projects will be meeting in Helft in March, 2004 to discuss future coordination. *Sharing Water* also meets regularly with representatives of the ***Okavango Delta Management Plan*** to ensure that each project's efforts complement each other most efficiently.

In addition, *Sharing Water* has drafted a matrix of ongoing or current projects in the Okavango / Kubango River Basin, available to the general public for review and additions.

SHARING WATER WORKSHOPS

In addition to on-going activities, Sharing Water includes a series of four workshops central to its implementation.

Miombo forest in Okavango / Kubango basin headwaters, Kuando Kubango Province, Angola

Sharing Water Project Steering Committee

Sharing Water has convened a Steering Committee with the role of overseeing and providing strategic guidance to the implementation and management of the project. The members of the Steering Committee include Antonio Chipita (ACADIR), Piet Heyns (OKACOM Namibia), Obonetse Masedi (SADC Water Division), Felix Monggae (Kalahari Conservation Society representing the *Every River has its People* project), Stevie Monna (OKACOM Botswana), Isidro Pinheiro (OKACOM Angola), Patricia Skyer (Namibian Association for CBNRM Support Organisations), Akiko Yamamoto (UNDP representing the OKACOM/GEF project). The Steering Committee convened in Luanda, Angola on 27-October, 2003, and is scheduled to convene again in March and July 2004.

Workshop #1

Project partners convened for the first *Sharing Water* workshop at the Southern African Wildlife College in Kruger Park from May 12-14, 2003. The workshop served primarily to built a tight and coordinated project implementation team by finalizing roles and responsibilities of project partners, and lead and support roles for all major tasks, thus ensuring a shared vision for the project.

Project partners Derek Hitchcock (NHI), Morse Nanchengwa (USAID/RCSA) and Tabeth Chiuta (IUCN ROSA)

Sharing Water project core participants and facilitation training

In order to support the critical foundation of stakeholder participation in the future management of the Okavango / Kubango Basin, the *Sharing Water* project invited 30 core participants (10 from each basin country) to participate in three project workshops October 2003, March 2004, and July 2004. These participants were chosen to represent a middle strata of stakeholders (between community level and high level government officials) who are involved in data collection, analysis, or management and were drawn from government departments, NGO's, traditional leaders, and businesses.

The *Sharing Water* project is facilitating a process of joint fact finding through which the core participants can build the skills necessary to share scientific data and local knowledge to help build and evaluate a range of basin management scenarios. Ideally this process will set the stage for participants to effectively engage with OKACOM to develop an Integrated Management Plan for the Basin that incorporates the wise and sustainable management of the system to meet socio-economic and ecological goals from local to international levels.

In addition, out of the 30 workshop participants and seven project partner organizations, the partners selected 15 people to receive additional intensive facilitation training at each of the three project workshops. These participants will assume greater responsibility as facilitators in upcoming workshops.

Workshop #2

The second *Sharing Water* workshop took place in Luanda, Angola from Oct. 25-31, 2003. In addition to forwarding overall project goals, the workshop was designed to take advantage of its location in Angola and focus attention on the headwaters of the Basin.

The workshop was opened by remarks from the Honorable Minister of Water and Energy in Angola, Bothelho Vasconcelos. Highlights included presentations by experts on *Plans and Challenges for Biodiversity Conservation in Kuando Kubango Province, Angola* (Dr. Tamar Ron, UNDP), *Management Issues in the Basin* (Dr. Peter Ashton, CSIR), and *Transboundary River Basin Management* (Dr. Tony Turton, AWIRU). In addition, simulation exercises were conducted in small break out groups on negotiation, water allocation, and joint fact-finding, and an enthusiastic and lively engagement by participants provided an excellent atmosphere for experiential learning and occasional comic relief.

Project participants engaged in workshop activities in Luanda, Angola

Project partners Lenka Thamae and Dr. Eben Chonguica (IUCN ROSA) conducting training in hydrological cycles in Luanda

The next *Sharing Water* workshop will take place in Windhoek, Namibia from 29-March to 2-April, 2004 and will include a field trip to the Kavango River near Rundu and Divundu.

Appendix N. (English)

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Towards Development of a Vision for the Okavango Basin

September 2004

Compiled by Bertha Nherera (IUCN ROSA)
With input from, Tabeth Matiza Chiuta (IUCN ROSA), Abias Huonga- JEA, Kulthoum Omari and Masego Madzwamuse-IUCN Botswana and Chris Brown NNF

Reviewed
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LIST OF ACRONYMNS USED

AWIRU	African Water Issues Research Unit
CSIR	Council for Scientific and Industrial Research
IUCN	International Union for the Conservation of Nature
JEA	Juventude Ecologica Angolana
GEF	Global Environment Facility
NCSA	National Conservation Strategy Agency
NNF	Namibia Nature Foundation
NHI	Natural Heritage Institute
HOORC	The Harry Oppenheimer Okavango Research Center
NNF	Namibian Nature Foundation
ODMP	Okavango Development Management Plan
RAISON	Resource and Information Services of Namibia
TDA	Transboundary Diagnostic Analysis
OBSC	Okavango Basin Steering Committee
OKACOM	Okavango River Basin Commission
SADC	Southern African Development Community
WWF	World Wide Fund

EXECUTIVE SUMMARY

The Okavango River Basin is shared by Angola, Botswana and Namibia. The river's basin forms the northwestern part of the larger Makgadikgadi Basin, which also includes Zimbabwe. The Okavango Basin is globally unique in that it is still relatively pristine. However, it is facing increasing demands for water from a variety of stakeholders, both inside and outside the basin, and there is a pressing need to develop a basin-wide vision that can form the basis for integrated management of the entire Okavango River Basin. Elsewhere in the world, stakeholders in shared river basins, such as the Murray Darling Basin in Australia, have demonstrated the importance of defining a shared vision for a resource with a multitude of stakeholders expressing competing demands for water. A vision is a prerequisite for sustainable development of a shared river basin. This concept is also supported by studies undertaken by World Wide Fund (WWF) and the Every River has its People project.

The purpose of this report prepared under the *Sharing Water Project* is to support the objectives of the Permanent Okavango River Basin Water Commission (OKACOM). OKACOM was established by Angola, Botswana, and Namibia in 1994 to advise the respective governments on the management of the Okavango River Basin.

The development of a basin-wide vision should ideally be based on, and incorporate, specific vision components of the individual riparian states, as well as appropriate aspects of international responsibilities of each basin state. Hence before a Basin Wide Vision can be developed for the Okavango River Basin, we need to gather information on visions, aspirations, and values relevant to the Basin at local, national, regional and international levels. This information is useful as a base from which to develop a Basin Wide Vision.

The *Sharing Water* project undertook a literature review to document relevant vision statements, aspirations, and values at country, regional and international levels. At country level, all three basin states had stated long-term objectives for 5-10 year national plans in the relevant sectors. The sectoral visions and aspirations that are relevant to this report are those of the Tourism, Agriculture, Energy, Water and Industrial sectors, as these have a direct bearing on the demands for water from the Okavango River Basin. In addition, Namibia and Botswana have developed long-term visions for the Okavango River Basin. These long-term visions highlight the pressing need for sustainable development and increased prosperity in each country.

As all three basin states belong to the SADC economic grouping, the SADC regional objectives are directly relevant to management of the Okavango River Basin. Recognizing that water is the single most important resource in the basin, this report also provides information on the Visions for Water, Life, and the Environment in Southern Africa, and at Africa and Global levels. Of the eight Millennium Development Goals that the United Nations agreed should be achieved by 2015, this report highlights two of particular relevance; these are on Poverty and Environmental Sustainability.

This report also contains suggestions from JEA and NNF on what could be important elements of a shared vision for the basin. The report concludes by recommending next steps in documenting vision statements, aspirations, and values at a local level and in the private sector.

1. BACKGROUND

1.1 Introduction

The Okavango River rises as the Kubango River on the Bié Plateau located in the highlands of central Angola, and is joined by the Cuito River before crossing the Caprivi Strip of Namibia and

flowing into Botswana, where it forms the Okavango Delta. Both the Rio Kubango and Rio Cuito are perennial rivers, with distinct seasonal patterns of flooding that provide a seasonally cyclical inflow to seasonal wetlands comprising the Okavango Delta in Botswana. The water in both rivers is very clean and clear. Reports by Shirley Bethune, Namibian Nature Foundation (NNF) (1991), on the Namibian section of the Okavango River and the Transboundary Diagnostic Analysis (TDA) (1999), indicate that water quality was very good in the section flowing through Namibia and Botswana. Because of the very low levels of development surrounding the upstream tributaries in Angola, it is likely they too have good water quality. Studies conducted by John Mendelsohn and Selma Obeid, Research and in Information Services for Namibia (RAISON) (2004), also indicate that Okavango River water is exceptionally clear of mud and contains few dissolved chemicals or solutes.

The Okavango River Basin covers a total of 725,000 km^2 (Angola- 200,000 km^2, Botswana- 340,000 km^2, Namibia -165,000 km^2 and Zimbabwe- 20,000 km^2 (Pinheiro et al.- online). According to Mendelsohn & Obeid (2004), the basin is home to about 601,000 people (Angola – 350,000[1], Namibia -163,000 and Botswana - 88,000). Roughly 92 percent of the basin remains unpopulated. The greatest concentrations of people live in the northwest between the towns of Huambo and Kuito, along the river in Kavango-Namibia and in and around scattered towns in villages throughout the basin.

The Basin is unique amongst the river basins in the world in that has remained relatively pristine with very little loss of the original vegetation cover. Within the Okavango River Basin, some 0.2 percent of the area consists of urban and industrial areas, while a 5.5 percent comprises croplands; the balance consists of natural vegetation forms. The Okavango River Basin is widely known for its rich biodiversity, including 116 mammal species (OKACOM TDA 1999), 80 endemic fish species, 55 Amphibian species, 80 reptile species, and over 430 bird species.

The Okavango Delta and its peripheral buffer zones comprise the largest Ramsar site in the world. As a Ramsar site, the Government of Botswana is required to develop and implement an effective management plan for this key wetland. Botswana's National Conservation Strategy Agency (NCSA) is coordinating the development of this management plan and aims to ensure the plan will promote positive contributions to the delta and the basin as a whole.

All three basin states have stated development objectives that focus on the creation of employment, improving food security through agricultural expansion, improving basic human health, supporting community based resource management, and promoting tourism. Angola, in particular, has a pressing need for development after its prolonged civil war. So, it is currently implementing a series of post-conflict reconstruction activities with the help of international donor agencies. The civil war devastated the relatively remote region in the southern portion of Angola, which forms the headwaters of the Kubango and Cuito rivers, leaving it in urgent need of reconstructed infrastructure.

Availability of water is key to meeting the aforementioned development objectives in each basin state. Angola, being the uppermost riparian state theoretically occupies the strongest hydropolitical position. Downstream riparians, Namibia and Botswana are both dry countries and face potential limitations to their future growth due to water scarcity. Consequently, both countries are interested in the Okavango River as a resource to supplement their existing water supplies.

Namibia withdraws between six and nine million cubic metres per annum from the Okavango River to supply the town of Rundu, a variety of irrigation schemes, and tourist lodges alongside the river. Namibia recognises its' obligation to first reuse its available water and curb water losses. Therefore,

[1] No census has been conducted in recent decades in Angola, so the population figure is based on estimates.

the country is developing additional groundwater resources, improving reuse of effluent, integrating existing water resources uses, establishing conjunctive use of surface and groundwater, as well as, instituting better water demand management practices. Yet, despite its highly innovative water management, Namibia's water demands will probably outstrip its supply unless the country completes the proposed diversion from the Okavango River before 2009 (Pinheiro et al. online).

In the early 1980s, Botswana looked to the Okavango Delta as a potential source of water to meet growing domestic, agricultural, industrial and other needs.

Given these development objectives and the varied demands for water from the basin, the Governments of Angola, Botswana and Namibia were proactive in developing a spirit of cooperation, and established the Permanent Okavango River Basin Commission (OKACOM) in 1994. OKACOM consists of three commissioners per country appointed by the respective governments from the line ministries responsible for management of water resources and the environment in each of the three riparian states. OKACOM was formed to coordinate and collaborate to devise equitable ways in which to share the basin's water resources and their benefits. It is responsible for advising the respective governments on the planning and development of the basin where such development would have basin-wide impacts. OKACOM now plans to develop an integrated basin wide management plan to guide future development and management of the basin.

1.2 Sharing Water Project and the Visioning Exercise

The *Sharing Water* project partners include: Natural Heritage Institute (NHI), IUCN – The World Conservation Union's Regional Office for Southern Africa (IUCN ROSA), Juventude Ecologica Angolana (JEA), IUCN – The World Conservation Union Botswana, Namibia Nature Foundation (NNF), The Harry Oppenheimer Okavango Research Centre (HOORC); the Council for Scientific and Industrial Research (CSIR); Research and Information Services of Namibia (RAISON); CONCUR Inc.; and the African Water Issues Research Unit (AWIRU). The project is an initiative that recognises the complexity of the Okavango/Kubango Basin in terms of its international status, its cultural and economic diversity, its ecological importance, the expectations and possible pressures on the system to support local and national development, and the uncertainties associated with future management of a highly variable system. The *Sharing Water* initiative offers a platform, for collaborative learning, collective resource inquiry, and for negotiation about sharing water and related ecological resources. The main objective of the project is to "*help promote the long-term sustainable management of the Okavango River and thereby protect the globally important Okavango Delta*".

One of the *Sharing Water* activities was to identify and document the three basin states' existing vision statements, core values, and aspirations at provincial, national, regional and international levels. These documented visions should be considered when developing a common or shared vision for the entire Okavango River Basin. The development of such a shared basin wide vision is one of the prerequisites for sustainable management of a transboundary river. *Sharing Water's* visioning activity was aimed at supporting OKACOM's objectives. For the purposes of this report, a *"shared vision for the Okavango River Basin"* is defined as a widely shared dream, aspiration, or view of how water and other resources in the basin should be used, allocated or shared and managed over a long period to achieve a balance between demand and supply in order to maintain sustainability of the resource base.

The purpose of this report is to document the three basin states' vision statements, core values and aspirations at provincial, national, regional and international levels to provide a synthesized report that could serve as springboard for a basin-wide visioning exercise in the future.

1.3 Visioning in a River Basin Context

The Okavango River Basin, like many other shared river basins worldwide, faces a variety of management challenges. Some of the most important management challenges are:

- Shared river basins transcend national boundaries and need to be managed jointly but are usually managed differently in each country
- Environmental problems know no boundaries, as exemplified by air pollution, water pollution, and dispersal of alien species
- Upstream activities affect the downstream health of a basin
- Decisions made outside the basin can impact the basin
- Multiple stakeholder decisions at different levels affect environmental and developmental outcomes

As a result, it is extremely important that management and sustainable use of resources are carried out harmoniously at the basin level as well as national and local levels (Jones et al. 1999- 2003).

Given these management challenges, river basins carefully integrated management incorporating all components of the hydrological cycle and engaging all stakeholder groups. Integrated water resource management cannot achieve its full potential if there is no common overall objective/vision. Studies undertaken by other organisations, such as World Wide Fund (WWF), support the importance of defining a shared vision for a river basin. Based on its evaluation of eleven case studies of river basin management, WWF distilled seven guiding principles for effective integrated river basin management. Among them, defining a common vision was one of the key guiding principles. The stated WWF principle states: "*management of river basins should be governed by a long-term vision (that has been) agreed by consensus between all major stakeholders. The vision must give equal weight to the three pillars of sustainable development, - economic, social and environmental concerns. The vision should stress the need to maintain and restore ecosystem services and biodiversity in order to enhance local livelihoods*".

The importance of defining a shared vision can also be seen in other shared river basins, such as the Murray Darling Basin in Australia. Stakeholders in the Murray Darling Basin recognised the complexity of management issues in the basin and developed a vision for *"a healthy River Murray system, sustaining communities and preserving unique values*" (Scanlon 2002). This shared vision has proved to be a unifying force, aiding stakeholders to address threats to water quality in the basin.

Given the results from the WWF case studies and the Murray Darling River Basin, it is clear that a basin wide vision shared by the basin's stakeholders is imperative to developing and managing the resources of a transboundary river basin.

1.4 Visioning - the Key Issue to Management of Okavango River Basin

The stakeholders of the Okavango River Basin are many and have diverse interests. The stakeholders include the three basin state governments, inhabitants of the basin, civil society organisations at local, national, regional and international levels, and the private sector.

Some of the specific interests expressed by the three basin state governments in the report from the OKACOM meeting held on 8 February 2002, are briefly highlighted below.

Angola is interested in seeing a strong commitment to effective water management and the SADC protocol; management of the Okavango Basin as a whole; equitable sharing of the resources and benefits from water power generation; joint development of agricultural projects in Angola; co-

operation in joint studies, participation in research, preparation and supervision of studies; and good relations with other member states in the basin.

Botswana is interested in receiving an adequate water supply from the Okavango River Basin for agriculture, municipal and other uses; conservation of the Okavango Delta and its natural resources; greater understanding of the Delta to enhance management, especially to sustain the tourism potential of the Delta; effective management of the river through co-management and community participation; and to maintain cordial relations with Namibia and Angola.

Namibia is interested in developing a hydropower facility in the basin; using water from the Okavango River for industrial, domestic, fishing, and agricultural purposes; augmenting surface and groundwater resources in the central part of Namibia; attracting tourists to the region; knowing Angola's plans for the Kubango that might impact tourist development in Namibia; sustaining ecosystem function by controlling pollution of the Okavango River; having assurance of sufficient water of good quality; and seeing Angola manage its portion of the basin in a sustainable fashion (e.g. managed land use, agricultural developments, pesticide use, etc).

Defining a shared vision for the Okavango Basin is key to transboundary integrated water resources management. The same has also been highlighted in the "Best practices Guide for promoting Shared River Basin Management 1999-2003 (Jones *et al. 2004*). The Every River Has Its People Project has also demonstrated the importance of defining a common agenda, objectives and vision in the Okavango River Basin. Effective planning and management are not possible if stakeholders cannot agree on the content of agendas, management objectives, and vision, whether within one country or across the basin.

1.5 Methodology

This report is mainly based on literature review. Each *Sharing Water* basin partner contributed by reviewing various relevant national, sectoral and thematic policies, plans, and strategies. IUCN ROSA reviewed documents on the Millennium Development Goals, Visions for Water, Life and the Environment and other relevant documents, to compile information at regional and international levels and finally, consolidated the report.

In addition to the literature review for Angola, JEA also consulted with some of the relevant Angolan Ministries.

2. VISIONING EFFORTS RELEVANT TO THE BASIN

The Sharing Water project gathered visioning statements for the Okavango River Basin against a background of other relevant global and regional visioning statements. As the Okavango basin states are part of the global and regional communities, the value statements expressed at these levels have certain critical implications for the Okavango River Basin.

Therefore, this section provides an inventory of the relevant international, African, and southern African level visioning efforts that OKACOM and the Okavango River Basin stakeholders might want to consider when they decide to develop the shared vision for the Okavango River Basin.

2.1 Millennium Development Goals

At the World Summit on Sustainable Development held in Johannesburg during September 2001, the 191 United Nations member states reached consensus on eight Millennium Development Goals to be achieved by 2015. Angola, Botswana, and Namibia voted in favor of adopting the United Nations Convention. Namibia is also a signatory to the Convention (Pinheiro -online et al.*)*. Thus, the three basin states have pledged to meet these goals within their sovereign territories.

These Millennium Development Goals (MDGs) bind countries to join forces in the fight against poverty, hunger, illiteracy, lack of education, gender inequality, child and maternal mortality, and disease and environmental degradation. While the whole array of MDGs are relevant to the socio-economic development of the Okavango River Basin, the goals specifically relevant to the management of water and related resources in the basin include:

Goal 1: Eradicate Extreme poverty and hunger

Target for 2015: - Halve the proportion of people living on less than dollar (US $) a day and those who suffer from hunger

Goal 7: Ensure environmental sustainability

- Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources
- By 2015 reduce by half the proportion of people without access to safe drinking water

2.2 World Water Vision (Vision for Water, Life and the Environment for the 21st Century)

As part of the global community, the vision for the Okavango River Basin community is influenced by the World Vision for water and its sub-visions. This global vision and sub-visions were endorsed by the 2nd World Water Forum and Ministerial Conference held in The Hague, Netherlands, events at which the three Okavango River Basin states were represented.

The global vision is encapsulated in the statement: "*Water is life. Every human being, now and in the future, should have enough clean water for drinking, appropriate sanitation, and enough food and energy at a reasonable cost. Providing adequate water to meet these basic needs must be done in an equitable manner that works in harmony with nature. Water is the basis for all living ecosystems and habitats and part of an immutable hydrological cycle that must be respected if the development of human activity and well being is to be sustainable"*(World Water Vision Commission Report 2000).

2.3 Africa Water Vision

The Okavango River Basin as part of the African continent and a key resource, the Africa Water vision and the sub-visions also influence the overall vision for the basin.

The UN WATER/AFRICA report states the Africa Water Vision: *"An Africa where there is equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional co-operation and the environment"*

This is a Vision of an Africa where:

- There is sustainable access to safe and adequate water supply and sanitation to meet the basic needs of all
- There is sufficient water for food and energy security
- Water for sustaining ecosystems and biodiversity is adequate in quantity and quality
- Institutions that deal with water resources have been reformed to create an enabling environment for effective and integrated management of water in national and transboundary water basins, including management of the lowest appropriate level
- Water basins serve as a basis for regional cooperation and development, and are treated as natural assets for all within such basins
- There is adequate number of motivated and highly skilled water professionals;
- There is effective and financially sustainable system for data collection, assessment and dissemination for national and transboundary water basins
- There are effective and sustainable strategies for addressing natural man-made water resources problems, including climate variability and change
- Water is financed and priced to promote equity efficiency and sustainability
- There is political will, public awareness and commitment among all for sustainable water resources management, including the mainstreaming of gender issues and youth concerns and the use of participatory approaches. (UN WATER/AFRICA)

All the elements of the Africa Vision may be pertinent to the basin. It will be very important for the stakeholders to discuss these elements in the process of developing their vision for the Okavango River Basin.

2.4 Southern Africa Water Vision

Angola, Botswana, and Namibia are all part of southern Africa, which, as part of the global World Water Vision, also developed its own vision on Water, Life and the Environment in the 21st Century. The southern Africa Water Vision is "Equitable and sustainable utilisation of water for social and environmental justice, regional integration, and economic benefit for present and future generations"

The sub-visions of the southern African Water vision are:

- Vision of Equitable and Sustainable Social and Economic Development in southern Africa
- Vision of Equitable Access to Water of an Acceptable Quantity and Quality
- Vision of Proper Sanitation for all and Safe Waste Management
- Vision of Food security for all
- Vision of Energy Security
- Vision of a Sustainable Environment
- Vision of Security from Natural Disasters

- Vision of Integrated Water Resources Development and Management

2.5 Southern Africa Development Community (SADC)

Fourteen countries in Southern Africa, including Angola, Botswana and Namibia, comprise the Southern African Development Community (SADC). SADC is an intergovernmental organisation for economic integration of the member states. The objectives of SADC provide some insight into the shared aspirations of the member states.

The objectives of SADC are:

- To achieve development and economic growth, alleviate poverty, enhance the standard and quality of life of the people of Southern Africa and support the socially disadvantaged through regional integration;
- To evolve common political values, systems and institutions;
- To promote and defend peace and security;
- To promote self-sustaining development on the basis of collective self-reliance, and the interdependence of Member States;
- To achieve complementarity between national and regional strategies and programmes;
- To promote and maximise productive employment and utilisation of resources of the Region;
- To achieve sustainable utilisation of natural resources and effective protection of the environment;
- To strengthen and consolidate the long standing historical, social and cultural affinities and links among the people of the region.

As the Okavango River Basin stakeholders develop a common shared vision they will need to take account of these SADC objectives. Some of the objectives are there to provide an enabling environment and a sound basis for coordination and collaboration amongst countries.

2.6 Other Initiatives in the Okavango River Basin Undertaking Visioning Exercises

Okavango Delta Management Plan (ODMP)

In accordance with its responsibilities under the Ramsar Convention, Botswana is implementing a project to develop an Integrated Management Plan for the Okavango Delta. One of the objectives of this management plan is the development of a long term vision for the Okavango Delta. This management plan will also include alternative scenarios for considering the potential impacts of issues such as climate change and upstream changes in land and water use. The vision is expected to outline the agreed upon development options and management scenarios for the Okavango Delta. The long term goal of the ODMP is: *"To integrate resource management for the Okavango Delta that will ensure it's long-term conservation and that will provide benefits for the present and future well being of the people, through sustainable use of its natural resources."* The vision developed by the ODMP project would need to be integrated into the shared vision for the Okavango River Basin.

3. COUNTRY BASED STATEMENTS AND ASPIRATIONS

This section provides information on values and aspirations collected at a national level from Angola, Botswana, and Namibia by the *Sharing Water* basin partners. Botswana and Namibia both have long term national visions for 2016 and 2030, respectively. They have also each respectively developed 10-year and 5-year national development plans. As the Okavango basin stakeholders develop a shared vision for the basin, they will need to verify that their vision is aligned and harmonized with the respective national visions in each country. Angola developed a strategy for its Water Sector and the objectives of its strategy can be used as a reference for the nation's vision regarding the Okavango River Basin. *Sharing Water* basin partners, IUCN Botswana and NNF, outlined the guiding principles being used at a national level in Namibia and Botswana, which need to be considered. Lastly, the *Sharing Water* basin partner's reports provided suggestions in terms of what a shared basin-wide vision might include.

3.1 JEA- Angola Report - Abias Huongo

This section provides information relevant to the visioning exercise provided by JEA. The information primarily concerns Angola's Water Resources Sector.

3.1.1 Water Resources Sector

Objective

The objectives of the water resources sector are to:

- Ensure the utilisation of national water resources in appropriate ways that will help to guarantee sustainable economic and social development and environmental preservation
- Ensure better living conditions and improved public health for the entire population, through generalised access to adequate potable water supply services and effective treatment of residual water

Important aspects of the Water Resources Strategy

The strategy is based on the concept of integrated water resource management and incorporates the following elements:

- Meeting basic human needs for water, achieving food security
- Working with neighbouring countries to achieve equitable access to shared water resources
- Preparing for and managing droughts and floods
- Using appropriate technologies
- Applying economic valuation to water
- Decentralising of decision-making in the sector
- Involving users and reforming institutions

Constraints

Some of the major constraints faced in the Water Resources sector include:

- Fragmented management and disjointed institutional coordination between different stakeholders within the sector
- Difficulties in the access to various regions of the country, which impedes the realization of studies, construction works and other evaluations or assessments of the hydrological resources potential
- Scarcity of human technical resources and absence of a program for its development

3.2 IUCN Botswana- Botswana Report - *Kulthoum Omari and Masego Madzwamuse*

This section provides an inventory of vision statements, values, and aspirations from Botswana

3.2.1 Botswana Vision 2016

The long-term vision for Botswana, Vision 2016 is *"Towards Prosperity for All"*

The vision characterises the kind of society the people of Botswana envision for the year 2016, its fiftieth anniversary since independence. It identifies goals, major challenges, and opportunities that must be productively grasped to attain national aspirations. This vision should guide the strategic thinking and policymaking in the coming years, and should form a rallying point around which all Batswana can unite.

Vision 2016 calls for a transformation of Batswana into a nation, which is

- Prosperous, productive and innovative
- Compassionate, just and caring
- Open, democratic and accountable
- Safe and secure
- Moral and tolerant and
- United and proud
- Educated and informed

The next section provides a list of the sub-visions corresponding to those stated above.

A Prosperous, Productive and Innovative nation

Sub-visions under this vision statement concern sustainable growth and diversification, the environment, and employment generation.

Sustainable Growth and Diversification:

- Botswana will have diversified its economy, with mining, agriculture, industry, manufacturing, services and tourism all making a substantial contribution. Botswana will have a vibrant and energetic economy that is able to meet the competitive demands of 21st century and attract investors**.**
- Agriculture in Botswana will be productive, profitable and sustainable, and will make a full contribution to economic development, poverty alleviation, food security, improvement of the quality of life, and the sustainable utilisation of our natural resources.
- There will be partnership arrangements between local and local foreign investors that will have empowered citizens and developed investment, and substantially increased resource ownership and management by citizens

The Environment:

- By the year 2016, economic growth and development in Botswana will be sustainable. Renewable resources will be used at a rate that is in balance with their regeneration capacity. Non-renewable resources such as minerals will be used efficiently, and their depletion will be balanced by enhanced physical and labour capital. There will be a fully integrated approach towards conservation and development.
- The key natural resources and assets of the country will be equitably distributed amongst its people. Communities will be involved in the use and preservation of their environmental assets, and will benefit directly from their exploitation. The attitude

towards natural resources will pay attention to a fair distribution between present and future generations. The eradication of poverty will have created a situation where no-one will be forced to damage the environment in order to obtain their basic needs.

- The wildlife of Botswana will be managed for the sustainable benefit of the local communities, and in the interests of the environment as a whole.
- By the year 2016, Botswana will have taken strong measures to limit the pollution that would otherwise have resulted from rapid industrialisation. The urban environment throughout the country will be enhanced by the building of parks and gardens for recreational purposes. Batswana will take pride in their clean and unlittered surroundings.

Employment Generation:

- The economic growth will come from diverse sources that generate jobs for the ordinary Batswana. Equitable distribution of resources will have eliminated bottlenecks, and given control and management to the people

A Compassionate, Just and Caring Nation

Sub-visions under this vision statement concern income distribution, poverty reduction, and social safety net

Income Distribution:

- By the year 2016, Botswana will have a more equitable income distribution that ensures the participation of as many people as possible in its economic success. There will be policies and measures that increase the participation of poorer households in productive and income earning activities. The economy will be growing in a distributive manner – that is in a way that creates sustainable jobs.

Poverty Reduction:

- By the year 2016, Botswana will have eradicated absolute poverty, so that no part of the country will have people living with incomes below the appropriate poverty datum line. Within the next ten years, the percentage of people in poverty will have been reduced to at most 23%, which is half the level in 1994.

Social Safety Net:

- All people will have access to productive resources, regardless of ethnic origin, gender, disability or misfortune. Botswana will have succeeded in helping people to escape from the poverty trap, and play a full part in society.

An open Democratic and Accountable Nation,

Sub-visions under this vision statement are on good governance and the role of local and traditional institutions.

Good Governance:

- The Botswana of the future will be a community-oriented democracy, with strong decentralised institutions.
- The role of civil society, including the churches, the non-governmental and voluntary organisations will be enhanced in the Botswana of 2016. These organisations are key elements of good governance, and will promote accountability within the democratic systems.

The Role of Local and Traditional Institutions

- Traditional leaders will be an important part of the democratic process through which the long lasting "Kgotla" system will pass from generation to generation. They will play a significant role as custodians of our culture and tradition, which will be dynamic in response to changing conditions.

3.2.2 A Synopsis of Vision/Aspiration Statements from the 9th National Development Plan (NDP9)

The NDP9 covers the period from 1st April 2003 to 31st March 2009. The plan marks the first major step towards integration of Botswana's long-term vision, **Vision 2016**, into the development planning process. The theme of this plan is *"Towards Realisation of Vision 2016: Sustainable and Diversified Development through Competitiveness in Global Markets"*. Most of the chapters in the NDP are in some way related to the management of the Okavango Delta and are therefore important as inputs into a visioning exercise. The major areas have been summarised into the following points:

Chapter 4- Planning and Strategy for Development

Economic Diversification and Employment Creation: There is potential for diversification in the agricultural, manufacturing, tourism, and financial services sectors of the economy, in addition to diversification within the mining sector itself. Through the diversification of economy in these different sectors, poverty alleviation and employment creation can be achieved.

Poverty Reduction: A strategy has been developed to adopt a multi-dimensional concept of poverty, incorporating incomes issues, human capabilities and participation. The strategy will focus on:

- Expanding employment opportunities through broad-based growth,
- Enhancing the accessibility of the poor to social investments that enhance human capabilities,
- Strengthening the capacity of individuals, families, communities and local institutions to enhance their absorptive capacity for assistance schemes.

Environmental Protection: To fully integrate environmental issues into development policies, programmes and projects. This will then be supported by the development of appropriate legislative framework and the necessary institutional reform to monitor and enforce such legislation.

Rural Development: Promotion of sustainable rural livelihoods, land and natural resources management, social protection, and re-tooling the institutional framework and capacity for implementing rural development initiatives.

Chapter 7- Trade and Industry

The main goal under this sector is to: "Enable Batswana to be a vibrant, self-sustaining and diversified economy, ranked among the best in the world and the preferred destination for investors by 2016." This goal is in line with the aspirations and vision statements forum in the National vision 2016. More specifically, the Ministry of Industry and Trade strategic plan has incorporated the following strategic goals:

- Ensuring the sustainable use of natural resources
- Protecting the environment
- Gender mainstreaming

- Contributing to poverty alleviation
- Fostering skills development

Chapter 10- Agriculture
The main focus of NDP 9 agricultural strategies revolve around development and adoption of appropriate agricultural technology, conservation of agricultural land resources, development of drought management schemes, mechanisation and commercialisation of agricultural operations, disease control, and farmer education as well as timely provision of agribusiness information. The Ministry's vision is, therefore, "provision of dynamic leadership in the development of sustainable, diversified agriculture and conservation of natural resources".

Some of the policy objectives of the National Agricultural Policy that will be pursued during NDP9 are:

- Improvement in food security at the household and national levels; emphasis will be laid on household food security
- Diversification of the agricultural production base, including veld products
- Conservation of scarce agricultural and land resources foe future generations; the objective is consistent with the broader Agricultural Strategy for developing the agricultural economy, while conserving its natural resources

Chapter 12- Water Resources
This chapter makes reference to the following statement from the Vision 2016 document:
By the year 2016, *"Botswana must have a national water development and distribution strategy that will make water affordable and accessible to all, including those who live in small and remote settlements"*.
The water resources chapter specifically notes that Botswana is a country with scarce water resources. Therefore, *"Batswana must use water as efficiently as possible by using water efficient technology and various water conservation techniques such as water harvesting from rooftops, and that it must play a full part in negotiating and promoting international agreements concerning water usage and storage at a regional level, to provide a buffer against localised drought"*. This vision is consistent with the SADC vision for water, which envisions the utilisation of the regions water resources in an equitable and reasonable manner.

Chapter 13- Wildlife, National Parks and Tourism
The Ministry's policy and strategy for NDP9 is: *"To sustain the wildlife population, including raising the numbers of those animal species that have become endangered, and resolve serious conflicts between humans and wildlife"*. The Department of Tourism's Vision is that: *"By the year 2009, we, the Department of Tourism, will have facilitated the development, diversification and promotion of sustainable tourism products thereby positioning Botswana among the top ten preferred destinations in the world"*

Chapter 14- Environmental Management
The National Policy on Natural Resources Conservation and development of 1990 is founded on the principle and concept of sustainable development defined as *"development that meets the needs of the present generation without compromising the ability of future generations to meet their on"*. The primary goal is *"to increase the effectiveness with which natural resources are used and managed, so the beneficial interactions are optimised and harmful environmental side-effects are minimised"*.

Chapter 15- Education and Training
In order to meet the challenges of a rapidly changing world, it is important for everybody to learn throughout their lifespan. The vision still remains *"All Batswana will have the opportunity for continued and universal education… Education must be made more flexible, so that people can enter and leave the education system at different times in their lives"*.

Chapter 17- Land Management, Housing and Settlement
The main focus of the housing sector during the NDP9 will be to ensure that *"all Batswana will be able to obtain access to good quality basic shelter in both urban and rural areas".*

Chapter 18- Culture and Social Services
The department of social services develops, coordinates, monitors and evaluates implementation of social services programmes, with particular focus on, among others, vulnerable groups such as children, destitute, female headed households, women and people with disabilities. Through the above*, "a caring and supportive environment is created by empowering and rehabilitating individuals, groups and communities with a view to creating sustainable social development".*

3.2.3 The Draft Wetlands Policy and Strategy

The main goal of the draft wetlands Policy and Strategy is *"to promote the conservation of Botswana's wetlands in order to sustain their ecological and socio-economic functions as well as providing benefits for the present and future well-being of the people".*

The policy recognises the following:

- The irreplaceable ecological and socio-economic value of wetlands
- Botswana's internationally important and unique wetlands
- Ongoing degradation of wetlands resources
- The responsibility of the people for stopping wetlands loss
- The need to maintain wetlands through sustainable use, improved management and full public support

3.2.4 The NGO Strategy on Environment 2002-2007

The vision of the strategy is *"To improve the quality of life of the people of Botswana through sustainable management of natural resources and conservation of their environment"*

The environmental NGOs have identified four key areas for emphasis and action over the next five years, namely the ecological, social, institutional and economical aspects of the environment. The key issues to focus on in the Okavango Delta are:

- **Improving The Understanding Of The Environmental Functions of the Okavango Delta.** A much more holistic picture of the functioning of the Okavango system needs to be created and understood by both communities and policy implementers to relate their particular activities to broader activities going on in other areas within the system. This is so as to gain knowledge that would allow informed decision-making on natural resources management, thus enhancing the sustainable utilisation of these resources.
- **Developing Trans-boundary Resource Management.** The major goals for developing transboundary resource management would be to enhance cohesive resource management tools and policies across national borders while learning from each other; to increase the size of habitat available to wildlife; and to improve cross-border relations and common understanding
- **Promoting education and information supply for wise water use.** The objectives for promoting education and information exchange for wise water use would be to increase the awareness of communities and other actors on water issues, and to enhance their

participation in management, thereby promoting environmentally sound practices at the local and district levels.

- **Improving equitable land rights and land tenure, and sharing of benefits from the use of natural resources.** Awarding communities traditional land rights and tenure over particular areas would therefore provide an incentive for interest in and commitment to sustainable resources management.
- **Expansion of sustainable community based tourism.** The objective of this would be to generate income and reduce poverty for local communities, to diversify tourism products to include those based on cultural and social aspects of local community livelihoods and lifestyles, and to raise the tourism-related skills levels of communities
- **Improved Marketing And Generation Of Revenues From Veld Products.** The main objective of this would be to generate income and reduce poverty for local communities. To improve craft skills, and to market a wider range of products
- **Improving Knowledge Of Environmental Policies And Legislation, And Strengthening Enforcement At Local Level.** The primary objective of this would be to improve the knowledge and understanding of environmental policies and legislation at local level, and to reduce fragmentation of the environmental agenda through information sharing and coordination
- **Adjusting Conflicting And Inappropriate Environmental Policies, Legislation And Plans.** The objective of this would be to harmonise and reconcile conflicting policies, and review and update policies to enhance the management of the Okavango Delta.

3.3 NNF -Namibia Report- *Chris Brown*

This section provides information on the inventory of visions that range from national long-term planning (30-year visions) to national medium-term planning (5-year), and then to regional (provincial) and sectoral planning.

3.3.1 Namibia's Long-term National Vision: Vision 2030

The concise 30-year vision statement for Namibia is: "A prosperous and industrialised Namibia developed by her human resources, enjoying peace, harmony and political stability".

This vision statement is supported by a number of sub-visions. In the chapter on "Peoples' Quality of Life", the following sub-sections and sub-visions are reflected:

Population and health: A healthy and food-secure nation in which all preventable, infectious and parasitic diseases are under secure control; people enjoy a high standard of living, good quality of life and have access to quality education, health and other vital services. All of these translate into long life expectancy and sustainable population growth.

Migration, urbanisation and distribution: There is a free movement of the population within the country and population distribution is maturely adjusted to the location of resources for livelihoods. Namibia is a highly urbanised country with about 75-percent of the population living in proclaimed urban centres, while the predominance of Windhoek has considerably reduced as a result of growth of other urban centres throughout the country.

Population age and sex distribution: Namibia is a just, moral, tolerant and safe society with legislative, economic and social structures in place to eliminate marginalisation and ensure peace and

equity between women and men, the diverse ethnic groups and people of different ages, interests and abilities.

Healthy living for longevity: Namibia is free of the diseases of poverty and inequality, and Namibians are living healthy lifestyles, provided with safe drinking water and a comprehensive preventive and curative health service, to which all have access.

Wealth, livelihood and the economy: Namibia operates an open, dynamic, competitive and diversified economy that provides sustained economic growth, the basis for availing resources for the fulfilment of major national objectives like poverty reduction, human resource development, employment creation and the provision of adequate social services and infrastructural facilities.

Employment: The economic environment is suitable for all citizens who are able and willing to work, and there is full employment in the economy, with a well-established and functioning labour market information system for the effective management of the dynamics of the labour force.

Production technology: Namibia is an industrial nation, with a viable natural resources export sector, increased size of skills based industrial and service sector, and market oriented production; there is a high level of self sufficiency, reliable and competitively priced energy, meeting the demand of households and industry.

Education and training: A fully integrated, unified and flexible education and training system, that prepares Namibian learners to take advantage of a rapidly changing environment and contributes to the economic, moral, cultural and social development of the citizens throughout their lives.

Culture and tradition: People and society are tolerant and supportive of a diversity of religious beliefs, cultures and ethnicity, and work to optimise the strengths of diversity.

Civil society: Civil society, its individuals, groups and organisations are highly resourceful and cooperate with government and its agencies at local, regional and national levels; respect each other and strive to consolidate democratic ideals, and collaborate in social and economic development for the benefit of all.

In the Chapter on "**Sustainable Resource Base**", the following subsections and sub-visions are reflected:

Freshwater and associated resources: Namibia's freshwater resources are kept free of pollution and are used to ensure social well-being, support economic development, and to maintain natural habitats.

Land and agricultural production: Land is used appropriately and equitably, significantly contributing towards food security at household and national levels, and supporting the sustainable and equitable growth of Namibia's economy, whilst maintaining and improving land capability.

Forestry: Namibia's diverse natural woodlands, savannahs and the many resources they provide, are managed in a participatory and sustainable manner to help support rural livelihoods, enhance socio-economic development, and ensure environmental stability.

Wildlife and tourism: The integrity of Namibia's natural habitats and wildlife populations are maintained, whilst significantly supporting national socio-economic development through sustainable, low-impact, consumptive and non-consumptive tourism.

Fisheries and marine resources: Namibia's marine species and habitats significantly contribute to the economy without threatening biodiversity or the functioning of natural ecosystems, in a dynamic external environment.

Non-renewable resources: Namibia's mineral resources are strategically exploited and optimally beneficiated, providing equitable opportunities for all Namibians to participate in the industry, while ensuring that environmental impacts are minimised, and investments resulting from mining are made to develop other, sustainable industries and human capital for long-term national development.

Biodiversity: The integrity of vital ecological processes, natural habitats and wild species throughout Namibia is maintained, whilst significantly supporting national socio-economic development through5 sustainable low-impact, high quality consumptive and non-consumptive uses, as well as providing diversify for rural and urban livelihoods.

In the chapter on "**Creating the Enabling Environment**", the following subsections and sub-visions are reflected:

Sustainable Development: Namibia develops a significantly more equitable distribution of social well-being, through the sustainable management of natural resources in a mixed economy, characteristic of higher income countries, primarily through stronger growth and poverty reduction.

International relations: A new international order has been established, based on sovereign equality of nations, where sustainable development, peace and human progress is ensured.

Development cooperation: Namibia has achieved a level of transformation in the flow of development cooperation in which it has advanced from a recipient of grant assistance to a provider of assistance to countries in need.

Regional peace and security: Collective regional and international peace and security have been accomplished.

Regional integration: Namibia enjoys full regional integration in terms of socio-economic and political structures through effective supra-national organisations.

Globalisation: The benefits of technology transfer, trade, investment and capital flows have contributed to a significant reduction in poverty in most regions of the world, and Namibia enjoys optimal participation and integration in the global village.

Democratic governance: Namibia maintains, consolidates and extends the good governance practices of a multi-party democracy with high levels of participation, rights, freedoms and legitimacy (under the Constitution), which continue to serve as a model for other countries.

Decentralisation: Local communities and regional bodies are empowered, and are fully involved in the development process; they actually formulate and implement their respective development plans, while the national government – working hand-in-hand with civil society organisations – provide the enabling environment (laws, policies, finance, security, etc.) for the effective management of national, regional and local development efforts.

Responsible decision-making: Namibia's goal is to promote and strengthen "smart partnerships" for sustainable development, to optimise her comparative and competitive advantages, and to generate and manage good quality information and knowledge by supporting and fostering active and

critical science and research through well-structured national institutions, as well as in partnership with institutions abroad.

3.3.2 Namibia's five-year national development plan: NDP2

The National Development Objectives for NDP2 (February 2001 – June 2005) are:

- To reduce poverty
- To create employment
- To promote economic empowerment
- To stimulate and sustain economic growth
- To reduce inequalities in income distribution
- To reduce regional development inequalities
- To promote gender equality and equity
- To enhance environmental and ecological sustainability, and
- To combat the further spread of HIV/Aids

The vision for NDP2 is "*Sustainable and equitable improvement in the quality of life of all the people in Namibia*".

The Plan's national strategies focus, among other things, aims at:

- Promoting and strengthening an enabling environment for economic growth and development
- Promoting sustainable use of natural resources and environmental management
- Promoting participatory development and equity
- Developing human resources
- Promoting good governance
- Strengthening Namibia's international role

NDP2 consists of a number of sectoral and crosscutting chapters. Each chapter contains a "mission statement" which is effectively the chapter on vision. The following chapter titles and mission statements have relevance:

Chapter 7- Population in Development: To improve the standard of living and quality of life of the people of Namibia, and to ensure sustainable development through the harmonisation of Namibia's population dynamics (growth rate, age and sex structures, migration and urbanisation) with the country's financial and natural resource availability and potential.

Chapter 8- HIV/Aids: To reduce HIV/Aids transmission to below pandemic levels, and to minimise the impacts of HIV/Aids on infected individuals and affected families, communities, regions and sectors.

Chapter 9- Human Resources Development: To ensure that appropriate policies and actions are adopted and implemented towards enhancing and improving human resources planning, education and training, health and employment creation, with a view to meeting economic, social and sustainable development needs and prospects of Namibia.

Chapter 11- Agriculture: To contribute to the national goals of improved food security at both household and national levels, and to create employment opportunities for secure and equitable growth throughout the economy.

Chapter 12- Water: To provide safe water to the whole population, to manage the resource according to the principles of equity and sustainability, and to ensure that water provision contributes effectively and efficiently towards the development of Namibia's economy.

The following major objectives are listed:

- Provide access to water of acceptable quality for the whole population, with priority to rural areas
- Utilise, conserve and protect all water resources in an environmentally sustainable manner
- Manage and allocate the scarce water resources in an equitable and efficient manner with due consideration to the environment
- Promote institutional efficiency and financial sustainability taking into account affordability and equity for all consumers
- Ensure that the availability of water promotes and supports gender balance, social and economic development

The following sector strategies are relevant:

- Integrated water resource management
    - Including collaboration between government, NGOs, private sector, etc.
    - Making use of water demand management
    - Conducting applied research
    - Collaboration, cooperation, partnerships, devolution
    - Evaluating sustainable development based on water availability
- Date collection and monitoring of water resources
- Legislative, institutional and administrative change and development
    - Including partnership with local institutions
    - Sustainability of water and wetland systems

Chapter 16- Forestry: To practice and promote the sustainable and participatory management of forest resources and other woody vegetation to enhance socio-economic development and environmental stability.

Chapter 17- Tourism: To develop the tourism industry in a sustainable, equitable and responsible manner, and to contribute significantly to the economic development of Namibia and to the quality of life of all her people.

Chapter 18- Wildlife: To contribute towards national sustainable development through the promotion of sustainable use of renewable natural resources, the promotion of sustainable rural and urban livelihoods, and the maintenance of essential ecological processes, biological diversity and ecosystem functions.

Chapter 21- Energy: To provide the energy resources required to power the socio-economic growth of the nation in an efficient, competitive and sustainable manner, and to provide all stakeholders with an equitable say.

Chapter 33- Poverty Reduction: To reduce poverty and unequal income distribution through fostering more equitable and efficient delivery of public services for poverty reduction countrywide; to accelerate equitable and sustainable agriculture expansion; to accelerate options for non-agricultural economic empowerment and provide safety nets for vulnerable groups to prevent them falling into poverty.

Chapter 35- Environment and Sustainable Resource Management: To contribute to national sustainable development through the promotion of the sustainable use of renewable natural resources, the promotion of sustainable rural and urban livelihoods, and the maintenance of essential ecological processes, biological diversity and ecosystems.

Sector strategies include:

- Incorporate environmental and social costs (e.g. water) into all levels of decision-making
- Integrate the planning of water use and other resource management (e.g. irrigation, livestock management)
- Harmonise natural resource management policies
- Develop institutional mechanisms for integrating sectoral policies, legislation and implementation approaches concerning community-based natural resource management
- Decentralise, devolve and democratise environmental rights and responsibilities
- Cooperate with neighbouring countries over the use and management of water, other shared resources and environmental monitoring

Chapter 39- Research, Science and Technology: To develop Namibian society with a strong cultural motivation, and a bias towards production, functional research and innovation. To ensure development in which all citizens use, adapt and apply modern scientific and technological tools to advance their knowledge, productivity, competitiveness and environmental responsibility.

Chapter 41- Developing Partnership with Civil Society (CBOs & NGOs): To create an enabling environment for civil society organisations, community based organisations and non governmental organisations to operate more effectively and efficiently in mobilising, managing and utilising resources; and to facilitate these organisations to play an active role in the social, political and economic development of Namibia.

Chapter 42- Decentralisation: To ensure economic, cultural and socio-economic development; to provide people at the grassroots level the opportunity to participate in decision-making on all matters that concern them; and to extend democracy as a right based on national ideals and values.

3.3.3 Namibia's Wetlands Policy (draft)

The Policy Vision for Namibia's wetlands is: *"Namibia shall manage national and shared wetlands wisely by protecting their vital ecological functions, life support systems and biodiversity for the current and future benefit of peoples' welfare, livelihoods and socio-economic development".*

The policy objectives in support of this vision are:

- To protect and conserve wetland diversity and ecosystem functioning to support basic human needs
- To provide a framework for the sustainable utilisation of wetland resources
- To promote the integration of wetland management into other sectoral policies
- To recognise and fulfil Namibia's international and regional commitments concerning shared wetlands and wetlands of international importance

The basic principles used in Namibia's National Water Policy, which "are intended to provide a framework for the development of all water-related policies" (Ministry of Agriculture, Water and Rural Development, 2000) have been adapted for the Wetlands Policy, as follows:

- Ownership – vested in the state, but with due consideration for regional, continental and global collaboration and obligations

- Sustainable and equitable use – these concepts, as advocated in Namibia's Constitution, NDP2 and Vision 2030, are fundamental
- Economic value – the scarcity and vulnerability of wetlands in Namibia's arid environment require that their total economic value be recognised, and that their social and environmental value be fully included
- Awareness and participation – committed to ongoing research and monitoring, dissemination of information and participation by stakeholders
- Openness and transparency – socio-economic and environmental information open and accessible to public, and decision-making regarding wetlands open and transparent
- Decentralisation – where capacity exists, management of wetlands shall be decentralised to the lowest appropriate level
- Ecosystem values and sustainability – the environment is a legitimate and essential water user to safeguard waters quality and maintains ecological functioning. Full care to be taken to protect these services
- Integrated management and planning – wetlands have multiple uses and functions and are thus cross-sectoral. They require a shared vision and integrated management approaches
- Clarity of institutional roles and accountability – need to be clearly identified and clarified, and separate policy and regulations from management
- Capacity building – continuous process on institutional and human development at all levels, including the participation of public, private, NGO, CBO and others
- Shared watercourses – Namibia shall cooperate with neighbours and the international community regarding the conservation, management and sustainable utilisation of shared wetlands and wetlands on international importance. In all negotiations regarding shared watercourses, Namibia shall adhere to generally accepted principles of international law. User rights asserted by Namibia will respect the rights of upstream and downstream users, and support the need for shared rivers to produce optimal benefits to all riparian countries.

3.3.4 Provincial (Regional in Namibia) perspective

Between May and August 2001, a detailed socio-ecological survey was carried out in the Kavango region of Namibia, for the "Every River has its People" project. The survey focussed on the river and riparian belt, where some 70-percent of the people live, but also extended into the adjacent Kalahari system away from the river. The survey covered 45 villages (and was) divided into four components tackling

- The Gciriku area
- The central areas in the Sambyu and Mbunza areas
- The Kwangali area
- The Mbukushi area

The survey was carried out using qualitative and quantitative data gathering instruments to interview whole villages, focal groups (formal and informal approaches, resource mapping), traditional leaders, traditional medicine people, and other stakeholders.

The following results and findings are widely applicable, and represent vision-type aspirations of the people in the region.

- The natural resources of the region should be carefully managed, used and developed to derive both livelihood support and optimal economic benefit for the people of the region. Local individuals and communities should be involved in tourism in the region – and tourism should be strongly promoted – as a way of increasing income and increasing local control over land and resources.

- Institutional arrangements should be developed and implemented, to allow for greater cooperation between individuals, families and communities, in the management, use and conservation of natural resources.
- The survey demonstrated a high degree of awareness among community leaders and community members about the main issues and problems concerning natural resources associated with the river, as well as a good variety of possible solutions. Interventions should focus on assisting communities to identify and solve local problems, by way of applying practical and appropriate local solution tailored to local circumstances. This should also involve the strengthening of the capacity of traditional authorities and other relevant institutions to enforce traditional laws and other agreed control mechanisms regarding sustainable natural resource management.
- Existing community structures, institutions, cohesion and commitment should be supported to manage and conserve natural resources, and to promote appropriate and sustainable local development.
- Communication and collaboration across the basin between different communities should be encouraged and supported, to help share ideas and to create a sense of intra-basin partnership. Similarly, communications and joint planning should be implemented between the different layers of decision-making, from village through to traditional leaders, regional councils, central government and to OKACOM.
- Information and relevant materials should be widely disseminated and shared across the basin, covering social, institutional, economic and ecological aspects, as well as management and monitoring techniques. The information should focus on providing practical advice and guidance on specific priorities, rather than broad-based environmental awareness. Capacity building should focus on support for the establishment of community conservation and management areas and associated local institutions.
- Interventions should support the sustainable use (consumptive and non-consumptive) of natural resources rather than the prohibition of their use.

3.3.5 A Vision for the Development of the Northeast of Namibia

In 1999 Namibia's Cabinet approved a vision for the development of the Northeast of Namibia, taking cognisance of the opportunities created by the upgraded Trans-Caprivi highway, better links and tourism circuits to neighbouring countries (Botswana, Zambia, Zimbabwe) and the opportunities that indigenous biodiversity and protected areas create for rural development. The following points were approved:

- The Caprivi Game Park shall be renamed the Bwabwata National Park and shall include the Kwando Triangle (previously unproclaimed) and incorporate the Mahango Game Park.
- The central area of Bwabwata shall be zoned for multiple use trophy hunting, human settlement and community-based tourism. The core areas of Buffalo and Mahango will be for special protection and controlled tourism.
- No cattle shall be allowed in the Bwabwata Park.
- The communities neighbouring or living in the Bwabwata National Park shall be given conditional tourism rights in the park, either to establish on their own or in joint venture partnership, appropriate tourism facilities in the Park.
- Tender proposals for the development of a tourism lodge at Buffalo shall be issues and allocated to the best bid, judged against a number of development criteria.

Unfortunately, because of the security situation in northeast Angola, these developments were not implemented. However, the situation is now improved and progress on these instructions is anticipated.

4. SUGGESTED ELEMENTS FOR A VISION AND GUIDING PRINCIPLES

Based on the submissions from the Basin Partners, this section provides some suggestions from JEA and NNF on what they feel should be the elements of the basin-wide vision and also some preliminary thoughts from IUCN Botswana on what the vision for the Delta should be. The vision for the Delta should be aligned with and in harmony with the basin-wide vision. The section also highlights some suggested guiding principles from each *Sharing Water* basin partner, which could contribute to the development of a basin-wide vision. .

4.1 Suggested Elements for a Vision

4.1.1 Suggestions from JEA

JEA suggested that a Basin wide vision could have elements such as the ones listed below;

- The long-term conservation of water resources
- Secure the rights of access for local communities
- Utilizing and managing the water with respect for the local culture, local authorities, and the local decision makers
- Water should be contributed for development of Angola
- The water and other natural resources should be preserved so they contribute to the development of present generation without compromising the hopes and aspirations of the next generations

4.1.2 Suggestions from NNF

NNF suggested that the basin-wide vision could have some of the following elements:

- The efficient functioning of the hydrology of the system
- Diverse, healthy, stable and productive ecosystems
- The people of the region being well developed, prosperous and healthy
- The region reflecting interpersonal harmony, peace and political stability
- The management of the system reflecting a good balance of needs at different scales, from local to national to basin-wide
- The system managed and developed to achieve its comparative and competitive advantages
- The system managed for equitable sharing of the costs and benefits
- The achievement of sustainable development in its full context

4.1.3 Suggestions from IUCN Botswana

Based on the ODMP project, IUCN Botswana provided some preliminary thoughts on the basin-wide vision for the Delta. These preliminary thoughts are:

- An unrivalled naturally functioning wetland ecosystem of local, national, regional and international cultural and natural importance shaped and characterised by annual and longer-term cycles of flood and drought. The landscape is scattered with a myriad of shifting, perennial rivers and streams, especially in the panhandle area, as well as vast tracts of permanent vegetated swamp dominated by Papyrus (*Cyperus papyrus*) and interspersed with still lagoons and backwaters. These give way to equally large areas of seasonal and occasional swamp, characterised by open grassland, and interspersed with characteristically vegetated islands. The area supports a wealth of plant and animal life, as well as human communities, which reflect the historic natural cycles of flood and drought as well as the influence of man over thousands of years.

- A Delta where people both live and work in harmony with the area's natural and cultural qualities. The local economy is sustained through a mixture of small scale organic farming, cattle ranching, subsistence and regulated commercial fishing, sustainable collection and use of wetland products such as reed, grasses and other veld products, well managed and sustainable ecotourism both at the community and private sector level based on a network of agreed and enforced wildlife management areas and game reserves.
- A Delta to which people travel throughout the year to enjoy the special qualities of the wetland landscape and enjoy a range of tourism offerings such as hunting and photographic safaris, camping and staying in lodges, travelling by boat and on land and undertaking recreational activities that are compatible with the Delta's special qualities and are thus environmentally sensitive and socially acceptable.
- A Delta formed by natural changes where those that live in, work on and manage the area recognise the importance of change on its structure and functioning. A Delta that in response to increasing change in the future, due to the influence of global warming and other human influences, develops an enhanced and increasingly harmonious interaction of its people with nature. A Delta where local communities enjoy improved economic prosperity through the local and sustainable management and engagement with their surrounding natural environment.
- A Delta that continues to maintain its international reputation as one of the worlds remaining pristine wild landscapes and "the jewel of the Kalahari"

4.2 Guiding principles

4.2.1 Angola- JEA

In terms of guiding principles for shared water use to benefit all riparian states, JEA suggested that certain key principles need to be taken into account. These include:

- There is need to have a framework, which ensures that present management should not compromise future developments;.that precautionary measures are taken to avoid those activities and agreements that do not take into consideration long-term plans for sustainable water resources utilisation.
- Continuous dialogue and consultation between the basin states because this is fundamental to the establishment of clear and agreed priorities in water utilisation and the development of related infrastructures.
- There is need to take stock of the conditions and responsibilities attached to all previous treaties and agreements that have been entered into with neighbouring states.
- Appropriate management system based on shared and open access to information.
- The thorough application of conventions and international accords supported by clear respect for all signed agreements, treaties and accords.
- The meaningful participation of local and international institutions in all aspects of water resource management.

4.2.2 Namibia –NNF

From the NNF perspective, the basin-wide vision should be guided by principles that are accepted by all parties. To this end, they provided some guiding principles that Namibians hold as central to their national character and constitution. These principles are:

- **Good governance**, peace, security and political stability through democracy, human rights, individual freedoms, civil liberties and open market economy
- **Partnership** through the creation of a conducive and policy environment with incentives, that promotes gender equity and outcomes oriented collaboration between government and

civil society, including the private sector, NGOs, CBOs, tertiary training institutions, individuals and development partners

- **Capacity enhancement** that recognises people are a country's most important resource, and that investment in people and in local institutions is a critical precondition for sustainable development
- **Comparative advantage** that capitalises on the competitive advantages of the region and basin, provides incentives and reduces obstacles to their productive management and development of the region
- **People-centred economic development** that promotes diversification, equity, balanced growth and a conducive macro and micro economic environment within the context of traditional practices, knowledge systems and cultures
- **Sustainable development** that meets the need of the present without limiting future generations, within a clean, productive and healthy social and ecological setting

4.2.3 Botswana

IUCN Botswana also highlighted the need for guiding principles for the basin-wide vision. The Botswana national guiding principles are:

- Democracy
- Development
- Self-reliance
- Unity
- *Botho* - This refers to one of the tenets of African culture- the concept of a person who has a well-rounded character, who is well mannered, courteous and disciplined, and realises his or her full potential both as an individual and as part of a community to which he or she belongs.

It will be essential for the basin stakeholders from each riparian state to develop a similar set of principles to guide implementation of a basin-wide vision.

5. CONCLUSION

This review of statements on values, visions, and aspirations at country, regional and international levels shows that there is important information on which to base a shared vision for the Okavango River Basin. However, the information is not yet complete. For example, information was not collected in Botswana and Angola to identify the specific aspirations of local communities and the private sector. This information will need to be documented to enrich the information base for the basin-wide vision.

NNF also suggested that successful implementation of a vision requires a paradigm shift from sector development to integrated approaches through strategic partnerships. This means that some structural changes and innovative thinking may be necessary. The following "new ways" of thinking and working were proposed:

- Move from developing and implementing fixed plans which get increasingly out of date towards operating an adaptive, dynamic system or process that can continuously evolve
- Move from a view that it is the state or government alone that is responsible for sustainable development towards one that gives responsibility to society as a whole – a full partnership,

where the state helps guide the identification of goals and helps create the enabling environment

- Move from centralised and controlled decision-making towards sharing results and opportunities, transparent negotiations, cooperation and concerted actions
- Move from a focus on outputs (e.g. projects, laws) towards a focus on outcomes (i.e. fundamental impacts) that actually contribute towards achieving visions
- Move from sectoral planning towards integrated planning, within and between sectors and institutions.

In forwarding the work on the Visioning for the Basin, the stakeholders need to also reflect on these suggested "new ways" of doing things.

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Appendix N. (Portuguese)

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Em Prol Do Desenvolvimento Duma Visão Para A Bacia Do Rio Okavango

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Lista de Acronimos Utilizados

CSIR	Concelho Para a Pesquisa Científica e Industrial
IUCN	União Mundial para a Natureza
JEA	Juventude Ecológica Angolana
GEF	Facilidade Ambiental Global
NNF	Fundação Namibia para a Natureza
NHI	Institute de Património Natural
HOORC	Centro de Pesquisa do Okavango Harry Oppenheimer
TDA	Análise Diagnóstica Transfroteiriça
OBSC	Comité da Bacia do Okavango
SADC	Comunidade para o Desenvolvimento da África Austral
WWF	Fundo para a Vida Silvetre

Sumário Executivo

A bacia do Okavango constitui a seccão mais nortestina da masi ampla bacia do Makgadikgadi, que engloba porções de quatro países nomeadamente: Angola, Botswana, Namibia e Zimbabwe e o rio Okavango é partilhado por Angola, Namibia e Botswana. No contexto mundia l a bacia tem caracteristicas umas uma vez que é relativamente prestina. Contudo, a bacia esta sofrendo demandas crescentes de água de vários agentes quer sejam provenietes do iteror ou exterior da bacia e existe uma necessidade premente de desenvolver uma visão mais ampla para a bacia que possa constituir a base para gestão integrada da bacia do Okavango na sua totalidade. Algures pelo mundo fora, diferentes agentes numa bacia hidrografica partilhada, tal como a de Murray Darling na Austrália, demostraram a importância de se ter uma visão partilada ao lidarem com uma multitude e agentes com demandas competitivas de água. Uma visão constitui um pré-requisito para o desenvolvimento sustentável de bacias hidrográficas partilhadas. A importância duma visão partilhada como pré-requisto para o desenvolvimento sustentavel, é também suportada pelas experiências de estudos levados a cabo pelo Fundo de Vida Silvestre (WWF) e do projecto Todos os rios têm o seu Povo.

O propósito deste relatório preparado sob os auspícios do Projecto Partilha de Água, é de suportar os objectivos da Comissão Peranente da Bacia do Rio Okavango (OKACOM). OKACOM foi estabelecida por Angola, Botswana e Namibia em 1994 com o fim de aconselhar os respectivos governos na gestão da bacia do rio Okavango

O desenvolvimento duma visão ampla da bacia deve preferivelmente ser baseada na, visão específica dos Estados individuais integrantes da bacia bem como na incoprporação de aspectos apropriados das responsabilidaes internacionais que cabem a cada um ods Estados. Nestes termos, a anteceder a formulação duma visão para a bacia do Okavango, é necessário reclher a informação sobre as visões, aspirações e valores que sejam relevantes para a bacia aos níveis local, regional e internacional. Esta informação é útil como base de referência e como base a partir do qual se possa desenvover a visão mais ampla da bacia. O projecto Partilha de Água facilitou a realização duma revisã bibliogáfica e docuentação de proposições relevantes de visões, aspirações e valores aos niveis nacional, reginal e internacional. Ao nível nacional existe informação sobre vsões de longo termo para a Namibia e Botswana e objectivos de long termo para planos nacionais de 5-10 anos para sectores relevantes de cada uma dos três países. Estas visões de longo tero realçam a necessidade premente para o desenvolvimento sustentável e incremento da prosperaridade em cada um dos países. As visões e aspirações sectoriais que seja relevantes para este relatório são as que correspondem ao Turismo, Agricultura, Energia, Águas, Sector Industrial uma vez que estes tem efeitos directos na demanda de água do rio da bacia do Okavango.

Todos estes países pertencem ao grupo economico da SADC, os objectivos da SADC são também relevantes na gestãda bacia do rio Okavango. Reconhecendo que a água é dos recursos mais imporatantes numa bacia hidrográfica, este relatório tamb'em providencia informação sobre as visões de água, vida e ambiente na áfrica Austral aos niveis de África e Global. Das oito metas do desenvolvimento do milénio aprovadas pelas Nações Unidas e a serem atingidas em 2015, o relatório destaca dois como sendo de particular relevância e estes sãos os relativos a pobreza e sustentabiliade ambiental.

Este relatório contem sugestões da JEA e NNF sobre os importantes elementos duma visão partilhada para a bacia hidrográfica. O relatório conclui providenciando relace para trabalhos adicionais tidos como necessários de serem levados a cado com vista a documentar proposições de visões, aspirações e valores ao nível local bem como sob a prespectiva do sector privado.

Antecedentes

1.1 Introdução

A bacia do rio Okavango é um recurso transfronteiriço. A bacia do Okavango constitui a seccão mais nordestina da mais ampla bacia do Makgadikgadi, que engloba porções de quatro países nomeadamente: Angola, Botswana, Namibia e Zimbabwe e o rio Okavango é partilhado por Angola, Namibia e Botswana. O rio Okvango nasce é denomindade de Cubango na sua nascente no planalto do Bié localizado nas terras altas da pate central de Angola e é ligado ao rio Cuito antes de atravessar a o estreito do Caprivi na Namibia crrendo de seguida para o Botswaa onde forma o Delta do Okavango. Tanto o Cubango como o Cuito, são rios perenes com padrões sazonais distintos de inundações que providenciam um ciclo sazonal de fluxos as terras húmidas sazonais que conformam o Delta do Okavango no Botswana. A água em ambos os rios é bastante limpa e clara. Relatórios de Bethune (1991) na secçãoNamibiana do rio Okavango e o relatório de Análise Doagnóstica (TDA) (1999) indicam que a qualiade de água no Okavango medido nas secções que atravessam a Namibia e Btswana é bastatte boa e isto poderá ser o caso para as secções à montane em Angola devido aos niveis bastante baixos de desenvolviento em tais regiões. Isto é subsequentemente suportado por (Mandleson e Obeid, 2004) que também indicam que as águas do Okavango são exceptionalmente limpidas e livres de argila contendo uma porção reduzida de substâncias químicas dissolvidas ou outros solúveis.

A bacia do Okavango cobre uma uma área total de 725 000 km2 (Angola – 200 000 km2, Botswana 340 000 km2, Namibia 165 000 km2 e Zimbabwe 20 000 km2 – Pinheiro et al online). De acordo com Memdelson & Obeid, 2004, a bacia temc erca de 601 000 habitantes (Angola 350 000, Namibia 163 000 e Botswana 88 000). Nenhum recenceamento foi conduzido nas decades recentes para o case de Angola e o número total de habitantes é baseado numa estimativa. Cerca de 92% da bacia não é povoada. Contudo grandes concentrações de populações encontram-se na parte noroeste entre as vilas de Huambo e Cuito ao longo do rio Kaaavango-Namibia e ao redor de vilas e aldeias dispersas nos limites da bacia.

A bacia tem características únicas a esacala mundial no sentido que é ainda considerado prestino com um n'ivel de perdas da vegetação orinal muito pequena. Na bacia do Okavango, cerca de 0.2% da área é composta por centros urbanos, enquanto que 5.5% são áreas agrcolas sendo a restante porção da bacia constituida por vegetação natural. A bacia do Okavango é largamete conhecida pela riqueza da sua biodiversidade, incluido 116 espécies de mamíferos (OKACOM TDA, 1999), 80 espécies endémicas de peixes, 55 espécies de amfibios, 80 espécies de répteis e 430 espécies de pássaros. O Delta do Okavango e zonas tampão periféricas constituem a maior proção de terras húmidas sob a designação do RAMSAR a escala mundial. O desenvolvimento do respectivo plano de maneio esta sendo coordenado pela a Agencia Nacional da Estratégia de Conservaçãodo Botswana e tem como objectivo assegurar que o plano possa promover actividades que contribuam positivamente para o delta e a bacia como um todo.

Todos os três Países têm objectivos de desenvolvimento que focalizam na criação de emprego, melhoramentos na segurança alimentar através da expanção da agricultura, melhoria das condições básicas de saúde humana, apoio a gestão comunitária de recursos naturais e promoção do turismo. Angola em particular, tem necessidades imperativas de desenvolvimento depois de longos períodos de guerra e encontra-se presentemente a implementar uma série de actividades de reconstrução do pós-conflicto com a ajuda de agências doadoras internacionais. Na parte sul de Angola, a zona relativamente remota que constitui a nascente dos rios Cubango e Cuito fora particularmente devastada durante a guerra civila Angolana pelo que existem necessidades urgentes de reconstrução da infrastrutura desta região.

A disponíbilidade de águas é chave para se atingirem este objectivos de desenvolvimento. Angola é o País a montante pelo que teoricamente ocupa uma posição de vantagem do ponto de vista da prespectiva hidro-política. Ambos a Namibia e o Botswana localizam-se a jusante de Angola e confrontam-se com limitações potencias no qie se refere ao seu crescimento potencial futuro devido a excassez de água. Por consequência, ambos os Países viram-se para o rio Okavango no que diz respeito a suplemento de demandas de água existentes.

Nos princípios dos anos 80, O Botswana considerou o Delta do Okavango como um afonte potencial de água para satisfazer as demandas crescentes do sector doméstico, agrícola, industrial e outras necesidades. A Namibia por outro lado utiliza cerca de 6 a 9 milhões de métros cubicos de água por ano derivados do rio para abastecer a vila de Rundu e diversos sistemas de irrigação bem como complexos turísticos ao longo do rio. A Namíbia reconhece que não qualquer obrigação em re-utilizar a água disponível e colamatar perdas de água pelo que encontra-se activamente engajada no desenvolvimento e exploração de águas subterrâneas adicionais, o melhoramento da re-utilização dos efluentes, o uso integrado dos recursos hídricos existentes, uso conjuntivo de águas superfíciais e subterrâneas bem como na implementação melhorada de práticas de gestão da demanda de água. Apesar de tudo isto, a necessidade de completar a proposta de liagação com o rio Okavango para o aumento das fontes internas de água para a Namibia central poderá provavelmente ser adiada por mais 5 oanos até 2009 (Pinheiro et al online).

Considerando este objectivos de desenvolvimento e as demandas variadas de água os governos de Angola, Botswana e Namibia foram proactivos no desenvolvimento dum espirito de cooperação e o estabelecimento da Comissão Permanente da Bacia do Okavango (OKCOM) em 1994. A OKACOM é composta por três Comissários por País, apontados pelos respectivos governos segundo os ministérios responsáveis pela gestão dos recursos hídricos e ambiente nos respectivos Países. A OKACOM foi formada para coordenar e colaborar no desenvolvimento e implementação de formas colaborativas e equitativas de paartilha dos recursos hídricos da bacia. Ela é responsável pelo aconselhamento dos respectivos governos n aplanificação e desenvolvimento da bacia para os casos de emprenedimentos com impactos amplos na totalidade da extensão da bacia. A OKACOM planifica e desenvolve um plano integrado de gestão da bacia que guia o desenvolvimento futuro e gestão da bacia.

1.2 Sharing Water Project e Exercício de formulaçao da Visão

O projecto partilha de Águas é um projecto colaborativo implementado numa parceria entre o Instituto de Patrim'onio Natural (NHI), a União Mundial para a Natureza (IUCN) Escritório Regional para a África Austral (IUCN-ROSA) a Juventude Ecológica Angolana (JEA)- Angola, o IUCN Botswana, a Fundação Namibiana para a Natureza (NNF) – Namíbia, o Centro de Pesquisa do Okavango Harry Oppenheimer (HOORC) – Botswana e o Centro para a Pesquisa Científica e Industrial (CSIR) – África do Sul. O projecto é uma iniciativa que reconhece a complexidade da bacia do Okavango/Cubango em termos do seu estatuto internacional, sua diversidade cultutal e económica, sua importância ecológica, as espectativas e possíveis pontos de pressão sobre o sistema com o propósito de suportar o desenvolvimento local e nacional bem como as incertezas associadas a gestão futura do sistema altamente variável e complexo. A inicativa "Partilha de Águas" oferece uma plataforma para aprendizagem collaborative, questionamente colectivo de recursos bem como para a negociação sobre a partilha de águas e outros recursos ecológicos associados. Objectivo principal do projecto é o de *ajudar a provomover a gestão sustentável de longo termo ba bacio do rio Okavango e assim proteger a o globalmente importante delta do Okavango.*

Uma das actividades do projecto Partilha de Águas foi o de identificar e documentar as proposições visionárias existentes, os valores centrais, as aspirações ao n'ivel (província l , nacional, regional e internacional) que poderão ser consideradas agaundo do desenvolvimento duma visão comum para a totalidade da bacia do rio Okavango. O desenvolviomento de tral visão partilhada é um dos pré-requisitos para a gestão sustentável de recursos transfronteiriços come seja a bacia do rio Okavango. As actividades alusivas a formulação da visão no ambito do peojecto Partilha deáguas têm como objectivo apoiar os oabjectivos da OKACOM. Para os propósitos deste relatório "visão partilhada da bacia do Okavango" é definida como sendo um sonho amplamente partilhado, aspirações ou pontos de vista sobre como a água e outros recuros na bacia deverão ser utilizados, alocados ou partilhados e geridos num longo peruiodo de forma a se atingir um equilibrio ebntre a demanda e a oferta a fim de se atingir a sustentabilidade do recurso.

O propósito deste relatório é de documentar as proposições vision'arias identificadas, valores a aspirações aos níveis provincial, nacional e regional que poderão servir de base para a futura formulação duma visão mais ampla para a totalidade da bacia.

1.3 Formulação da Visão no Contexto da Bacia

A bacia do Okavango, tal como outras bacias hidrigráficas partilhadas pelo munod fora, confronta-se com uma variedade de desafios. Alguns dos desafios de gestão mais importantes são:

i. Bacias hidrográficas partilhadas transcendem fronteiras nacionais e necessitam de ser geridas conjuntamente quando no entanto são usualmente geridas diferentement de País para País.

ii. Alguns dos problemas ambientais não conhecem fronteiras como por exemplo a poluição do ar e águas e a dispersão de espécies invasoras
iii. Actividades a montante afectam a sanidade ambiental de secções a jusante da bacia
iv. Decisões tomadas fora dos limites da bacia podem gerar impactos na bacia
v. Decisões tomadas por multiplos parceiros aos diferentes níveis têm efeitros sobre o ambiente e resultados do desenvolvimento

Assim sendo, é extremamente imporantante que a gestão e uso sustentável dos recursos sejam levados a cabo harmoniosamente ao nível da bacia como um todo bem como aos níveis nacional e local (Jones et al 1999-2003)

Considerando estes desafios de gestaão, bacias hidrográficas devem ser geridas de forma integrada e cuidadosa incoprorando todos os componentes do ciclo hidrológico bem como todos os grupos de parceiros ou partes interessadas e afectadas. A gestão integrada de recursos hídricos não pode ser materializada na sua plenitude sem que exista uma visão e objectivos comuns, partilhados na extensão global da bacia. Estudos conduzidos por outras organizações como seja o Fundo Mundial para a Natureza (WWF) substanciam a importância de se ter uma visão partilhada nos limites de qualquer bacia hidrográfica. Com bas na avaliação de onze estudos de caso sobre gestão de bacias hidrográficas o Fundo Mundial para a Natureza destilou sete princípios básicos que norteam a gestão integrada de bacias hidrográfica. O desenvolvimento duma visão comum partilhada constitui apenas um aspecto deste conjunto de princípios. Os princípios formulados pela WWF indicam que: a gestão de bacias hidrográficas deve ser governada por uma visão de longo termo que tenha sido acorda por concenso entre a maioria de todos os parceiros envolvidos. A visão de providenciar significância equitativa ao três pilares do desenvolvimento sustentável – dimensão económica, social e ambiental. A vis~ao deve enaltecer a necessidade de se manter e restaurar os serviços ecosistémicos e a biodiversidade de forma a se melhorarem as condições de vida ao nível local.

A importância de se ter uma visão partilhada também é demonstrada em outras bacias hidrográfica tais como a de Murray Darling na Austrália. As partes interessadas e afectadas na bacia de Murray Darling reconheceram a compelxidade em volta da problemática da gestão da bacia e desenvolveram uma visão para se antingir um sistema salutar na bacia do rio Murray quando em simultânea se sustem as comunidades e se preservam valores únicos (Scanlon, 2002). Como resultado do desenvolvimento da visão comum visto como o factor unificador,as partes interssadas e afectas trabalharam em conjunto no sentido de proporcionar respostas as ameaças impostas a qualidade da água nos limites da bacia.

Com base nas experiências dos estudos de caso da WWF e da bacia de Murray Darling, a gestão e desenvolvimento efectivo de recursos duma bacia hidrográfica, particularmente a partilha de águas, não pode ser efectivamente materializada sem que exista uma visão partilhada entre os parceiros ou partes interessadas e afectadas.

1.4 Formulação da visão – questões chaves para a gestão da bacia do Okavango

Os parceiros ou partes interessada e afectas bem como os utilizadores dos recursos ba bacia do rio Okvanago são vastos e com uma grande diversiodade de interesses. Os parceiros incluem os governos dos três países, as populações que habitam na bacia, a sociedade civíl e suas organizações ao nível local, nacional regional e internacional bem como o sector privado.

Alguns dos intersses específicos expressos pelos três governos estão contidos no relatório da reunião da OKACOM realizada em 8 de Fevereiro de 2002 e são sumariamente aqui apresentados:

Angola tem interesse em ver um forte cometimento para a gestão efectiva dos recuros hídricos e do protocolo da SADC; getão da bacia do Okavangocomo um todo; partilha equitativa dos recursos bem como dos benefícios da gerão de energia hidroeléctrica; desenvovlimento conjuntode projectos agrícolas em Angola; cooperaçao em estudos conjuntos; participação na pesquisa; preparação e supervisão de estudos; manutenção de boas relações com outros estados membros da bacia.

Botswana tem interessses na obtenção de abastecimentos de água adequados do Okavango para uso municipal grícola entre outros; conservação do Delta do Okavango e seus recursos naturais; amplo conhecimento e comprenesão do Delta de forma a ser gerido com base nos melhores métodos possíveis especialmente para se sustentar o potencial turiístico do Delta; gestão efectiva do rio através da co-gestão e participação comunitária; desenvolvimento e manutenção de relações cordiais com a Namíbia e Angola.

Namíbia tem interesses em desenvolver infrasturas hidroeléctricas na bacia; utilização das águas do rio Okavango para fins industriais, doméstico, piscícola, agícola; incremento do volume de águas superficiais e subterrâneas para aparte central da Namibia; atracção turística na região; conhecimento dos planos Angolanos para o Cubango que poderão term impactos no desenvolvimento turístico na Namíbia; manutenção do funcionamneto dos ecosistemas através do control da poluição no rio Okavango; ter segurança sobre uma suficiente e boa qualidade da água; ver Angola a gerir sua porção da bacia de forma sustentável (e.g. gestão do uso de terras, desenvolvimento agrícola, uso de pesticidas, etc.

Para se gerirem todos estes interesses, é fundamental que se desenvolve uma visão partilhada da bacia do Okvango de forma a se conseguir obter uma gestão integrada da totalidade da bacia. Isto requere a existência duma agenda comum, objectivos e visão ta como já foi expresso pelos participantes do projecto Todos os rioso têm o seu povo que esta sendo presentemente implementado na bacia do rio Okavango. O mesmo foi enaltecido no guião sobre melhores práticas para a promoção da gestão de bacias hidrográficas partilhadas (ones et al 2004). A planificação e gestão efectivas não são possíveis sem que as partes interessadas estejam de acordo quanto ao conteúdo das agendas, objectivos de gestão e visão quer seja ao nível dum país ou na extensão total da bacia.

1.5 Metodologia

Este relatório foi principalmente compilado com base na revisão bibliográfica. Cada um dos parceiros da bacia contribuiu através da revisão de várias políticas e estratégias nacionais, sectoriais e temáticas. IUCN-ROSA fez a revisão de documentos sobres os Objectivos/Matas de Desenvolvimento do Milénio, visão para a água vida e ambiente bem como de outros documentos relavantes com o proposito de compilar informação a escala regional e internacional e finalmente consolidar o relatório.

Para alem da revisão bibliográfica para Angola, a JEA também fez uso de auscultações a ministérios Angolanos relevantes.

2. Esforços Relevantes na Formulação da Visão para a Bacia

As proposições das visões para a bacia do rio Okavango foram recolhidas e comparadas com outras relevantes proposições de visões formuladas a escala regional e global. Fazendo parte de comunidades regionais e globais, os valores das proposições formuladas a este nível têm certas implicações importantes para a bacia do rio Okavango.

Assim sendo, esta secção providencia um inventário de relevantes esforços de formulação de visões a escala internacionais, Africanas e da África Austral que a OKACOM bem como os parceiros da bacia do Okavango poderão tomar em consideração quando decidirem desenvolver sua visão partilhada para bacia do rio Okavango.

2.1 Objectivos de Desenvolvimento do Milénio

Na Cimeira Mundial sobre Desenvolvimento Sustentável levado acabo em Johannesburgo em Setembro de 2001, os 191 Estados membros das Nações Unidas atingiram um concenso sobre oito objectivos de desenvolvimento do milénio que terão que ser atingidas no ano 2015. Angola, Botswana e Namibia, votaram a favor da adopção das convenções das Nações Unidas e a Namíbia também é siignatária da convenção (Pinheiro et al online). Assim os três países se comprometeram em atingir tais objectivos nos seus respectivos territórios soberanos.

Estes objectivos de desenvolvimento do milénio obrigam os paises da fazerem mais e juntar esforços no combate a pobreza, fome, analfabetismo e falta de educação, desigualdades em termos do género, mortalidade infantil e materna, doenças e degradação ambiental. Enquanto que a totalidade do espectrum dos MDG são relevantes para o desenvolvimento socio-económico da bacia do rio Okavango, as metas que são especificamente relevantes para a gestão da água re recursos relacionados numa bacia, incluem:

Objectivo 1: Erradicação da extreama probreza e da fome

Meta para 2015: - reduzir par ametade a proporção de pessoas que vivem com menos de um dollar (US$) por dia e os que sofrem de fome

Objectivo 7: Assegurar a sustentabilidade ambiental

- Integrar os princípios do desenvolvimento sustentável nas políticas e programas nacionais e reverter a perda de recursos ambientais
- Em 2015 reduzir para metade a proporção de pessoas sem acesso a água potável

2.2 Visão Mundial da Água (visão para a água, vida e ambiente para o século 21)

Como parte a comunidade global, a visão para a comunidade da bacia do rio Okvango é influenciada pela visão munidal da água e suas respectivas sub-visões. Esta visão global e respectivas sub-visões foram endossadas pelo segundo Forum Mundial da Água e a Conferência Ministerial que tiverm lugar em The Hague na Holanda, eventos nos quais os três estados da bacia estiveram representados.

A visão globlal esta encaplusada no proposição: ***A água é vida. Todo o ser humano, agor ae no futuro, deve ter suficiciente água potável para beber, condições sanitárias apropriadas, comida e energuia suficientes a um custo razoável. A provisão adequada de água para se atingirem estas necessidades básicas de ser feita de forma equitativa e em harmonia com a natureza. A água é a base de todos os ecosistemas e habitats vivos e parte dum ciclo hidrológico imutável que deve ser respeitado se o desenvolvimento da actividade humana e bem estar se pretedem sustentaveis.*** *(Relatório da Comissão da Visão Mundial da Água, 2000).*

2.3 Visão Africana da Água

Uma vez que a bacia do rio Okavango é parte integrante docontinente africano e sendo a água um recurso chave na bacia, a visão africana da água e suas sub-visões influenciam a visão para a bacia.

O relatório da Nações Unidas WATER / AFRICA estipula a visão africana da água como sendo:

Uma África onde existe um uso equitativo e sustentável e gestão dos recursos de água para o alívio da pobreza, desenvovliment sócio-económico, cooperação regional e do ambiente.

Esta é a vião duma África onde:

i. Existe um acesso sustentável ao abastecimento seguro e adequado de água e condições de saneamento que satisfazem as necessidades básicas de todos;
ii. Existe água suficiente para a segurança alimentar e energia
iii. Água para a sustentabilidade dos ecosistemas e biodiversidade em quantidades e qualidade adequadas

iv. Instituições que lidam com a água reformadas para a criação do ambiente apropriado para a gestão integrada e efectiva da água em bacias nacionais e transfronteriças, incluindo a gestão ao nível apropriado mais baixo;
v. Bacias hidrográficas constituem a base para a cooperação e desenvolvimento regional e são tradas como recursos naturais para todos nos limites de tais bacias
vi. Existe um número adequado de profissionais motivados e altamente qualificados na gestão de recursos hídircos
vii. Existem sistemas efectivos e financeiramente sustentáveis de recolha de dados, avaliação e disseminação para bacias nacionais e transfronteriças
viii. Existem estratégias efectivas e sustentáveis para confrontar problemas alusivos aos recuros hídricos naturalmente induzidos ou provocados pelo homem incluindo a variabilidade e mundanças climáticas
ix. A água é financiada e com preços que promovem equidade, eficiência e sustentabilidade
x. Existe vontade política, consciência pública e cometimento entre todos para a gestão sustentável dos recuros hídricos, incluindo a integração dos assuntos do género e preocupações da juventude e uso de enfoques participativos. (UN WATER/AFRICA)

Todos os elementos ddda visão africana poderão ser pertinentes a bacia. Será muito importante para todos os parceiros a discussão destes elementos no processo de desenvolvimento da visão para a bacia do rio Okavango.

2.4 Visão da Água para a África Austral

Angola, Botswana e Namíbia, são partes da África Austral e a áfrica Austral como parte da visão global da água a escala mundial também desenvolveu a sua própria visão sobre a água, vida e ambiente parao século 21 que é relevante ao desenvolvimento da visão para a bacia do rio Okavango. A visão da água para a África Austral é: ***utilização equitativa e sustentável da água para a justiça social e ambiental, integração regional e benefícios económicos para as gerações presentes e futuras.***

As sub-divisões da visão da água para a África Austral são:

- Visão do desenvolvimento socio económico equitativo e sustentável da África Austral
- Visão do acesso equitativo da água em quantidade e qualidade aceitáveis
- Visão sobre condições de saneamento apropriados para todos e gestão segura dios lixos
- Visão da segurança alimentar para todos
- Visão da segurança em energia
- Visão dum ambiente sustentável
- Visão da segurança com relação aos desatres naturais
- Visão do desenvolviemnto e gestão integrada dos recursos hídricos

2.5 Comunidade para o Desenvolvimento da África Austral (SADC)

Catorze países na África Austral, incluindo Angola, Botswana e Namíbia, compõem a ***C***omunidade para o Desenvolvimento da África Austral (SADC). A SADC é uma organização inter-governamental para a integração económica dos estados membros. Os objectivios da SADC providenciam algumas indicações das aspirações partilhadas entre os estados membros.

Os objectivos da SADC são:

i. atingir o desenvolvimento e crescimento económico, aleviar a pobreza, melhorar os padrões e qualidade de vida das populações da África Austral e suportar os segmentos socialmente e desvantagem através da integração regional;
ii. evolução dos valores políticos comuns, sistemas e instituições;
iii. promover e defender a paz e segurança;
iv. promover o desenvolvimento auto-sustentado com base na auto-dependência colectiva e inter-dependência dos estados membros;
v. antigir complementaridade entre as estratégias e proramas nacionais e regionais;
vi. promover e maximizar emprego produtivo e utilização de recursos da região;
vii. atingir a utilização sustentável dos recursos naturais e protecção efectiva do ambiente;
viii. fortalecer e consolidar ligações a afinidades sociais e culturais de longa tradição histórica entre os povos da região

A medida que os parceiros da bacia do Okavango desenvolvem a visão partilhada comum, eles irão precisar de tomar em consideração estes objectivos da SADC. Alguns dos objectivos estão assim formulados para providenciar o ambiente apropriado a a base sustentável para a coordenação e colaboração entre os países.

2.6 Outras iniciativas de exercio da visão na bacia do rio Okavango

De acordo com as suas responsbilidades sob a égida da convensão do Ramsar, o Botswana está implementando um projecto para o desenvilvimento dum plano de gestão integrada para o Delta do Okavango. Um dos objectivos deste plano de maneio é o de desenvolver uma visão de longo termo para o Delta do Okavango. Este plano de maneio irá também incluir cenários alternativos para consideração dos potenciais impactos de questões como sejam as mudanças climáticas e mudanas a montante em termos dos padrões de uso de terra e água. Espera-se que a visão formule as opções de desenvilvimento acordadas e cenários de gestão para o Delta do Okavango. O objectivo de longo termo do plano de maneio do Delta do Okavango é:
Integrar a gestão dos recursos do Delta do Okavango que irão assegurar a sua conservação a longo termo e que irá providenciar benefícios para as gerações presentes e futuras através do uso sustentável de seus recursos naturais.

O visão desenvolvida pelo projecto ODMP terá que ser integrada na visão partilhada da bacia do ri Okavango.

3. Proposições e Aspirções dos Estados

Esta secção providencia informação sobre os vaores e aspirações colhidas ao nível nacional em Angola, Botswana e Namíbia pelos estados membros. Botswa e Namíbia ambos têm visões de longo termo projectadas para 2016 e 2030 respectivamente. Eles tambem desenvolveram plans nacionais de desenvolvimento para um horizotede 10 e 5 anos respectivamente. A medida que os parceiros da baci do Okavango desenvlvem suas visões, terão que tomar em consideração que suas visões estão alinhadas e harmonizadas com as respectivas visões nacionais em cada país. Angola desenvolveu uma estratégia para o sector de águas e os objectivos da estratégia podems ser usados como referência para o desenvolvimento da visão partilhada.

Tods os relatórios do parceiros da bacia providenciaram sugestões em termos dos conteúdos que deverão ser incluídos na visão. Os relatórios da IUCN Botswana e NNF providenciara informação sobre os princípio directores que estão sendo usados ao nível nacioal e que devem ser considerados aquando do desenvolvimento da visão para a bacia do Okavango.

3.1 Relatório da JEA – Angola - Abias Huongo

Esta secção providencia informação derivada da JEA que é relavate para o exercício da formulação da visão. A informação é primariamente relativa ao sector dos recursos hídricos.

3.1.1. O sector dos recuros hídricos

Objectivo

Os objectivos do sector dos recursos hídricos são:

- Assegurar a utilização dos recursos hídricos nacionai de forma aapropriada e que contribuam para a garantia do desenvolvimento económico e social sustentaveis incluindo a preservaçao ambiental;
- Assegurar melhores condições de vida e melhramento da saúde pública para a totalidade da população através do acesso generalizado aos serviços de abastecieto de água potável e tratamento efectivo de águas residuais;

Aspectos importantes da Estratégia dos Recursos Hídricos a considerar

A estratégia é baseada no conceito de gestão integrada dos recursos hídricos e incorpora os seguintes elementos:

- Satisfazer as necesidades humanas básicas em termos de água e segurança alimentar;

- Trabalhar comos paises visinhos de forma a se atingir um aceso equitativo do s recursos hídricos partilhados;
- Estar-se preparado e abilitado a gerir secas e cheias
- Uso de tecnologias apropriadas
- Aplicação de valores económicos a água
- Descentralização do proceso de tmada de decisões no sector de águas
- Involvimento dos utilizadores e reforma institucional

Constrangimentos

Alguns dos principais contrangimentos que afectam o sector dos recursos hídricos incluem:

- Gestão fragmentada ecoordenação institucional desarticulada entre os diferentes parceiros dentro do sector
- Dificuldades de acesso as varias regiões do país o que impede a realização de estudos, construção de infrastruturas e outras avaliações ou estudos do potencial dos recursos hídricos
- Excassez de recursos técnicos humanos e ausência dum programa para o desenvolvimento dos mesmos

3.2 Relatório da IUCN BOTSWANA – Botswana – Kulthoum Omari e Masego Madzwamuse

Esta secção providencia um inventário de proposições de visão, valores e aspirações do Botswana.

3.2.1 Visão do Botswana para 2016

A visão de long termo para o Botswana – visão 2016 – é: **Em Prol da Prosperidade para Todos"**

Esta visão caracteriza o tipo de sociedade que a população do Botswana deverá ser no ano 2016 periodo em que celebra o quiquagésimo aniversário dede a indendência. Identificam-se os objectivos que deverãoser atingidos, os principais desafios a serem ultrapasados e oportunidades que deverão ser produtivamente exploradas de forma a se materalizarem as aspirações nacionais. A visão dever guiar o pensamento estratégico e formuação de políticas nos anos que se seguem e deverá constituir o ponto de partida a partir do qual todo o Botswana se unifica.

A visão 2016 demada a trasformação do Botswana numa nação que seja:

- Próspera, produtiva e inovativa;
- Compaixonada, justa e cudadosa;
- Aberta, democrática e de confiança
- Protegida e segura
- Moral e tolerante
- Unida e orgulhosa
- Educada e informada

Para vada uma das proposições de visão apresentadas acima existe um conunto de sub-visões. Asecção que se segue providencia um listagem de tais sub-visões:

Uma Nação Próspera, Produtiva e Inovativa
As sub-visões ao nível desta visão são alusivas ao crescimento sustentável e desertificação; o ambiente e gerção do emprego.

Crescimento sustentável e desertificação:

- O Botswana tera diversifiado sus economia com a mineração, agricultura, indústria, manufacturação, serviços e turismo fazendo todos uma contribuição substancial. O Botswana irá ter um economia vibrante e energética capaz de satisfazr as demandas competivas do século 21 e atrais investodires;
- A agricultura do Botswana será produtiva, rentável e sustentável e irá contribuir significativamente para o desenvolvimento económico, alívio a pobreza, segurançaalimentar, melhoramento da qualidade de vida e utilização sustentável dos respectivos recursos naturais
- Serao estabelicidas parcerias entre nvestidores locais e estrangeiros que irão capacitar os cidadãos e desenvolver investimetos e incrementar

substancialmente o sentido de posse dos recursos e respectiva ggestão pelos cidadãos

O Ambiente

- No ano 2016, o crescimento económico e desenvolvimento do Botswana será sustentável. Os recursos renováveis, serão usados numa taxa que esteja em equilíbrio com a sua capacidade de regeneração. Os recursos não renováveis, tais como os minerais, serão usados eficientemente e sua depleção será balanceada com o melhoramento da capacidade física e capital laboral.
- Os recursos naturais chaves bem como os bens activos do país serão distribuidos equitativamente entre a população. As comunidades serão envolvidas no uso e preservação de seus valors ambientais e irão beneficiar directaente da exploração dos memsos. A atitude com relação aos recuros naturais irá prestar atenção a distribuição justa entre as gerções presentes e futuras. A erradicação da pobreza irá cria uma situação na qual ninguem será forçado a degradar o ambiente como alternativa para obtenção de necesidades básicas.
- A fauna do Botswana será gerida para o benefício sustentável das comunidades locais e para o interesse do ambiente como um todo.
- No ano 2016, o Botswana terá tomado medidas fortes para limitar a poluição resultante da rápida industrialização. O ambiente urbano pelo país fora será melhorado através da construção de parques e jardins para propósitos recreativos. O Botswana irá se orglhar pelos seus ambientes limpos e livres do lixo.

Geração de emprego

- O crescimento económico será derivao de fontes diversas que geram emprego para o cidadão comum. A distribuição equitativa dos recursos irá eliminar engarrafamentos e providenciar control e gestão exercidas pelo povo.

Uma Nação Compaixonada, Justa e Cuidadosa

As sub-visões ao nível desta visão são relativas a distribuição das receitas, redução da pobreza e segurança social

Distribuição das receitas

- No ano 2016 O Botswana terá uma melhor distribuição equitativa das recitas que assegure a participação de tantos indivíduos quanto possível no seu sucesso económico. Irãoeistir políticas e medidasque incrementem a partiipaç~ao dos agregados familiares mais pobres em actividads produtivas e de geração de recitas. A economia irá crescer de forma distributiva – quer isto dizer, de forma a criar empregos sustentáveis.

Redução da pobreza

- No ano 2016, O Botswana terá erradicado a pobreza absoluta de forma que nenhuma parte do país terá individuos com receitas abaixo da linha apropriada de pobreza. Dentros dos próximos dez anos, a percentagem de pessoas pobres terá sido reduzida para 23% no minimo o que corresponde a metade do nível registado em 1994.

Segurança social

- Todos os individuos terão acesso a recursos produtivos, independentemente da origem étnica, género, diminuição física ou desgraça. O Botswana terá conseguido ajudar as populações e escapar da armadilha da pobreza e telos envolvidos como partes integrantes da sociedade na sua totalidade.

Uma Nação Democrática Aberta e de Confiança

As sub-visão ao nível desta visão referem-se a boa goveranação e o pael das instituições locais e tradicionais.

Boa Governação

- O Botswana do futuro será uma democracia orientada pela comunidade, com forte instituições descentralizadas
- O papel da sociedade civil, incluindo as igrejas, organizações não goveramentais e organizações voluntaris irão ser melhoradas no Botswana de 2016. Estas organizações chão elemntos chaves para a boa governação e irão promover os princípios da boa prestação de contas, dentro dos sistemas democráticos.

O Papel das Instituições Locais e Tradicionais

- Os lideres tradicionais serão uma parte importante do proceso democrático através do qual o sistema duradoiro do "Kgotla" seraá transmitido de geração para geração. Eles irão desempenhar um pael significativo como depósitos da cultura e tradições que serão dinâmicas em resposta as condições de mundanças.

3.2.2 Uma sinpóse de proposições da visão / aspirações do no Plano Nacionalde Desenvolvimento (NDP9)

O NDP9 cobre o período que vai desde 1 de Abril de 2003 a 31 de Março de 2009. O panomarca o primeiro passo importante em direcção a integração da visão de longo termo do Botswana, Visaão 2016, no contexto do prceso de planificação do desenvolvimento. O tema deste plano é: ***"Em Prol da Realização da Visão 2016: Desenvolvimento Sustentável e Diversificado Através da Competitividade dos Mercados Globais"***. A maior parte dos capítulos do NDP9 estão de alguma forma relacionados com a gestão do Delta do Okavango e são porcosneguinte importants subsídios ao exercício da formulação da visão. As principais áreas são sumarizadas nos seguintes termos:

Capítulo 4 – Plannificação e Estratégia para o Desenvolvimento

Diversificação económica e criação de emprego: Este potencial para a diversificação da agricultura, manufactura, turismo e serviços do sector financeiros da economia em adicção a diversificação do sector mineiro em tanto que tal. Através da diversificação da economia nestes diferentes sectores, o alívio da pobreza e criação do emprego poderão porconseguinte, ser atingidos.

Redução da pobreza: Uma estratégia fora ja desenvolvida, para adoptadar o conceito multi-dimensional da pobreza incorporando questões relativa as receitas, capacidades humanas e participação. A estratégia terá como focus:
A expansão das oportunidades de emprego através dum crecimento de base ampla
Melhoramento da acessibilidade dos pobres ao investimeto social que melhore as capacidades humanas
Fortalecimento das capacidades individuais, de familias, comunidades e instituições locais na melhoria de suas capacidades de absorver esquemas de assistência

Proteção ambiental: Integrar de forma cabal questões ambientais nodesenvolvimento de políticas, programas e projectos. Isto irá, subsequentemente, ser suportado pelo desenvolvimento de quadros legais apropriados bem como da necessária reforma institucional para monitorar a implementação de tal legislação.

Desenvolvimento rural: Promoção de melhores condições de vida rural sustentáveis, gestão de terras e recursos naturais, protecção social e reforma do quadro istitucional e capacidade de iplementação de iniciativas de desenvlvimento rural.

Capítulo 7 – Comércio e Indústria

O principla bjectivo dentro deste sector e:

Capacitar o Botswana em ser uma economia vibrante, auto-suficiente e diversificada, qualificada entre as melhores no mundo e vista como destino preferencial dos investidores em 2016. Este objectivo esta alinhado com as aspirações e proposiçao d visão do forum da visão nacional 2016. De forma mais específica, o plano estratégico do Ministério da Indústria e Comério, incorporou os seguintes objectivos estratégicos:

- Assegurar o uso sustentável dos recursos naturais
- Protecção do ambiente
- Integração dos assuntos do género
- Contribuição para o alívio da pobreza
- Fortalecimento de abilidades para o desenvolvimento

Capítulo 10 – Agricultura

O principal focus do NDP9 em termos das etratégias no sector da arciculture revolvem em torno do desenvolvimento e adopção de tecnologias agrícias apropriadas, conservação dos recursos da terras agrícola, desenvolvimento de esquemas de gestão da

seca, mecanização e comrecialização das operações agrícolas, control de doenças, educação do camponês e provisão atempada de provisões de informação relativas ao negócio agrícola. A visão do Ministério é por conseguinte: ***"provisão duma liderança dinâmica no desenvolivimento sustentável, diversificação agrícola e conservação de recursos naturais"***

Alguns dos objectivos em matéria de políticas do sector agrícola nacional que serão levados a abo durane o NDP9 incluem:

Mellhoramento da segrança alimentar aos níveis do agregado familara e nacional; enfase será direccionada a segurança alimentar ao nível do agregado familiar
Diversificação da base de produção agrícola incluindo produtos silvestres
Conservaça dos recuros de terra agrícola ja excassos para as gerãoes vindouras. Este o objectivo e cosnsitente com a estratégia agrícla masi ampla para o desenvolvimento da economia agrícola enquanto se conservam os recursos naturais.

Capítulo 12 – Recursos Hídricos

Este capítulo faz referência as seguintes proposições inseridos no documento – visão 2016:

No final do ano 2016, **"O Botswana deverá ter uma estratégia nacional de desenvolvimento e distribuição de águas que faça com que a água seja acessível a todos e a preços apropriados incluindo oso que vivem em aglomerados populacionais pequenos e remotos"**.

O capítulo dos recursos hídricos especificamente nota que o Botswana é u país com escassez de recursos hídricos e por conseguinte; O Botwna deve usar a água o mais efectivamente possível fazendo uso de tecnologias eficientes e várias outras técnicas de conservação tais como recolha de águas pluvias e que também deve desempehar um papel funamental as negociações e promoção de acordos internacionais relativos ao uso e armazenamento da águaao nível regional de forma a providenciar um base de amortecimento contras as secas localizadas. Eta visão é consistente com a visão da SADC pra a água que tem em vista a utilização dosrecursos hídricos regionais de forma equitativa e razoável.

Capítulo 13 – Fauna Bravia, Parque Nacionais e Turismo

A política e estratégias do Ministério para o NDP 9 são:

Manter uma população faunistica, incluindo o incremento dos numeros de espécias aniamais que estejam em perigo e resolver of sérios conflitos entre seres humanos e a fauna bravia.

Visão do Departamento de Turismo
No ano 2016 o Departamento de Turismo irá ter facilitado o desenvolvimento e diversificação e promoção de produtos turisticos sustentáveis e assim posicionar o Botswana e entre os 10 primeiros destinos preferidos do mundo.

Capítulo 14 – Gestão ambiental

A política nacional sbre conservação e desenvolvimento de recursos naturais de 1990 tem os seus fundamentos no principio e conceito de desenvolvimento sustentável definido como: *desenvolvimento que satisfaz as necessidades das gerações presentes sem comprometer a abilidade das gerações futura satisfazerem suas necessidades*. O objectivo principal é: ***incrementar a efectividade com a qual os recursos naturais são usados e geridos de forma a que os benefícios inter-activos sejam optimizados e osimapctos ambientais negativos sejam minimizados***.

Capítulo 15 – Educação e trainamento

Com o propósito de satisfazer os desafios das mudanças rápidas do mundo, é importante para todo que adoptem o principio da aprendizagem ao longo do curso total da vida. A visão ainda se mantem como sendo: Todo o Botswana terá a oportunidade para uma educção contínua e universal ... A educação de ser feita flexivel de forma a que o povo possa entrar e sair do sistema educacional em tempso diferentes no decurso de suas vidas.

Capítulo 17 – Gestão de Terras, Habitação e Povoamentos

O enfoque principal do sector habitacional durante o NDP9 será o de assegurar que ***"todo o Botswana seja capaz de obter aceso a habitação básica de boa qualidade tanto nas áreas urbanas como rurais"***.

Capítulo 18 – Cultura e Serviços Sociais

O Departamento de Serviços Sociais desenvolve, coordena, monitora e avalia a implementação de programas dos serviços sociai com particuar enfoque, de entre outros, nos grupos vulneráveis tais como criaças, orfãos agregados familiares chefiados por mulheres, mulheres e diminuidos físicos. Através disto: ***um ambiente de provisãode cuidades e apoio é criado atraves da capacitação e reabilitação de indivíduos, grupos e comuniddes com vista a criar o desenvolvimento social sustentável.***

3.2.3 A Versão Preliminar da Politica e Estratégia das Terras Húmidas

O objectivo principal versão preliminar da politica e estratégia das terras húmidas é: ***promover a conservação das terras húmidas do Botswana de forma a manter suas funoes ecológicas e soci-económicas bem como providenciar benefícios para o bem estar presente e futuro das populações.***

A política recohence o seguinte:

- O insubstituivel valor ecológico e socio económico das terras húmidas

- A degradação contínua dos recursos das terras húmidas
- A responsabildade das população na travagem das perdas das terras húmidas
- A necessidade de se manterem as terras húmidas através do uso sustentável, melhorias de gestão e apoio público total

3.2.4 A Estratégia das ONG sobre o Ambiente 2002 – 2007

A visão da estratégia é: melhorar a qualidade de vida das populações do Botswana através da gestão sustentável dos recursos naturais e conservação do ambiente.

As ONGs ambientais identificaram quatro áreas chaves de intervenão e acção para os próximos cinco anos, nomeadamente, a área ecológica, social, institucional dos aspectos económicos do ambiente. As questões chaves de enfoque sobre o Delta do Okavango são:

Melhoria da compreensão das funções ambientais do Delta do Okavango
Uma maior visão holistica do funcionamento do sistema deverá ser criada e compreendida quer pelas comunidades como pelos implementadores de politicas de forma a poderem relacionar suas actividades aprticulares com um quadro mais amplo de activiades em curso em outras áreas nos limites do sistema. Isto deverá ser vistoomo forma de se ganhar conhecimento que possa facilitar o proesso de tomada de decisões sob uma base informada sobre a gestão dos recursos naturaise assim se melhorar a utilização sustentável destes recursos.

Desenvolvimento da gestão transfronteiriça dos recursos
Os objectivos principais do desenvolvimento duma gestão transronteiriça dos recursos são os de melhorarem os instrumentos de gestão coesiva dos recursos bem como das políticas para além das fronteiras nacionais enquanto se facilita a aprendizagem de uns ara com os outros; incrementar o tmanaho do habitat disponível para a fauna bravia; melhorar as relações transfronteiriças e compreensão comum.

Promoção da educção e forncecimento de informação para uma utiização refinada da água
Os objectivos da promoção da educação e troca de infromações para o uso adequado da água incluem o incremento da conscialização das comunidades e outros actores sobre os recursos hídricos e melhoria de suas partipações na gestão para ssim se promover práticas ambientalmente sustenáveis ao nível local e distrital.

Melhoria da equidade sobre os direitos de terra e regimes de possse bem como a partlha de benefícios derivados do uso dos recursos naturais
A abtribuição de direitos de terra e posse as comunidades tradicionais os limites de áreas particulares irá por conseguinte providenciar um incentivo para o interesse e cometimento na gestão sustentável dos recursos

Expansão do turismo comunitário sustentável
O objectivo a este nível é o de gerar receitas e reduzir a probreza para a comunidades locais e diversificar os produtos turísticos de forma a incluir os baseados em aspectos

culturais e sociais das comuniddes locais e suas formas de vida e assim se elevar as abilidades comunitárias relacionadas com o turísmo.

Melhoria dos mercados e geração de receitas a partir de produtos silvestres

O principal objectivo consiste em gerar receitas e reduzir a probreza da comunidades locais. Melhorar as abilidades artesanais e de escultura e comercializar um quadro mais amplo de produtos.

Melhora o conhecimento das polítias e legislação ambietais e fortalecer a capacidade de implementação ao nível local

O objectivo principal é de melhorar o conhecimento e compreensão das políticas e legislação aombiental ao nível local e reduzir a fragmentação da agenda ambiental através partilha de informação e coordenação.

Ajustamento de politicas ambentais conflitivas e a inapropriadas bem como da legislação e planos

O objectivo consiste em harmonizar e reconciliar opliticas conflictivas e rever e actualizar as politicas de foram a melhorar a gestão do Delta do Okavango.

3.3 Relatório da NNF – Namíbia – Chris Brown

Esta secção providencia informação sobre o iventário de proposições de visão que variam desde a escala de planificação nacional de longo termo (visão de 30 anos) a escala de planificaçãonacional de médio termo (5 anos) e subsequentemente a escala regional (província) e planificação sectorial.

3.3.1 Visão NacionalNamíbia de longo Termo: Visão 2030

A visão concisa de 30 anos para a Namíboa é:
"Um Namíba próspera e industrializada, desenvovlida pelos seus recursos humanos, gozando dum ambiente de paz, hormonia e estabilidade política"

Esta visão é suportada por um número de sub-visões. No capítuo referente a qualidade de vida das populações as subsecções seguinte e respectivas sub-visões são reflectidas:

População e saúde: Uma nação salutar e de segurança alimentar na qual todas a doenças previníveis, infeciosas e parasíticas estejam sob control seguro; a população gozando de elvados padrões de vida, boa qualiade de vida e com acesso a educação de qualidade, saúde e outros serviços vitais. Todos estes aspectos se traduzem numa esperança de vida longa e um crescimento populacional sustentável.

Migração, urbanização e distribuição: Exitência dum movimento populacional livre dentro dos limites do país e uma distribuição populacional matuuramente ajustada as condicções locais e de recursos para as respectivas condições de vida. A Namíbi é um país altamente urbanizado com cerca de 75% da população vivendo em centros urbanos proclamados, enquanto que a predominâncai de Windhoek reduziu-se consideravelemente como resultado do crescimento de outros centros urbanos ao longo de to o país.

Distribuição etária e por sexo da população: A Namíbia é um país just, tolerante e com uma sociedade segura com estruturas legislativas, económicas e sociais funcionais que eliminam a marginalização e asseguram a paz e equidade entre mulhres e homens, diversidade de grupos étnicos e pessoas de diferentes idades, interesses e abilidades.

Modo de vida salutar para a longevidade: A Namíbia é livre de doen,cas relativas a pobreza e desigualdades e os Namibianos vivem um estilo de vida salutar com água potável segura e um serviço de saúde preventivo e curativo compreensivo e acessivel para todos.

Riqueza, condições de vida e economia: A Namíbia opera um economia aberta, dinâmica, competitiva e diversificada que providencia um crescimento económico sustentável com base para a alocaç~ao de recursos para a satisfação dos principais objectivos nacionais como a redução da pobreza, desenvolvimento dos recursos humanos, criação do emprego e provisão de serviços sociais adequado e facilidades infrastruturais.

Emprego: O amiente económico é adequado para todos os cidadão capazes e com desejo de trabalhar e existe emprego pleno na economia com um sistema de informação do mercado laboral bem estabelecido e funcioanl para uma efectiva gestão das dinâmicas da força de trabalho.

Tecnologias de produção: A Namíbia é um pais industralozado, com um sector viável de exportação de recursos naturais, um sector de serviços e tamanho incrementado de profissionais do sector industrial, e uma produção orientado para o mercado; exite um nível elevado de auto-suficiência, energia segura e a preços competitivos satisfazendo a demanda doméstica e industrial.

Educação e treinamento: Um sistema de educação e treinamento completamente integrado, unificado e flexível que prepara os estudantes Namibianos a tirarem vantagens do ambiente de mudaças rápidas e contribui para o desenvolvimento económico, moral, cultural e social dos cidadão ao longo da totalidade de suas vidas.

Cultura e tradição: As populações e a sociedade são tolerantes e suportivas a diversidade de relgiões, crenças, culturas e étnicidade e funcionam de forma a optimizar a força da diversidade.

Sociedade civil: Asociedade civil, seus individuos, grupos e organizações são altamente equipados em recursos e cooperativos com o governo e suas agências aos níveis local, regional e nacional; respeitam-se mutuamente e esforçam-se em consolidar a democraia e colaboram no desenvolvimento social e económico para o benefício de todos.

No capítulo sobre **"Recursos de Base Sustentável**" as segintes sub-secções e sub-visões são reflectidas:

Águas doces e recursos associados: Os recursos de águas doces da Namíbia são mantidos livres de poluição e usados para assegurar o bem estar social, apoio ao desenvolvimento económico e manutenção dos habitats naturais.

Terra e produção agrícola: A terra é usa de forma apropriada e equitativa contribuindo significativamente para a segurança alimenta aos níveis dos agregados familiare e nacional e a suportam o cresciment sustentável e equitativo da economia Nambiana enquanto se mantem e se melhora a capacidade da terra.

Florestas: A diversidade da vegetação natural arbórea Namibiana, savanas e outros muitos recursos que os memos proporcionam, são geridos de formas participativas e sustentáveis de forma a suportar o melhoramento das condições de vida, incremento do desenvolvimento socio-económico e segurança da estabilidade ambiental.

Fauna bravia e turismo: A integridade dos habitats naurais Namibians e populações de fauna bravia são mantidos enquanto suportam significativamente o desenvolvmento económico nacional através do turísmo sustentável, de baxio impacto, consumptivo e não consumptivo.

Recursos pesqueiros e marinhos: As espécies arinhas Namibianas e respectivos habitats contribuem significativamente para a economia sem ameaçarem a biodiversidade ou o funcionamento dos ecosistemas naturais num ambiente dinâmico externo.

Recurso não renováveis: Os recurso minerais Namibianos, são estrategicamente explorados e optimamente beneficiados providenciando oportunidades equitativas para todos os Namibianos de participarna indústria, enquanto se assegura que os impactos ambentais sejam minimizados e os investimentos resulantes da mineração são direccionados para o desenvolvimeto de outras industrias sustentáveis e capital humano para o desenvolvimento nacionalde longo termo.

Biodiversidade: A integridade de processos ecológicos vitais,habitats naturais e espécies bravias em toda a Namibia são mantidas enuqnto suportam significativamente o desenvolvimento socio-económico nacional através do uso sustentável de baixo impacto, uso consumptivo e não consumptivo de elevada qualidade bem como através da provisão de alternativas diversificadas de melhoramento das condições de vida rural e urbana.

No capítulo sobre a **"Criação dum Ambiente Favorável"** as seguintes subsecção e sub-visões são reflectidas:

Desenvolvimento sustentável: A Namibia desenvolve uma distribuição significativamente mais equitativa do bem estar social através da gestão sustentável dos recursos naturais numa economia mista caracteristica dos países de receitas elevada, principalmente através dum crescimento forte e redução da pobreza.

Relações internacionais: Uma nova ordem internaciona foi estabelecida com base na igualdade das nações soberanas on se asseguram o desenvolvimento sustentável, paz e progresso humano.

Cooperação para o desenvolvimento: A Namíbia atingiu um nível de trasnformação no fluxo da cooperação para o desenvolvimento no qual atingiu progressos e transformou de paí recipient de fundos de assistência para país proviso e assistência a outros países com necessidades.

Paz e segurança regional: Materialização da paz e segurança regional colectiva e internacional.

Integração regional: A Namíbia goza duma integração regional completa em termos socio económicos e de estrutura políticas através organismos supra-nacionais efectivos.

Globalização: Os benefícios da transferência de tecnologias, comércio, investimento e fluxos de capital contribuem para uma redução significativa da pobreza na maioria das regiões do mundo e a Namíbia goza duma participação optimizada e integrada na vila global.

Governação democrática: A Namíbia mantem, consolida e extende a práticas de boa governação duma democracia multi-partidária com elevados níveis de participação,

direitos, liverdades e legitimidade (sob a constituição) que continua a servir de modeo para outros países.

Descentralização: As comunidades locais e os orgãos regionais são providos de poderes e capacidade e estão totalmente envolvidos no proceso de desenvolvimento; eles practicamente formulam e implementam seus respectivos planos de desenvolvimento, enquanto o governo nacional – trabalhando lado a lado com a sociedade civil – providencia o ambiente apropriado (leis, políticas, finanças, segurança, etc.) para uma gestão efectiva dos esforços de desenvolvimento regional e local.

Mecanismos de decisão responsáveis: O objectivo da Namíbia é o promover e fortalecer parcerias inteligentes para o desenvolvimento sustentável, optimizar suas vantagens comparativas e competitvas e gerar e gerir boa qualidade de informação e conhecimento através do apoio e fortalecimento da ciência activa e crítica e da pesquisa com base em instituições nacionais bem estruturadas bem como com parcerias com outras instituições no estrangeiro.

3.3.2 Plano de Desenvolvimento Nacional Quinquenal da Namíbia: NDP2

Os objectivos do plano nacional de desenvolvimento para o NDP2 (Fevereiro 2001-Junho 200) são:

- Reduzir a pobreza
- Criar emprego
- Promover o empoderamento económico
- Stimula e manter o crescimento económico
- Reduzir as desigualdades na distribuição das receitas
- Promover a igualdade e equidade com base no género
- Melhorar s sustentabilidade ambiental e ecológica
- Combater a propagação ulterior do HIV/SIDA

A visão para o NDP2 e: **"Melhoramento Sustentável e Equitativo na Qualidade de Vida de todo o Povo na Namíbia"**

As estratégias do plano nacional focalizam em:

- Promover e fortalecer um ambiente favorável para o crescimento e desenvolvimento económico
- Promover o uso sustentável dos recursos naturais e ggestão ambietal
- Promover o desenvolviment participativo e equitativo
- Desenvolvimento de recursos humanos
- Promoção da boa governação
- Fortalecimento do papel da Namíbia a escala internacional

O NDP2 consiste de um número capítulos sectoriais e trasnversais. Cada capítulo contem uma proposição da missão que efectivamnete constitui um capítulo da visão. O capítulo seguinte respectivos t'ituos e missão têm relevância:

Capítulo 7 – População e desenvolvimento: Melhorar os padrões e qualidade de vida do povo da Namíbia e assgurar o desenvolvimento sustentável trvés da harmonização das dinâmicas populacionais Namibianas (taxa de crescimento, estrututa etária e sexul, migração e urbanização) com as disponibilidade e potencial de recursos financeiros e de recursos naturais.

Capulo 8 – HIV/AIDS: Reduzir a trasnmissão do HIV/AIDS para níveis abaixo do pandémico e minimizar os impactos do HIV/AIDS nos indivíduos infectdos e familias, comunidades e regiões afectadas.

Capítulo 9 - Desenvolvimento de recursos humanos: Assegurar que as políticas apropriadas e acção sejam adoptadas e implementadas para o melhoramento da planificação dos recursos humanos, educação e treinamento, saúde e criação do emprego com vista a atingir as necessidade do desenvolvimento econóico, social e sustentável e os prospectos da Namíbia.

Capítulo 11 – Agricultura: Cntribuir para os objectivos nacionais de melhorar a segurança alimentar ambos ao nível familiar e nacional e criar oportunidades de emprego para crescimento seguro e equitativo da totalidade da economia.

Capítulo 12 – Água: Promover o acesso seguro a água potável para a totalidade da população, gerir os recuros de acordo com os principios da equiade e sustentailidade e assegurar que a provisão da água contribui efectiva e eficientemente para o desenvolvimento da economia Namibiana.

Os objectivos principais são listados:

- Providenciar acesso a água de qualidadede aceitável para a totalidade da população com prioridade para as áreas rurais
- Utilizar, conservar e proteger todos os recursos hídricos de forma ambientalmente sustentável
- Gerir e alocar os recursos de água excassos de forma equitativa e eficiente e com consideração devida do ambiente
- Promover a eficiência nstitucional e sustentabilidade financeira tomando em consideração a capacidade ou poder de compra e equidade dos consumidores
- Assegurar que a disponibilidade de água promova e suporte o equilíbrio do género e o desenvolvimeno social e económico

As seguinte estratégia sectoriais são relevantes:

- Gestão integrada dos recursos hídricos
  - Incluindo a colaboração entre o governo. ONGs, sector privado, etc.
  - Fazendo uso da gestão da demanda da água
  - Conduzindo a pesquisa aplicada
  - Colaboração, cooperação, parcerias, devolução
  - Avaliando o desenvolvimento sustentável baseado na disponibilidade da água
- Recolha de dados e monitria dos recursos hídricos

- Mudanças legislativas, institucionais e administrativas e respectivo desenvolvimento
  - Incluinod aparceria com instituições locais
  - Sustentabilidade da água e sistemas de terras húmidas

Capítulo 16 - Florestas: Praticar e promover a gestão sustentável e participativa dos recursos florestais e outras vegetações madereiras com o fim de melhorar o desenvolvimentosocio-económico e estabilidade emabiental.

Capítulo 17 – Turismo: Desenvolver a indústria do turismo numa forma sustentável,equitativa e responsável e que contribua significativamente para o desenvolvimento eocnómicoda Namíboa equalidade de vida detodoo povo.

Capítulo 21 – Energia: Providenciaros recursos energéticos necessários a recarregar o cresceminento económico da nação de forma eficiente,competitiva e sustentável e providenciar todoso oso parceiros com equidade de opinião.

Capítulo 33 – Redução da pobreza: Reduzir a pobreza e desigualdadesna distribuição das receitas através do fortalecimento mais equitativo e eficiente da disponibilização de serviços públicos para a redução da pobreza na extensão total do país; acelerar a expansão equitativa e sustentável da agricultura; acelerar optções do empoderamento económico não agrícola e providenciar sistemas de segurança para grupos vulneráveis de forma a prevenir que os mesmos caiam na probreza.

Capítulo 35 – Gestão ambiental e sustentável dos recursos: Contribuir para o desenvolvimento sustentável através da promoção do uso sustentável dos recurwsos naturais renováveis,promoçãode condições de vidarural e urbana sustentáveis e da manutenção de processos ecológicos essenciais, diversidade biológica e ecosistemas.

As estratégias do sector incluem:

- Incorporação de custos ambientais e sociais (e.g. água)em todos os níveis de tomada de decisões
- Integrar a planificação do uso da'agua e outras gestões de recuros (e.g. irrigação, gestão da pecuária)
- Harmonizar as políticas de gestãode recursos
- Desenvolver mecanismos institucionais para a integração de políticas sectoriasi,legislação e enfoques de implementação de relativas a gestãocomunitária de recursos
- Descentralizar, devolver e democratizar os direitos e resposabilidades ambientais
- Cooperar com os paises vizinhos sobre o uso e gestão da água e outrosrecuros partilhados e monitoria ambiental

Capítulo 39 – Pesquisa, Ciência e Tecnologia: Desenvolvver a sociedade Namibiana com motivações culturais fortes com um bias para a produção, pesquisa funcional e inovação. Assegurar um desenvolvimento noqualtodos os cidadãos usam, adaptam e aplicam ciência moderna e ferramentas tecnológicas para o progresso de seus níveis de conhecimentos, produtividade, competitividade e responsabilidade.

Capítulo 41 – Desenvolvimento de Parcerias com a Sociedade Civil (OCB & ONGs): Criar um ambiente favorável para as organizaoes da sociedade civil, organizações comunitárias de base e organizações não governamentais de forma a poderem operar efectiva e eficientemente na mobilização, gestão e utilização dos recursos; facilitar o trabalho destas organizações de forma a desmpenharem um papel activo no desenvolvimento social, político e económico da Namibia.

Capítulo 42 – Descentralização: Assegurar o deenvolvimento económico, cultural e social; providenciar as populações ao nível de base a oportunidade de participar nos processos de tomada de decisão em todos os assuntos que hes digam respeito; extender a democracia como um direito baseado nos ideais e valores nacionais.

3.3.3 Politica Namibia sobre Terras Húmidas (Versão Preliminar)

A visão política para as terras húmidas Namibianas é:
A Namibia deve gerir as terras húmidas nacionais e patilhadas de forma efectiva e racional através da protecçao de suas funções ecosistémicas vitais, sistemas de suporta a vida e biodiversidade para benefícios currentes e futuros do bem estar da população, condições de vida e desenvolvimento socio-económico.

Os objectivos da política em apoio a esta visã são:
Proteger e conservar a diversidade das terras húmidas e o funcionamento dos ecosistemas de forma a satisfazerem as necessidade b'asicas humanas
Providencia um quadr para a utilização sustentável dos recursos das terras húmidas
Promover a integracão da gestão das teras húmidas em outras políticas sectoriais
Reconhecer e cumprir com as ogrigações Namibianas nos acordos internacionais e regionai relativos as terras húmidas partilhadas bem como as de importâcia internacional.

Os principios básicos utilizados na plitica nacional de águas da Namíbia, têm por objectivo, providenciar um quadro para o desenvolvimento de políticas sobre questões alusivas a problemática da água (Miistério da Agricultura, Água e Desenvolvimento Rural, 2000) e foram adpatadas para a política ds terras húmidas nos seguintes termos:

i. Sentido de propriedade: atribuido ao Estado, mas com a necessária consideração das necesidades de colaboração e brigações a escala regional, continental e global.
ii. Uso sustentável e equitativo: estes conceitos são fndamentais, tal como o advocado na constituição da Namíbia, NDP2 e visão 2030.
iii. Valor económico: a escassez e vulnerabilidade das terras húmidas no ambiente árido Namíbiano, determina a necessidade de se reconhecer os seus valores económicos totais bem como a inclusão total de seus valores sociais e ambientais.
iv. Consciencialiazação e participação: cometimento a pesquisa e monitria currente, disseminação de informação e participação de todos os parceiros.
v. Abertura e transparência: Informação socio-eonómica e ambiental aberta e acessivel ao público e mecanismos de tomada de decisões sobre terras húmidas feitas com abertura e transparência.

vi. Descentralização onde exista capacidade, a gestão das terras húmidas deve ser descentralizada ao nível apropriado mais baixo
vii. Valores dos ecosistemas e sustantabilidade: o ambiente é um utilizador legitimo e essencial da água de forma a assegura a qualidade da água e manter a funcionalidade ecológica. Todoso os cuiddos devem ser providenciados de forma se protegerem estes serviços
viii. Gestão e planificaao integradas; as terras húmidas têm multiplos usos e funcoes pelo que se trata duma questão trans-sectorial. Elas requrem uma visão partilhada e aplicação de abordagens integradas de gestão.
ix. Clareza nos papeis e responsabilidades institucionas: necessidde de serem claramente identificados e clarificados e separar-se a dimensão política e de regulamentação com a dimensão da gestão.
x. Capacitação: um processo contínuo sobre desenvolvimento istitucional e humano a todos os níveis incluindo a participação pública, privada, ONGs, OCB e outros.
xi. Cursos de águas partilhados: A Namíbia deve cooperar com os países vizinhos e a comunidade internacional no que se refere a conservação, gestão e utilização sustentável das terras húmidas partilhadas e de importância internacional. Em todas as negociações alusivas aos cursos de 'aguas partilhados, a Namíbia de aderir aoprincipios geralmete aceites do direito internacional. Os direitos de uso alocados a Namibia deem respeitar os direitos dos países a monante bem como dos utilizadores a jusante e apoiar a necessidade dos rios partilhados produzirem beneficios optimizados para todos os estados partilhantes da bacia.

3.3.4 Perspactiva Provincial (Regional na Namíbia)

Entre Maio e Agosto de 2001, foi conduzido um inventário sócio-ecológico detalhada n aregião do Kavango na Namíbia, para o projecto 'Todos os Rios Têm o Seu Povo". O inventário focalizou-se na cintur afluvial onde cerrca de 70% dos habitantes vivem incluindo também uma área adjacente dentro do sistema do Kalahari fora do sistema fluvial.. O inventário cobriu 45 aldeais (*e foi*) dividido em quatro componentes nomeadamante:

i. A área do Gciriku
ii. As áreas centrais de Sambyu e Mbunza
iii. A área de Kwangali, e
iv. A área de Mbukushi

O inventário foi conduzido fazendo uso de instrumentos qualitativos e quantitaivos para a intrevista dos habitantes das aldeias, grupos focais (ênfoques formais e informais, mapeamento de recursos) líderes tradicionais, indivíduos envolvidos na medicina tradicional e outros parceiros.

Os resultados que se seguem são amplamente aplicáveis e representam o tip de visão e aspirações das populações da região.

- Os recursos naturais da região devem ser geridos cuidadosamente, usado e desenvolvidos para a geração da base para o suporte das condicções de vida bem com para o benefício económico optimizado dos habitantes da região. Indivíduos e comunidades locais devem ser envolvidos no turismo da região - e o turismo deve ser fortemente promovido – com forma de incrementar a geração de recitas bem como o incremento do control local sobre a terra e recursos.

- Os arranjos institucionais devem ser desenvolvidos e implementados de forma a permitir uma maior cooperação entre os indivíduos, família e comunidades, na gestão, uso e conservação dos recursos naturais.

- O inventário demonstrou a existência dum elevado nível de consciencialização entre os líders comunitários e membros da comunidade sobre as questões e problemas principais alusivos aso recursos naturais associados aso rios, bem como duma boa variedade de possíveis soluções. As intervenções devem ser focalizadas na assistência das comunidades na identificação e solução de problemas locais através da aplicação de soluções pr'aticas e apropriadas ajustadas as circunstâncias locais. Isto devem também involver o fortalecimento das capacidades das autoridades tradicionais e outras instituições relevantes para o fortalecimento das leis tradicionais e outros mecanismos de control acordados relativos a gestão sustentável dos recursos naturais.

- As existentes estruturas comunitárias, instituições, coesões e cometimentos devem ser apoiodos para gerir e conservar os recursos naturais e promover o desenvolvimento sustentável apropriado.

- A comunicação e colaboração ao nível dad bacia entre as diferentes comunidades deve ser encorajada a apoiada de forma a suportar a partilha de ideias e criar o sentido de parceria entre os habitantes da bacia. De forma similar, a comunicaçãoe planificação conjuntas devem ser implementados entre os diferentes níveis de tomada de decisão a partir da aldeia aé ao nível dos lídeers tradicionais, conselhos regionais, governo central e a OKACOM.

- A informação e materiais relevantes devem ser amplamente disseminados e partilhados na extensão total da bacia, cobrindo aspectos sociais, institucionais e ecológicos bem como os de gestão e técnicas de monitoria. A informação deve focalizar-se na rpovisão de conselhos e direccionamento práticos sobre prioridades específicas em vez da conscienciaização ambiental genérica. A capcitação deve focalizar-se no apoio para o estabelecimento de áreas de conservação e gestão comunitárias e instituições locais associadas.

- As intervenções devem apoiar o uso sustentável (consumptivo e não consumptivo) dos recursos naturais em fez da proibição do seu uso.

3.3.5 A Visão para o Desenvolvimento do Nordeste da Namíbia

Em 1999 o governo da Namíbia aprovou a visão par ao desenvolvimento do nordeste da Namíbia, tomando em consideração as oportunidades criadas pela auto-estrada melhorada do Trans-Caprivi, melhores articulações dos circuitos turísticos com os países vizinhos (Botswana, Zambia, Zimbabawe) e oportunidades criadas pela biodiversidade indígena e áreas protegídas para o desenvolvimento rural. Form aprovados os seguintes pontos:

- O parque faunístico do Caprivi deve se re-designado como Parque nacional de Bwabwata e deve incluir o triângulo do Kwando (anteriormente não proclamado) e incorporar o Parque Faunístico de Mahango.
- A área central do Bwabwata deve ser zonificado para a caça desportiva de uso múltiplo, assentamentos humanos e turísmo de base comunitária. As áreas centrasi de Buffalo e Mahango serão designadas para protecção especial e turísmo controlado.
- A pecuária não será permitida no Parque de Bwabwata.
- As comunidades vizinhas ou vivendo no Parque Nacional de Bwabwata devem receberdireitos condicionasi de turísmo no parque, quer através do estabelecimento de empreendimentos apropriados prórpios, ou através de parcerias na forma de joint-ventures nos limites do parque.
- Concursos públicos para o desenvolvimento de lodges turísticos na região do Buffalo devem ser emitidos e alocados aos melhores proponentes, sancionados com base num conjunto de critérios de desenvolvimento.

Desfortunadamente, devido as condições de segurança na regão nordeste resultantes do conflicto em Angola, estes desenvolvimentos não foram implementados. Contudo, a situação tem estado a conhecer melhorias e antecipam-se progresos no desenvolvimento destas proposições.

4. Elemenos Propostos para Visão e Princípios Orientadores

Tomando como base as submissões feitas pelos parceiros da bacia, esta secção providencia algumas sugestões da JEA e NNF sobre o que ele consideram constituir os elementos para a formulção da visão da bacia como um todo bem como alguns elementos preliminares formulados pelo IUCN Botswana sobre o que deverá ser a visão para o Delta do Okavango. A visão para o Delta deve estar em consonância e em harmonia com a visão global da bacia do Okavango. Esta secção também realça algumas sugestões dos princípios orientadores propostos por cada um dos parceiros da bacia qu epoderão cntribuir para o desenvolvimento da visão para a bacia como um todo.

4.1 Elementos propostos para a visão

4.1.1 Sugestões da JEA

A JEA sugeriu que a visão da bacia como um todo deverá ter os seguintes elementos:

- A conservação a longo termo dos recursos
- Atribuição de direitos de acesso as comunidades locais

- Utilização e gestão da água, respeitando as autoridades locais, cultura e orgãos de tomada de decisões
- A água deve contribuir para o desenvolvimento dos Angolanos
- A água e outros recuros naturais devem ser preservados de forma a que possam contribuir para o desenvolvimento das gerações presentes sem compromoter as esperanças e aspirações das gerações futuras

4.1.2 Sugestões da NNF

A NNF sugeriu que a visão deve conter alguns dos seguintes elementos:

- O funcionamento eficiente da hidrologia do sistema
- Um ecosistema diverso, salutar, estável e produtivo
- As populações da região com um bom desenvolvimento, prósperos e cheios de saúde
- A região reflectindo harmonia inter-pessoal, paz e estabilidade política
- A gestão do sistema reflectindo um bom balanco das necessidades a diferentes escalas, desde o nível local ao nacional na dimensão da bacia
- O sistema é gerido e desenvolvido para atingir suas vantanges capprativas e competitivas
- O sistema é gerido para a partilha equitativa dos custos e benefícios
- O desenvolvimento sustentável é atingido na sua plenitude

4.1.3 Sugestões do IUCN Botswana

Tomando como base o projecto ODMP o sIUCN Botswana basicamente providenciou alguns pensamento spreliminares sobre a vis~ao para o Delta do Okavango. Estes pensamentos preliminares são:

Um ecosistema de terras húmidas funcional de improtância local, nacional e internacional, cultural e natural, marcado e cracterizado por ciclos de cheas e secas anuais e de longo termo. A paisagem é pulverizado de vários rios e curso de água perenes, especialmente na área de panhandle, bem como por porções de pantanos vegetados permanentes dominados por Papyrus (*Cyperus papyrus*) e intercalados com lagoas e charcos de águas. Estas condições também geram um conjunto de pântanos sazonais e coasionais caracterizados por vegetação gramínea aberta e ocaionalmente intercalados por ilhas vegetadas. A área suporta uma riqueza de vida vegetal e animal bem como comunidades humanas que reflectem os ciclos históricos naturais de cheias e secas bem como da influência humana ao longo de milhares de anos.

- Um Delta onde as populações vivem e trabalham em harmonia com as qualiades naturais e culturais da área. A economi local é sustentada através duma mixtura de agricultura orgânica de pequena escala, produção bovina, pesca de subsistência e comercial regulamentada, colecção e uso sustentável de produtos das terras húmidas tais como, caniços, capins e outros produtos silvestres, ecoturismo bem gerido e sustentável ao nível comunitário como privado e

baseado numa rede de áreas de gestão faunistica e reservas de caça acordadas e implementadas.

- Um Delta on a população viaja ao longo de todo o ano e goza pacificamente as qualidades especiais da paisagem das terras húmidas e goza duma variedade de ofertas turísticas tais como a caça e safaris fotográficos, campismo e lodges, viajando de barquinhos ou por via terrestre levando a cabo actividades recreativas que sejam compatíveis com as qualidades especiais do Delta e sejam ambientalmente sensíveis e socialmente aceitáveis.
- Um Delta formado por mundaças naturais e onde os que la vivem, trabalham e gerem a área reconhecem a importância de tais mudanças e as influências fundamentais que tenham ocorrido na currente estrutura e funcionamento . Um Delta que em resposta as mundanças incrementais no futuro como consequência das influência do aquecimento global e outras influências humanas, desenvolve um harmonia incremental melhorada de interacções com suas populações com a natureza. Um Delta onde as comunidades locais gozam uma prosperidade económica melhorada através da gestão sustentável e local com o engajamentode seus ambientes naturais circundantes.
- Um Delta que continua a manter a sua reputação internacional como uma das paisagens sivestres prestinas do mundo e a "*jóia do Kalahari*"

a. Princípios orientadores

4.2.1 Angola – JEA

Em termos de princípios orientadores a JEA sugeriu que o uso de águas partilhadas para o benefício dos Estados da bacia ao partilharem uma bacia hidrogr'afica internacional, certos princípios chaves deven ser tomados em consideração. Estes são:

- É necessário que exista um quadro que essegure que as dificuldades presentes não compromotem desenvolvimentos futuros; que medidas preventivas sejam tomadas de forma a evitar actividades e acordos que não tomam em consideração planos de longo termo para a utilização sustentável dos recursos hídricos.
- Diálogo contínuo e consultas entre os países partilhantes da mesma bacia hidrográfica, uma vez que isto é fundamental para o estabelecimento de prioridades claras e acordadas na utilização da água e desenvolvimento de infrastruturas relacionadas. Também, deve ser tomar em consideração as condições e responsabilidades ligadas aos tratados e acordos prévios que tenham sido rubricados entre os países vizinhos.
- Um sistema apropriado de gestão baseado na partilha e acesso aberto a informação
- Através da aplicação de convenções e acordos internacionais apoiados pelo respeito claro a totalidade dos acordos e tratados assinados.
- A participação significativa das instituições locais e internacional em todos os aspectos da gestão dos recursos hídricos.

4.2.2 Namíbia – NNF

Do ponto de vista da prespectiva da NNF, eles gostariam de que a visão da bacia como um todo seja guiada or princípios que sejam aceites por todas as partes. Para este fim, eles providenciaram alguns princípios guias que os Namibianos acham centrais a sua carta nacional e constituição. Estes princípios são:

- Boa governação, paz, segurança e estabilidade política através da democracia, direitos humanos, liberdades individuais, liberdade civil e economia aberta de mercado
- Parcerias, através da criação de um ambiente político conducivo e de incentivos que promova a equidade em termos do género e orientado para resultados e colaboraç`ao entre o governo e soceidade civil incluindo parcerias com o sector privado, ONG, OCB, instituições de treinamento terciário, desenvolvimento de individuos e parceiros
- Melhoria de capacidades, que reconhecem que as populações são o recurso mais importante dos países e que o investimento na população e instituições locais é a pré-condição critica para o desenvolvimento sustentável
- Vantagens compartivas, que capitalize nas vantagens comparativas da região e bacia, providenciando incentivos e reduzindo obstáculos de sua gestão e desenvolvimento e produtivo da região
- Desenvolvimento económico centrado na população, que promova diversificação, equidade, crescimento balanceado e ambiente macro-económico conducivo dentro do contexto das práticas tradicionais, sistemas de conhecimento e culturas.
- Desenvolvimento sustentável, que satisfaz as necessidades do presente sem limitar as futuras gerações de satisfazerem as suas num contexto limpo, produtivo a salutar do ponto de vista social e cológico

4.2.3 Botswana

A IUCN Botswana também realçou a necessidade de se terem princípios orientadores para a visão da bacia como um todo. Os principios orientadores para o Botswana são:

- Democracia
- Desenvolvimento
- Auto-dependência
- Inidade
- *"Botho"* – isto refere-se a um dos pilares da cultura africana – o conceito dum pessoa que tem um carácter bem articulado, cheio de boas maneiras, cortez e disciplinado e que materializa todo o seu potencial quer como individuo ou como parte duma comunidade a que ele ou ela pertence.

Será essencial para os parceiros da bacia em cada um dos estados qeu desenvolvam um conjunto similar de principios que guiem a implementação da visão para abacia como um todo.

5. Conclusões

Esta revisão e inventário de proposições sobre valores, visões e aspirações ao nível nacional, regional e internacional, demonstra que existe informação importante que possa servir de base para a visão partilhada nocontexto da bacia do rio Okavango. Contudo, a informação não é ainda completa; por exemplo, não foi recolhida informação no Botswana e Angola que identifique as aspirações específicas das comunidades locais e do sector privado. Esta informação terá que ser documentada para enriquecer a base de informação para visão da bacia como um todo.

A NNF também sugeriu que a implementação satisfatória duma visão requer uma mudança de paradigmas do sesenvolvimento sectarizado para os enfoques integrados através de parcerias estratégicas. Ist significa que algumas mudanças estruturais possam vir a ser necessárias bem como o pensamento inovador. As novas formas de pensamento e trabalho são propostas:

- Partir-se do desenvolvimento e implementação de planos fixos que se tornam crescentemente ultrapassados para a operação dum sistema adaptativo e dinamico ou processos que podem evoluir continuamente
- Partir-se dum ponto de vista de que é aenas o estado ou governo que se responsabiliza pelo desenvolvimento sustentável para um ponto de vista que reconhece a responsabilidade da sociedade como um todo – um parceria completa – onde o estado ajuda na identificação dos objectivos e ajuda na criação do ambiente apropriado
- Partir-se do processo de tomada de decisões centralizado e controlado para o da partilha de resultados e oportunidades, negociação transparente, cooperação e acções concertadas.
- Partir-se do enfoque nos "*outputs*" (e.g projectos, leis) para o enfoque nos resultados (e.g. impactos) que contribuam sunstantivamente para a realização da visão; e
- Partir-se da planificação sectorial para a planificação integrada dentro e entre os sectores e instituições.

Ao levar-se avante o exercício da formulação da visão para a bacia os parceiros devem também reflectir sobre estas novas formas de agir aqui sugeridas.

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Appendix O. (English)

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

River Basin Governance: The Importance Of Regulatory and Institutional Arrangements in Managing the Okavango River Basin

27th August, 2004

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Acronyms and Abbreviations

ACADIR	-	Association for Environment Conservation and Rural Development
ACORD	-	Agency for Cooperation in Research and Development
ARB	-	Agricultural Resources Board
BCC	-	Botswana Council of Churches
BCC	-	Botswana Council of Churches
BOCOBONET	-	Botswana Community Based Network
BWMA		Botswana Wildlife Management Association
CBM	-	Community Based Water Management
CBNRM	-	Community Based Natural Resource Management
CBO	-	Community Based Organisation
CCF	-	Community Conservation Fund
CEPA	-	Communication, education and public awareness
CHA	-	Controlled Hunting Area
CI	-	Conservation International
CITES	-	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSD	-	Community Service Division
CSO	-	Community Support Organisation
DAHP	-	Department of Animal Health and Production
DART	-	Directorate of Agricultural Research
DGS	-	Department of Geological Survey
DLUPU	-	District Land Use Planning Unit
DOD	-	District Officer Development
DoL	-	Department of Lands
DoT	-	Department of Tourism
DRFN	-	Desert Research Foundation of Namibia
DWA	-	Department of Water Affairs
DWNP	-	Department of Wildlife and National Parks
ERP	-	Every River has its People
FANR	-	Food Agriculture and Natural Resources
FAO	-	Food Agricultural Organisation
GoB	-	Government of Botswana
HATAB	-	Hotel and Tourism Association of Botswana
HOORC	-	Harry Oppenheimer Okavango Research Centre
IRDNC	-	Integrated Rural Development and Nature Conservation
JC	-	Joint Committee
JEA	-	Juventude Ecologica Angolana
JOCT	-	Jakotsha Okavango Community Trust
JPCC	-	Joint Permanent Commission for Cooperation
JPTC	-	Joint Permanent Technical Commissions
KCS	-	Kalahari Conservation Society

KCT	-	Khwai Community Trust
KDT	-	Kuru Development Trust
KMTC	-	Kopano Mokoro Community Trust
LBTC	-	Limpopo basin Technical Commission
MAWRD	-	Ministry of Agriculture, Water and Rural Development
MDBMC	-	Murray-Darling Basin Ministerial Council
MEWT	-	Ministry of Environment, Wildlife and Tourism
MHSS	-	Ministry of Health and Social Services
MLG	-	Ministry of Local Government
MLRGH	-	Ministry of Local and Regional Government and Housing
MMEWA	-	Ministry of Minerals, Energy and Water Affairs
MoA	-	Ministry of Agriculture
MoH	-	Ministry of Health
MRC	-	Mekong River Commission
MZCT	-	Mababe Zukutsham Community Trust
NACT	-	National Council on Tourism
NBI	-	Nile Basin Initiative
NCSA	-	National Conservation Strategy (Co-ordination) Agency
NG 11	-	Ngamiland Controlled Hunting Area number
NGO	-	Non-Government Organisation
Nile-TAC	-	Nile Technical Advisory Committee
NMMAG	-	The National Museum, Monuments and Art Gallery
NNWP	-	Namibia National Water Policy
NWDC	-	North West District Council
NWMP	-	National Water Master Plan
NMC	-	National Mekong Committee
OBSC	-	Okavango Basin Steering Committee
OCT	-	Okavango Community Trust
ODMP	-	Okavango Development Management Plan
OKACOM	-	Permanent Okavango River Basin Commission
OKMCT	-	Okavango Kopano Mokoro Community Trust
OLG	-	Okavango Liaison Group
OMVS	-	Organisation for the Development of the Senegal River
OPT	-	Okavango Poler's Trust
ORASECOM	-	Orange-Senqu River Commission
PACT	-	Private Agencies Collaborating Together (Institutional Reinforcement for Community Empowerment)
PJWC	-	Permanent Joint Water Commissions
PON	-	Polytechnic of Namibia
PWC	-	Permanent Water Commission
RADO	-	Remote Area Development Officer
RAISON	-	Research and Information Services of Namibia
SACU	-	Southern Africa Customs Union
SADC	-	Southern African Development Community
SNV	-	Netherlands Development Organisation
STMT	-	Sankuyo Tshwaragano Management Trust
TCDT	-	Teemashane Community Development Trust
TFC	-	Tsetse Fly Control
TLB	-	Tawana Land Board
UNCBD	-	United Nations Convention on Biodiversity
UNCCD	-	United Nations Convention to Combat Desertification
UNCLOS	-	United Nations Convention on the Law of the Sea

UNEP	-	United Nations Environmental Programme
UNFCCC	-	United Nations Framework Convention for Climate Change
VDC	-	Village Development Committee
VTC	-	Village Trust Committees
WASP	-	Water Supply and Sanitation Sector Policy
WERRD	-	Water and Environmental Resources in Regional Development
WHO	-	World Health Organisation
WIMSA	-	Working Group for Indigenous Minorities in Southern Africa
WMA	-	Wildlife Management Area
WRA	-	Water Resources Agency
WSDS	-	Water Sector Development Strategy
WUC	-	Water Utilities Corporation
ZAMCOM	-	Zambezi Watercourse Commission

Executive Summary

the Okavango River Basin is one of the few large rivers in the world that has so far remained relatively pristine without notable man made developments. The Okavango River basin states have different socio-cultural interests, demands and development objectives. The Okavango River is shared by three countries, namely Angola, Namibia and Botswana. The use and management of natural resources in this river basin is affected by numerous challenges associated with water sharing and allocation between and among the three riparian states, as well as the different water use governance instruments. The nature of water governance in any given setting relies to a large extent on the regulatory and institutional frameworks that exist in a country or river basin. An understanding of the existing regulatory and institutional arrangements is crucial to the promotion of the long-term sustainable management of the Okavango River Basin. This review, commissioned under the *Sharing Water* project focused on the regulatory and institutional aspects of Okavango River Basin governance. The main purpose of the regulatory and institutional review report is to provide the Okavango River Basin states with information that will assist them to strengthen the regulatory and institutional frameworks for the effective development and transboundary management of the basin.

The use and management of water and related resources in the Okavango Basin is governed and influenced by a number of regulatory frameworks, which include international agreements and conventions, regional protocols, basin level agreements, national policies and national laws.

International Agreements and Conventions provide a platform for cooperation and collaboration among Okavango River riparian states. Whilst some countries within the basin have incorporated some of the elements found in these international conventions into their national water regulatory frameworks, it is not apparent that the basin states are using these provisions to facilitate collaboration and cooperation in the development and management of the Okavango River Basin.

Like the International Conventions, Regional Agreements and Protocols are important sources of guiding principles in the sustainable utilisation of shared waters of the Okavango Basin. The formulation and signing of the OKACOM Agreement is a very proactive initiative taken by the Okavango River riparian states to translate the provisions and principles of the regional agreements and protocols to theOkavango Basin. Whilst the regional agreements and protocols (including the OKACOM Agreement) act as instruments of collaboration, they are hardly enforceable if they are not translated into the national water regulatory framework. Some countries of the Okavango River Basin have reformed their laws to take into account some of the principles found in these instruments, while others are still to do this.

While at present there are no policies formulated at the river basin level, the policy frameworks regulating water resources in the three riparian states generally promote the optimal and sustainable utilisation of water resources within the Okavango River Basin. While there may be apparent differences and focus in the national policy provisions between the Okavango River Basin states, all the national water policies whether still in draft or approved, recognise the existence and importance ofinternational/transboundary water.

The extent to which the water legal frameworks of each basin state incorporate international water law principles promoting optimal and sustainable use of shared river basins vary from country to country. This variance probably reflects the different stages of water law reforms in the respective countries. For those countries that are still to reform their water laws, it is important that the new legal frameworks adequately reflect the international water law principles necessary to achieve the sustainable utilisation of transboundary rivers.

The review of institutional frameworks has shown that different institutional arrangements exist in the Okavango River Basin. While at the basin level, institutions (especially government) are organized

under OKACOM, the stakeholders within each of the three countries are organized according to institutional models that show some variation. While there are marked differences between and among countries, the review and analysis of institutions have shown that there are some common elements of institutional arrangements found in each of the three countries.

At the basin level, the apex/lead institutions are coordinated under OKACOM. As a basin-wide structure, OKACOM has been very effective in facilitating inter-state technical and ministerial interactions. However, the organization has some serious capacity constraints. All the OKACOM Commissioners hold full-time positions in the ministries, enabling them to spend only a limited amount of time on OKACOM duties. Therefore, the Commissioners only meet once a year. Due to the nature of the OKACOM Agreement, the current arrangements within OKACOM are perpetuating the segmentation of decision making to the interests of the three sovereign countries. The formal operational water organizations, (directly responsible for the operational management of water resources in each of the riparian states) are members of the Okavango Basin Steering Committee (OBSC). Interaction and coordination between these three institutions is facilitated under this Steering Committee. Since its incepton, nine years ago, the OBSC has held 13 meetings, a number far too small to facilitate effective interaction and the sharing of data and information on the developments in the basin. In addition, there are capacity imbalances between the three riparian states with regards to technical capacity, financial resources and the ability to collect, monitor and generate information on the basins resources also poses a challenge.

While all the riparian states have a number of other formal government institutions that use water and whose activities have an impact on water resources, decentralised water structures and formal water related organizations, there seems to be no clear mechanisms of collaboration nor coordination between these structures across the basin. However as far as collaboration around research is concerned, the riparian states have recognised the potential of using HOORC as platform for joint research if its mandate is extended. The current institutional capacity within HOORC can easily be used to stimulate basin wide research and educational links.

The community stakeholders in the basin are coordinated through the Basin-wide Forum established under the Every River has its People project (ERP). One of the key activities of this project is to develop formal participation mechanisms for communities to have a voice in basin-wide decision-making and interact with other groups such as OKACOM. Through its three workshops and the Shared Okavango Database, the *Sharing Water* project has also advanced basin-wide interaction between the informal and formal interested organizations and groups.

The review of the regulatory and institutional arrangements in the Okavango basin has identified a number of key emerging issues and challenges, which include:

The regulatory frameworks relevant for the management of shared watercourses in the three riparian states are not harmonised. There is also a need to streamline other sectoral policies (within development oriented ministries) that tend to negatively impact shared watercourses. Some of these policies emphasise economic, and industrial development with little or no consideration for the environment, conservation or the hydrological integrity of transboundary rivers.

A gap in the regulatory frameworks of the three basin states is the lack of provisions and clear statements that promote the equitable and reasonable utilisation of shared river basins as provided for in international law. Whilst some countries have included such provisions in draft policy documents and legislative instruments, other countries are still to do so. The policy and legal provisions also do not make provisions for mechanisms to enforce principles of international law including dispute settlement and conflict resolution mechanisms.

In addition, the element of sustainability lacks in some sectoral policy and legislative instruments that impact shared watercourses, such as industry, trade, and investment, which generally emphasise on development without necessarily providing for sustainability.

The OKACOM Agreement does not obligate member countries to utilise the Okacango River Basin in an equitable and reasonable manner as stated by international law principles embedded in the UN Convention on Shared Watercourses and the Revised SADC Protocol on Shared Watercourses. Furthermore, the Agreement does not contain provisions that ensure effective implementation and enforcement such as dispute settling and conflict resolution mechanisms with corollary sanctions.

The platforms for effective cooperation and cross-sectoral coordination are generally weak. Considering the diversity of stakeholders in the basin, national, and local level, issues of cooperation and coordination remain a key challenge for transboundary management of the Okavango Basin. While OKACOM is attempting to become a platform for inter-state interaction at the technical and ministerial level, it will need to advance beyond its current structure into a fuller platform for formal and informal dialogue.

There are no effective mechanisms for dealing with transboundary conflicts in the Okavango River Basin. Based on the current review of institutional frameworks and arrangements, there are no clear provisions in the OKACOM agreement of dealing with conflicts. Under the OKACOM Agreement disputes are to be referred to the Contracting Parties. But the Agreement is silent on the mechanisms for settling disputes within the basin. Institutional mechanisms for conflict resolution and management are required at the basin and, to some extent, sub-basin level.

There is no common developmental vision shared by the three basin states. This review of institutional frameworks and arrangements in the Okavango River Basin has revealed that the current frameworks lack clarity in terms of what they are supposed to achieve in the long term. The institutional arrangements lack a common and shared developmental vision. Although the current institutional arrangements (both formal and informal) tend to rally around OKACOM, efforts are still required to develop common goals or a vision of the future that is attractive for large sections of society in the basin.

There is no basin-wide authority to organize and coordinate the cooperation between the three riparian states. Although the Revised SADC Protocol on Watercourse Systems makes provision for the establishment of river basin authorities, the riparian states have not fully used the provision to establish the necessary structures for the effective and sustainable management of the Okavango River Basin. While OKACOM provides for inter-state interactions, a basin-wide authority is required to organize and supervise the cooperation of the three riparian states.

There are no clear mechanisms for facilitating cooperation, integration, joint monitoring or networking between and among the various stakeholders operating in the basin. Within the Okavango River Basin there is a rich institutional landscape and numerous stakeholders, with a variety of different interests, which together create an intrinsically complex web of relations. An effective institutional structure for river basin management should facilitate the necessary cooperation within the water management sector and between sectors in order to achieve sustainable water use and maintain the balance of the system.

The information flow and communication arrangements between and among the various stakeholders are not very effective. While the OKACOM Agreement stipulates that member countries are obliged to provide information required by the Commission in furtherance of its duties, there are no formalized institutional arrangements for communication and information flow within

the basin. As a result, there is very little communication and synergy between activities of stakeholders, OKACOM, government, and other institutions.

Within the Okavango Basin, effective stakeholder/community participation in river basin development and management poses a serious challenge to the sustainable use and management of the basin's resources. Institutional structures within the basin should provide mechanisms for the active participation of all stakeholders in river basin management including interest groups, local communities, environmental NGOs and women. Although OKACOM and some national structures provide a forum for government stakeholder participation, this institutional review has observed that there is poor communication between national agencies. At the basin level, the effective participation of stakeholders/communities in OKACOM and other arrangements remains a challenge. While the Every River has Its People project provides a good opportunity for this participation. The opportunity is consticted by the project's funded lifespan. Furthermore, the ERP created Basin-wide Forum is governed by informal rules since it is not yet a legal structure.

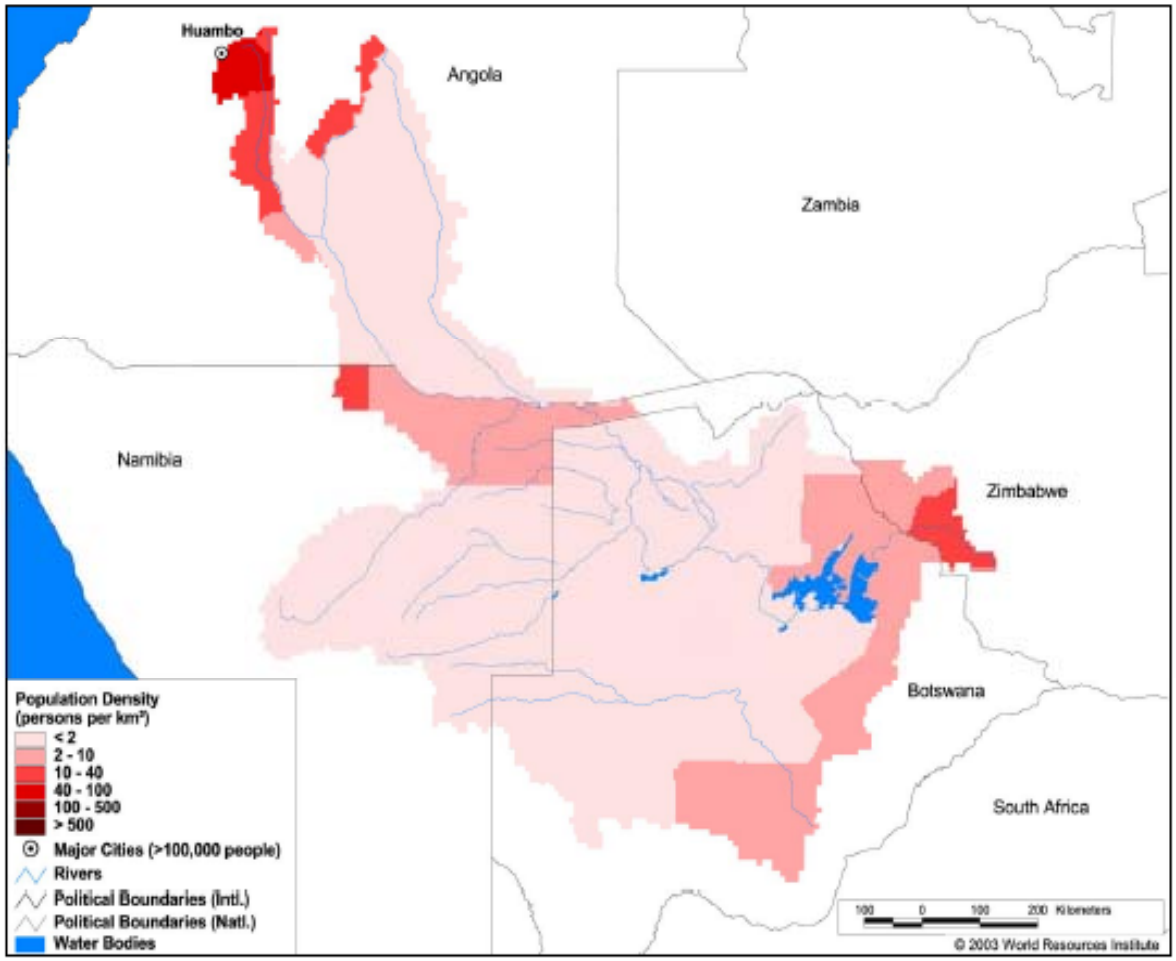
Finally, inadequate provision of financial resources remains a key constraint for the institutional arrangements of the Okavango basin. The financial resources available to the three countries differ greatly and national budget allocations to government agencies are limited. Furthermore, private sector investment in the basin has not been mobilized. The three basin states need to increase the budget allocation for institutions working in the basin and mobilize private sector contributions to the development and management of the basin.

1. Background

1.1 The Okavango River

The Okavango River is shared by three countries, namely Angola, Namibia and Botswana. The Okavango basin which lies in a water scarce region of Southern Africa, is characterized by a complex ecosystem. The river rises in Angola as the Kubango and is joined by the Cuito River before crossing the Caprivi Strip of Namibia and flowing into Botswana, where it forms the Okavango Delta swamps (see figure 1). The river links up occasionally with the Zambezi river via the Selinda spillway, which backs up in times of high flow in the Kuando/Chobe/Linyati and floods into the Okavango Delta (Turton A. R. et al, 2003). The Okavango River can be described as a perennial endoreic river with some ephemeral tributaries.

Figure 1: The Okavango Basin (inclusive of the Makgadikgadi System)



Source: Watersheds of the World, Water Resources eAtlas, IUCN/IWMI/ Ramsar/ WRI, 2003.

The Okavango River Basin has remained a relatively pristine ecosystem and is one of the few large rivers in the world without notable man made developments. In Angola, the uppermost riparian state, no development has taken place in the catchment since the civil war started in 1975. Namibia,

the second riparian state, currently pumps water from the Okavango for domestic and irrigation use in its north-eastern regions. Botswana, the lowermost riparian state, has not made any major developments on the Okavango Delta within its borders[1]. Activities that occur in the Delta include recreation, tourism, subsistence farming, fishing and livestock grazing. Although Botswana and Namibia are considered water poor, neither country has withdrawn an appreciable amount of water from the Okavango River. Consequently, the river and delta have remained relatively intact. However, under changing socio-economic conditions in Angola and water scarcity conditions in Namibia and Botswana, proposed developments for water diversions now threaten the pristine condition of the Okavango River Basin.

1.2 The Okavango Basin States

The Republic of Angola, located in the northwestern part of southern Africa[2], has a total area of 1,246,700 square kilometres. The country generally has a tropical climate with the coastal areas being arid or semi-arid, largely due to the Benguela current. The rainy season occurs during summer (October to April) and the rainfall levels vary between 1,500mm/a in the northeast and 100 mm/a in the desert area along the coast in the southwest[3]. Angola has abundant surface water due to high annual precipitation accounting for surface overflows of 140 000 cubic Mm/a. The country has a complex hydrological system consisting of 47 major river basins including the Cunene, Cuvelai, Zambezi, Congo and the Okavango, which Angola shares Rivers with Botswana, Namibia, Democratic Republic of Congo and Zambia[4]. Most of these rivers drain into the Atlantic Ocean Angola, which is the upstream riparian state, accounts for the largest portion of the Okavango Basin within its borders (approx.46%). Perhaps equally as important, precipitation in Angola's upper catchment contributes an average of 95% of the annual river inflows[5]. The long years of civil war decimated Angola's infrastructure and a disenfranchised its population. In conclusion, given its upstream position in the Okavango Basin, the manner in which Angola implements its water sector re-development strategy will have profound downstream implications.

Botswana, located downstream of the Okavango River, has an arid climate with mean annual rainfalls varying between 250 mm and 650 mm. Evaporation varies between 2,200 mm/a in the south of the country and 1,900 mm/a in the north. Because of the extreme arid hydroclimatic conditions, it is estimated that of all the rainfall the country receives 80% evaporates and only 2% remains as surface runoff[6]. Water is therefore a very significant and strategic resource for Botswana. Water resources are categorised into two categories, namely, internal water resources and shared water resources[7].

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[4] Robinson P, *Angola Water Policy Review*, SADC Water Sector, 2003
[5] Krishna Talukdar, *The Okavango River Basin – A Case Study*, Institute of Geodesy and Photogrammetry
Swiss Federal Institute of Technology Switzerland
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[6] Krishna Talukdar, *The Okavango River Basin – A Case Study*, Institute of Geodesy and Photogrammetry
Swiss Federal Institute of Technology Switzerland
ETH Hönggerberg 2003
[7] Heyns P, *Botswana Water Policy Review*, SADC Water Sector, 2003

Internal water resources include ephemeral river systems, and groundwater supplies. Shared water resources, on the other hand, consist of shared river basins, including the Zambezi, Limpopo, Orange and the Okavango Rivers. Botswana, one of Africa's oldest democracies, derives the most benefit from the continued ecological vitality of the Okavango Delta because it is the mainstay of the country's tourism industry. Botswana will cope with increasing demands from upstream riparian states, Angola and Namibia, for the use of the waters of the Okavango River. The Okavango Delta supports a key component of Botswana's growing tourist industry and sustains many thousands of rural inhabitants in an area characterized by a harsh dry environment.

Namibia is situated in the western part of southern Africa, bordering Angola and Zambia in the north, Botswana in the east, and South Africa in the south. It also has an arid climate with mean annual rainfall ranging between 0 mm along the Atlantic Ocean coastline, and 700 mm in the eastern Caprivi region[8]. The average rainfall for the whole country is 250 mm/a[9]. Due to the extreme hydroclimatic condition in Namibia, it is estimated that 83% of the precipitation is immediately lost to evaporation (Heyns, P. 2003). This has severe implications on surface runoff and groundwater resources[10]. Water resources in Namibia, like in Botswana are categorised into two groups: the internal water sources and internationally shared water sources. The internal water sources are ephemeral in nature and comprise of surface runoff, groundwater, and unconventional sources[11]. Shared water sources on the other hand, comprise of the perennial rivers includng the Cunene, Orange, Zambezi and Okavango Rivers. The other shared water source is the ephemeral Cuvelai River system. Namibia already faces significant water stress and is looking for additional supplies to augment its scant water resources.

The demands and development objectives of each basin state present opportunities and challenges to water sharing and allocation in the Okavango Basin.

1.3 Purpose of the Review

This review, commissioned under the *Sharing Water* project, focused on the regulatory and institutional aspects of river basin management governance. An understanding of the existing regulatory and institutional arrangements is crucial to the promotion of long-term sustainable management of the Okavango/Kubango River Basin. Within the context of the issues and challenges faced by the basin states, the main purpose of the regulatory framework and institutional review report is to provide the Okavango River Basin states with information to develop effective regulatory and institutional frameworks for the development and management of the Okavango River Basin. Furthermore, the results of this review will support OKACOM in its mandate to develop and implement the integrated management plan for the basin.

The review of regulatory frameworks focused on detecting gaps in the laws and policies governing the basin and determining the congruency in the laws and policies to demonstrate where they can be harmonized. The institutional part of the review focused on identifying institutions and stakeholders in the basin at local, national and regional levels; determining the specific roles played by institutions in the management of the Okavango River Basin; identifying possible gaps and shortfalls in the institutional arrangements at local, national and regional levels.

The report begins with an overview of the Okavango River Basin and the purpose of the review. The conceptual framework follows this, which highlight the importance of regulatory and institutional

[8] Piet Heyns, *Namibia Water Policy Review*, SADC Water Sector Report (2003)
[9] Piet Heyns, *Namibia Water Policy Review*, SADC Water Sector Report (2003)
[10] Piet Heyns, *Namibia Water Policy Review*, SADC Water Sector Report (2003)
[11] Unconventional water sources include wastewater that is recycled, reused or reclaimed. It also includes desalinated brackish water.

structures in river basin governance, highlighting the examples and experiences that exist worldwide. Section 3 of the report provides a catalogue of the regulatory and institutional frameworks in the basin. This listing of policies, laws and institutions is supplemented by a short comparative analysis. The last section of the report includes key issues emerging from the review.

The scope of this report is restricted to generic regulatory and institutional issues, gaps, constraints and challenges on the current institutional arrangements as opposed to the analysis of the strength and weaknesses of each country's regulation and institutional frameworks.

2. Governance in Shared River Basins

With more than 293 river basins shared by two or more countries worldwide, water governance is recognized as a critical issue to the effective development and management of river basins. The term *"governance"* as used in this report refers to "*the framework of social and economic systems and the legal and political structures through which the people of the basin uses and manages water and related resources*"(GWP TAC Paper No.7, 2003). The governance of water resources can take many different forms depending on the economic, cultural and traditional political norms of a country and the behaviour of legislature and legislators. The word *"regulation"* as used in this paper refers to the *"framework of control,"* which includes the use of *specific tools* of controlling/regulating such as legislation, policies and practices to achieve effective management. The term *"institution"* as used in this document refers to *formal or informal organisations.*

A river basin, being a geographical area determined by watershed limits, including surface and groundwater flowing into a common terminus, is a subject of joint responsibility, protection, management and improvement. The management arrangements of river basins should therefore consider the whole river basin as a single ecosystem or unit, regardless of the jurisdictions of the area to be managed and this calls for effective transboundary governance structures. The importance of effective water governance within a river basin context has been highlighted at various global fora discussing water resource management issues. For instance, the global framework for action to achieve the Vision for Water, Life and the Environment in the 21st Century highlighted the fact that the water crisis being faced by the world today is in reality a governance crisis. The Framework for action developed to achieve the global vision identified effective water governance as one of its key targets for action. The global water community considers effective governance as a basic element of good integrated river basin planning and management.

The management of water resources in a shared river basin involves a range of actions carried out on the river itself and in the greater watershed in order to guarantee the function of the river as a source of water and protect the functions of the river basin as an ecosystem. It is critical to achieve consensus between and among the various actors in the basin as wellas synchronize the numerous uses and basin-wide demands with the goals and interests of each riparian state. The experiences of river basin management from various parts of the world have shown that effective governance instruments can bring about consensus, facilitate the synchronization of multiple demands, and are necessary to effectively manage the issues of groundwater and surface water, quantity and quality, and land and water use.

A literature review of shared river basin management practices has revealed that many shared river basins face a variety of similar challenges and threats such as watershed degradation due to erosion; clearance and decline of native vegetation; wetland degradation; uncoordinated and inappropriate policies; failure to apply existing regulations; technical knowledge gap; inadequate community education and inaccessibility to information; inappropriate land use and management practices; as well as insufficient support to community activities. A number of these problems seem to arise from the fact that there are no effective regulatory instruments nor institutional arrangements that can effectively foster coordination and collaboration around the development and management of the

basin. In many cases, the severity of threats faced by the basin has provided impetus for developing effective water governance and arrangements for sharing the water.

More specifically, literature on river basin management in Africa and elsewhere in the world has shown that there are several dimensions to water governance. The fact that water resources cross different administrative boundaries and influences every aspect of human life, means that special regulatory and institutional arrangements are needed before one can start setting up management systems for river basins. Where these arrangements have been established, they have tended to guarantee sustainability and resilience of mutual management frameworks even in conditions of external and internal instability.

One key element of governance is to create a framework (regulatory and institutional) within which people with different interests can peacefully discuss issues of mutual concern and agree to cooperate and coordinate their actions. The nature of water governance in any given setting relies to a large extent on the nature of regulation and institutional setting that exist in a country or river basin. There is growing perception that the governance of water resources functions more effectively with open social structures which enable broader participation by civil society. Although there is no single ideal model of water governance, it is widely recognized that for governance to be effective, the system must fit the social, economic, and cultural particularities of each country.

2.1 Regulatory Arrangements for River Basin Management

The term regulation as defined earlier refers to a framework of policies, legislation, and practices designed to regulate the use and management of shared water resources. Various models of regulatory frameworks and arrangements have been applied worldwide to govern the management of shared river basins. The most commonly used instruments include international agreements and conventions; regional agreements; and national policy and legislative (laws) instruments. We will review each of these instruments below.

2.1.1 International Agreements and Conventions

There are a number of international agreements and conventions that have been developed to regulate the management and use of water and related resources. Among others, these include the United Nations Convention on the Law of Non-navigational use of International Watercourses (UN-Convention), The Convention on Wetlands (Ramsar), United Nations Framework Convention for Climate Change (UNFCCC), United Nations Convention on Biodiversity (UNCBD) and United Nations Convention to Combat Desertification (UNCCD). These instruments provide an important part of the platform for international cooperation in the management of water and related resources.

2.1.2 Regional Agreements and Protocols

The most commonly used regulatory framework for river basin management at the regional or basin level is an agreement and/or protocol signed by the basin states. River basin agreements and protocols have been developed and applied in a number of basins throughout the world. In the Murray-Darling Basin for example, the five states sharing the basin have successfully achieved equity, efficiency and sustainable use of land, water and environmental resources in the basin through the development and enforcement of the Murray-Darling Basin Agreement. Within the Nile Basin, one of the hotspot areas in Africa, a Cooperative Framework and Headquarters Agreement (signed in 2002) is presently facilitating the development and implementation of cooperative principles, rights, obligations and institutional structures for the development and management of shared water and related resources. The Nile River Basin Cooperative Framework and Headquarters Agreement has fostered cooperative development in a region where consensus and compromises were once a mere dream. In West Africa, the Senegal River Water Charter signed in May 2002, provided the framework for the establishment of a legal and regulatory framework stating that river water must be fairly

allocated to the various use sectors. In Asia, the management of the Mekong River Basin is governed by an Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin (5 April 1995) under which the member countries agreed to cooperate in the fields of sustainable development, utilization, management and conservation of the water and related resources of the basin, such as navigation, flood control, fisheries, agriculture, hydropower, navigation, timber floating, recreation and tourism, and environmental protection.

Within the SADC region, there are over 21 agreements between different SADC countries concerning joint cooperation in various fields, including water resources of mutual interest. In some cases the agreements deal with a large number of general topics including water, while others refer specifically to the use of a river basin or a specific project. Recently, the Zambezi Basin riparian states signed the ZAMCOM Agreement, which sets the provision for the effective management of the shared Zambezi River, including the course of action that should be taken in the event of non-compliance with the provisions of this Agreement. This Agreement also describes how data and information will be shared among the riparian states; implementation of planned programmes, projects or activities by Member States; the approaches for emergency situations such as natural disasters; and settlement of disputes. An important regional regulatory instrument in the region is the Revised Protocol on Shared Watercourse Systems of which the three basin states of the Okavango are signatories.

2.1.3 National Policy Instruments and Legislation (Laws)

The normal regulatory arrangement for the management of a shared river basin recognizes that water resources in a shared basin fall under the jurisdiction of the respective riparian state governments. At this level, the management of water resources is regulated by the national policies and legal framework of the country concerned. Although policies and law provisions vary from country to country, there are common threads found in most policies and legislative instruments. Most of the policies and laws are designed to deal with water rights and obligations, water allocation, water resource planning and management, monitoring and enforcement. These laws rarely address transboundary water management.

2.2 Institutional Structures

Global experience with river basin coordination and organizational arrangements provide a wide array of examples and lessons. There are numerous ways of organizing stakeholders in a shared river basin. Although there is no ideal type of institutional arrangement that can be prescribed for each basin or country, generic structures exist throughout the world. Stakeholders can be organized under river basin commissions, joint committees, basin fora, technical working groups, etc. The experiences of river basin management in the Murray-Darling, Mekong, Denube and many others have shown that a stable institutional framework, with representation from the top to bottom tiers and supported by appropriate legislation and cooperative arrangements covering the whole basin, is one of the key elements of sustainable river basin planning. These experiences have also revealed that the resilience of institutional frameworks is very important in addressing issues of cooperation and conflict management in transboundary water resources.

2.2.1 Basin Level Organizational Structures

The management of shared river basins, wherever they are found, is complicated because the responsibility for various aspects is shared among various institutions and stakeholders. Coordination between and among various players in the basin is a critical aspect of institutional frameworks for river basin management. Water resources planning and management is a multidisciplinary process, which requires a sound collaborative framework among all relevant agencies operating nationally and in the river basin. One key issue in river basin management is the division of management responsibilities for one river basin between different administrative authorities resulting in

fragmented approaches. A number of basin organizations are operational worldwide. These are organized according to institutional models that show a wide variation in their tasks and structure.

For example, in Australia, the management of the Murray-Darling Basin is coordinated and facilitated by a structure, which comprise the five Governments (Commonwealth, New South Wales, Queensland, South Australian and Victoria), Murray-Darling Basin Ministerial Council (MDBMC), Community Advisory Committee, Murray-Darling Basin Commission and the Commission Office. These various layers make up the forum where strategies and policies are set out for sharing the water and managing the serious problems of water quality in the basin. The Ministerial Council has the power to make decisions for the basin as a whole because of the presence of Ministers representing each of the States and Territories. Resolutions of the Council are arrived at through consensus. In theory, this means that decisions taken by the council represent a consensus of governmental opinion and policy across the basin at a point in time. However, the Ministerial Council relies on the States to implement any decisions taken. A community Advisory Committee, which reports to the Ministerial Council serves as a two-way communication channel between the ministerial Council and communities living in the basin. The Murray-Darling Commission is an autonomous organization equally responsible to the governments represented on the Ministerial Council as well as to the Council itself. It is a rather unusual entity in that it is neither a government department nor a statutory body of any individual government (Darla Hatton MacDonald and Mike Young, 2001).

In the Mekong River Basin, the Mekong Agreement is the Mekong River Commission (MRC) is the primary institution whose main mission is to promote and coordinate sustainable management and development of water and related resources for the countries' mutual benefit and people's well-being by implementing strategic programmes and activities and providing scientific information and policy advice. The MRC was established by the signatories of the Mekong Agreement. Although China does not participate in the MRC, the organization enjoys the status of an international body, including entering agreements and obligations with the donor or international community for the purpose of exercising its functions. The MRC consists of three permanent bodies: the Council, the Joint Committee (JC) and the Secretariat. The Council includes one member at ministerial and cabinet level from each MRC member country and convenes annually. The Joint Committee, comprising also one member from each member country at no less than head of department level, convenes at least twice per year. The Secretariat, which provides technical and administrative services to the Joint Committee and the Council,, is under the direction of a Chief Executive Officer (CEO) appointed by the Council. Under this arrangement, the budget of the Commission consists of contributions from its members and donor community. Formal consultation with the donor community is preceded through an annual Donor Consultative meeting.

Within the Nile Basin, the stakeholders are organized under an initiative called the Nile Basin Initiative (NBI). Under this arrangement, the Nile-COM, whose chairmanship rotates annually, serves as the highest decision-making body of the NBI. Nile-COM is supported by a Nile Technical Advisory Committee (Nile-TAC), which is composed of two senior officials from each member country. The NBI maintains a secretariat, the Nile-SEC, located in Entebbe, Uganda. In the Senegal River Basin, the Organisation for the Development of the Senegal River (OMVS) is considered a strong organization, which links the three member states sharing the basin. OMVS is integral to all aspects of cooperation in the region, including the continued healing of wounds from the 1988 conflict. The economic needs of the basin states in the Senegal Basin are given the absolute priority in all joint projects on the river, with the environment and considerations of long-term sustainability not receiving adequate attention. Diplomatic relations between Mauritania and Senegal were restored through the OMVS, which at the time was the only administrative structure common to the two states, which helped the countries to meet and negotiate the successful and conciliatory sharing of the resources of the Senegal River.

In southern Africa, activities within river basins are organized around a variety of structures, which include Joint Permanent Technical commissions (JPTC), Permanent Joint Water Commissions (PJWC) and River Basin Commissions. The various agreements that have been signed to facilitate the management of the more than 21 shared river basins facilitated the establishment of several bodies, of which the Okavango riparian states are party to. Some examples of Shared River Basin Organization in Southern Africa are provided in Box 1.

Box 1: Some Examples of Shared River Basin Organization in Southern Africa

- Joint Permanent Technical Committee (JPTC) on the Limpopo River between Botswana and South Africa, 1983;
- Limpopo Basin Permanent Technical Committee between Botswana, Mozambique, South Africa and Zimbabwe established in June 1986.
- Permanent Joint Technical Commission on the Cunene River between Angola and Namibia established in 1990.
- Joint Permanent Water Commission between Namibia and Botswana, to deal with the utilization of water resources from the Kuando/Linyanti/Chobe River system 1990.
- Permanent Water Commission on the Orange (Gariep) river between Namibia and South Africa established in September 1992 at Noordoewer, Namibia.
- Agreement on the establishment of the Vioolsdrift and Noordoewer Joint Irrigation Scheme on the Lower Orange River, 1992. A Joint Irrigation Authority was created to operate the irrigation scheme straddling the river along the border;
- Permanent Okavango River Basin Water Commission (OKACOM) between Angola, Botswana and Namibia, 1994;
- Orange-Senqu River Commission (ORASECOM) between Botswana, Lesotho, Namibia and South Africa, 2000.

The Zambezi Watercourse Commission (ZAMCOM) is one of the newest bodies to be created in soutnern Africa through the signing of the ZAMCOM agreement (July 2004). The ZAMCOM Agreement established a Joint Permanent Commission comprising of the eight countries that share the basin. The main objective of the Commission is to promote the equitable and reasonable utilization of the water resources of the Zambezi River as well as its efficient management and sustainable development. The Commission under the ZAMCOM Agreement will work with an elaborate structure comprising of the Council of Ministers, a Technical Committee, and a Secretariat.

2.2.2 National Level Organizational Arrangements

Despite the fact that a river basin may be shared, the management of the water body that falls within the territorial boundaries of a country is the sole responsibility of that country. The organizational arrangements for the management of water resources at the national level vary widely between and among countries. While the structure of a river basin organization may extend to a country, as is the case with the Mekong Commission, the national organizational arrangements are the responsibility of each country concerned. For example, in the Mekong Basin, the MRC established the National Mekong Committees (NMCs), which are important arms of the MRC. These committees act as focal points for the Commission in each of the member countries and are the principal implementers of MRC programmes and projects. In some cases, the basin level structures define the general responsibilities of basin states.

This is also the case with the ZAMCOM arrangement in which basin states are obliged by the agreement to take all appropriate technical, legislative, administrative and other measures in the

utilization of water, conduct their management and development plans, collaborate closely with civil society, institutions and organizations responsible for water resources management, development and utilization, and take the necessary legislative, administrative or other measures to implement the privileges and immunities provided for in the Agreement.

While it is impossible to describe the wide range of country level institutional arrangements in existence, the organizational arrangements that have proved successful at the country level tend to include a number of common elements, such as an apex body, operational bodies and decentralized structures. At the central government level, most countries have an apex body or lead organization (in the form of a ministry) whose main function is to ensure ownership and allocation of water, set principles of water management, design institutional and regulatory arrangements (laws, policy, operational guidelines and technical control). This apex body often decides on the mechanisms for water management and the institutional arrangements required based on the situation in the country. In many countries, this body is bestowed with adequate authority to lead other technical ministries in order to ensure coordination and sustainable use of water resources. While it may not be the norm in some countries, the coordination and regulatory functions are attributed to different distinct ministries. This allows for harmonization of water policy provisions with those of other water related policies. This harmonization, where effectively achieved can ensure the sustainability of the water resource base and the integrity of water dependent ecosystems.

The apex/lead body can delegate the allocation and management rights to a designated operational organization, which will be entrusted with the maintenance of water systems. The management of shared river basins should have an appropriate institutional arrangement that allows decisions to be made at both basin and lower levels. This is in line with the Rio/Dublin principles. In countries where the water sector reforms have been carried out, water resources management has been decentralized to the lowest appropriate levels. The main rationale for decentralized systems is to promote a sense of ownership and directly involve stakeholders in initiating and implementing programmes and activities of the institutional framework and arrangement. In many shared river basins, the formation of special districts/regional authorities and watershed or conservation associations has promoted intergovernmental coordination and decentralization of authority and responsibilities to the lowest level. A number of countries in Southern Africa have established catchment and sub-catchment councils or committees to facilitate the effective management of water resources. However, in the delegation of power to decentralized structures, it is critical to maintain a balance between central government and these structures. If too much decision is delegated to the lowest appropriate level, this may threaten international cooperation.

2.2.3 Some Key Institutional Success Factors

Irrespective of the level of operation, the experience of water resources management institutions reveals some common key factors that have provided effective water governance in river basins. The experience throughout the world has shown that integrated management cannot achieve its full potential if there is *no common overall objective*. As a single unit affected by the interplay of a multitude of stakeholders whose interests and aspirations are sometimes competing and conflicting, a common shared vision and/or aspiration is a very important dimension in the institutional frameworks and arrangements. This is the case in the Murray-Darling and Nile basin cases.

Integration and interaction between and among the various stakeholders can only be effective if *well-defined procedures* are clearly laid out. The experience in the Murray-Darling and Mekong River Basins indicates that well-defined procedures of interaction between the basin organization and national agencies are key to the success and effectiveness of institutional frameworks and arrangements in these shared river basins. In these frameworks and arrangements, traditional regimes and institutions were recognized and integrated. Both horizontal and vertical integration are critical. However, with regards to shared river basin frameworks, it is important to note that integration may imply that some

decisions, which were previously taken by individual states, are taken regionally, and those decisions taken nationally give due consideration to regional positions and circumstances. In the cases of the Murray-Darling and Mekong River Basins, the countries have set up a joint or coordinated body to serve as a platform for coordination and negotiation. The joint and coordinated bodies also play important roles in organizing and supervising cooperation. The experiences in these river basins have shown that cooperation on technical matters is the easiest first step to develop mutual understanding, trust, and political commitment for further cooperation. Many institutional arrangements survive not by statutory decree, but by the ability of their proponents to maintain and negotiate for rules and norms with other members and outsiders.

The clarity of mandates and roles among the different players is key to effective institutional arrangements. It is a fact that water and related resources are used and managed by several institutions. Due to the multiplicity of players in river basins, institutional frameworks and arrangements should have a clear definition of tasks and clear allocation of duties and responsibilities at basin, national and local government levels. The experiences in the Murray-Darling and Mekong River Basins, show that the successes achieved by these frameworks was largely due to the fact that mandates, roles and tasks for each structure were clearly articulated.

The separation of regulatory and implementation functions is critical. For river basin management, two types of organizations are needed, i.e. regulatory (policy level) and developmental (implementation level). For the regulatory functions, joint water commissions have been established, while executive river basin authorities have also been established with an implementation function. This separation of functions has been seen to work at basin and national levels. From the Murray-Darling and Mekong examples, it is clear that a river basin commission can effectively provide a good platform for intergovernmental coordination and negotiation. In addition to this, a river basin commission can also provide advice, coordination of research & monitoring, and coordination of management, planning, compliance, monitoring and conflict resolution. A river basin authority with autonomous decision-making powers may be a good option for operational tasks with a narrow scope.

Literature on the establishment and management of shared river basin institutional frameworks show that institutions that *reflect local conditions* provide a sound framework for conflict avoidance and management, and are responsive to changing needs. The vitality of institutions at different levels depends to a large extent on how well they are able to meet local expectations and are owned at the local level. This is an important prerequisite for institutional sustainability. The examples of river basin management also show that effective river basin organizations should also have strong political and financial backing from the basin states. In cases where effective institutional frameworks have been established, these have been used as a means of empowerment where all stakeholders are able to play an active role

The involvement and engagement of the basin community is critical to performance of an institution in terms of effectiveness, efficiency and accountability to stakeholders. The voice of the stakeholders oils the engine of river basin institutional frameworks. Effective institutional frameworks should have open stakeholder consultation mechanisms that are able to draw up an agreement to cooperate in managing the river basin. The experiences in the Murray-Darling River Basin have shown that the basin community is a critical part of a river basin institutional framework.
Within shared river basins, aspirations and interests evolve and change over time as situations change. Institutional frameworks for managing such basins should be *flexible and responsive* to these changing situations. For example, the Murray-Darling institutional arrangements are an evolving set of rules, which manage conflicting interests. When first established, the Murray-Darling Commission's mandate was to manage water quantity; this mandate was extended to include water quality issues and related land resource management issues. In recent years, the scope of the

commission's mandate has been widened to also include initiating, supporting and evaluating integrated natural resources management across the Murray-Darling Basin. Furthermore, institutional and legal regimes should be flexible enough to provide effective frameworks for conflict avoidance management.

3. Regulatory and Institutional Dimensions in the Basin

The long-term sustainable management of the Okavango River and related resources depends on the type of governance that presides over the shared resources of the basin. Governance strongly influences the effectiveness of sharing data and information, stakeholder participation, and consensus on the equitable and sustainable use of the basin's resources. Sustainable management of the river basin requires cooperation between institutions and individuals from each of the three basin states: Angola, Botswana and Namibia.

3.1 Key Issues and Challenges

The Okavango Basin as an internationally shared basin has similar conditions and issues as other international basins. The three riparian states recognize the complexity of the Okavango/Kubango Basin in terms of its international status, its cultural and economic diversity, its ecological importance, the expectations and possible pressures on the system to support local and national development, and the uncertainties associated with future management of a highly variable/complex system. The main issues and challenges that the basin states face today include disparities in water resource endowment, increasing demand for water, a diverse stakeholder base, conflicting interests, and data gaps. These issues are discussed in more detail below.

3.1.1 Disparities in Water Resources Endowment

The Okavango River Basin, which partly lies in a water scarce region of southern Africa, is a very important resource for economic development and the sustenance of human livelihoods. The three countries that share the basin, Angola, Botswana and Namibia, have vast differences in water endowment. Angola, at the headwaters of the basin, is well watered while Namibia and Botswana are extremely arid countries. The Okavango is the only exploitable perennial river that flows through their borders. This spatial disparity in the availability of water is a source of competition among the riparian states, and between sectors and communities. The competition over the scarce water resources between countries and economic sectors can generate inter-state and inter-sectoral tensions. We anticipate competition over water will increase along with population growth in all three basin states.

3.1.2 Increasing Demands for Water

One of the greatest challenges facing the three basin states is the management of ever growing demand for water in the basin. In each of the basin states, various aspects of economic growth such as urbanization, irrigation development, industrialization and increased tourism will inevitably lead to a higher per capita demand for water against a background of general scarcity. Due to paucity of data and information, it is difficult to determine the current and future demands on the Angolan side of the basin but it is believed that prevailing peace will encourage displaced Angolans to move back into the basin, thereby increasing demands on the water resources.

The Okavango River is a major source of water for Namibia. According to Heyns, P., (2003), the demand for water in Namibia is also expected to increase from 300Mm³/a (2000) to 660Mm3/a by the year 2020. While Botswana may have put on hold the plans to extract water from the Okavango Delta for domestic and mining purposes, the future water demand in that country (including the region in which the Okavango Delta is located) is set to increase from 195Mm³/a (2000 estimate) to 400Mm³/a by the year 2020 (Heyns, P. 2003). This increase in demand will have implications on perennial water sources, including the Okavango Delta.

3.1.3 Diverse Stakeholder Groups

The basin states face a major challenge to foster effective co-ordination and collaboration among and between the diverse groups of stakeholders who are currently involved in the management of the basin at the national, regional, and, to some extent, international levels. At the national level, government ministries and departments, academic and research institutions, non-governmental organizations, traditional leaders, local communities, and private sectors are all interested in the natural resources of the basin. At the regional level, the three riparian states, the relevant SADC Directorates, academic and research institutions, regional non-governmental organizations and the private sector are involved in the basin. Being the largest Ramsar site and one of the world's unique ecosystems, the Okavango Delta has attracted a lot of international attention. Coordinating this diverse group of stakeholders and reconciling these international, regional and national interests presents a great challenge for the riparian states.

3.1.4 Conflicting Interests

The riparian states of the Okavango have different interests and priorities when it comes to the resources of the basin. With the end of the civil war, Angola is likely to initiate development in the basin through such activities as irrigation and power generation. Angola is currently focused on reconstruction and resettlement of internally displaced people who need to access to land and water.

Namibia has intimated extracting water from the Okavango River to meet the growing water demands in its central region, mainly for the city of Windhoek and for expanded irrigation in the Kavango region. Preliminary investigations on the feasibility of generating hydroelectric power at Popa Falls, have been carried out by the Namibia Power Company, (NamPower). However this could negatively affect the ecological function of the river and accordingly, tourism in the area.

Botswana considers the Okavango Delta a strategic resource for the country's tourism industry, which supports a large number of the rural people in the country[12]. The continued ecological functioning of the delta is dependent on the quantity of water reaching it and also the timing of that water. Therefore, Botswana is interested in maintaining the ecological integrity of the Okavango Delta, which it declared a Ramsar site. The country has a vested interest in limiting all upstream development of the river, placing it in a contrary position to the upstream countries.

These divergent interests of the basin states, if unchecked, may negatively impact on the ecosystem integrity of the basin and create tensions. Although the countries are trying very hard to reach a basin-wide consensus on water sharing and allocation, failure to provide conducive regulatory and institutional instruments will open the door for increased tension and/or conflicts that will result in the destruction of the aquatic ecosystem associated with the basin. The different and sometimes conflicting demands and interests expressed by the three riparian countries require effective regulatory instruments and institutional frameworks.

3.1.5 Data Gaps

Although the Okavango River Basin states have made some progress in generating and sharing data and information through the Sharing Water Okavango Shared Database. However, the data gaps and lack of information required for effective decision-making at the basin level remains a critical issue. In addition to the Okavango Shared Database, the production and publication of the "Okavango River – The Flow of a Lifeline (John Mendelsohn and Selma el Obeid, 2004) is a major breakthrough in terms of distributing data and information on the basin. However, the basin community

[12] Turton A. R, Ashton P. J, and Cloete T. E, (eds); *Transboundary Rivers, Sovereignty and Development: Hydrological Drivers in the Okavango River Basin*; Africa Water Issues Research Unit (AWIRU) AND Green Cross International (GCI) 2003

acknowledges that there is a dearth of information on the upper catchment in Angola. Gathering scientific data and information on this part of the basin is a big challenge considering the need to address the impact of the civil war (landmines). Another issue that is related to data and information is the problem of language.

3.2 Regulatory Frameworks

The use and management of water and related resources in the Okavango Basin is governed and influenced by a number of regulatory frameworks which include international agreements and conventions, regional protocols, basin level agreements, national policies and national laws.

3.2.1 International Agreements and Conventions

A number of international agreements and conventions have been signed and or ratified by the Okavango Basin riparian states. The provisions of this agreement regulate the actions of the basin states. As far as the management of the Okavango Basin is concerned, the following sections highlight the relevant regulatory conventions.

- *United Nations Convention on the Law of Non-navigational use of International Watercourses (UN-Convention).*

The United Nations Convention on the Law of Non-navigational use of International Watercourses (UN-Convention) provides the legal foundation for regulating shared or transboundary watercourses. This convention, which is based on the concept of 'equitable, and reasonable water use', is embedded in international water law. The principle of 'equitable and reasonable water use' is a customary international law rule that developed from national and international judicial practice in the resolution of disputes concerning transboundary waters[13]. According to Article 6 of the Convention, riparian states are obliged to take into account, among other factors, the effects of the use or uses of the watercourses in one watercourse state on other watercourse states, when utilising a shared watercourse.

Article 3 of this Convention generally encourages states sharing watercourses to enter into agreements that apply and adjust the provisions of the Convention to the particular characteristics of the watercourse concerned or consider harmonizing already existing agreements with the basic principles of the Convention. The cornerstone of the law of international watercourses is the principle that a riparian state must use an international watercourse in a manner that is equitable and reasonable vis-à-vis other states sharing the watercourse. The actions of the three Okavango basin states are influenced by the provision of this Convention, especially the principle of 'equitable, and reasonable water use'. This principle and the principle of "sustainable use", which denotes the use of water in a manner and at a rate that does not result in a long-term decline of the resource thereby ensuring its potential to meet the aspirations of present and future generations, are critical to the development and management of shared river basins including the Okavango.[14]. This is because they create an atmosphere of cooperation and collaboration, whilst at the same time minimising the likelihood of conflicts.

The Convention also obligates parties when using international watercourses within their territories, not to cause harm to the territories of other countries sharing the same watercourse under Article 7. It further obligates States whose use causes harm to a riparian state to take all appropriate measures to mitigate such harm or to compensate the affected State for the damage caused. All the riparian states of the Okavango River are party to this convention.

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[13] Patricia Wouters; *The legal response to international water scarcity and water conflicts: The UN Watercourses Convention and Beyond*,

[14] Adapted from the Sustainable Use definition of the Convention on Biological Diversity (CBD)

- *The Convention on Wetlands (Ramsar).*

The Convention on Wetlands of International Importance, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention's mission is the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as well as contributing towards achieving sustainable development throughout the world. At the river basin level the Ramsar Convention requires countries to consult with each other about the implementation of the Convention, especially with regard to transfrontier wetlands, shared water systems, shared species, and development projects that may affect wetlands. The Ramsar Convention has produced a number of guidelines for Contracting Parties relating to integrated river basin management. These guidelines encourage countries to develop consultative processes which involve the various sectors and institutions responsible for water management; environmental protection and agriculture (at least); a basin-wide plan for the conservation, utilisation and management of the water resources; promotion of the establishment of appropriate mechanisms to bring together all major groups involved in river basin management such as government, municipalities, water regulatory bodies, academic institutions, industries, farmers, local communities, and NGOs; the promotion of appropriate education and public awareness schemes as effective tools for integrated management of river basins; setting standards and objectives; forming multi-stakeholder river basin management authorities; and development of cost sharing formulas (such as beneficiaries pay, river basin resident levies, government subsidies, environmental costs of degradation/ "impacter pays", etc.) to raise the funds needed for integrated river basin management.

Both Botswana and Namibia have ratified the Convention under which Botswana has designated one Ramsar site and Namibia has designated four Ramsar sites. Angola is still in the process of compiling the necessary information required for the ratification of the convention.

- *United Nations Framework Convention for Climate Change (UNFCCC).*

The UNFCCC, which entered into force on 21 March 1994, sets out an overall framework for intergovernmental efforts to tackle climate change. Climate change as a result of the coupled effects of global warming and greenhouse gases is likely to have a measurable impact on water resources in Southern Africa (Hirji, R. etal., 2002). In fact, one of the biggest problems threatening the sustainability of water resources in the Okavango basin is climate change[15]. This Convention establishes objectives and principles, while spelling out commitments for different groups of countries according to their circumstances and needs. It also provides a set of institutional arrangements to enable governments to monitor efforts to implement the Convention and to share insights on how to best pursue the Convention's aims. The objective of the Convention is: " ...to achieve stabilization of atmospheric concentrations of greenhouse gases at levels that would prevent dangerous anthropogenic (human-induced) interference with the climate system..." All Parties to the Convention are subject to general commitments to respond to key issues related to climate change. They agree to compile an inventory of their greenhouse gas emissions, and submit reports known as national communications on actions they are taking to implement the Convention. All three basin states are signatories to this convention.

- *United Nations Convention on Biodiversity (UNCBD.*

[15] P. Wolski, T. Gumbricht, T.S. McCarthy; *Assessing future change in the Okavango Delta: the use of a regression model of the maximum annual flood in a Monte Carlo simulation*; **www.ees.ufl.edu**

The UNCBD is the first global agreement on the conservation and sustainable use of biological diversity. It was adopted at the Earth Summit in Rio de Janeiro in 1992. The objectives of the Convention are to conserve biological diversity; promote the sustainable use of biodiversity components, and foster the fair and equitable sharing of benefits arising from the utilization of genetic resources, including appropriate access to genetic resources through appropriate transfer of relevant technologies, taking into account all rights over those resources and technologies. Under this Convention, each Contracting Party shall, as far as possible and as appropriate, co-operate with other Contracting Parties, directly or, where appropriate, through competent international organizations, in respect of areas beyond national jurisdiction and on other matters of mutual interest. All the three Okavango Basin states are signatories to this convention.

- *Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973) CITES*

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973) is another agreement that is relevant to the regulation of natural resources in the Okavango Basin. All three Okavango Basin states are members of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES). Of importance to this review is that CITES deals with trade in a number of wetland species and therefore has important links with Ramsar in that it takes seriously the risks posed by the inadvertent release of alien species into the wild. All the Okavango River Basin states have ratified this convention.

- *United Nations Convention to Combat Desertification (UNCCD)*

The United Nations Convention to Combat Desertification aims to promote effective action through innovative local programmes and supportive international partnerships. The Convention acknowledges that the struggle to protect drylands will be a long one, and there will be no quick fix. This is because of the fact that the causes of desertification are many and complex, ranging from international trade patterns to unsustainable land management practices. Real and difficult changes will have to be made, both at the international and the local levels. There are four principal categories of obligation under the terms of the UNCCD and its regional implementation arrangements. The principal categories relate mainly to international cooperation in implementation of the UNCCD at all levels, particularly in the areas of the collection, analysis and exchange of information, research, technology transfer, capacity building and awareness building, the promotion of an integrated approach in developing national strategies to combat desertification, and assistance in ensuring that adequate financial resources are available for programmes to combat desertification and mitigate the effects of drought. Contracting Parties affected by desertification in Africa undertake to prepare national action programmes and to co-operate at the regional and sub regional levels. All three Okavango Basin states are signatories to this convention.

- *Relevance and Application of the Provisions of the International Agreements and Conventions to the Okavango River Basin*

The significance of International Agreements and Conventions in the context of shared river basin management (including the Okavango) cannot be over-emphasized. These agreements and conventions provide a platform for cooperation and collaboration among member countries. Their importance is even more pronounced if all shared watercourse states are parties to each of them, which is the case in the Okavango River Basin (with the exception of the Ramsar Convention).

Whilst some countries within the basin have incorporated some of the elements found in these international conventions into their national water regulatory frameworks, it is not apparent that the basin states are using these provisions to facilitate collaboration and cooperation in the development and management of the Okavango River Basin. However, in view of the OKACOM Agreement and the provisions and intent articulated, one could safely say the principles of the international conventions and agreements are being applied in the Okavango River Basin through this agreement.

Although there are national action plans designed to respond to the provisions of this convention, there seem to be little collaboration among and between the riparian states with regards to the implementation of the convention's provisions in the Okavango River Basin. For example, while Botswana and Namibia are both parties to the Ramsar Convention, it is not evident whether the two countries consult each other regarding the implementation of the convention's obligations such as designation of sites and the application of the river basin management guidelines.

3.2.2 Regional and Basin Level Agreements

- The SADC Revised Protocol on Shared Watercourse Systems

The Revised Protocol on Shared Watercourses in Southern Africa (Revised Protocol) is an important instrument for the management of water resources in the Okavango Basin. The Revised Protocol was signed by all three states, although only Botswana and Namibia have so far ratified it. The objective of the SADC Protocol is to foster closer cooperation for judicious, sustainable and coordinated management, protection and utilization of shared watercourses, including the Okavango River Basin. The Revised Protocol is an instrument that can be utilised by the three states to promote the principles of sustainable management of the Okavango River Basin. The reason for this is that it encompasses major international water law principles such as the Dublin Principles, as well as key principles found in the United Nations Convention on Non-Navigational Uses of International Watercourses. Furthermore, it was specifically designed for the hydrological, socio-economic, and political condition of southern Africa. The Revised Protocol's provisions (principles) that reflect sustainable and reasonable shared water use include the following:

- **Unity and coherence.** It denotes that State Parties should recognise the principles of unity and coherence of each shared watercourse and through that, harmonise water uses in the shared watercourses and ensure that all necessary interventions are consistent with the sustainable development of all Watercourse States and observe the objectives of regional integration and harmonisation of their socio-economic policies and plans [Article 3(1)]
- **Applicability of International Law Principles**. It stipulates that existing rules of customary or general international law relating to the utilisation and management of the resources of shared watercourses should be respected by member states [Article 3 (3)]
- **Sovereignty.** This principle states that the utilisation of shared watercourses within the region should be open to each basin state in respect of the watercourse within its territory without prejudicing its sovereign rights. [Article 3(2)]
- **Sustainable Development**. It denotes that basin states within a shared river basin should maintain a balance between resource development for a higher standard of living for their people, and conservation of the environment to promote sustainable development. [Article 3(4)]
- **Information Exchange**. It stipulates that basin states within a shared river basin should establish close cooperation regarding the study of the river basin and on the implementation of projects that may have an impact on the integrity of the watercourse system [Article 3(5) and (6)]
- **Equity**. It states that basin states should utilise the shared watercourse in an equitable manner with the aim of attaining optimum utilisation and obtaining benefits that are consistent with the adequate protection of the watercourse. [Artcle3 (7), (8) and (9)]

Article 4 of the Revised Protocol further provides for specific mechanisms and structures required in the management of shared watercourse systems. In particular it provides for the management through the establishment of joint commissions, regulation by way of cooperation amongst riparian states, protection of installations and water works, prevention of harm to the ecosystem integrity of the watercourse system, and notification of emergency situations. (Article 4 (1) - (5)]

- SADC Protocol on Fisheries 2001

The SADC Protocol on Fisheries is another important regional instrument that has a very strong influence on natural resources development and management in the Okavango River Basin. The protocol recognises the UN Convention on the Law of the Sea (UNCLOS) and takes into account the FAO Code of Conduct for responsible Fisheries. Its objective is "*to promote the responsible and sustainable use of the living aquatic resources and aquatic ecosystems*." and defines a fish as *any aquatic plant or animal* and resources as *all aquatic ecosystems*. The preamble emphasizes the *necessity for joint co-operative and integrative actions at regional level*, as well as awareness and support of national initiatives to *implement international conventions on sustainable use* and recognises *the unique transboundary character of the aquatic resources and ecosystems* and the need to cooperate in their management. Articles 6, 7 and 8, which explicitly address issues of international relations, management of shared resources and harmonisation of legislation respectively, are pertinent to the management of the Okavango River Basin. Under article 6 (International Relations), the state parties are encouraged to establish common positions and to undertake coordinated and complementary actions with regards to international fora, conventions and agreements relevant to fisheries. In terms of management of shared resources the signatories agree to cooperate in information exchange on shared fishery resources; to establish joint instruments for cooperation and management; and involve all stakeholders in decision making *at the appropriate level* and finally to introduce relevant national legislation to enable rapid and appropriate responses to the above provisions. In addition, the signatories agreed to harmonize management plans and implementing measures to balance the needs of the industry and fishermen in a *politically, environmentally and economically sustainable manner*. All three Okavango River Basin states have signed this protocol.

- SADC Protocol on Development of Tourism (1998)

Concerned by the fact that the potential of tourism remains undeveloped, and therefore not contributing to the economic well being of the people of the region, the SADC member states developed the Protocol on Development of Tourism. The protocol is based on the realization that the full potential of tourism in the region can only be achieved through collective and concerted action of all member states. The objectives of the protocol are to use tourism as a vehicle to achieve sustainable social and economic development, and to ensure equitable, balanced and complementary development of tourism industry region-wide. Parties to the protocol commit themselves to aggressively promote the region as a single but multifaceted tourism destination capitalizing on its common strengths and highlighting individual member states unique tourist attractions. Since tourism has been identified as a possible land and water use in the Okavango Basin, the provisions of this protocol are very important. Namibia & Botswana have signed this protocol.

- SADC Protocol on Wildlife Conservation and Law Enforcement (1999)

The primary objective of the protocol is to *establish within the region and within the framework of the respective national laws of each state party, common approaches to the conservation and sustainable use of wildlife resources, and to assist with effective enforcement of laws governing those resources*. Some of the specific objectives of this protocol include facilitating the harmonization of the legal instruments governing wildlife use and conservation; facilitating the exchange of information concerning wildlife management; utilization and the enforcement of wildlife laws; and promotion of the conservation of shared wildlife resources through the establishment of transfrontier conservation areas. Wildlife being a key resource in the Okavango Basin, the provisions of this protocol are pertinent to the basin. Angola and Namibia are party to this protocol.

- The OKACOM Agreement

The OKACOM Agreement between the governments of Angola, Botswana, and Namibia establishing the Permanent Okavango River Basin Water Commission was signed in 1994. The main objective of the Agreement is to establish a River Basin Commission that advises member States on

technical matters relating to, amongst other things, conservation, development, and utilisation of water resources of common interest to the riparian States of the Okavango.

Through the Agreement, OKACOM has the power to appoint consultants to assist in the gathering and processing of information on any matter on which it advises the Contracting Parties. With regards to financial arrangements, each Contracting Party is responsible for all costs incurred with regards to attendance and participation of its delegation to all meetings of the Commission. All costs incurred or liabilities accepted by the Commission in the performance of its functions and the exercise of its powers, are supposed to be shared equally by the Contracting Parties, unless otherwise agreed by the Commission.

Under the OKACOM Agreement, member countries are also obliged to provide information required by the commission in the furtherance of its duties in accordance with the laws and procedures of their respective jurisdictions. The Parties to the Agreement are required to notify the Commission of any proposed development, which falls within the functions of the Commission. The OKACOM agreement calls for the use of Agenda 21 principles and also acknowledges the Helsinki Rules on the use of international waters. OKACOM is required to meet at least once a year although more meetings may take place if there is need. All decisions of the Commission should be taken on the basis of consensus, however if the commission fails to reach consensus the issue is referred to the Contracting Parties for further negotiation.

- Draft SADC Regional Water Policy

The purpose of the policy is to provide a framework for sustainable, integrated and coordinated development, utilization, protection and control of national and transboundary water resources in the SADC region. The draft regional water policy is aimed at promoting socio-economic development and regional integration and improving the quality of life for all people in the region. The policy framework is a tool for policy makers at regional and national levels. More specifically, the policy will:

- Inform and give guidance to SADC Water Division, in particular, and the other SADC divisions on in coordinating the development of the water sector in the SADC region
- Inform and give guidance to shared watercourse institutions and member states in the management of shared watercourses
- Give guidance for harmonizing national water policies and management of water resources in member states
- Give guidance for implementing water resources activities by all stakeholders (private sector, NGOs and civil society) and other interested parties such as cooperating partners

All three Okavango River Basin states actively participated in the development of this regional water policy.

- Implementation of Regional Agreements and Protocol Provisions in the Okavango River Basin

Such As the International Conventions, Regional Agreements and Protocols are important sources of guiding principles in the sustainable utilisation of shared watercourses. They generally incorporate principles agreed at the international level and adapt them for the regional context. Their effectiveness as regulatory frameworks will be enhanced if all basin countries of the Okavango are parties to them, a situation that prevails in the basin (with the exceptions of the Revised SADC Protocol on Shared Watercourses, Protocol on Tourism Development and the Protocol on Wildlife Conservation and Law Enforcement). The formulation and signing of the OKACOM Agreement is a very proactive initiative taken by the Okavango River riparian states to translate the provisions and principles of the regional agreements and protocols to the Okavango Basin. Whilst the regional agreements and protocols (including the OKACOM Agreement) act as instruments of collaboration

they are hardly enforceable if they are not translated into national water regulatory framework. Some countries of the Okavango River Basin have reformed their laws to take into account some of the principles found in these instruments, while others are still to do this.

3.2.3 National Water Policies

The use and management of water and related resources in the Okavango basin is regulated by different national policies. While the three riparian states of the Okavango are at different stages of their water policy development and reform, each of the countries is using a number of policy instruments to guide the activities in the basin.

a). Angola Water and Sectoral Policy Provisions

Angola, located within the headwaters of the basin, is presently overhauling its water sector policy framework and the related legal instruments. The government intends to reconstruct the country through the improvement of the country's infrastructure and restarting viable economic activities that had ceased to exist due to the prolonged war of liberation and the subsequent civil war that spanned over 27 years[16]. The policy framework that currently applies in Angola is mainly based on the Water Sector Development Strategy (WSDS). The WSDS is founded on the concept of integrated water resources management and is the blueprint for managing water resources in Angola.[17] It contains components that refer to meeting basic needs for water, achieving food security, preparing for and managing droughts and floods, using appropriate technologies, applying economic valuation to water, decentralising decision-making in the water sector, involving water users, reforming institutions, working with neighbouring countries to achieve equitable access to shared water resources, and facilitating dialogue with neighbouring riparian states through the creation of integrated catchment management plans [18]. The provisions of the Angola Water policy subscribe to the principle of "reasonable and equitable use", envisaged by international water law. The commitment made by Angola to components work with neighbouring countries to achieve equitable access to shared water resources, and to facilitate dialogue with neighbouring riparian states through the creation of integrated catchment management plans is very important for the effective development and management of the Okavango River Basin.

In addition to the policies directly associated with water resources, there are a number of sectoral policies that affect and influence water resources in Angola. These include a fisheries policy, which regulates and control artisanal fishing, sport fishing, protection of endangered fish species, and foreign fishing vessels[19]. This sectoral policy regulates artisanal fishing by prescribing the technical requirements needed for fishing vessels to operate either in marine or offshore waters and inland water such as the Okavango River. This policy lists authorised fishing nets and vessels that are permitted to navigate the waters. This policy also lists the species that may be caught and the fishing gear to be used. Furthermore, sport fishing is controlled by requiring specific conditions to be met and by penalising any infringement of such conditions. The purpose of these regulations is to ensure sustainable fishing practices and consequently leading to sustainable utilisation of fish resources within the waters concerned. The policy contains provisions that ensure the sustainable utilisation of fish resources, which are a component of a shared aquatic ecosystem. This is in line with the principle of ensuring the equitable and reasonable use of fish as a shared aquatic resource. However, the Fisheries policy does not make specific reference to the management of shared watercourses.

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[16] Robinson P, *Angola Water Policy Review*, SADC Water Sector, 2003

[17] It also makes provision for potable water and sanitation.

[18] Robinson P, *Angola Water Policy Review*, SADC Water Sector, 2003

[19] Order No. 9 of 1973; Executive Decree No. 17 of 1980; Decree No. 518 of 1973; Executive Decree No. 3 of 1983; and Executive Decree number 12 of 1986 respectively

Although there was limited information available during this review, it is assumed that influence on water resources management in Angola is also exerted by the ministries of Agriculture and Rural Development, Fisheries and Environment, Administration of the Territory, Tourism, Transport, Geology and Mines, Defence, Interior, Health, Labour and Social Security, and Oil/Petroleum. This assumption is made on the basis of the nature of activities that these sectors are believed to be involved in.

b). Provisions in the Namibia Water and other Sectoral Policies

Namibia has also been actively engaged in a process of water policy reform since independence upon realising that there were overlaps in certain water functions. Two main policy documents regulate water resources in Namibia. These are the Water Supply and Sanitation Sector Policy (WASP) (the main objectives are listed in box 2), and the Namibia National Water Policy (NNWP). These policy documents augment each other in that the WASP deals with water and sanitation issues whilst the NNWP deals with the more general issues relating to water resources management.

The NNWP was developed to govern water resources in Namibia. The rationale behind the creation of this policy is the country's physical setting (its aridity), and the legacy of the pre-Independence era. It was also based on the current trends in development specifically relating to Namibia's water resources management[20]. The salient principles of this policy instrument are provided in box 3. *The National Water Policy White Paper* that forms the basis for the new Water Resources Management Bill that is currently being finalised, stresses sectoral co-ordination, integrated planning and management and resource management aimed at coping with ecological and associated environmental risks. The *National Water Policy* includes a basic principle focused on "Ecosystem values and sustainability" that stresses that *management of water resources* needs to *harmonise human and environmental requirements, recognising the role of water in supporting the ecosystem*

Box 2: Water Supply and Sanitation Sector Policy (WASP) Aims:

- Utilise the water supply sector to promote socio-economic development
- Safeguard human health and prevent water-related diseases
- Ensure that water supply and sanitation services are available to all Namibians at a cost affordable to the country
- Ensure that the water and supply services are a combined effort between the Government and the beneficiaries
- Ensure that communities determine water supply and sanitation levels and contribute to cover costs of the services exceeding basic needs
- Ensure that water and sanitation development is environmentally sustainable
- Prioritise the use of the limited water available in the country with the first priority being given to domestic use (including livestock watering, subsistence and commercial farming), and the second priority being given to economic activities (including mining, industries, and irrigation)
- Guarantee the development of a water tariff policy covering running and maintenance costs by each of the water supply institutions that will ensure the self-sufficiency and sustainability of the sector
- Subject tariffs to the approval of the Minister in charge of Water Affairs for purposes of determining compliance with Government policy
- Separate the management of the water supply and sanitation sector into three divisions, namely the management of the resources base, the supply of water, and the provision of sanitation services

[20] White Paper on National Water Policy for Namibia, May 2000

The National Water Policy for Namibia clearly states that the country shall promote the equitable and beneficial use of international watercourses, based on generally accepted principles and practices of international law. This policy is based on the needs identified in the 1974 Water Master Plan to gain access to internationally shared water resources in future. In order to achieve this objective the Government took the necessary steps to establish watercourse institutions on the different border rivers and acceded to the regional and international instruments of international water law as they became ready for ratification. The NNWP, amongst other things, recognises the need to promote equitable and beneficial use of international watercourses based on generally accepted principles and practices of international law. This principle originated from the 1974 Water Master Plan that identified the need for Namibia to gain access to shared perennial rivers as a measure to complement the internal water sources. The totality of the principles found in Namibia's policy framework for water resources management satisfies the criteria for sustainable use of shared watercourse systems.

Box 3: Salient principles of the Namibia National Water Policy:

- Ownership of water - It states that Namibia's limited and vulnerable water resources are an indivisible national asset, whose ownership is vested in the State on behalf of the whole society
- Shared watercourses - It states that Namibia should strive to promote the equitable and beneficial use of international watercourses based on generally accepted principles and practices of international law
- Integrated management and planning - It provides that management and planning of water resources should be integrated across economic, environmental, and social dimensions
- Development and intergenerational equity - It avers that the country's water resources should be utilised, developed and managed in a way that promotes equitable and sustainable socio-economic development without prejudicing the benefits and opportunities of future generations
- Equity - It stipulates that all Namibians should have the right of access to sufficient safe water for healthy productive life
- Water for Ecosystems - It denotes that water resources management needs to harmonise human and environmental requirements and at the same recognising the role of water in supporting ecosystems
- Recognition of economic value - It provides that economic value of water resources in Namibia should be recognised given its scarcity and vulnerability, and that abstraction, management, conservation and use should be efficient and cost effective
- Stakeholder involvement - It states that planning and management of water resources and water services should take place within a framework that encourages awareness and participation among stakeholders at all levels
- Information exchange - It stipulates that water resources information systems should be developed and made accessible to the public, and that institutions involved in the management and provision of water services should do so in an open and transparent manner
- Decentralisation - It provides that the management of water resources and water services should be decentralised to the lowest practicable level

The Namibia Water policy framework embraces the management of shared watercourses by acknowledging the existence and importance of transboundary waters and supporting Namibia's involvement in the equitable and beneficial use of shared watercourses based on the principles and practice of international law. The policy is in tandem with the equitable and reasonable use principle.

Other sectoral policies that influence water resources in Namibia include the Environmental Assessment Policy (1994), the Green Plan (1992), Trade and Investment policies, Draft Wetland

Policy (November 2003), National Agricultural Policy (1995), National Drought Policy and Strategy (1997), Regional Planning and Development Policy (1997), National Fisheries Policy (2001), Development of Forestry Policy for Namibia (2001), Policy for Prospecting and Mining in Protected Areas and National Monuments (1999), Revised Draft Tourism Policy (2001 to 2010), Community Based Tourism Policy (1995), National Policy & Strategy for Malaria Control (1995), and National Policy on Enabling the Safe Use of Biotechnology (1999).

The Environmental Assessment Policy provides a framework for environmental impact assessments in the country and promotes a holistic approach whereby all projects, both public and private, and programmes are required to undergo environmental assessment procedures. These procedures involve all stakeholders and promote sustainable development especially ensuring that there are minimum negative impacts on the environment and at the same time maximising benefits of development. This has direct relevance to the equitable and reasonable utilisation of shared watercourses because it creates the platform for the country to weigh the balance of the benefits of development with other factors relating to the ecological and hydrological integrity of the shared basin including environmental concerns.

The Green Plan clearly states Namibia's objective to manage water resources for present use without jeopardizing future water supplies, biotic diversity and ecological processes. The Plan promotes the achievement of sustainable development through ensuring that Namibia has clean air, water and land and that the government supports the sustainable use of natural resources. It also stresses the significance of protecting certain special places and species. The policy statements enunciated in this document support the ecological and hydrological integrity of, amongst other things, water bodies including shared watercourses. The statements also highlight the importance of sustainable use including the sustainable utilisation of transboundary watercourses. This also subscribes to the equitable and reasonable use principle of international law.

The trade and industry sector policies direct their attention to realise four objectives, namely, investment promotion, facilitation of manufacturing activities, promotion of the growth and development of small and medium enterprises, and the growth and diversification the country's exports. In order to achieve the above objectives, specific policies and strategies have been formulated to provide the resources to facilitate the process. Under the facilitation of manufacturing, activities, the relevant policy statements give priority to manufacturing especially supporting and encouraging the private sector to focus on the manufacturing of non-traditional meat, fish, and beverage export products. The provisions under this policy encourage industrial expansion without balancing it with the need for conservation or sustainable use.

The *Draft* Wetland Policy (November 2003), whose vision is to "manage national and shared wetlands wisely by protecting their vital ecological functions, life support systems and biodiversity for the current and future benefit of people's welfare, livelihoods and socio-economic development" has a bearing on the management and use of water resources in the country. A key objective in this policy is the recognition of the need for Namibia to fulfill Namibia's international and regional commitments concerning shared wetlands and wetlands of international importance. The draft policy is founded on the basic principles of ownership, ecosystem values and sustainability, and shared watercourses.

The National Agricultural Policy (1995), whose main aim is to increase agricultural productivity, recognises that water resources in Namibia are limited and that growth within the agricultural sector should not be at the expense of the natural environment. Furthermore, this policy encourages the use of Environmental Assessments for agriculture projects and proposes a review of legislation related to agrochemical use. The Regional Planning and Development Policy (1997), on the other hand acknowledges trends of increasing degradation of pastures, rangelands and woodland and gives

attention to soil, water and forest management as development tools. It promotes strategies such as soil conservation and controlled grazing cycles, important to agriculture alongside the Okavango River.

Another important policy instrument is the Namibia Aquaculture Policy (2001), which deals with the responsible and sustainable development of farming with aquatic plants, fish, molluscs and crustaceans and advocates responsible aquaculture developments. This policy also deals directly with the potential impacts of alien and other invasive species and seeks to minimize the impacts on aquatic ecosystems. Impacts specifically mentioned in this policy include the release of introduced species and genetically modified organisms, the mixing of farmed and wild stock (genetic pollution) and the risk of disease transfer.

The Development of Forestry Policy for Namibia (2001) is another pertinent instrument. This policy focuses on biodiversity conservation. The main aim of this policy is to reconcile rural development with biodiversity conservation by empowering farmers and local communities to manage forest resources on a sustainable basis".

The Policy for Prospecting and Mining in Protected Areas and National Monuments (1999) is another important policy. This policy recognises that mineral exploitation can result in significant negative environmental impacts including habitat destruction, loss of biodiversity and impacts that will threaten growth within the tourism industry. It aims to ensure that the environment is protected through the implementation of mitigation measures that are adopted before, during, and after the prospecting and mining activities.

As far as tourism is concerned, there are a number of policy instruments in Namibia. These include the Tourism White Paper (1994) (which commits the Government of Namibia to (*inter alia*) developing the tourism industry without threatening Namibia's biodiversity), the Draft National Tourism Policy (MET 1999) (whose main aims is to secure and develop important tourism areas including those associated with wetlands such as the Okavango so that their value is not undermined by other, unsustainable land use options), the Community–Based Tourism Policy (MET 1995) (focused on bringing significant social and economic benefits to previously disadvantaged people, whilst also promoting biodiversity conservation), and the Revised Draft Tourism Policy 2001-2010 (June 2001) which stresses that no tourist development should be at the cost of biodiversity and requires that some of the income derived be re-invested in natural resource conservation.

The National Policy & Strategy for Malaria Control (1995) is another relevant policy instrument. This policy recommends personal protection against malaria through the use of low impact repellents which, when compared to pesticides like DDT, are considered to be more environmentally friendly.

The National Policy on Enabling the Safe Use of Biotechnology (1999) is another important policy, designed to guide the judicious use of modern biotechnology in Namibia for sustainable development, in ways which do not in any way jeopardize human and environmental health, including Namibia's biodiversity and genetic resources and to ensure effective control of transboundary movements of genetically modified organisms or products thereof resulting from modern biotechnology, through exchange of information and a scientifically based transparent system of advance informed agreement.

The other important policy instruments are the National Land Use Planning Policy (MLRR 2002), which provides a framework for the implementation of regional integrated land use plans and the National Land Policy (MLRR 1998) which is based on constitutional principles and on the national commitment to redress the social and economic injustices inherited from Namibia's colonial past. This policy proposes financial and tax incentives for the protection and rehabilitation of natural

environments (e.g. planting of indigenous trees and using alternative energy to reduce rates of deforestation and pollution). The National Resettlement Policy provides for resettlement, in accordance with the basic objectives of the Government, which is institutionally, socially, economically and environmentally sustainable and will enable the beneficiaries to become self-supporting. Some areas in the Kavango region are earmarked for resettlement. The National Land Tenure Policy *(2003 Draft)* covers all land tenure systems in urban, communal, commercial (freehold) and resettlement areas and is intended to guide all land tenure rights in Namibia. This policy promotes sustainable utilization of the nation's land and other resources, provides a way to regulate different land tenure rights, provides secure tenure for informal urban settlers, farm workers and occupiers (those who have been employed less than ten years on a single farm and do not have secure tenure elsewhere), and provides guidelines on compensation for occupiers of expropriated land.

As highlighted above, Namibia has a broad range of sectoral policies, particularly those applicable to natural resource conservation, management and utilisation that are pertinent to the conservation and management of the Okavango River Basin. These sectoral policy provisions promote sustainable utilisation of shared rivers whilst others directly contribute to the equitable and reasonable utilisation of international river basins such as the policy statements found in the environment sector that support the assessment of benefits arising from a development within a shared basin against the negative effects of such developments that impinge on, amongst other things, the ecological and hydrological integrity of the basin. The other sectoral policies generally do not make specific reference to shared watercourses. Some of the provisions or policy statements have a negative impact such as those that allow for unsustainable practices that may lead to siltation, and water pollution.

c) Botswana Water and other Sectoral Policy Provisions

Although Botswana has not been actively engaged in a water policy reform process in recent years, a number of policy instruments are being applied to govern water resources. The overall policy context in the country is geared towards sustainable use of the scarce water resources available in the country to achieve the nation's developmental goals[21]. Whilst there is no specific document that outlines the country's water policy, the National Water Master Plan (NWMP) approved in 1993 contains most of the significant directions that the government intends to take, or has already taken in water resources management. The NWMP, which is currently going through a review, presents an integrated approach to water resources management. It cautiously endeavours to provide for the optimum use of the scarce water resources to ensure the satisfaction of environmental, social, economic/industrial needs of the country, and at the same time planning to meet the growing demand that may arise in future. Some of the areas that the Plan places emphasis on include:

- avoiding excessive depletion of groundwater through close monitoring of abstraction levels.
- developing and conserving water through increased use of alternative technologies such as desalination.
- bolstering the development and management of water supplies by local communities.
- enhancing co-ordination between government institutions in the planning and development of water resources.
- incorporating environmental impact statements in project feasibility studies for water development projects.
- responding to drought through interconnection of water supply schemes.

The Botswana National Water Master Plan provisions are in line with the principle of equitable and reasonable use, and the principle of prior notice and good faith in that they on the one hand

[21] The developmental goals include; rapid economic growth, social justice, economic independence, and sustainable development

encourage the conservation of water, including transboundary water, through the use of alternative technologies and enhanced institutional co-ordination, and on the other hand, they require environmental impact statements that will be communicated to riparian States in the case of development projects being commissioned within a shared river basin. The Master Plan also stresses the issue of use of water in rural areas for domestic purposes only. However food self sufficiency is encouraged at household level, and irrigation schemes have been established on State land to facilitate the same.

The water policy framework also makes several references to international waters. The main thrust of the policy statements in this regard is to acknowledge the shortage of water supply in the country and to endorse transboundary rivers as a legitimate source of water for social and developmental purposes. The Policy does not clearly highlight the government's intent to co-operate with riparian States in the management of shared watercourses. However, it does make some important statements that promote the sustainable conservation of transboundary waters in line with the principles of equitable and reasonable use and prior notice and good faith negotiation. In addition to the National Water Master Plan, Botswana has a number of other forward-looking environmental policies such as the draft Wetlands Policy, Wildlife Conservation Policy (1986); National Policy on Natural Resource Conservation and Development (1990); and the National Policy on Agricultural Development (1991), Wastewater and Sanitation Management Policy (2001), Revised Rural Development Policy (September 2001), and the Draft Community Based Natural Resources Management Policy (June 2004). Efforts are underway to develop a National Water Conservation Policy that will address conservation measures

The National Policy on Natural Resources Conservation and Development (NCSA, 1990) identifies water resources, water pollution, value of the Okavango Delta, tourism development, inter-regional water transfers, WMA and National Parks as key issues. The goals of the Policy on Natural Resources Conservation and Development (NCSA, 1990) are 1) to increase the effectiveness with which natural resources are used and managed, so that beneficial interactions are optimised and harmful environmental side-effects are minimized and 2) to integrate the work of the many sectoral Ministries and interest groups throughout Botswana, thereby improving the development of natural resources through conservation, and visa versa. The National Policy on Natural Resources Conservation and Development emphasises the importance of ensuring that the present generation does not consume natural resources in a manner that exceeds their output yield. This will enable future generations to have access to such resources - i.e. the principle of intergenerational equity. It further highlights the need for the nation to adopt the National Conservation Strategy that engenders sustainable development through, amongst other things, the comprehensive evaluation of environmental and economic implications before major development work occurs. These provisions and policy statements have a bearing on transboundary water resources. On the one hand, they ensure the protection of natural resources that are important for the ecological integrity of shared river basins. On the other hand, they directly relate to some aspects of the principle on equitable and reasonable utilisation of shared river basins through ensuring that environmental and economic concerns are taken into account when development work is planned within a transboundary river basin.

The Wildlife Conservation Policy (DWNP, 1986) is focused on Wildlife Management Areas, Park regulations, citizen participation in job creation / income generation, and regulates the industry, wildlife migration and impact of fences. The Wildlife Policy has a commercial focus through encouraging the development of the commercial wildlife industry for purposes of creating employment and enhancing the livelihoods of communities. It anticipates achieving this goal through sustainable management and utilisation of wildlife resources. It generally regulates all wild animals except fish, which are regulated under the Fish Protection Act. It significantly prohibits the utilisation, including hunting of wild animals without a licence. The Government of Botswana

recognises that wildlife takes up a sizeable proportion of land and therefore economic returns from wildlife utilisation should be of an equally higher magnitude. The wildlife policy provisions do not have direct relevance to transboundary river management save for supporting the sustainable utilisation of wildlife resources as a component of the ecosystem wherein shared river basins are found. However, some negative impact can be inferred from the strong emphasis on commercialisation without the balancing emphasis on conservation or sustainability. This may result in industrial growth, which may lead to pollution, environmental degradation and biodiversity loss directly impacting on river basins including shared river basins.

The Tourism Policy (MCI, Dept. of Tourism, 1990) guides tourism in Botswana. The purpose of the policy is to ensure the highest possible net socio-economic benefit for the people of Botswana from tourism in a sustainable manner. This entails the need to increase government revenue, generate employment, arrest rural to urban migration, promote development in rural areas, and generally improve the quality of life of the Batswana people. The Tourism Policy recognised wetlands as tourist attractions, as well as the need for industrial control measures and profit sharing by local communities. The policy also deals with tourism concessions, taxation structures and localisation of employment opportunities. The policy statements enunciated in the policy try to strike equilibrium between the need to encourage tourism and advance the economy of the country and the need to do so sustainably. However there seems to be more emphasis on expanding the tourism industry as evidenced by the tourism concessions, and tax structures, which are designed to attract investors in the industry. This may have an adverse impact on rivers such as the Okavango since it is a tourist attraction.

The Trade Sector policy intends to protect the country's basic industries. To facilitate this, there is tariff protection through levying import duties on countries especially Southern Africa Customs Union (SACU) countries. The purpose of this is to allow domestic industries to compete effectively with other countries such as those from the SACU. The government of Botswana also intends to expand and diversify the economy through domesticating business. Its thrust is national business development with minimal reliance on Foreign Direct Investment (FDI). The policy statements and direction on trade and investment seems to aim for expansion of the economy of Botswana through supporting local businesses. This may have an adverse impact on transboundary rivers if such accelerated growth is pursued with minimal or no regard for conservation.

Botswana is the only country in the Okavango River Basins that has a substantive draft National Wetlands Policy that has been shared with the public. The mission of Botswana's draft wetlands policy is to promote the conservation of Botswana's wetlands in order to sustain their ecological and socio-economic functions and benefits for the present and future well-being of the people. The specific objectives articulated in this policy instrument are to:

- Promote the conservation, sustainable use and, where appropriate, rehabilitation of wetlands through the promotion of cultural, economic and ecological values.
- Provide a framework for the management of wetlands in an ecologically sustainable way within a social and ecosystems framework.
- Ensure a shared vision and multi-sectoral government involvement in the management of wetlands.
- Achieve optimal and informed civil society involvement in the management of wetlands through appropriate participatory approaches.
- Ensure civil society awareness of the value of wetlands and their role in the implementation of this policy.
- Ensure a sound information base for the management, conservation and rehabilitation of wetlands.
- Ensure the implementation of international obligations relating to wetlands.

Another important policy instrument influencing the use and management of natural resources in the Okavango River Basin in Botswana is the Agricultural Policy. The *National Policy on Agricultural Development* (MoA, 1991) focuses, among other things, on fencing of communal areas, household food security, and irrigation schemes. In addition, the National Forest Policy (MoA, Dept), outlines the role of forestland and resources play in enhancing environmental functions including biodiversity and natural habitat, and watershed protection.

The Botswana Wastewater and Sanitation Management Policy (2001) aims to promote the health and well-being of the people of Botswana through the provision of appropriate and sustainable wastewater/sanitation management and to introduce mechanisms for the protection and conservation of the water resources. Botswana's wastewater / sanitation management policy effectively relates to the integrated management of the country's water resources in a sustainable manner ensuring wastewater reuse, and continued supply of potable water for many generations. The conservation and protection of the nation's water resources requires that the wastewater / sanitation sector should be managed effectively to ensure that:

- Wastewater / sanitation systems do not constitute a source of pollution for either surface water or groundwater sources
- Properly treated wastewater can be reused where safe to reduce the demand upon raw water resources.

Another policy that governs the sustainable use of natural resources in the Okavango River is the Revised Rural Development Policy (September 2001) The 1973 Rural Development Policy had mixed results. On the one hand, it succeeded in improving economic infrastructure and social services and on the other hand, it was less successful in increasing, sustainable production and productivity from the land and wildlife resources and sustaining rural development. Therefore, the aims and objectives of the *revised* policy are to reduce poverty, provide opportunities for income generation and involvement in economic activities, create employment, and to enhance popular participation in development planning as a basis for broad-based, balanced and sustainable development. The specific objectives of the revised policy include:

- Reduce rural poverty
- Stimulate rural employment and income generation through identification and exploitation of profitable alternatives to livestock, such as rural industries, services, and crafts; attraction of skilled youth; and promotion of private sector initiatives
- Promote sustainable livelihoods
- Retain subsistence livelihood opportunities for those without adequate alternatives and through the establishment of a viable rural commercial sector
- Reduce, where socially acceptable, the livelihood dependency of people on government
- Maintain and improve rural capital in the form of skilled labour, economic infrastructure and natural resources
- Increase agricultural productivity
- Improve the rural development extension services
- Promote a participatory rural development process, through the involvement of local communities, non-governmental organizations, community-based organizations and the private sector.
- Develop an integrated approach towards the reduction of the HIV/AIDS epidemic

The overall objectives of the *Draft* Community Based Natural Resources Management Policy (June 2004) is to create a foundation for conservation-based development, in which the need to protect biodiversity and ecosystems is balanced with the need to improve rural livelihoods and reduce

poverty. This will be achieved by providing communities with diversified livelihood and economic options, opportunities and incentives and by managing and using the country's natural resources in a sustainable manner. The specific CBNRM policy objectives include:

- Clarify and strengthen tenure, property and natural resources rights that may be devolved to communities.
- Establish a framework that provides incentives for communities to conserve natural resources outside of protected areas, links conservation with rural development that also encourages investment in communities and their socio-economic activities and promotes the responsible and accountable management of community resources.
- Facilitate opportunities for community participation in natural resources management processes through capacity building and the development of appropriate institutional structures.
- Enable communities to participate meaningfully in the monitoring of CBNRM processes and activities at all levels.
- Promote increased communication, education and public awareness (CEPA) regarding the management and sustainable use of natural resources within and by communities
- Protect the intellectual property rights of communities with regard to natural resources and the management of such natural resources

Botswana was also involved in a national stakeholder Draft SADC Regional Water Policy Review to obtain national level feedback on the draft regional policy and to redefine the policy based on the national needs and interests. The issues of capacity building, harmonisation of SADC policies with national policies, as well as the lack of a policy on wildlife and tourism needed to be addressed. The review also recommended that countries upstream practice watershed management while countries downstream practice water demand management.

The overall policy framework regulating water resources in Botswana is utilitarian as observed from the preceding policy directions. The aim of the Botswana government is to, as far as possible, utilise both internal and shared sources of water to ensure that the basic needs of the population i.e. potable water for consumption are met and that the excess is used to meet economic, social and environmental needs. However the policy endeavours to ensure that such use of water does not have negative environmental impacts on the river system.

d) The Reflection of International Principles into National Water Policy Provisions

While at present there are no policies formulated at the river basin level, the policy frameworks regulating water resources in the three riparian states generally promote the optimal and sustainable utilisation of water resources within the Okavango River Basin. While there may be apparent differences and focus in the national policy provisions between the Okavango River Basin states, all the national water policies, whether still in draft or approved, recognise the existence and importance of international/transboundary water. The emphasis on the importance of these waters and the articulated level of national commitment vary from one country to the other. The water policies generally support cooperation, promote dialogue among riparian states, and encourage conservation of water, including water from shared watercourses, taking into account the scarcity of water within their borders.

3.2.4 National Water Law and Related Legislative Frameworks

As reflected in the National policies, national laws also vary in their approach to shared watercourse management. Such variation may be attributed to the different stages of legislative reform or to different national priorities in the riparian states.

a) Legislative Frameworks in Angola

In Angola**,** the legal framework governing water resources consists of the Constitution of Angola, the Executive Water Decree of 1992 and the newly enacted Water Law 6 of 2002. This piece of legislation encompasses integrated water resources management and water supply. The Constitution of Angola and the Executive Water Decree of 1992 complement the Water Law to constitute the overall legislative framework. The Constitution of Angola states that water is owned by the State. Under this arrangement, users are granted user rights, which may take various forms. The Executive Water Decree on the other hand, establishes that national water administrations shall be under provincial administration in order to facilitate drinking water supply.

The newly enacted Water Law 6/02 makes provision for the granting of water-use rights to private entities. In particular, it bestows water-use rights to a private entity and further allows it to apply for licence or concession to use water. A licence is a short-term right of use that may extend to 15 years. A concession on the other hand is a longer-term right of use that may extend to 50 years. The Water Law also proclaims the principle of national recognition of international obligations. The Law makes specific reference to the national recognition of international obligations in the context of transboundary waters and provide the provisions for the government to co-operate in the management of shared watercourses. This piece of legislation is the legal basis for the national adoption of international water law provisions accepted or ratified by the government of Angola. Under section 19 it states that Angola will (i) adopt co-ordinated measures for the management of water resources in shared hydrological basins taking into account the interests of all states in the basin, (ii) commit itself to just and reasonable allocation of common water or its joint use in conformity with the interests and obligations of the country, and (iii) control water quality and soil erosion[22]. Through the provisions in section 19, the government of Angola committed itself to co-operate with riparian states sharing the same basin to pursue sustainable management approaches whilst advancing their own national agenda.

Another important sectoral law that impacts shared watercourses in Angola is the Fisheries law. The Angola Fisheries Act prohibits persons from catching endangered species thereby ensuring their survival. The law also regulates foreign vessels from navigating and fishing in Angolan waters, including inland waters in compliance with regional agreements such as the SADC Protocol on Fisheries. This legal requirement emphasises the territorial sovereignty principle of international law that supports the utilisation and protection of resources within a country's jurisdiction[23]. Whilst this provision may have conservation benefits it also flies in the face of the international law principle of community of interests that views shared river basins not as divided by borders but as a single hydrological unit to advance economic efficiency and the greatest beneficial use possible[24].

As stated in section 3.2.1, Angola is signatory to international agreements relevant to shared water resources management such as the United Nation Framework Convention on Climate Change (UNFCCC), the United Nations Convention on Biological Diversity (UNCBD), and the United Nations Convention to Combat Desertification (UNCCD). The provisions of some of these conventions have also been incorporated into the Water Sector Development Strategy

Angola is signatory to Revised SADC Protocol on Shared Watercourse Systems and is also a member of two river basin organisations, namely the Permanent Joint Commission and Joint Operating Authority with the government of Namibia over the Cunene River, and the Permanent Okavango

[22] Adopted from section 19 (a) -(c) of the Water Law 6/02

[23] Patricia Wouters; The Legal Response to International Water Scarcity and Water Conflicts: The UN Watercourses Convention and Beyond; www.thewaterpage.com

[24] Patricia Wouters; The Legal Response to International Water Scarcity and Water Conflicts: The UN Watercourses Convention and Beyond; www.thewaterpage.com

River Basin Water Commission (OKACOM) with the governments of Botswana and Namibia over the Okavango River. As signatory to the Revised Protocol, Angola has gone further to incorporate the provisions of the Protocol in its domestic laws namely the Water Law 6 of 2002. The same provisions have also been incorporated into the Water Sector Development Strategy.

b) Legal Instruments in Botswana

The legislature in Botswana enacted several laws to regulate the use of water. The range of legal instruments in Botswana is outlined in Box 4. Critical legal instruments include the Water Act of 1968, the Borehole Act of 1956, the Waterworks Act of 1962 and Waterworks Amendment Act of 1983, and the Water Utilities Corporation Act (WUC) of 1970 and WUC Amendment Act of 1978. Other water-related legislative instruments include the Public Health Act, the Local Government District Councils Act, and the Aquatic Weeds Act.

The legal framework that regulates water resources in Botswana is limited to legislative instruments that define the ownership of water rights, the manner of allocation of water, and the quality of water in the country. They are relevant in understanding how water resources are controlled and managed within the boundaries of the country, including controls in regulating abstraction rates and controls in determining the 'receiving' quality in water sources. One of the most important legal instruments is the Water Act [Cap. 34:01]. The purpose of the Act is to define the ownership of rights to use water, and to grant the use of such rights to users. The Water Act distinguishes between the inherent right of users to own and use public water and the rights acquired through application by users on the other. The inherent ownership and use rights are defined under Part 2 of the Act as those that permit any person who has lawful access to a public stream, natural lake, pan, or swamp to use such water for the following purposes: water stock; drinking, washing and cooking; and use in a vehicle. This section of the Act has some relevance to shared watercourses in that it permits persons with lawful access to a public stream including a shared watercourse to use it for specified purposes as enumerated in the Act.

The Law allows an owner or occupier of any land to sink or deepen a well or borehole for domestic purposes. However the extraction of water for such purposes should not exceed the prescribed amount per day and the borehole should not be sunk within two hundred and thirty-six metres of any other borehole. This provision has relevance to shared watercourses in the case where a borehole is sunk near a transboundary river. Under such circumstances, water from the river may be extracted through the borehole as a result of seepage. The law also applies to the use of water by mineral rights holders when they are extracting minerals within their land. Depending on where the land is located, undergroundwater from a transboundary river may also be utilised in the course of mining activities. The Act however does not make specific provision for the regulation of transboundary waters although it contains statements that are relevant to shared watercourses, such as maintenance of water quality.

The Forest Act allows lawful access to public water to persons who utilise forest produce for temporary logging and saw milling activities not to exceed the prescribed amount. Permission to use such water is obtained from the Water Board through the Water Registrar. Again, in the case of boreholes and public streams mentioned above, the significance of this provision as far as transboundary river management is where such public water is drawn from a shared river such as the Okavango. In this case, it will have to be done in accordance with the principles of equitable and reasonable use.

The water quality for potable water in Botsana is guided by the World Health Organisation (WHO) standards. Bacteriological, chemical and physical parameters of the water are further analysed through inspections and sampling by the Department of Water Affairs (the institution responsible for water issues). Furthermore, the quality of effluent that is permitted to be disposed in public

wastewater systems is prescribed. Toxic sewage and domestic sewage is prohibited from being disposed into rivers. This includes non-disposal in all rivers including shared perennial rivers such as the Okavango. Instead, they are deposited in evaporation ponds and later disposed as solid waste, which protects water quality in shared watercourses, along with other water resources. It is also in line with the reasonable and equitable use principle, and the *Sic Utere Tuo* (appreciable harm) principle because it ensures that activities within Botswana do not cause pollution or any appreciable harm relating to such pollution down stream.

As far as agriculture is concerned, the main legislative instrument that regulates agricultural activities in Botswana is the Agricultural Resources Conservation Act. The purpose of this law is to conserve and protect agricultural resources by advising landowners and occupiers agricultural measures. It also regulates agricultural land use practices in designated areas. Whilst the law does not make specific reference to transboundary water resources, it does have the potential of impacting the utilisation of shared waters through the adoption of agricultural land use options or practices that depend on transboundary waters. International water law and the Revised SADC Protocol on Shared Watercourses permits the use of shared water for agricultural, domestic, industrial, navigational, and environmental purposes. Although agricultural use is permissible it may negatively impact the hydrological and ecosystem integrity of shared river basins to the prejudice of downstream states.

The Fish Protection Act governs the fisheries sector in Botswana. This law provides for the regulation, control, protection and improvement of fish and fishing practices in the country. To achieve these objectives it prohibits the use of explosives, poisonous or noxious substances in fishing. The relevance of this law to shared watercourses is two-pronged. One effect is that it encourages the sustainable utilisation of fish resources as a component of an aquatic ecosystem including transboundary waters. To this extent, it promotes the equitable and reasonable use of fish resources taken as a subset of a shared river basin. Secondly, it contributes to the water quality standards by prohibiting the introduction of polluting substances such as poisonous or noxious material into a shared river basin. Whilst these provisions were probably meant to specifically regulate fish resources, they do have an impact on the sustainable management of transboundary rivers.

The main instrument regulating forests in Botswana is the Forest Act. It generally governs forest reserves and State land. The act specifically prohibits the unauthorised cutting, felling and burning of trees. It further designates certain trees or classes of trees as protected. However, where such trees are found on private land such designation cannot occur without the consent of the owner of the land. The significance of forests in maintaining the ecological integrity of aquatic ecosystems, including shared river basins, cannot be over emphasised. It contributes to the curtailment of soil erosion, siltation and loss of biodiversity. The provisions of the forests law arrest such negative impacts on the ecosystem thereby enhancing the ecological integrity of shared river basins including the Okavango.

The environment sector is regulated by the Natural Resources Protection Bylaws. The Natural Resources Bylaws were formulated to ensure the protection of natural resources. It defines natural resources as firewood, sand, gravel, soil, stones, thatching grass, veld products, and river reeds. The Wildlife Conservation and National Parks Act regulates the wildlife sector in Botswana.

Box 4: Range of legal instruments in Botswana

- ***Water*** *Act* of 1968
- ***Borehole*** *Act* of 1956
- ***Waterworks Act*** of 1962 and Waterworks Amendment Act of 1983
- ***Water Utilities*** *Corporation Act* (WUC) of 1970 and WUC Amendment Act of 1978
- ***Public*** *Health* Act
- ***Local*** *Government District* Councils Act
- ***Aquatic*** *Weeds* Act
- ***Interpretation Act*** (Cap. 01:04 of 1984): Defines land to include water.
- ***Tribal Land Act*** Cap.32:02 (1970): In areas of tribal land, the act controls land use rights and makes provision for the imposition of restrictions.
- ***Tribal Land*** (Amendment) Act (1993): Allows for determination of land use zones. Land grants may not conflict with the zoned land use. Land Boards may determine management plans for use and development of the zones.
- ***Town and Country Planning*** Cap. 32:09: Requires development plans for all areas declared as planning areas.
- ***State Land*** CAP.32:01: Controls use of state land and its resources.
- ***Wildlife Conservation and National Parks Act*** (Act No. 28 0f 1992): Enables gazettement of national parks, game reserves and Wildlife Management Areas in which wildlife conservation and use is the primary land use. The WMA Regulations could be a useful tool for managing wetlands in WMAs.
- ***Waste Management Act*** CAP.40.02 of 1998: Management of controlled and hazardous waste. Provision of waste management plans; identification of waste management sites, control of groundwater pollution.
- ***Agricultural Resources (Conservation) Act***: Provides for the conservation of Botswana's agricultural resources. The Act defines agricultural resources as animals, birds, plants, waters, soils, vegetation and vegetation products, fish, insects, etc.
- ***Public Health*** CAP.63:01: Protects the quality of water by preventing the disposal of polluted water which may be used by the public. Control of mosquito larvae.
- ***Mines and Mineral*** CAP.66:01: Prohibits wasteful mining and processing. Regulates extraction of materials such as sand
- ***Mines, Quarries, Works and Machinery*** CAP.44:02: Generally aimed at working conditions but includes sections on slimes dams, fuel and oil spills and effluent water.
- ***Water*** CAP.34:01: In terms of wetlands this is an important act as it defines ownership, rights and use of public water. It also prohibits the pollution, fouling or poisoning of, interference with, or flow alteration of public water.
- ***Forest Act*** CAP.38:04: The Act gazetted forest reserves, protected trees and the control of forest products. There is provision for the protection of trees on state land that occur within 10 m of a river bank.
- ***Herbage Preservation*** (Prevention of Fires) CAP.38:02: All persons require permission from the Herbage Preservation Committee to set fire to any vegetation on land of which one is not the owner or lawful occupier.
- ***Aquatic Weeds*** (Control) CAP.34:04: Allows for the control of aquatic weeds mainly through the control of boat movement. Can affect wetlands by limiting boating and procedures used to control weeds. Eight plants are listed as weeds.
- ***Fish Protection*** CAP.38:05: Allows for the protection and sustainable management of fish resources.
- ***Noxious Weeds*** CAP.35:04: Allows for the control of arable and aquatic weeds by making land owners or occupiers responsible for destruction of weeds. 27 weeds listed, many of which occur in wetlands
- ***Tourism Act*** (Act No. 22 of 1992): Regulates the tourism industry and allows for the establishment of a Tourist Industry Licensing Board.
- ***Acquisition of Property Act*** (Cap. 32:10 of 1955) Provides powers for the compulsory acquisition of property for public purposes.

The water-related legislative framework for Botswana does not specifically make provision for the establishment of institutional arrangements that ought to govern transboundary waters or to implement international agreements related to cooperation over shared water resources. There is an apparent dearth in the water-related legislative framework that should be addressed looked at when the same is reformed. However, the provisions in the laws analysed do make significant reference to transboundary river management and, to some extent, subscribe to the international water law principles of equitable and reasonable use and appreciable harm (*sic utere tuo*).

As mentioned in Section 3.2.2, the government of Botswana is also a signatory to several significant international and regional agreements such as the Ramsar Convention on Wetlands of International Importance, the United Nations Framework Convention on Climate Change, the United Nations Convention to Combat Desertification, the United Nations Convention on Biological Diversity, and the Revised Protocol on Shared Watercourse Systems in Southern Africa. It is also a member of several River Basin organisations such as the Joint Permanent Technical Commission (JPTC) over the Limpopo, Molopo and Nossob Rivers; the Limpopo Basin Permanent Technical Committee (LBTC); the Joint Permanent Water Commission (JPWC) over the Kwambo-Linyati-Chobe River system; the Joint Permanent Commission for Cooperation (JPCC) over the Orange-Senqu River, the Agreement over the Marico River; the ZAMCOM over the Zambezi River; and the Permanent Okavango River Basin Water Commission (OKACOM) over the Okavango River.

c) Namibia Water Laws

Although a Water Resources Management Bill is being finalized in Namibia, the (South African) Act 54 of 1956, often referred to as the old Water Act is the major legal instrument that governs the management of water resources. The Act 54 of 1956 was designed for South Africa and is presently being selectively applied to govern water resources in Namibia. The Act has been duly incorporated into Namibian law and gives the Minister the power to investigate water resources; plan water supply infrastructure; develop water schemes; control pollution; protect, allocate and conserve water resources; inspect water works; levy water tariffs; and advise on all matters related to the water environment in general. It is clear that the Act was not designed to suit Namibia's hydrological, political, social, and economic condition. Nevertheless, the framework generally regulates ownership of water rights, allocation of water and water rights, and water quality issues. Despite ensuring basic water supply requirements and maintaing water quality standards, it does not address issues relating to water security for maintaining ecosystem health, protection of long-term sustainability of freshwater flows, and accessibility of data on water to all parties, nor does it adequately cover issues important to shared watercourses such as ways to prevent and resolve conflicts over water and ways to ensure wide stakeholder participation in water planning and decision-making. Several Regulations ancillary to the South African Act exist and these deal with issues pertaining to, amongst other things, effluent disposal, undergroundwater control areas, abstraction of water from public streams, construction of small dams, and the development of water wells.

The Constitution of Namibia is another critical legal instrument. The Constitution vests all natural resources including water in the State. Article 100 of the Constitution states that all natural resources, including water, shall belong to the State unless otherwise legally owned. The importance of the manner in which this provision is couched is that unless legal ownership to water resources in a specific locality is proved by an entity, such water resources are owned by the State. This means that water can be privately legally owned if legal proof of land ownership is produced, thereby denoting the existence of riparian water rights.

The old Water Act 54 of 1956 buttresses the above formulation of Article 100 of the Constitution. It categorically distinguishes between 'private' water and 'public' water. Section 5 of the Act states that "the sole and exclusive use and enjoyment of private water [shall] be in the owner of the land on which such water is found". This means that owners of land through which water flows are vested

with riparian water rights. The provisions in the Namibian Constitution have direct relevance on the management of transboundary rivers. By allowing, riparian rights, the provisions expose the management of rivers including shared river basins that flow through privately owned land, to various management approaches including unsustainable practices. They do not contain corollary provisions that specifically obligate private landowners to equitably and reasonably use water save for outlining the maximum amount of water to be extracted and the purposes for which the water is to be used.

The Namibia Water Corporation Act, No 12 of 1997, established the water utility company as another important legal instrument. The Act places an obligation on NamWater to conduct its functions in an environmentally sustainable and sound manner, as it specifies a '*duty to conserve and protect the environment'*. There is however no specific mention of environmental water requirements in this act. Since water in Namibia is allocated through a permit regulatory system, the Namibian Water Company (Namwater) is entitled to apply for a permit to impound surface runoff water on ephemeral rivers, and to abstract water from perennial rivers and groundwater. Individual irrigation projects found along perennial or even transboundary rivers, such as the Okavango, are also allocated water through permits, thereby controlling the quantity of water to be utilised within a shared river basin. The quantity of water abstracted for domestic use along perennial shared rivers is also regulated by specific agreements between the government of Namibia and the other riparian basin States.

The *draft* Water Resources Management Bill (MAWRD 2003), based on the National Water Policy, recognises that the Management of Water Resources need to harmonise human and environmental needs and protect water quality, while acknowledging the role of water in supporting the ecosystems'. The bill provides for basic human and environmental water needs through the "Allocations for Priority Purposes".

One of the fundamental principles that the draft Water Resources Management Bill is based on is: *meeting Namibia's international obligations to neighbouring States and promoting respect for Namibia's rights with regard to shared water resources and, in particular, to the abstraction of water for beneficial use and the discharge of polluting effluents"*. The *draft* Bill also recognises Namibia's obligations under international treaties, conventions, such as the UNCBD, and agreements. It specifically mentions the Law of Non-navigational Uses of International Watercourses and the revised SADC Protocol on Shared Water Resources. Regarding shared watercourses, the *draft* bill authorizes the minister to participate in the development of a common database, joint projects and conflict resolution and to establish institutional links and ensure stakeholder participation with neighbouring riparian states. The bill includes the obligation to collect and share data and information on internationally shared water resources, an issue critical to the Okavango River Basin management.

The legal instruments that govern the quality of potable water in Namibia include the Water Act 54 of 1956, the Public Health Act, Municipal Drainage Regulations, the Model Sewerage and Drainage Regulations (1996), and the Namibian Water Guidelines. The Namibian Water Guidelines are based on the World Health Organisation (WHO) and European Union (EU) standards. The purpose of these guidelines is to ensure that the aesthetic, chemical, and bacteriological quality of potable water is within the limits of the WHO standards. This has a bearing on shared watercourses in that it requires the water quality to be of an acceptable quality and standard for human and related consumption. The Act 54 of 1956 also ensures the protection of water quality in shared watercourses. It determines the quality of effluent to be disposed in public wastewater systems. It further forbids the disposal of effluents in any of the ephemeral rivers or any of the perennial shared rivers, including the Okavango. This ensures the maintenance of the 'receiving water' quality standards. The provisions of the domestic water laws regulating the use of water resources do not have provisions that specifically govern shared watercourses. They were promulgated to regulate

inland water. However, as noted above they also contain some provisions that have a bearing on the management of shared watercourses. Other pieces of legislation that influence shared water resource use and management in Namibia include: the Agricultural (Commercial) Land Reform Act, Agronomic Industry Act, National Fishing Corporation of Namibia Act and the Nature Conservation Ordinance No 4 of 1975 & amendments, the Export Processing Zone Act, the Agricultural Pest Ordinance No 11 of 1927, Agricultural Pest Act No. 3 of 1973, the Aquaculture Act No 18 of 2002 and Aquaculture (licensing) regulations, the Inland Fisheries Resources Act No 1 of 2003, the Forest Act No 12 of 2001, Draft Parks and Wildlife Management Bill of 2004 (May 2004 draft), the Environmental Management Bill (draft1995), the Communal Land Reform Act No 5 of 2002, the Flexible Urban Land Tenure Act 1999 and Deeds Registries Act, the Land Survey Act, the Minerals Prospecting and Mining Act No 33 of 1992, and the Water Research Act No 34 of 1971.

Agricultural land and the agriculture industry are governed by the Agricultural (Commercial) Land Reform Act No 6 of 1995 and the Agronomic Industry Act respectively. The Agricultural (Commercial) Land Act makes provision for the allocation of land to Namibians who do not own or have access to land for agricultural purposes. It further empowers the State to purchase or compulsorily acquire agricultural land and regulates the acquisition of land by foreign nationals. The law does not have much relevance to the management of shared watercourses save for the fact that it has the potential to result in unsustainable land use or agricultural practices if no concomitant provisions that oblige new land owners or occupiers to use their land sustainably are included. Unsustainable land use practices may result in land degradation, which if occurred within the vicinity of shared watercourses may lead to soil erosion, siltation, or pollution of the shared river basin. The Agronomic Industry Act on the other hand regulates the agricultural industry, mainly agronomic crops. It promotes and facilitates production, processing, storage, and marketing of controlled products. Like the preceding agricultural law, the Agronomic Act does not have direct relevance to the management of shared river basins. However, some links can be inferred between the emphasis of production and industrial expansion of the agriculture industry where there is no specific provision regulating the adverse environmental effects that may result from such industrial expansion. This may negatively impact on the ecological and hydrological integrity of rivers including shared watercourses.

Fishery is an important industry for Namibia. This industry is generally regulated by the National Fishing Corporation of Namibia Act, the Inland Fisheries Act and the Nature Conservation Ordinance. The National Fishing Act aims to promote the exploitation of fish and other marine resources. It also aims to establish the development and efficiency of other businesses engaged in the fishing industry. This law encourages the exploitation of fish as an industry for economic purposes and is pertinent to the marine sector. The Inland Fisheries Resources Act takes into account, both the exploitation and conservation or sustainable use of freshwater fish, an important component of any aquatic ecosystem including shared watercourses. Conservation concerns, for inland waters, are further given cognisance in the Nature Conservation Ordinance. It, amongst other things, prohibits the unauthorised release of fish into inland waters, and further prohibits unauthorised angling. However, angling is permitted in inland rivers that flow through private land or through communal areas. It also forbids the use of explosives, poisonous or intoxicating material as fishing methods. These provisions promote the sustainable utilisation of fish resources specifically in inland waters where transboundary rivers exist. Through prohibiting unauthorised fishing practices and introduction of fish species that may be alien, it supports the conservation of fish resources also found in shared watercourses. It also contributes to the prevention of pollution through prohibiting the introduction of poisons or intoxicating material into rivers.

Although the Nature Conservation Ordinance no: 4 of 1975 and amendments, are the legal authority until repealed (sometime in 2004) regulating natural resources, it does not specifically deal with shared watercourses. It is relevant to note that the definition of '*wildlife*' does not include

invertebrates and that section 66 dealing with fish in inland waters and prohibiting the placing or release of any fish in inland waters, was recently repealed in the Inland Fisheries Resources Act 1 of 2003. This essentially reflects the take-over of responsibility for freshwater fish by the Ministry of Fisheries and Marine Resources. Relevant to this review is that the Minister is responsible for the *preservation of wild animals, exotic game, fish and plants* and may destroy, decrease, or eliminate any species that is detrimental to any other species, undertake research and surveys on any species, *take the measures….for the control of aquatic vegetation* and *issue regulations with regard to…the import, cultivation and control of any plant…indigenous or not…detrimental to, any wild animal, fish or indigenous plant.* Essentially this Act affords protection to wetlands located inside National Parks.

The development and growth of small and medium enterprises is promoted by the White paper on Industrial Development, and the Export Processing Zone Act. The provisions and policy statements contained in these documents support the establishment of industries in certain areas through providing economic incentives such as tax rebates. The legislative framework promotes increased production and economic advancement through exploitation of natural resources. They do not have direct relevance on the management of transboundary watercourses save when the anticipated industrial expansion occurs in a manner that does not take into account the environmental and ecological concerns of rivers. Under investment promotion, laws such as the Foreign Investment Act and the Foreign Investment Protection Act guarantee foreign investors against expropriation and also ensure that they have rights of repatriating their profits and dividends.

Although the Agricultural Pests Ordinance No 11 of 1927 is a very outdated legislation whose intention and purpose has been repealed by the Agricultural Pests Act 38 of 1973 and will certainly fall away once the current revision of the new Conservation of Agricultural Resources bill is finalized, this ordinance is useful in that it lists prohibited imports that can cause pest and weed problems as well as those species allowed by permit that would require particular precautionary measures. These regulations are important when dealing with a transboundary area such as the Okavango as are those of the Agricultural Pests Act below. On the other hand, the Agricultural Pests Act No 3 of 1973 on the other hand deals with the registration of nurseries, the control and eradication of plants, insects and diseases at nurseries, the control and eradication of exotic (vertebrate) animals (excluding farm animals) and plants infected by insects or plant diseases, control of plant, insect and plant disease imports, honey bees, honey and exotic animals, the eradication of plant diseases, insects and locusts as well as defining the powers of inspectors. It is essentially aimed at preventing the introduction and spreading of plants, insects, non-farming exotic vertebrates and diseases that may prove detrimental to the agricultural sector.

The Weeds Act No 42 of 1937 and the Weeds Ordinance No 19 of 1957, although no longer applicable in South Africa, still apply in Namibia but it is not clear which would take precedence. According to the ordinance the "administrator" has the power to declare weeds and landowners have a duty to eradicate such weeds. It allows for regulations including ones that prevent the introduction of weeds by prohibiting or restricting their importation and distribution. Important to this review is Section 8 that makes it a criminal offence to place, cause or permit *any portion of a weed or any weed in any river, watercourse, or water furrow or on any public road.* This is particularly pertinent in controlling the potential spread of aquatic weeds such as *Salvina molesta* and *Pistia stratiotes* that my threaten floodplain areas alongside the river in Namibia as well as seasonal and permanent swamps downstream in Botswana should they be introduced into the Okavango in Namibia.

The Soil Conservation Act No 76 of 1969 makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources. Thus, where management strategies for the Okavango River Basin are conducive to these aims, particularly the conservation of water resources, this act is applicable. Although the jurisdiction of the original Act was limited to commercial land, the recent Communal

Land Reform Act of 2002 specifically mentions it and requires compliance in terms of conservation and prevention of soil erosion (clause 31), implying that these measures apply to communal land areas too. Most of the catchment area of the Okavango River Basin is communal land and this provision is thus important. The Second Soil Conservation Amendment Act No 38 of 1971 deals mainly with soil conservation, soil stabilization and fire protection. This Act is being revised by the Ministry of Agriculture, Water and Rural Development as part of the new Conservation of Agricultural Resource bill that is currently with the legal drafters. This provides an ideal opportunity to incorporate some broader conservation issues pertinent to wetland conservation and shared watercourses. Sediment transport has been identified as a driving force in the wetland dynamics of the Okavango Delta and soil conservation measures applied upstream would have an impact on this. Another area that could be addressed in this emerging legislation is the control and importation of alien invasive species and the development of appropriate screening mechanisms to protect riparian and wetland ecosystems from plants that take advantage of disturbed areas that have been subject to erosion, particularly alongside river courses.

The Aquaculture Act No 18 of 2002, regulates and controls aquaculture activities and the sustainable development of aquaculture resources. It allows the Minister to formulate policy based on social, economic and environmental factors, the best scientific information and advice from the advisory council to *inter alia* promote sustainable aquaculture and manage, protect and conserve aquatic ecosystems. Aquaculture (licensing) regulations basically give effect to the Aquaculture Act and sets out the requirements for gaining a licence and running aquaculture facilities. Part VI deals with protection of the aquatic environments and reiterates that no one may release or allow aquaculture products to escape, 19 (1-3) and that written Ministerial permission is needed prior to the introduction or transfer of any aquatic organism. The Inland Fisheries Resources Act No 1 of 2003 deals with the conservation and utilization of inland fisheries resources and allows for the updating and development of new policies for the conservation and sustainable utilisation of Namibia's inland fisheries. It encourages cooperation with neighbouring countries regarding the management and conservation of shared waterways.

The Forest Act No 12 of 2001 defines '*forest produce*" broadly as any thing which grows or is naturally found in a forest including, *any living organism*….. This Act is cantered around sustainable management of forests, and "*the purpose for which forest resources are managed and developed, including the planting of trees where necessary, in Namibia, is to conserve soil and water resources, maintain biological diversity..."*(Part 2. 10). The Act provides for the protection of the environment and of importance to this review is the clause for the protection of riparian vegetation that in effect also legislates against soil erosion and resultant siltation. This clause, essentially taken from the old Forestry Act No 72 of 1968 states that it is an offence "*to harm, injure or remove any living tree, bush or shrub within 100m of any river, stream or watercourse."* However, in practice this legislation has never been enforced and large areas of riparian vegetation have been lost and continue to be cleared. Examples are found along the Namibian side of the Okavango River where areas have been cleared for irrigation, crop planting and in at least one instance simply to improve the view from a tourist lodge.

The d*raft* Parks and Wildlife Management Bill, of 2004 (May 2004 draft) will protect all indigenous species and control the exploitation of all plants and wildlife. The preamble clearly states that the bill is intended: *"To give effect to paragraph (l) of Article 95 of the Namibian Constitution by establishing a legal framework to provide for and promote the maintenance of ecosystems, essential ecological processes and the biological diversity of Namibia…….. and to promote the mutually beneficial co-existence of humans with wildlife, to give effect to Namibia's obligations under relevant international legal instruments including the Convention on Biological Diversity and the Convention on International Trade in Endangered Species of Wild Fauna and Flora…*" In keeping with the Namibian Constitution the principles underlying the draft Act, are simply that biological diversity and essential ecological processes and life support systems be maintained.

The *Draft* Environmental Management Bill (draft 1995) requires adherence to the principle of optimal sustainable yield in the exploitation of all natural resources. Once enacted, it will promote inter-generational equity in the utilisation of all natural resources and make Environmental Assessments (EAs) essential prior to the development of projects that can impact on wetlands. In terms of the management of shared wetlands such as the Okavango, two issues are important: the threat posed by invasive alien species particularly plants and the need of sufficient water to maintain ecological functioning of the Okavango River and its floodplains in Namibia as well as in the Delta in Botswana. The bill specifically applies the precautionary principle, as well as including "*the farming or importation of any genetically modified organism or plant or animal species that may have a significant impact on the Namibian environment"* in the list of developments requiring Environmental Impact Assessments. One of the principles on which the draft bill is based is "e*quitable".*

The Communal Land Reform Act No 5 of 2002 provides for the allocation and administration of all communal land and makes provision for the prevention of land degradation and mitigating the impacts of mining, prospecting, roadworks and water provision. The Act provides certain rights to communal farmers and traditional authorities and representation on Communal Land Boards. The regulations section states that future regulations will address issues pertinent to the conservation and sustainable management of the Okavango River Basin. It states that: *"The Minister may make regulations in relation to …The combating and prevention of soil erosion, the protection of the pastoral resources and the limitation and control of the grazing of stock and any other matter as the Minister may consider necessary or expedient for giving effect to this Act …"* Interestingly this Act provides for the application of provisions of the Soil Conservation Act, particularly those that deal with soil erosion and "*disturbances that may cause soil erosion*", on communal lands. The Flexible Urban Land Tenure Act 1999 and Deeds Registries Act provides a land registrations system that is just, modern, contributes to economic growth and supports household welfare. It also provides for two new tenure forms in urban areas: starter title and land hold title tenure. The Deeds Registration Act on the other hand provides for the registration of title and the issuing of deeds or certificates for all land, including rural land, for areas where this is required by law through the office of the Registrar of Deeds.

The Land Survey Act, provides land surveying where new title deeds are required and makes the office of the Surveyor General responsible for all land surveys, while the Minerals Prospecting and Mining Act No 33 of 1992 has significance for water supply in Namibia in general as it has several references to adequate protection of the environment including water. The Customs and Excise Act of 1998 empowers customs officials, under Customs and Excise in the Ministry of Finance, to execute the function of controlling entry of exotic plants and animals. Provision is made for this in the Customs and Excise Act of 1998, under section 123 *Prohibitions and restrictions: (e) goods which may, in terms of any provision of this Act or of any other law, only be imported into Namibia in terms of a permit, certificate or other authority, unless imported under such a permit, certificate or other authority which purports to be issued by virtue of any such provision, shall be imported into Namibia, unless in terms of a permit issued by the Permanent Secretary…".* The Water Research Act No 34 of 1971 (a South African Act) provides for water related research through the establishment of a water research commission and fund remains applicable in Namibia, neither the commission nor the fund were ever established in Namibia

The government of Namibia is party to various international agreements on the environment with a bearing on water resources management. These include the Ramsar Convention, the UNFCCC, the UNCCD, the UNCBD, the SADC Revised Protocol on Shared Watercourses and the SADC Protocol on Fisheries. It is also a member of several joint water or river basin commissions such as the Joint Permanent Water Commission (JPWC) with the Government of Botswana on shared rivers, on both the Okavango River and the Kwando-Linyati-Chobe System section of the Zambezi River system; the Permanent Okavango River Basin Water Commission (OKACOM) with the Governments of Angola and Botswana on the Okavango River; the Permanent Joint Technical Commission (PTJC) with the Government of Angola on the Cunene River; the Permanent Water

Commission (PWC) with the Government of South Africa and the Agreement establishing the Vioolsdrift and Noordoewer Joint Irrigation Scheme on the lower Orange River; the Orange-Senqu River Commission (ORASECOM) with the Governments of Botswana, Lesotho, and South Africa over the Orange, Senqu and Molopo-Nossob river system; and the Zambezi River Commission on the Zambezi River .

The FAO Fishery Department Code of Conduct for Responsible Fisheries (October 1995) is another important instrument regulating fisheries throughout the world. Although compliance is voluntary, it established sound conservation, management and development principles adopted by many countries to ensure *sustainable exploitation of aquatic living resources in harmony with the environment*. The Code aims to *ensure the effective conservation, management and development of living aquatic resources, with due respect to ecosystems and their biodiversity*. Namibia has endorsed the Code of Conduct for Responsible Fisheries and, as stated in the Aquaculture Policy (MFMR 2001), is committed to managing its fisheries in accordance with these internationally accepted guidelines, particularly the specific provisions for aquaculture.

The WTO Agreement on the Application of Sanitary and Phyto-sanitary measures (SPS Agreement) 1995, attempts to establish consistency in applying sanitary and phyto-sanitary measures and safeguards against countries using strict Phyto-sanitary measures as a smokescreen for trade protectionism. Namibia is a member of WTO.

d) Incorporation of International Law Principles into Legal Frameworks

The extent to which water legal frameworks of the Okavango River riparian states incorporate international water law principles that promote optimal and sustainable use of shared river basins vary from country to country, probably reflecting the different stages of water law reforms in the respective countries. Countries such as Angola have a legal framework that takes cognisance of principles such as the "reasonable and equitable" principle and generally supports cooperation in the management of international basins. However, it lacks some important provisions such as those that relate to conflict resolution. Namibia is in the process of reforming its water law with the drafting of the draft Water Resources Management Bill. The Bill facilitates the implementation of International Conventions, Regional Conventions and Agreements. Once passed by Parliament, the provisions in this Bill will provide Namibia with effective tools for cooperation and collaboration. The water legal framework of Botswana on the other hand still needs to be reformed to adequately reflect the international water law principles necessary to achieve the sustainable utilisation of transboundary rivers.

3.3 Organizational Structures in the Basin

Institutional arrangements, in terms of how the stakeholders are organized within a river basin are key to the effectiveness of water governance. The term stakeholder as used in this report refers to a person or group of people with an interest, as expressed in form of rights to, claims on and/or responsibilities for water and related resources (Edmund Barrow, etal., 2002). As described in the GWP TAC Paper No 7 (2003), the political, social and administrative systems that are in place to develop and manage water resources at different levels of society are critical elements of effective water governance. In the context of this paper, the type and nature of organizations administering the development and management of water resources at different levels of the basin and the structures for interaction and coordination that have been put in place are key to the effective governance of the basin as well as the subsequent sharing of water and benefits in the Okavango Basin.

The importance of the Okavango Basin is recognised by the establishment of institutions at local, national and regional levels that promote rational utilisation, conservation and protection of the basin. Sound institutional arrangements and frameworks at all levels of water resources management

are one of the pre-requisites for sustainable water resources management (Mostert, E. 2000). An appropriate, functional institutional framework is required to serve as a vehicle for implementation at national and regional levels (Mostert, E. 2000). This may require the development of new institutions, or restructuring or building the capacity of existing institutions, as well as development of linkages for formal collaboration between institutions in different sectors and countries (Hirji, R. et al 2002).

The available literature on the Okavango River Basin has shown that different institutional arrangements exist in the basin. While at the basin level, the stakeholders (especially government stakeholders) are organized under basin commissions, within the countries, stakeholders are organized according to institutional models that show a wide variation. At the central government level, the three countries have an apex/lead body, supported by an operational organization and decentralized structures. The following sections provide a snapshot of the institutional governance structures that exist in the Okavango River Basin.

3.3.1 Southern African Development Community

As members of the Southern African Development Community, the three riparian states of the Okavango are influenced by the SADC institutional structures. The three countries, individually and collectively are supposed (according the SADC Treaty provisions and values) to coordinate their actions and efforts within the Okavango Basin with those of SADC, especially the activities of the two of Directorates i.e. Directorate of Infrastructure and Services and Directorate of Food, Agriculture and Natural Resources (FANR) which deals specifically with water and other natural resources related issues respectively.

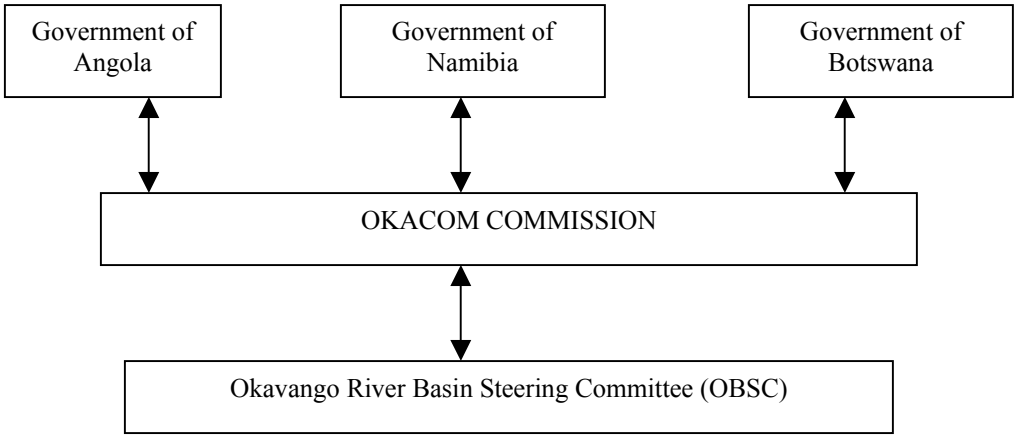
Although the SADC Water Division is not directly involved in the collaboration between the states of the Okavango basin, it is mandated to coordinate the development and implementation of policies, strategies and programmes in all aspects of water resources development and management, at national and regional levels, with an emphasis on transboundary watercourses. This new role entails the development of environmental standards, guidelines and regulations to be adopted and enforced by all member states; development and harmonization of regional positions in negotiations in international environmental conventions, protocols and other agreements assisting member states to develop national action programmes for implementing such agreements; and inter-sectoral coordination and close collaboration with all the SADC Sectors to ensure that their programmes and activities integrate environmental management concerns for sustainable development.

The SADC Framework, through the SADC Water Division and FANR, provides a good vehicle for engaging government representatives throughout the basin. Since the Okavango River Basin states took their own initiative to collaborate and establish OKACOM, the involvement of SADC in this river basin has been very minimal and the structure is rarely used.

3.3.2 The Permanent Okavango River Basin Water Commission (OKACOM)

The Permanent Okavango River Basin Water Commission (OKACOM) was established in 1994 by the governments of the Republic of Angola, the Republic of Botswana and the Republic of Namibia. At the basin level, the actions of the riparian states are coordinated under the umbrella of OKACOM, an intergovernmental organizational framework that provides a coordination and advisory framework for the management of the river basin. Under the OKACOM arrangement, each basin state remains responsible for managing the water resources within its own territorial boundaries. The commission, which is answerable to the national governments, comprise of three representatives from each of the basin states. Based on the provisions of the OKACOM Agreement, the organizational structure of OKACOM can be summarized as presented in figure 2.

Figure 2: Summarized Organizational Structure of OKACOM



The Main Functions of the Permanent Okavango River Basin Water Commission are to advise the three contracting parties on:

- Measures and arrangements to determine the long-term safe yield of the water available from all potential water resources in the Okavango River Basin;
- Reasonable demands for water from consumers in the Okavango River Basin;
- Criteria to be adopted in the conservation, equitable allocation and sustainable utilization of water resources in the Okavango River Basin;
- Investigations, separately or jointly by the Contracting Parties, related to the development of any water resources in the Okavango River Basin, including the construction, operation and maintenance of any water works;
- Prevention of pollution of water resources and control over aquatic weeds in the Okavango basin.
- Measures that can be implemented by one or all the Contracting Parties to alleviate short term difficulties resulting from water shortages in the Okavango River Basin during periods of drought, taking in to consideration the availability of stored water and the water requirement within the territories of the respective Parties at that time (Agreement On the Establishment of OKACOM, 1994).

In order to direct and coordinate its activities in the basin, OKACOM appointed the Okavango River Basin Steering Committee (OBSC) on 6 June 1995 to advise OKACOM on matters, related to the agreed activities of the Commission. The Rules and procedures of the Steering Committee were developed in 1997. The OBSC comprises three OBSC permanent appointed members from each basin state. Each member country may also co-opt additional members to serve on the OBSC and the number of co-opted members is determined by the scope and magnitude of the work. However there is an upper limit of 5 persons from each country who can participate at any one event. By July 2002 at least 13 meetings had been held by the OBSC.

As a basin-wide structure, OKACOM has been very effective in facilitating inter-state technical and ministerial interactions. However, the organization has serious capacity constraints. All the OKACOM Commissioners hold full-time positions in ministries, restricting their time for OKACOM duties. This results in infrequent opportunities for interaction between Commissioners; so they only meet once per year. Most of the Commissioners have engineering backgrounds with little experience in water law, negotiation skills and consultation and are unprepared to deal with multi-stakeholder trans-national issues inherent in the management of a river basin. Due to the

nature of the OKACOM Agreement, the current arrangements within OKACOM are perpetuating the segmentation of decision-making to the interests of the three sovereign countries.

Although relatively young, OKACOM provides a good framework upon which a properly mandated river basin organization will in the future be able to ensure sustainable development and management of the Okavango River Basin. There is much goodwill within OKACOM for rallying actors together. Within the Commission, there is also a growing realization of the distinctly different functions of guardianship of the resources and the resource use or utilization function. In light of the limited human capacity problems faced by the OKACOM Commissioners, OKACOM has already requested a Secretariat. The activities of OKACOM have been and will be coordinated at a GEF/OKACOM project management office in Luanda, Angola while a proposal for a Secretariat is presently under investigation. If a Secretariat is established this would improve dialogue with civil society stakeholders. Worldwide lessons from RBOs stress the importance of broad stakeholder involvement, catering to grassroots participation at basin-wide level. Currently, civil society and community participation in OKACOM business is not yet formalized. However, this has been taking place to some extent through projects like the Every River has its People and the *Sharing Water* project.

3.3.3 National Arrangements

Apart from being one ecosystem, the Okavango River Basin is divided by international boundaries into three distinct components, the upper system located in Angola, the middle systems situated in Namibia and the lower system hosted by Botswana. Within each of the riparian states there are country specific institutional arrangements that have been put in place to manage the part of the basin that falls in the country. While there are marked differences between and among countries, the review of institutions have shown that there are some common elements of institutional arrangements found in each of the three countries. In each of the three countries there are formal and informal structures.

a) Formal National Apex or Lead Organization

In all the three riparian states of the Okavango river, there is a formal apex/lead organization in the form of a ministry that is tasked with ensuring ownership and allocation of water, setting principles of water management and designing institutional arrangements in form of laws, policies and institutional structures. In Angola, the Ministry of Energy and Water is the apex/lead body with the mandate to decide on water ownership, design institutional arrangements, including the mandating of regulatory and executive organizations. In Namibia, water resources are regulated by the Ministry of Agriculture, Water and Rural Development which provides the national policy and legislative framework, enforces legislation, monitors the use of the river and its natural resources, educates the public on conservation, consult stakeholders and encourages civil society participation in decision-making. In Botswana, the Ministry of Minerals, Energy and Water Affairs (MMEWA) has the overall responsibility for policy in the water sector in Botswana. The Ministry of Mineral Resources and Water Affairs is the designated custodian of Botswana's water resources through the Botswana Department of Water Affairs. These institutional arrangements also provide the framework and mechanisms for international cooperation of governments and civil society in the management of the basin and its resources. The heads of these apex/lead bodies (ministries) in the three countries report directly to the presidency, an authority expected to be impartial when it comes to water resources allocation and issues around the resource.

While the OKACOM arrangements provide for interaction and coordination between the apex/lead organizations in each of the riparian states, there seems to be limited interaction between the Ministry of Energy and Water (Angola), Ministry of Mineral Resources and Water Affairs (Namibia) and Ministry of Agriculture, Water and Rural Development. This is due a number of reasons of which capacity and financial resources are the major constraints.

All the OKACOM Commissioners hold full-time positions within their ministries, enabling them to spend only a limited amount of time on OKACOM duties. This results in infrequent interaction between Commissioners with only one meeting per year. Most of the Commissioners come from an engineering background, with little experience in water law, negotiation skills and consultation therefore the Commissioners have less capacity to deal with multi-stakeholder trans-national issues, which is required in the management of a river basin.

b) Formal Operational Organization

In all three basin states, there are operational water organizations, directly responsible for the operational management of water resources.

- Angola

In Angola, the lead institution in Angola's water sector is the National Directorate of Water, which falls under the Ministry of Energy and Water. This institution is mandated to look after the water resources. While protecting national interests, the National Water Directorate is empowered to promote international cooperation in order to ensure adequate management of shared hydrological basins. The Water Sector Development Strategy, prepared by the National Directorate of Water, reinforces this orientation to international cooperation, placing additional emphasis on integrated water resource management as a means to ensure longer-term environmental sustainability. Integrated catchment management plans are to be drawn up for all major catchments, which will facilitate fruitful dialogue with neighbouring states (Decreto n.º 3/00). Under the water sector reform proposals, hydrological information gathering is to be improved by the formation of a Water Resources Institute, with financing being provided by a National Fund, which is provided for in the Water Law. For the management of water resources, a National Water Council is to be formed, which will be an umbrella body for a decentralised structure of Catchment Councils.

- Namibia

In Namibia, the Water Sector Review by the NWRMR recommended the establishment of a number of new institutional arrangements to improve the management of water resources. The Department of Water Affairs (DWA) in the Ministry of Agriculture, Water and Rural Development (MAWRD) in Namibia have the responsibility of managing the water resources of the country. The mandate and responsibilities of the Department of Water Affairs if further divided into two main directorates, i.e. Directorate Resource Management and Directorate Rural Water Supply. The Directorate Resource Management operates at the national level, while the Directorate Rural Water Supply takes care of the a social responsibility of the Government to assist the formerly disadvantaged communities in the country to obtain access to safe water and sanitation, and has a basin level office in the Kavango region. The Water Sector Review in Namibia has ushered in a new way of doing business within the water sector. As part of the review, it was also decided that the DWA should be realigned to become a Water Resources Agency (WRA), operating on business principles. A separation was also made between the water resource manager, the water supplier and the water sector regulator. In order to achieve this, it was proposed to create a Cabinet Committee on Water Resources (at Ministerial level), a Standing Committee on Water Resources (at Permanent Secretary level), a Utility Regulator and a Water Tribunal. Provision is also made for a Water Advisory Council and a Policy and Strategy Unit in the Ministry to advise the Minister. As the Water Resources Management Bill is yet to be passed, the Department of Water Affairs remains responsible for the water sector and the main coordinator between all the institutions involved in the water related issues. The Namibian DWA in the MAWRD is at present the custodian of all existing water agreements that Namibia signed with neighbouring countries. The DWA finds it difficult to manage all the activities of these different water commissions so the creation of a dedicated international water office has been under discussion for some time.

- Botswana

In Botswana, the Department of Water Affairs (DWA) is in charge of the long-term availability and management of surface and groundwater sources in the whole country including the Okavango Delta. The Hydrology Section of DWA is routinely monitoring the hydrological variables of the Okavango Delta (flow quantity and to a minor extent water quality) and also oversees flow control measures (issuing permits for small bunds, constructed on farmers floodplain fields). Within the MMEWA, the Department of Water Affairs (DWA), supported by the Department of Geological Survey (DGS), is responsible for groundwater investigations, as well as the protection and monitoring of the resources. Furthermore, the DWA is responsible for water supply development in rural areas, for surface water resource investigation and development, and for overall water resources planning. The DWA is also responsible for the protection of surface water resources from pollution and aquatic weed infestation, conservation of water and water quality, as well as administrating the country's water legislation. The activities of any other ministries that can impact on the use of water resources, or otherwise lead to their degradation, have to be coordinated through the Department of Water Affairs in line with Botswana's Constitution and its national policies of environmental conservation and resource protection. In Botswana, the DWA in the Ministry of Mineral Resources and Water Affairs is at present the custodian of six water agreements that Botswana signed with neighboring countries. In order to effectively administer these agreements Botswana has established an International Water Unit that manages international agreements concerning water usage and storage at the regional level. The unit also plays a major role in coordinating the country's interest and input into transboundary water discussions.

- Coordination and Collaboration between the Formal Operational Water Organizations

The formal operational water organizations, directly responsible for the operational management of water resources in each of the riparian states constitute members of the OBSC. Interaction and coordination between these three institutions is facilitated under this steering committee. Since its establishment, nine years ago, the OBSC has held 13 meetings, a number far too small to facilitate effective interaction and the sharing of data and information on the developments in the basin.

The OKACOM Agreement obliges the Parties to the Agreement to provide information required by the Commission for the performance of its functions as permitted by each Contracting Parties' own laws and procedures. One serious constraint affecting these formal operational organizations is the availability of competent manpower to staff all these institutions. There are capacity imbalances in the three riparian states with regards to technical capacity, financial resources and the ability to collect, monitor and generate information on the basins resources also poses a challenge. Botswana for example has dedicated national institutions involved in the collection of data and information on the delta and is in the process of developing a delta management plan. Namibia is also collecting a lot of data on the basin. In the case of Angola, one of the main constraints already highlighted in the Angola Water Policy reform process, is the shortage of adequately trained staff at all levels.

c) Formal Water Supply Organizations

Water supply organizations constitute an important tier of the institutional arrangements in the three riparian states. Although it seems there is no formal coordination and collaboration between the formal water supply organizations in each of the basin states, each country has an institution or institutions whose mandate is water supply.

- Angola

While it is not quite clear as to which institution has the sole responsibility of water supply in Angola, there seem to be a number of institutions performing this function. These include private companies, such as EPAL (*Empresa Pública de Águas de Luanda*), which is responsible for treating and distributing water in Luanda), and provincial governments and local governments (municipalities). According to the provincial administrative arrangements in Angola, all the responsibilities of managing water

resources for multiple purposes (including water supply) falls under the provincial government through its provincial Directorate of Water Affairs. In some cases, the provincial governments create local water companies whenever necessary.

- Namibia

Namibia restructured its civil service in 1997. At that time, the country created a water company, Namwater, whose sole responsibility is water supply. This company took over many of the water supply functions that were previously the responsibility of the Department of Water Affairs. Namwater is responsible for the commercial supply of bulk water to local authorities, industry and irrigation. The creation of Namwater led to unavoidable changes in the water sector and required further consideration for improvement. The reticulation of water to urban communities and the disposal of sewage is the responsibility of the local authorities that fall under the Ministry of Local and Regional Government and Housing (MLRGH). Some municipalities supply their own water, independent from the activities of Namwater. In the rural areas, including parts of the Kavango Region, the Directorate of Rural Water Supply is responsible for water supply and is assisted in their task by the Water point committees at the local level.

- Botswana

In Botswana, the Department of Water Affairs is responsible for water supply development in rural areas (including the Okavango region), and for surface water resource investigation and development. At the district level, District Councils, under the MLG, are responsible for the operation and maintenance of water schemes in medium and small rural villages. Usually the DWA constructs these water schemes, and on completion they are handed over to the respective councils. To secure and improve water supply in rural villages, all District Councils have established separate Water Departments. The planning and provision of on-site sanitation facilities is the responsibility of the MLG. This is contrary to the general principle practised elsewhere in the world where water supply authorities are responsible for wastewater disposal as well. However, it has been decided to transfer the wastewater responsibility from MLG to the District Councils that is in any case expected to gradually take over the operation and maintenance responsibilities for the major village water supplies. The Water Utilities Corporation, a parastatal under the MMEWA, is responsible for the supply of water to the six urban/mining centres and other designated areas except for Orapa, which is supplied directly by the mining company. In urban centres, the Town/City Councils are responsible for the planning, design, implementation and operation of effluent disposal works. The Department of Water Affairs is responsible for the planning, design and implementation of water-borne sewage systems in conjunction with the upgrading of the major village water supplies. In smaller villages, water-borne sewage schemes are planned and implemented by the MLG. The respective District Councils carry out the operation of the sewage facilities.

d) Formal Decentralised Water Structures

The Water Sector Reforms carried out in some of the countries in the basin have created decentralized water management structures. However there are no clear mechanisms of collaboration and coordination between these structures across the basin.

- Angola

In Angola, the catchment council structure is catered to in the new National Water Policy and Strategy. The exact structure, responsibilities and functions of the Catchment Councils are to be specified in detail in the pending regulations, but the Water Law does give Catchment Councils the important role of issuing licences to private water users. A licence is a legal document giving official permission to an applicant to gain access to water. Where a Catchment Council does not exist, the power to issue licences is granted to local authorities or the National Water Directorate. By contrast, concessions for water use, which are similar to licences except that the duration of the permission

allowing access is longer, are to be decided at the highest level in the state structure (the Council of Ministers). Water rights are legal rights to use water from a watercourse or body of water on a property. These rights are often obtained before applying for either a licence or a concession, are to be granted by the National Water Directorate. At present, it is only the Cunene River, which has a formal catchment institution[25]. Within each province there are Municipalities and small Villages with local administration that are accountable to the Provincial Government. In the Kuando Kubango Province, existing key riparian municipalities include Dirico, Mucusso and Caiundo. The communal administrations are responsible for the management of community services such as waste and sanitation management in public areas, development and maintenance of roads, garbage collection, illumination of public roads as well as conservation andn management of public gardens and all green zones (decree 17/99).

- Namibia

The review of the Water Sector in Namibia also makes provisions for regional councils. Water Resources management at the Regional level in Namibia will be coordinated by Regional Councils with water management responsibilities. An innovative provision of the draft Water Resources Management Bill is the creation of River Basin Management Committees designated as the most appropriate level of water resources management. To demonstrate this new structure, Namibia has already established the Kuiseb and Cuvelai River Basin Management Committees. The experience from these pilot areas will benefit the management of the Okavango River Basin. Under the auspices of the Directorate of Rural Water Supply, some 200 Water Point Committees are active country wide and are responsible for the smooth operation and maintenance of local water points, a task that includes colleting payment for this service from the communities served. This is part of the Community Based Water Management (CBM) initiative, actively promoted by the DWA since independence.

- Botswana

In Botswana, DWA is responsible for water supply development in rural areas, for surface water resource investigation and development, and for overall water resources planning. Although decentralized water management structures are not articulated in the Water Act, the District Authority and the kgotla, (a democratic village discussion forum), facilitate and coordinate activities in the villages. The kgotla is presided over by the traditional chiefs (Kgosi). In Botswana, these fora are frequently used as land use planning platforms where land related issues (including water resources) are discussed and debated. Another important function of the kgotla is to disseminate information and initiate discussions on issues that affect the community.

e) Formal Water Related Organizations

There are a number of other formal government institutions that use water and whose activities have an impact on water resources. These are mainly the water user ministries and departments whose actions are supposed to be coordinated with those of the ministry directly responsible for water resources in the Okavango River Basin.

- Angola

Angola has a numbers of ministries and departments that use water and whose activities have an impact on water resources. These include the Ministries of *Agriculture and Rural Development, Fisheries and Environment, Administration of the Territory, Tourism, Transport, Geology and Mines, Defence, Interior, Health, Labour and Social Security, and Oil/Petroleum.* These ministries have varied interests and impacts on water resources.

[25] Gabinete para a Administração da Bacia Hidrográfica do Cunene [GABHIC].

The Ministries of Agriculture and Rural Development responsible for all Land Husbandry issues is a key user of water. The Ministry of Agricultural and Rural Development defines and determines the policies and strategies for the development of agriculture in the agrarian, forestry and rural domains. It is responsible for carrying out sectoral agricultural development plans aimed at promoting the conservation and efficient user of natural resources so as to prevent and minimise the degradation of the environment.

Another important institution in Angola is the Ministry of Fisheries and Environment, whose mandate is to manage the marine resources. Within this Ministry, the specific fisheries and environment responsibilities are delegated to the Fisheries Department and the Secretariat for Environment respectively. Since 2002, the Ministry of Fisheries was also given the responsible for fisheries within all Angolan freshwater ecosystems, including the Okavango River Basin.

The Ministry of Housing and Environment established in 1992, is another important player in Angola water sector. This Ministry is responsible for Policy Development, Management and implementation of Environmental Activities in the Angolan territory, including the Kuando Kubango region. The Ministry for the Administration of the Territory on the other hand, ensures the coordination between central and local administration, and is responsible for the articulation of the relationships between the local administrative and the traditional authorities, and the role of local administrative managers within the Autarquis/ (municipalities) (decree no/ 16/99). Although the tourism industry of Angola is not fully developed, the Ministry of tourism has the responsibility to build, execute and promote, the tourism in the country and provide leadership in the management and conservation of the tourism resources in the country, (Decree n.º 16/99, Estatuto Organico, artigo 2/1, 3/1) .

The Ministry of Transport regulates licences and fiscal policy, and is responsible for inspecting the activities of economic agents within the transport sectors. It collaborates in the protection of consumer rights, provision of quality services by companies / firms in the transport sectors. The national authority on marine mercantile and ports (harbours), transports land and civil aviation provides technical supervision to all agents and development activities in the sector, including licensing for sector activities in accordance with the established regulations (Decree no 1/98).

The Ministry of Geology and Mines is another stakeholder in Angola. Besides collecting and carrying out the mineral activities regarding the legal obligations and contracts of the concessionaries (Mining law, article 24 Executive decree no38/92, Geology and Mines article 2/1), the Ministry also promotes the harmonious development of the mineral sector by orientating, coordinating and regulating all the mineral and geological activities in the country. This Ministry is also mandated to ensure rational distribution and protection of the environment, in terms of the law 1/92, aimed at protecting and / conserving the environment while taking stock of the value of natural mineral resources. The Ministry is also responsible for following up and controlling the activities of all firms and organizations, which explore mineral resources or are involved in the geological and mineral activities.

Other key players in Angola's Water Sector include the Ministry of Public Works which is responsible for the promotion and control of investments in the area of public works and infrastructures, including the regulation of the activity plans within the sector, as well as other critical functions related to territorial regulations.

The Ministry of Health, whose sole responsibility is to promote the health of the population and the sanitation development, encourages the application of the international and national sanitary norms in line with the public health legislation. It also promotes healthy life style, nutrition, and healthy environment by disseminating knowledge and increasing awareness for positive changes and

behaviours. The general inspection health services aim at applying and disseminating sanitary legislation in particular in the area of the environment, food and the provision of primary health care (decree no/2/00)

Although not directly involved with water resources use and management, the other role players whose actions may have some implications on the Okavango River Basin are the Ministry of Defence (responsible for securing all the National boundaries, including the border shared with Namibia), Ministry of Interior (responsible for the security of all the people in the country, at the provinces, municipalities and village levels, and for the definition of rules of conduct for effective protecting the people), Ministry of Labour and Social Security (which defines and sets policies and rules on security, hygiene at the work place [decree no/31/94]), and Ministry of Oil/Petroleum (whose responsibility is to carry out studies and proposes necessary means for the national implementation related with the experience, contacts value, rational utilization and renewal of petroleum reserves [decree no/10/90]).

- Namibia

In Namibia, the key formal government organizations influencing water resources include the Extension and Engineering Services Directorate and Directorate of Agricultural Research (DART) within the Ministry of Agriculture, Water and Rural Development; the Ministry of Lands, Resettlement and Rehabilitation; the Directorate of Scientific Services within the Ministry of Environment and Tourism; and The Ministry of Health and Social Services (MHSS).

The Directorate of Extension and Engineering Services for the Kavango Region falls under the Ministry of Agriculture, Water and Rural Development. The vision of the Directorate is to improve livelihoods and food security by 50% by 2020. Its mission is to provide agricultural extension services in the form of communication, advisory and training services aimed at empowering farmers to adopt improved agricultural technologies and practices, thereby improving their standard of living and increasing food security. The Kavango region has 26 extension technicians whose main roles and responsibilities include: participatory extension and to address all aspects of the farming/livelihood systems; coordination of activities with stakeholders; offer farmer training, promote the development of Community Based Organisations; deal with issues such as food insecurity and malnutrition; promote non-agricultural income generating activities; implement effective drought planning; develop capacity within the organisation; and support irrigation and the Green Scheme.

The Directorate of Agricultural Research (DART), in the Ministry of Agriculture, Water and Rural Development (MAWRD) is another key institution. The main objectives of the Directorate of Agricultural Research are to facilitate and coordinate the development and management of all ministerial human resources that will enable Namibia to meet the nation's strategic and business objectives; implement research agendas and priorities; render specialised services of acceptable quality to external and internal customers; and facilitate adequate access of appropriate information and technology to all stakeholders and customers. One sub-division in the Directorate is involved in mapping the soils of Namibia, including the soils along the Kavango River terrace with the main source of funding being government. GIS format data on soils of the Kavango Region, including profile descriptions and analytical data is available.

The Ministry of Health and Social Services (MHSS) is another key institution, responsible for the monitoring of the bacteriological and chemical quality of the potable water supplied by the other institutions, as well as the safe disposal of sewage and solid waste and is responsible for malaria control, an activity pertinent to the Okavango River Basin.

The Ministry of Lands, Resettlement and Rehabilitation, Directorate of Land Reform is one of the Government institutions created at independence in 1990. The main focus of the Ministry is to

implement land reform through providing opportunities towards sustainable means of livelihood and the enhancement of dignity, well-being and economic empowerment of the previous disadvantaged groups of Namibian society. As custodian of state land, the Ministry of Lands, Resettlement and Rehabilitation has embarked upon the formulation of the following relevant land policies, legislations and programs in an effort to affirm the government's stance towards black economic empowerment and sustainable utilization of the country's natural resources. The ministry administers the *National Land Policy, National Resettlement Policy, Communal Land Reform Act, National Land Use Planning Policy, National Land Tenure Policy, Flexible Urban Land Tenure Act, and Agricultural (Commercial) Land Reform Act*. To ensure that infrastructure, land and other natural resources are used sustainably and developed productively for the benefit of the current and future generation, the Ministry of Lands Resettlement and Rehabilitation through the Directorate of Land reform produces the Integrated Land Use Plan. So far six regions have been covered, namely; Kunene, Caprivi, Oshana, Oshikoto, Ohangwena and Omusati region. The purpose of producing comprehensive regional land use plans is to provide decision makers with a framework and information, which could assist them to realize development of the region and propose possible land use zones, based on local land use practices, and to identify and promote regional coordination structure in the light of the new policy dispensations.

The Division of Monitoring, Research and Planning under the Ministry of Environment and Tourism in the Directorate of Scientific Services provides professional and technical information and support for conservation and resource management programs throughout Namibia. The mission statement of the division is to maintain and rehabilitate essential ecological processes and life supporting systems (including those dependent on water), to conserve biological diversity and to ensure that the utilisation of natural renewable resources is sustainable for the benefit of all Namibians, both present and future, as well as for the international community. The main functions of the Division of Monitoring, Research and Planning are to research, monitor, coordinate and make recommendations on national level aspects of wildlife management and conservation, including the determination of population trends, conservation status, the utilisation and management of species, communities and ecosystems of special economic and conservation importance, especially endemic species and systems unique to or under threat in Namibia. The Sub-division Research and Planning is responsible for conducting and, where appropriate, coordinating management related scientific research and monitoring of wildlife species and populations of ecological and economic importance, as well as providing coordination and support for the implementation of conventions and international agreements (e.g. Convention on Wetlands, Convention on Biological Diversity and bilateral agreements on protection and management of various species). With regards to management and conservation of resources in the Okavango River Basin activities mostly involve monitoring of wildlife population sizes in the Bwabwata National park, including Mahango Game Park through aerial surveys and the count of river-associated species.

- Botswana

Botswana has a wide array of formal water user organizations. These include the Department of Wildlife and National Parks (DWNP), under the Ministry of Trade, Industry, Wildlife and Tourism, which is the primary government agency responsible for wildlife conservation and utilization and is thus an important stakeholder in Management Planning for the Okavango Delta. At District level the DWNP *Community Service Division (CSD)*, with its Community Liaison Officers, and the *Management and Utilization Division* are the Divisions involved in CBNRM while the *Research Division* would have expertise related to wildlife counts, quota setting and endangered species in the Okavango Delta. Together with the Ministry of Agriculture, the DWNP is drawing up a joint Community Based Natural Resource Management Policy that will clarify resource management responsibilities and roles and will, once approved, be an essential legal document guiding the planning process.

The Department of Tourism (DoT) is a national institution responsible for the implementation of the Tourism Policy and has been involved in the formulation of Botswana's new Wetland Policy and

Strategy. The Department of Tourism issues licenses required for tour operators and safari companies to run a tourist facility (Tourist Industry Licensing Board). These licenses have to be renewed annually after the regional office has checked whether the tourism operator is complying with the regulations. DoT has a regional office in Maun that offers information to tourists (road conditions, accommodation facilities etc.) and handles loan and grant applications in the tourism sector to encourage citizen involvement in tourism development in Botswana. The Department of Tourism (DoT) is preparing a "National Tourism Development Master Plan".

The National Conservation Strategy Agency was established in 1990 to integrate the work of different ministries involved in natural resource management in Botswana. NCSA is the government institution responsible for the implementation of the Ramsar Convention in Botswana and thus is the authority to facilitate and supervise the management planning process in the Okavango Delta. Under the Ramsar Convention, Botswana has established National Wetland Committees, involving all government institutions dealing with water resources, development planning, protected areas, biodiversity, tourism, education, development assistance, etc. Participation by NGOs and civil society in natural resources management is also encouraged by the NCSA.

The Department of Lands has been working together with the DWNP on the preparation of Controlled Hunting Area head leases, which are legally binding documents between the Land Boards and Community Trusts on the utilization of Controlled Hunting Areas in Tribal Land. At district level the Tawana Land Board (TLB), which administers the tribal land in Ngamiland, has to approve all land use plans (District Land Use Plan, Management plans for CHAs managed by communities, and technical operation plans of the tourist operators), before they become the legal basis for tribal land allocations. At the district level, the District Land Use Planning Unit (DLUPU) provides an arrangement for coordinated planning and development. DLUPU is a technical advisory body to the Tawana Land Board, chaired by the Senior Technical Officer Tawana Land Board, whilst the District Officer Lands is the secretary. It consists of the District Officer Development (DOD) and the Physical Planner, two representatives from the DWNP, staff from the Regional Agricultural Office (Land Use Officer, Range Ecologist), representatives from NWDC (Council Planning Officer, Tourism Officer, Remote Area Development Officer (RADO)), and the Regional Tourism Officer.

The Ministry of Agriculture has several Departments involved with their programs and extension services in the utilization and protection of the natural resources in the Okavango Delta. These include fisheries; Tsetse Fly Control Division (Animal Health and Production Department); Division of Range Ecology, Forestry and Bee-keeping; Agricultural Resource Board (ARB); and Conservation Committees. The various roles of these departments are elaborated in Annex 1.

- Coordination between Formal Water Related Organizations

Each of the riparian states has numerous formal water related organizations working in the Okavango River Basin. The actions of these organizations are supposed to be coordinated with those of the ministry directly responsible for water resources in the Okavango River Basin. The internal coordination arrangements vary from one country to the other. In Angola, the actions of the various stakeholders (including the actions of formal water related organizations) are coordinated through the Water Sector Development Strategy and the Catchment Councils provided for under this strategy. The Water Sector Review in Namibia has ushered in a new way of doing business within the water sector. The actions of the stakeholders in the water sector (including the formal water related organizations) will be coordinated through the proposed Cabinet Committee on Water Resources (at Ministerial level), a Standing Committee on Water Resources (at Permanent Secretary level), and Water Advisory Council. The Namibia Wetlands Working Group also facilitates collaboration among wetland scientists. Within the Kavango Region, the coordination will be facilitated by the Regional Councils with water management responsibilities, River Basin Management Committees and Water Point Committees. In Botswana, a variety of arrangements exist including the District Land Use

Planning Unit (DLUPU), which provides an arrangement for coordinated planning and development at district level, the National Conservation Strategy Agency (MEWT), which oversees the development of the ODMP, and the Botswana National Wetlands Committee.

f) Formal Research Institutions

Research institutions provide important information required for sound decision-making. As such these bodies constitute an important arm of the institutional arrangements of the Okavango Basin.

In Angola, the Department of Civil Engineering, Universidade Agostinho Neto (which deals with research and capacity building) and the *Direcao Nacional de Hidraulica e Engenharia Rural* are the key research institutions in the country.

In Namibia, the National Museum of Namibia is a Government institution, which falls under the Ministry of Basic Education, Sport & Culture. The Directorate of Cultural Heritage in the National Museum Division is an important institution. The institution covers National Issues on heritage conservation, which includes research, management, preservation, education and liaison. The Mission Statement of the National Museum is "to preserve, understand and explain the national heritage of Namibia". '*National heritage*' implies immovable, movable, and intangible cultural heritage, as well as *ex-situ* natural heritage. Objectives of the institution include *collection and documentation of representative objects, specimens and information relevant to the cultural and natural heritage; curation (by accessioning; restoring where necessary; preserving; providing suitable, secure accommodation; and preventing damage, deterioration and loss); research, promotion of museum resources; and dissemination of knowledge.* Management, conservation and research within the basin are primarily conducted by various national agencies, including the National Museum and Directorate of Cultural Heritage in areas within their operational ambits. Although the Museum was actively involved in snail research in the Kavango Region in the 1980s, the Okavango Basin is currently not a specific Museum priority and there is little reason to regard it as a future national development focal point. There are also no user requests on the Okavango Basin. The Polytechnic of Namibia (PON) is a parastatal tertiary training institution, primarily involved with national tertiary training. Departments of the Polytechnic of Namibia are indirectly involved in Kavango related issues through training and research. The Polytechnic of Namibia is involved in the management of the Kavango River indirectly through the training of students in natural resource management in the departments of Agriculture, Nature Conservation and Land Management. The subject of Aquatic Ecosystems Management deals directly with the Kavango River as an example of an aquatic ecosystem. Since 1983, the Ecological Research Division in the Department of Water Affairs has been actively involved in research on the Namibian section of the river, as has the freshwater fisheries section of the Ministry of Fisheries and Marine Resources.

Although each of the riparian state has formal research institutions, there seems to be little collaboration between these institutions. However, the riparian states have recognised the potential of using HOORC as platform for joint research, if its mandate is extended. The current institutional capacity within this institution can easily be used to stimulate basin wide research and educational links.

In Botswana, the Harry Oppenheimer Okavango Research Centre of the University of Botswana located in Maun is a key source of information. Its main mandate is to work for the conservation of the natural systems in Northern Botswana particularly the Okavango Delta. The Harry Oppenheimer Okavango Research Centre specializes in the areas of hydrology and water resources management, ecology, social aspects of natural resource management, and tourism. HOORC aims at enhancing the understanding of the natural system of the Okavango Delta (and indeed the Basin) and its relationship between human activities and it's functioning. It is set up to be the center of research, documentation and dissemination of information and knowledge on the Okavango Delta in order to be able to provide rapid response to environmental issues as they arise. The focus of the Centre is

natural resource management of the Okavango Delta, with an emphasis on community involvement. Research and monitoring activities in the Delta are being carried out at the Harry Oppenheimer Okavango Research Center such as biodiversity monitoring (tsetse fly spraying and regular research), land use planning, ecological / botanical studies, hydrological modeling etc. The Research Center's recent cooperation with the EU on a substantial research programme for the delta and river basin is expected to yield crucial information.

In addition to the Okavango Research Centre, the Department of National Museums, Monuments and Art Gallery (NMMAG) has been involved in the Okavango Delta Ramsar planning area particularly in conserving the Tsodilo Hill area as one of the important national monuments. The Department is trying to promote eco-tourism activities at Tsodilo and is the legal authority in planning and regulating the utilization of this national monument. Khwebe Hills, another important historical site, is also enclosed within the Ramsar planning area boundaries.

g) Other Formal and Informal Interested Organizations and Groups

Several formal and informal interest groups are also found in the basin. These range from international organizations, national non-governmental organizations private sector and community based groups.

- Angola

Based on the information available, there seems to be no international organizations working in the basin in Angola. The only key non-governmental institutions working in this area are Juventude Ecologica Angolana (JEA), Association for Environment Conservation and Rural Development (ACADIR), and the Land Network and Associação Kwebe.

JEA is a non-profit organisation based in Angola. As the leading Environmental NGO in Angola, JEA has developed environmental education material for children and adults. JEA developed the "Environmental Olympics" and introduced environmental education programmes in all the major media institutions in Angola. JEA also airs environmental radio programmes in the Provincial and National stations and carries out education campaigns for children and youth. The organization was established in 1991 and is registered with the Ministry of Environment and the Angolan Ministry of Justice.

ACADIR is a Provincial NGO in Angola that is operating within the Okavango basin. The objectives are to protect the environment, material development, environmental education, and rural development. The organization is registered in Department of Environment in the province.

The Land Network is a national NGO that deals with land tenure conflicts. The organization assists local communities in understanding their rights and is assisting communities in cases of potential conflicts.

The Associação Kwebe *is a* small local NGO whose main objective is to promote environmental education on water issues in local communities within the basin. The organization works through Radio programmes in Kwando Kubango and is not yet officially registered with the government of Angola.

- Namibia

There are a number of key NGOs involved in the management and conservation of the Okavango Basin in Namibia. Both national and local NGOs are currently involved in the activities taking place in the basin. These include the Namibia Nature Foundation, Desert Research Foundation of Namibia and Research and Information Services of Namibia (RAISON), as well as several newly established and emerging conservancies along the river.

The Namibia Nature Foundation is a non-governmental organization, not-for-profit, established under a Deed of Trust as a charitable and funding institution of a public character, with an independent Board of Trustees. The objectives of NNF are given in Box 5. Specific work being undertaken by NNF in the Okavango River Basin includes implementation of the Every River has its People Project[1] (ERP) and the *Sharing Water* project in Namibia. Along with other Every River partners, NNF helped produced two profiles of the Okavango entitled, "Okavango River: The flow of a lifeline" and "Sand and Water: A profile of the Kavango Region". The Every River project's activities initially took place in Namibia and Botswana and following a peaceful settlement to the conflict in Angola, the second phase now includes Angola's upper catchment.

The Desert Research Foundation of Namibia is a national NGO, which was registered on 2 February 1990. The vision of the organization is enhanced understanding of arid environments by Namibians and improved capacity of decision-makers at all levels to manage arid environments appropriately. With regards to the Okavango Basin, two of the DRFN's work packages 4 and 5 deal with socio-economic studies within the basin. Information is gathered in a participatory manner and the process offers an opportunity for researchers and people within the basin to share knowledge on best management practices. The Desert Research Foundation of Namibia has produced materials with Water and Environmental Resources in Regional Development (WERRD) and plans to use their findings to influence decision-making at local and national level. The institution has produced posters, a WERRD website, booklets, brochures on promoting management, wise use, research and interest in the Okavango River Basin. DRFN also supervises and provides resources for staff members to do their MSc research. In 2003, DRFN supported two MSc. students.

The Research and Information Services of Namibia (RAISON) is a private company based in Windhoek registered as a Close Corporation in 1996, which operates at the national and international levels. The company has a staff compliment of two and specializes in the provision of services to collect, analyze and provide information, particularly in the fields of environmental and education planning and management. The main objectives of the company are to process and disseminate information using appropriate tools; develop and query database and statistical programmes; and process and analyze aerial photographs. It also provides orthophotos and satellite imagery; geographical information systems; and advanced graphics and design programmes. The company strives to combine these skills with a broad conceptual perspective in the human and social sciences to provide a better understanding of processes, issues and relationships between people and their environment. RAISON has accumulated and distributed data and literature on the Okavango, and they also have a variety of other data sets that could be of interest and value. RAISON, along with project partners authored "Sand and Water: A profile of the Kavango Region" and "Okavango River: The flow of a lifeline".

The Namibia Wetlands Working Group is another key institution with keen interest in the Okavango River Basin. The Wetlands Working Group, a cross-sectoral group of aquatic scientists continues to include the Okavango in its ongoing research and monitoring activities.

Box 5: Main Objectives of NNF

- Initiate, support and promote activities that conserve Namibia's environment, protect biological diversity and foster the sustainable and ethical use of natural resources
- Raise funds for conservation and environmental initiatives, in support of the mission statement
- Administer funds for partners, donors, private sector, government, communities and project implementers
- Plan, develop, implement and manage selected projects and programmes, in support of the mission, but not in areas which are being addressed by other organisations
- Encourage and support sustainable community-based natural resource management initiatives
- Initiate and support activities that promote more effective and efficient use of resources particularly where management of resources is devolved to the appropriate level and where local groups have identified good initiatives that could make a real difference
- Help strengthen natural resource institutions in ways that help them better understand and sustainably manage natural resources
- Cooperate and foster partnerships with other organisations – government, NGO, private sector, community and donor – to better promote sustainable development
- Raise awareness, promote and support environmental education and help build capacity in the fields of renewable natural resources and sustainable development

There are a number of formal and informal groups operating in the Kavango region in Namibia, and these include Basin Forums (organized under the Every River Project), community groups, traditional authorities, private sector, conservancy committees, village development committees, and water points committees. In addition to these broad groups, there are also a number of specific formal and informal institutions and these include Volunteer Service of Overseas (VSO), Lux Development, Rundu Town council, Germany Development Service, UNHCR, Afri-care (American funded organization), Rossing Foundation, Catholic Aid, Fidolfia Trust HIV/ AIDS, Lihepurura Kavango Trust, Namibian Crane Working Group, Tondoro, Shambyu, Nyangana and Angdara mission schools, Integrated Rural Development and Nature Conservation (IRDNC) and Namibia Wildlife Resorts. The private sector is quite active in the region and is operating hotels, lodges and camping grounds at Hakusembe lodge, Okavango river lodge, Mashere lodge, Ngandu lodge, Kaisosi lodge, Mayana lodge nKwazi lodge, Popa, Ngepi lodge, Malunga lodge, Suclabo lodge and Mahangu lodge. The detailed list of conservancies operating in the Kavango region is given in Annex 4.

- Botswana

Botswana has a considerable number of organizations (both formal and informal) working in the Okavango Basin. This group of non-governmental organizations forms another important dimension of the institutional arrangements and these operate at national, district and local levels. The formal and non-formal interest groups in Botswana are organized under NGOs, community based groups and private sector. The most prominent non-governmental organizations include Conservation International (CI), Kuru Development Trust (KDT), The Okavango Liaison Group (OLG), Working Group for Indigenous Minorities in Southern Africa (WIMSA), Botswana Council of Churches (BCC), The Okavango Peoples Wildlife Trust, Institutional Reinforcement for Community Empowerment (PACT), People and Nature Trust, The Kalahari Conservation Society (KCS), International Union for the Conservation of Nature (IUCN) and Birdlife Botswana (formerly Botswana Bird Club). Details of the roles and mandates of these institutions are provided in the Annex 2.

Within the category of community based groups, key institutions are the Botswana Community Based Network (BOCOBONET), Ngamiland District CBNRM Forum, Ngao Boswa Women's Co-operative and the Bokamoso Women's Co-operative, Teemashane Community Development Trust (TCDT), the Okavango Poler's Trust (OPT), and the Community Trusts found in the basin include Khwai Community Trust (KCT), Okavango Community Trust, Jakotsha Okavango Community Trust (JOCT), Okavango Kopano Mokoro Community Trust (OKMCT), Teemashane Community Development Trust (TCDT), Sankuyo Tshwaragano Management Trust (STMT), NG3 Community Trust, the Cgaecgae Tlhablolo Trust and the Mababe Zukutsham Community Trust (MZCT).

Within the private sector group, active players include the Hotel and Tourism Association of Botswana (HATAB), Safari Operators, Micheletti Bates Safaris (Pty) Ltd., Johan Calitz Hunting Safaris, Crocodile Camp Safaris, African Field Sports (Rty.) Ltd., Bird Safaris (Pty) Ltd., Soren Lindstrom Safaris (Pty) Ltd., and Botswana Wildlife Management Association. Details of the roles and mandates of these institutions are provided in the annex 3.

- Coordination between Other Formal and Informal Interested Organizations and Groups

The number and diversity of formal and informal interested organizations and groups vary from one country to other, with Botswana having the largest number and greater diversity. While there is little information to determine how the formal and informal interested groups are organized in Angola, Namibia and Botswana seem to have institutional arrangements that are facilitating the coordination among the various groups. While DLUPU provides the platform for overall coordination in Botswana, the kgotla and the Botswana Community Based Network (BOCOBONET) facilitated coordination and collaboration between these interest groups. The Botswana Community based Network also provides a forum for sharing information, lessons and experiences. In Namibia, the stakeholders are coordinated through the Regional Councils with water management responsibilities, River Basin Management Committees, Basin Forums (organized under the Every River Project), community groups, traditional authorities, conservancy committees, village development committees, and water points committees.

Basin-wide interaction between the informal and formal interested is currently facilitated through the Every River has its People project. One of the key activities of this initiative is to develop formal participation mechanisms for communities to interact with forums such as OKACOM and to have a voice in basin-wide decision-making.

4 Key Emerging Issues

The review of the existing regulatory and institutional arrangements in the Okavango basin has provided an overview of the situation with regards to the critical water governance parameters. The review also identified a number of key emerging issues and challenges as far as regulation and institutional arrangements is concerned. The key challenge faced by the Okavango River Basin states is the development of effective institutional and legal frameworks for integrated management of water resources to promote the mutual benefits to all the three riparian states, without individual states losing their sovereign control over these resources. The sections below highlight some of the key issues that the basin states (and community) may want to consider and address individually and/or collectively. These issues are highlighted without prejudice to the draft policy documents and draft legislative bills that are still be approved and signed by the respective governments.

4.1 Regulatory Frameworks

4.1.1 Lack of Harmony in the Regulatory Frameworks

The regulatory frameworks relevant for the management of shared watercourses in the three riparian states are not harmonised. This could be attributed to the different levels or stages in policy and legislative reforms that currently existing in the three countries. Angola and Namibia are in a more

advanced stage of reform, especially of the water sector, than Botswana. This is evident from the provisions contained in those countries water policies and laws discussed above.

The incongruity could also be as a result of different developmental emphasis in national agendas. It was noted, for instance that Botswana's water sector policy and legislative framework, whilst making some reference to shared watercourses does not contain clear provisions ensuring the equitable and reasonable use. Instead, the policy and legislative provisions are mainly directed towards ensuring that the country, which is water scarce, efficiently utilises internal and shared water sources. Namibia too, is concerned about efficient water use and actively pursues water demand management.

There is also need to streamline conservation and sustainable use principles into sectoral policies such as trade and industry. These policies tend to have potential negative impacts on shared watercourses due to their emphasis on economic and industrial development with little consideration for the ecological or hydrological integrity of river basins.

4.1.2 Gaps in Transboundary River System Management Provisions

A gap in the regulatory frameworks of the three countries is the lack of provisions and clear statements that promote the equitable and reasonable utilisation of shared river basins as provided for in international law. Whilst some countries have included such provisions in draft policy documents and legislative instruments, such as the Namibian draft Water Resources Management Bill, they still have to be approved or signed into law to be effective. Countries such as Angola have provisions that formally acknowledge the existence of shared watercourses and provide for the need to co-operate in the management of the same, however there are generally no effective provisions that reflect international law in the management of transboundary rivers.

In particular the provisions do not promote the use and development of shared rivers with a view of attaining optimal and sustainable utilisation and benefits through the weighing and consideration of specific factors such as geographic, hydrological, climatic, ecological and other natural factors; social and economic needs of basin States; people dependant on the shared watercourse effects of the use of the transboundary river by one State on the other; conservation, protection, and development of shared watercourses; and the availability of alternatives of comparable value to a planned use.

The policy and legal provisions also do not make provisions for the establishment of mechanisms to enforce international law principles including dispute settlement and conflict resolution mechanisms. Generally, the gaps identified relate to the lack of provisions or statements ensuring equitable and sustainable utilization of shared river basins. In particular the water laws and policies do not mention the need to establish shared river basin institutions. They do not state the importance of using shared basins to meet the economic, developmental, and social needs of riparian states at the same time ensuring that such use is equitable and reasonable to enable other riparian uses.

4.1.3 Absence of Elements for Sustainability

Some sectoral policy and legislative instruments lack the element of sustainability pertaining to shared watercourses. The natural resource sector policies such as fisheries, forestry, environment, and wildlife generally contain provisions that encourage sustainable use. However, other sectors such as industry, trade, and investment generally have a strong emphasis on development without necessarily providing for sustainability.

4.1.4 Limitations in the OKACOM Agreement

Besides fostering cooperation on technical matters on an advisory basis, the Agreement does not obligate member countries to utilise the shared river basin in an equitable and reasonable manner as provided by international law principles embedded in instruments such as the UN Convention on Shared Watercourses and the Revised SADC Protocol on Shared Watercourses. Furthermore, the

Agreement does not contain provisions that ensure effective implementation and enforcement of its stipulations such as dispute settling and conflict resolution mechanisms with the corollary sanctions.

4.1.5 The Level of International Conventions Ratification

One of the most significant international conventions in the context of sharing water in general and sharing the Okavango River in particular is the Ramsar Convention. Besides Botswana, Namibia is party to this Agreement (see table 2 for details of the status of signatories to these conventions) and. Angola is still considering ratification[26]. The Okavango Delta was designated by Botswana as a Wetland of International Importance. The significance of this is that obligations contained in the Convention will be applicable to the Okavango River Basin. Since Namibia is a contracting party as noted above, it is obliged in terms of Ramsar to contribute to the conservation efforts of the delta because 3% of the water that enters the Okavango Delta originates from within its borders. Unfortunately Angola, which contributes 94% of the river inflows, is not party to the Convention and therefore does not have an obligation to assist in the conservation of the same[27]. This may have adverse impacts on the ecological and hydrological integrity of the shared river system.

Table 2: Ratification dates of key international conventions

Country	RAMSAR	UNFCCC	UNCBD	UNCCD
Angola	Not Party	17 May 2000	1 April 1998	30 June 1997
Botswana	9 Dec 1996	27 Jan 1994	12 Oct 1995	11 Sep 1996
Namibia	23 Aug 1995	19 May 1995	16 May 1997	16 May 1997

Angola's absence from the convention may have a negative impact on the management of shared rivers such as the Okavango River Basin in particular. For instance one of the three obligations of Ramsar to ensure international cooperation through consultation by parties to the convention concerning the implementation of Ramsar with respect to transboundary wetlands, shared watercourses and co-ordinated conservation of wetland flora and fauna[28]. Since Angola is not party to the convention, it is not legally obliged to consult with the other riparian States to promote the conservation and wise use of the shared Okavango River Basin. This may have a negative impact on the sustainable utilisation of the Okavango Delta down stream. The impact of this disparity is also true with other relevant Agreements to which some of the riparian states are not party. For instance, Angola has not ratified the Revised SADC Protocol on Shared Watercourse Systems.

4.2 Key Institutional Issues for Consideration

The review has shown that institutional frameworks and arrangement for the Okavango River Basin are evolving and the basin-wide institutions are still at their infancy stage. While some countries may have elaborate arrangements, others still have to develop and implement these arrangements. At a basin and national level, there are common institutional issues worthy of consideration in order to improve governance and subsequent sharing of water and benefit in the basin.

4.2.1 Platforms for Coordination and Cooperation

Effective cooperation and cross-sectoral coordination is an important prerequisite for sustainable river basin institutional frameworks. Considering the numerous stakeholders at the basin, national,

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[26] Turton, A.R., Brynard, P. and Meissner, R. (2002) Four Strategic Policy Issues for consideration by the permanent Okavango River Basin Water Commission (OKACOM). *3 rd WaterNet/Warfsa Symposium 'Water Demand Management for Sustainable Development'*, Dar es Salaam, 30-31 October 2002. [http://www.waternetonline.ihe.nl/aboutWN/pdf/Turton&al.pdf (accessed, 25 October 2003)]

[27] Krishna Talukdar, *The Okavango River Basin – A Case Study*, Institute of Geodesy and Photogrammetry Swiss Federal Institute of Technology Switzerland
ETH Hönggerberg 2003

[28] Article 5 of the Ramsar Convention

and local levels, issues of cooperation and coordination remain a key challenge the Okavango. Cross-sectoral coordination at the basin level poses a serious challenge where data and information sharing and consultation mechanisms required for the development of water resources management policies and strategies are absent. Cross-sectoral coordination at the national level and even at the basin level is a key issue that basin-wide institutional frameworks and arrangement should address. The platforms for effective cooperation and cross-sectoral coordination in the Okavango River Basin are generally weak.

While the current structure of OKACOM is trying to offer a platform for inter-state interaction at the technical and ministerial level, the current arrangements does not provide the type of platform that international river basin management requires. The OKACOM Agreement does not empower the three basin states jointly to manage the water resources of the entire basin. It confines the responsibilities of the basin states to an advisory role.

Due to the limitations imposed by the OKACOM Agreement, the Commission has not fully evolved and assumed the structures that other river basin commissions have developed to facilitate coordination, cooperation and integration. There seem to be delays within OKACOM to develop platforms for joint projects and there is no permanent secretariat to make such activities operational. An important structure that is urgently required in the basin is a basin-wide forum, bringing together different groups of stakeholder and serving as a conflict resolution platform. Although the Every River Has Its People Initiative is not an officially formalized cooperation and coordination platform, the initiative has established a basin wide forum for community leaders in all the three riparian states. This basin wide forum, if officially formalized can provide a very useful vehicle for community consultation and involvement in OKACOM. According to the provisions of the OKACOM agreement, the Commission is scheduled to meet once a year, but can meet more frequently according to the need of such meetings. The scheduling of the Commission's meetings, once per year may not be conducive to effective coordination, cooperation and integration.

4.2.2 Effective Mechanisms to Deal with Conflicts

Due to the disparities in economic development agendas, availability and access to water, competing demands for water, and the different value attached to water by the three riparian states and resident communities, managing conflicts may become a real issue in the Okavango River Basin. Based on the current review of institutional frameworks and arrangements, there are no effective mechanisms to deal with conflicts in the Okavango River Basin and there are no clear provisions in the OKACOM agreement for dealing with conflicts. While the OKACOM Agreement states that disputes under the agreement are to be referred to the Contracting Parties) it is silent on the mechanisms for settling disputes within the basin. Institutional mechanisms for conflict resolution and management are required at the basin and to some extent at the sub-basin level.

4.2.3 No Common Developmental Vision

The review of institutional frameworks and arrangements in the Okavango River Basin have revealed that the current frameworks lack clarity on what they are supposed to achieve in the long term. The institutional arrangements lack a common and shared developmental vision. Although the current institutional arrangements (both formal and informal) tend to rally around OKACOM, efforts are still required to develop common goals or a vision of the future that is attractive for large sections of society in the basin. A common developmental vision is a critical tool for institutional coordination and cooperation.

4.2.4 Absence of a Basin-wide Authority

Although the Revised SADC Protocol on Watercourse Systems makes provision for the establishment of river basin authorities, the riparian states have not fully used the provision to establish the necessary structures for the effective and sustainable management of the Okavango

River Basin. While OKACOM provides for inter-state interactions, a basin-wide authority is required to organize and supervise the cooperation of the three riparian states. An international river basin authority with decision-making and enforcement powers is important for operational tasks such as the restoration of water quality, joint operation and management of infrastructure. Such an authority (and the several mechanisms accompanying it) could be used to overcome conflicting (upstream-downstream) interests, e.g. payment of financial compensation by the benefiting state, or compensate an upstream state for not being able to exploit its agreed equitable share of a resource.

A river basin authority in the context of the Okavango Basin can play important functions of reconciling and harmonizing the interests of the riparian states; facilitate technical cooperation; standardization of data collection; monitoring water quantity and quality; exchange of hydrologic and other information; submission for examination and approval of proposed activities, schemes, plans; development of a concerted action programme; enforcing agreements; and dispute resolution. Such an authority can also provide a forum for open discussion of ideas and problems between states and users. This often begins at the level of technicians bust should gradually extend to water user associations, local authorities and official basin representatives.

4.2.5 Mechanisms for Cooperation, Integration, Monitoring and Networking

Within the Okavango River Basin there is a rich institutional landscape and numerous stakeholders, with a variety of different interests, which together creates an intrinsically complex web of relations. An effective institutional structure for river basin management should facilitate the necessary cooperation within the water management sector and between sectors in order to achieve sustainable water use and maintain the balance of the system.

Despite the existence of OKACOM and various initiatives targeted at fostering cooperation, there are no clear institutional mechanisms to facilitate cooperation among project implementers the various institutions operating in the basin can have duplication of activities. Arrangements for data monitoring and information exchange (i.e. systems of data collection and exchange including information regarding availability of water resources, water users, hydro-systems and land management) which are an essential component of cooperation, seem to be still at its infancy stages in the basin. Although Namibia and Botswana have been cooperating on data sharing, joint research and monitoring for many years, the involvement of Angola in this collaboration is critical. The institutional frameworks and arrangements for sharing data (on rainfall, hydrology, dam operations, and related aspects), joint research (to stimulate basin wide research and educational links), human resources development, joint plans and joint ventures need to be developed. The *Sharing Water* Okavango Shared Database is the first widely accessible basin-wide database with input from all three basin states. It will be housed at HOORC and online at www.sharingwater.net.

To improve cooperation and integration, the countries sharing the Okavango River Basin should open consultations and attempt to draw up an agreement or other arrangement to cooperate in managing the river basin. Although there are some notable efforts (such as the Okavango Delta Management Plan project in Botswana and the Basin Forum established under the Every River Project) to bring about coordination, cooperation and networking at the sub basin level, effective frameworks are still limited. For example, in Botswana, lack of cooperation between the different Government and Non-Government institutions that work with the local communities in the Okavango Delta has caused confusion and misunderstandings in the communities. Lack of cooperation has been an ongoing issue, especially in cases where several communities are jointly responsible for the management of one or two CHAs and where communities with a different ethnic composition have to work together in Community Based Natural Resource Management.

The inventory and review of institutional frameworks both at the basin and national level has shown that there are a variety of institutions with mandates and roles that are sometimes conflicting and

overlapping. A key issue in the institutional arrangements of the basin is the rationalisation of responsibilities between these institutions in order to encourage proper and sustainable water resources management and planning. Although efforts at the national level have achieved a lot of success in rationalizing the responsibilities of the various institutions, of it still remains a big issue and challenge at the basin level.

Apart from OKACOM and national governments (which have clear lines of authority and accountability), the other institutional frameworks and arrangements in the Okavango river basin do not have clear lines of authority and accountability. This confusion has resulted in poor communication, coordination and performance as well as duplication of efforts and resources among the main actors in the basin. For a shared river basin like the Okavango, institutional authority and accountability is very important. Institutional authority for policy formulation, mediatory, regulatory and other management tasks should be well defined, clearly allocated and made transparent.

Although a shared basin, the Okavango is managed by the three sovereign riparian states using different management and administrative procedures and rules. There are also varying standards, qualifications and performance criteria for staff involved in the management of the basin's resources. While the OKACOM Agreement acknowledges these differences, the effective management of shared river basin and the required institutional frameworks calls for synchronization of management and administrative procedures. This issue remains a key challenge for the basin.

Although there is good will among the basin states to manage the Okavango basin as an ecosystem and to cooperate under the OKACOM agreement, there is also a general mistrust among the states as well as among the institutions both at the basin and national level. Transparency between countries, between different sectors of water users and experts is a key issue in the basin.

4.2.6 Information Flow and Communication Arrangements

The information flow and communication arrangements between the various stakeholders in the Okavango River Basin are not very effective. Effective communication is also a key element of river basin institutions. Communication and effective information flows facilitate the smooth running of river basin institutions. While the OKACOM Agreement stipulates that member countries are obliged to provide information required by the Commission in furtherance of its duties, there are no formalized institutional arrangements for communication and information flow within the basin. As a result, there is insufficient communication and synergy between activities of various agencies, e.g. there is no effective communication between agencies operating on the ground and those agencies with basin-wide and country level responsibilities. This gap also exists at the national level, for example, in Botswana it has been observed that the flow of information between the Community Based Organizations Board Members of the Trust Committees, the communities, and their traditional leaders is not satisfactory. Consequently, a lot of decisions are taken without seeking the consensus of the majority of the villagers (ODMP Project Proposal Document, 2002).

Although some information and data has been collected through the OKACOM diagnostic studies, the knowledge of strategic assets of the Okavango, the uses and users, the needs and the pressures exerted on the system is still limited. Standardization of data procurement methods is also important for the basin.

4.2.7 Stakeholder/Community Participation

Within the Okavango Basin, effective stakeholder/community participation in river basin development and management is an issue that is posing a serious challenge to the sustainable use and management of the basin's resources. Institutional performance can be measured in terms of effectiveness, efficiency and accountability to stakeholders. As experienced by other river basins, stakeholder or community voices are critical to basin initiatives. Effective institutional frameworks

should therefore have open stakeholder consultation mechanisms that are able to draw up an agreement to cooperate in managing the river basin. This should also be case for the shared Okavango Basin.

Although OKACOM and some national structures provide a forum for government stakeholder participation, this institutional review has observed that there is poor communication between national agencies. At the basin level, the effective participation of stakeholders/communities in OKACOM and other arrangements remains a challenge. While the Every River has Its People project provide a good opportunity for this to happen, this project has a life span constricted by its funding period. In addition, the Basin-wide Forum is still governed by informal rules since it is not yet a legal structure. Institutionalising this arrangement may provide a good formal framework. Institutional structures should provide mechanisms for the active participation of all stakeholders in river basin management including interest groups, local communities, environmental NGOs and women.

4.2.8 Financial Resources

Inadequate provision of financial resources remains a key constraint for the institutional arrangements of the Okavango basin. While OKACOM has strong political backing, the financial support from the basin states is not adequate. As clearly stated in the OKACOM Agreement, each Contracting Party is responsible for all costs incurred with regards to attendance and participation to all meetings of the Commission. The financial resources endowment of the three countries differ and national budget allocations to government agencies are limited, private sector investment in the basin has not been mobilized (although Botswana is making progress in this area). There is need to increase the budget allocation of the institutions working in the basin, and to mobilize private sector contributions to the development and management of the basin.

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49. SADC, 1999, Protocol on Health, SADC, Maputo Mozambique
50. SADC, 2000, Amendment Protocol on Trade, SADC, Windhoek, Namibia
51. SADC, 2000, Protocol on Tribunal and the Rules of Procedure Thereof, SADC, Windhoek, Namibia
52. SADC, 2000, Revised Protocol on Shared Watercourse, SADC, Windhoek, Namibia
53. SADC, 2000, Protocol on Legal Affairs, SADC, Windhoek, Namibia
54. SADC, 2001, The Control of Firearms, Ammunition and other Related Materials, SADC, Blantyre, Malawi
55. SADC, 2001, Agreement Amending the Treaty of the Southern African Development Community, SADC, Blantyre, Malawi
56. SADC, 2001, Declaration on Information and Communications Technology, SADC, Blantyre, Malawi
57. SADC, 2001, Protocol against Corruption, SADC, Blantyre, Malawi
58. SADC, 2001, Protocol on Politics, Defence and Security Cooperation, SADC, Blantyre, Malawi
59. SADC, 2001, Protocol on Fisheries, SADC, Blantyre, Malawi

Annexes

Annex 1: The Specific Mandates and Roles of Departments in the Ministry of Agriculture, Botswana.

Department	Functions
Fisheries	Fisheries**,** is a section of the Department of Animal Health and Production (DAHP) in MoA involved in extension, production and research on the fish resources of the Okavango Delta. The promotion and implementation of loan and grant making in the fisheries sector is one of its major activities.
Tsetse Fly Control Division (Animal Health and Production Department)	Tsetse Fly Control (TFC) Division, which has its office in Maun, has been working in the Okavango Delta to control the tsetse fly population. Due to its long-term involvement in the Delta, the TFC Division has accumulated profound knowledge of the area (mapped information on infrastructure and access possibilities, etc.). TFC is implementing an integrated campaign to eradicate tsetse fly in the Okavango Delta utilising all proven control measures (odour baits, sequential aerial spraying and the Sterile Insect Technique).
Division of Range Ecology, Forestry and Bee-keeping	The Division is represented at the District level by a Regional Forestry Officer (based at the Regional Agricultural Office) who carries out extension work, reforestation measures, propagation of woody plants though the forestry nurseries, and forestry inventories. Northern Ngamiland District has potential for the commercial exploitation of timber trees however this has to be assessed and monitored.
Agricultural Resource Board (ARB)	The Agricultural Resource Board is a Division of the MoA, and has direct management authority over the utilisation of natural recourses by providing permits for gathering of certain veld products. At present the ARB is supervising the construction of 10 000km of firebreaks in the whole country, carried out by private contractors. ARB is working together with the Ministry of Lands Housing and Environment on a joint CBNRM policy which aims at increasing the power of the communities to manage the use of their natural resources (wildlife and veld products) self responsibly, by deriving a benefit from them and thus developing an interest in their sustainability and protection.

Conservation Committees	The Conservation Committees and the Fire Rangers which are the entity of the ARB at District level, are assisting the communities on resource conservation issues (educational campaigns) and are in charge of veld fire management (burning permits), fire control (mobilising population, planning of firebreaks) and monitoring of fires (mapping and assessment of damage).

Annex 2: Key International and Local NGOs in Botswana

NAME OF INSTITUTIONS	FOCUS AREA
Conservation International (CI)	Conservation International is an international NGO oriented towards natural resource conservation. In 1990 CI established its office in Maun. CI's focus is environmental education, community development, ecotourism and enterprise development. It works in Ngamiland in capacity building of CBOs mainly with the Gudigwa Village Development Trust (mapping of traditional land rights, establishment of a cultural village, crafts upgrading and marketing) and with the women basket co-operatives in Shorobe and Gumare.
Kuru Development Trust (KDT	The Ngamiland branch of Kuru Development Trust is based in Shakawe. It supports remote area communities in land use planning, strengthening of CBOs and identifying and setting up income generating projects (thatching grass harvesting and marketing, fishing, community tourist enterprises) and in starting a communal savings- and reinvestment system. KDT supports an educational programme carried out by the Working Group for Indigenous Minorities in Southern Africa (WIMSA). Both programmes are aimed at promoting the cultural heritage of ethnic minority groups, particularly the San. In the basin, KDT also assists the Teemashane Community Development Trust (NG11) formed by representatives of the Village Trust Committees of Shaikarawe, Mohembo West, Kaoxwe, Kaputura, Xakao, Tobere, Sekondomboro, Ngarange and Mogothlo in starting a "Cultural Wilderness Trail" as community tourist enterprise.
The Okavango Liaison Group (OLG)	The Okavango Liaison Group is based in Maun. It was originally formed to consult the Delta communities about the plans of Namibia to divert water from the Okavango to meet the water shortage in Windhoek. Presently, the OLG is mainly involved in carrying out the *Every River Has Its People* project which aims at enhancing the participation of communities and other stakeholders living in the whole Okavango River Basin in the management planning processes through capacity building and development of mechanisms to promote and facilitate participation in decision making about natural resource use.
Working Group for Indigenous	WIMSA runs an educational, and a cultural programme aimed at documenting

Minorities in Southern Africa (WIMSA)	and preserving the culture and history of the San people. WIMSA works hand in hand with the Kuru Development Trust in the remote areas of Ngamiland West and in the Okavango Panhandle.
Botswana Council of Churches (BCC)	The Botswana Council of Churches has been assisting the local basket weavers in the Etsha area in quality upgrading and marketing of their crafts.
The Okavango Peoples Wildlife Trust	The Okavango Peoples Wildlife Trust is a Maun based NGO headed by the Paramount Chief. This NGO presently is not in operation.
Institutional Reinforcement for Community Empowerment (PACT)	PACT is an international NGO that has worked in Botswana since 1995 mainly in capacity building of CBOs to manage the natural resources of their areas. In Ngamiland PACT was involved in rural animation and tourism enterprise development in Sankuyo village. The project closed down in September 2000 but the activities are carried out by an NGO called People and Nature Trust.
People and Nature Trust	The People and Nature Trust is an NGO that has started to work on mobilisation and strengthening of the Sankuyo Tshwaragano Management Trust (STMT) in running a community tourism enterprise, building up a campsite and establishing a traditional village. The People and Nature Trust is supporting the STMT in starting up a Wilderness Training School which would provide training in several tourism related professions and accommodate paying clients at the same time to make the school self-sufficient.
The Kalahari Conservation Society (KCS)	KCS was established in 1982 and based in Gaborone. Its main concern is the conservation of Botswana's environment. It is involved in the promotion and facilitation of Community Based Natural Resource Management through seminars, workshops, mobilisation of communities, assistance in trust formation, proposal writing and fund rising. KCS is one of the implementing partners of the "Every River has its People" project.
International Union for the Conservation of Nature (IUCN)	IUCN founded in 1948, is an international organization with an office in Gaborone. It is working more at policy level to promote sustainable use and conservation of natural resources. IUCN assisted Botswana in implementing the CMNRM strategy, is giving technical advisory service and is organising workshops and national conferences (IUCN/SNV Support Programme, National CBNRM Forum, ART/IUCN/CBNRM Community Outreach Programme). IUCN has also been involved in development planning for the Okavango Delta since 1991 when Botswana Government responded to local concerns. In the ongoing Okavango management planning exercise required by the Ramsar convention IUCN is supporting the NCSA to coordinate and facilitate the management planning process within the Okavango delta.
Birdlife Botswana (formerly Botswana Bird Club	Birdlife Botswana is a conservation oriented NGO. As far as the Okavango Delta is concerned they are mainly interested and involved in taking inventories and monitoring bird life (particularly endangered species). The organization has shown great concern on the possible negative side effects of the sequential aerial spraying to control tsetse fly in the Okavango Delta planned for 2001.

Annex 3: Private Sector in Botswana

Name	Function
Hotel and Tourism Association of Botswana (HATAB)	HATAB is an association representing the interests of a number of companies in the hotel-, tourism-, and related services sector (like air transport companies). HATAB takes active part in the CBNRM District Forum and sends representatives to almost all workshops and reference groups that deal with the management of the natural resources of the Okavango Delta. Tourism is a major income generating activity in the Delta.
Safari Operators	Two groups of safari operators have to be distinguished which operate within the Delta area: the six companies that work in joint venture partnership with Community Trusts, and the companies that operate under a direct lease agreement with the Tawana Land Board.
Micheletti Bates Safaris (Pty) Ltd.	Micheletti Bates Safaris is operating in NG 22/23. It has a 5-year lease agreement with the Okavango Community Trust. While Micheletti Bates Safaris uses the hunting rights in the concession area, it has subcontracted the photographic rights to Okavango Wilderness Safaris (OWS). The main benefits the OCT gets from leasing this concession area consist in: formal employment of 120 people in the safari camps, staff training, health care for staff member through nurse visits and transport to hospital, establishment of schooling facilities in one of the remote areas, HF radios to communicate between the trust office and the 5 member VTC, a funeral fund, and financing of a trust management advisor and a community liaison officer.
Johan Calitz Hunting Safaris	Johan Calitz Hunting Safaris has a three year joint venture agreement with the Okavango Kopano Mokoro Community Trust for area NG32 which includes hunting and photographic right. The company operates three photographic and two hunting camps in area NG32. The benefits of KMCT from the joint partnership consists of: employment of 100 people, staff training, financial assistance for funerals, fund for maintenance of trust's vehicles, rental and quota fee, radio communication, medical service by a doctor twice a year, transport to hospital, and building of airstrip.
Crocodile Camp Safaris	In 1999 Crocodile Camp Safaris entered in a three-year lease agreement with the Sankuyo Tshwaragano Management Trust (STMT) for the areas NG33/34. Crocodile Camp Safaris runs the photographic activities whilst Johan Calitz Hunting Safaris and Buffalo Trails assist in managing the consumptive resource use. The benefits to the community from leasing out their CHAs consist in monetary benefits of Pula 5995 460 /annum, 55

	people permanently employed, staff training, sponsoring of scholars from Sankuyo and of football club, and assistance with STMT vehicle maintenance. By participating in the CBNRM Forum and in most of the workshops and discussion forums related to the utilisation and protection of the Okavango Delta and its natural resources, Crocodile Camp Safaris has shown a great interest in resource management issues.
African Field Sports (Rty.) Ltd.	African Field Sports (Rty.) Ltd. is carrying out hunting and photographic activities in NG41 that is administered by the Mababe Zokotsama Community Trust.
Bird Safaris (Pty) Ltd. Soren Lindstrom Safaris (Pty) Ltd.	The two safari companies have obtained the hunting quota for the year 2000 for NG18 administered by the Khwai Development Trust through a public auction. As their contract extended only over one hunting season they might not necessarily have a along term commitment to the area.
Botswana Wildlife Management Association	The Botswana Wildlife Management Association is a private Community Support Organisation (CSO). It has raised funds (from Safari Club International) and is assisting the Sankuyo Tshwaragano Management Trust (NG 34) in carrying out a Community Wildlife Monitoring Programme. BWMA helps the Trust to acquire resource management skills (mapping resources) and to gain an understanding of the importance and value of these resources. The programme is meant to empower the community in resource management. The BWMA is actively involved in the CBNRM District Forum.

Annex 4: Active Conservancies in Kavango Region, Namibia

Name of Conservancy	Location and Sizes	District	Number of People	Boundaries	Constitution	Conservancy Committee
Shamungwa Conservancy	180 km east of Rundu 35000 hectares	Mukwe	600	5 villages involved	Done submitted to MET	10
Joseph Mbamba - Ngandu	30 km east of Rundu 3773 hectares	Shambyu	1500	4 Villages involved	Gazetted by the Government	10
King Ndango Gavagwe	99 km south west of Rundu 37 500 hectares	Shambyu	1000	5 Villages involved	On going	11
Manyondo Conservancy	60 km west of Rundu 30 hectares	Mbunza	800	2 Villages involved	On going	10
Shamagaigai Conservancy	100 km south of Rundu 1750 hectares	Shambyu	60 farmers	Farm Owners	Done submitted to MET	11
Muduva Nyangama	North of Khaudum 160 km south of Katere	Gciriku	507	8 Villages involved	Done submitted to MET	11
Tare Conservancy	200 km west of Rundu 250km²	Kwangali	300	3 Villages involved	Ongoing	
George Mukoya	North of Khaudum	Gciriku	202		Done submitted to MET	10

Appendix P.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Selecting Scenarios that Reflect the Possible Futures of the Okavango River Basin: A Proposed Planning Framework for the Sharing Water Project

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Selecting Scenarios that Reflect the Possible Futures of the Okavango River Basin: A Proposed Planning Framework for the Sharing Water Project

The ultimate future of the Okavango River Basin is of acute interest to the residents of the Okavango Basin and the wider SADC region, together with many other actors around the world. This widespread interest reflects the "internationalized" nature of the Okavango River basin and differentiates it from many other river basins. As *Sharing Water* seeks to catalyze a framework within which the impact of alternative future scenarios can be explored, scenario development is an essential project activity.

Clearly, all attempts to describe the possible or probable future of the basin are exercises that are characterized by varying (usually high to very high) levels of uncertainty. Increasingly, the process of resource planning in the face of uncertainty relies upon the development of plausible future scenarios that provide a framework for decision-makers to evaluate the tradeoffs and impacts associated with potential management strategies or interventions. This document explores the role that scenarios could play in assisting the current planning initiatives that are already underway in the Okavango River basin, in particular OKACOM's efforts to develop a formal management plan for the Okavango catchment that deals systematically with emerging demands for social and economic development.

An Example of the Use of Scenarios in Resource Planning Initiatives

One of the best-known examples of scenario based planning involves the efforts of the Intergovernmental Panel on Climate Change (IPCC), which was organized under the auspices of the World Meteorological Organization and the United Nations Environment Programme. This panel is charged with defining the linkages between the concentrations of Greenhouse Gases (GHG) in the atmosphere and potential changes in global climate over the course of the coming century. In order to estimate GHG emissions over this period, a subject of some uncertainty, the IPCC developed four scenario families that combined plausible inferences regarding potential future changes in global population, social and economic development, technological advancement and environmental protection efforts into narrative storylines about the future. Descriptions of two of the scenario families are presented in **Text Box 1**. These scenarios were used to provide preliminary estimates of likely GHG emissions that were then used in Global Circulation Models (GCMs) that simulated changes in global weather patterns. In turn, the results of these models were used to begin to quantify impacts of climate change.

Text Box 1: Examples of Two Contrasting IPCC Scenarios

In order to demonstrate how scenarios were used by the IPCC, the following two extreme (contrasting) scenarios were amongst those used to estimate future GHG emissions.

The A2 Family: The underlying themes are self-reliance on local energy sources, a continually increasing population, development that is oriented towards increased per capita consumption (linked to improved quality of life), and relatively slow technological advancement in the energy sector.

The B1 Family: The underlying themes are a global population that peaks mid-century and then declines (as a result of undefined reasons), rapid changes in economic structures towards the service and information economy, reductions in material use intensity, the introduction of resource efficient technologies, and an emphasis on global solutions to local and regional economic and social problems.

The paired results of the IPCC scenario and GCM model runs produced a series of extremely interesting and plausible conclusions regarding future GHG emission levels, the concentration of GHG in the atmosphere and changes in the global climate. While results have yet to be translated into concrete management options and accepted policy instruments, largely because of the considerable resistance exerted by major global "players", the IPCC scenario planning exercise served its primary purpose of

creating widespread awareness and improved understanding of the link between GHG emissions and climate change.

What does this failure to achieve the secondary objective of implementing effective policy and management decisions say about the use of development scenarios in the Okavango River Basin? First and foremost it says that scenario based planning exercises require all stakeholders who engage in the process to realize that the exercise must be translated into effective management strategies if it is to have effective outcomes in the lives and livelihoods of people. This will be particularly important for the Okavango River Basin, where the implications of development scenarios must be translated into broadly beneficial management plans.

The Use of Scenarios in the Okavango River Basin

Ideally, planning initiatives in the Okavango River basin must seek to achieve a balance between water resource development options that can meet the demands for water provision to a growing population, and the protection of important natural components in the hydrological system so that they can continue to provide the array of ecosystem goods and benefits that society requires. Here, one of the most notable ecosystem issues relates to the health of the Okavango Delta; in turn, this is linked to, or associated with, a wide variety of other natural processes occurring in upstream tributary rivers and their floodplains.

In the same way that future levels of GHG emissions are related to assumptions about uncertain future global development patterns, future water development activities in the Okavango River basin will respond to as yet undetermined development patterns in the catchment, but also to "understandable" or "known" (but perhaps poorly appreciated) development priorities and imperatives within the basin states. This suggests that the development of appropriate scenarios could provide a powerful tool to improve our collective knowledge of the potential water management options and strategies that could be deployed within the basin. In addition, this would also enhance our understanding of the consequences of these strategies and help to define the basis for any tradeoffs that may be made. Paraphrasing the definition of scenarios used in the IPCC project:

> *Scenarios are (plausible) alternative images of how the future might unfold and are an appropriate tool with which to analyze how prevailing driving forces and external factors may influence future outcomes. (IPCC Special Report, Emissions Scenarios: Summary for Policy Makers, page 3).*

The development of relevant and coherent scenarios can help to enrich our appreciation of the linkages between the major driving forces in the catchment, namely, pressure to develop all or part of what has heretofore remained a largely "untouched" water resource, and the potential outcomes of different development options in terms of the health, vibrancy and resilience of the overall system.

Scenario Components for the Okavango River Basin

The first challenge in developing plausible scenarios for the Okavango River basin is to clearly identify the central components of a series of relevant and coherent storylines. While numerous components could be considered, the following eight components are proposed, as an initial listing that would cover most of the potential strategies that could be deployed:

- Achievement of appropriate development antecedents (e.g. the removal of land mines, followed by infrastructure rehabilitation in Angola);
- Improved distribution of electrical power and other services to all basin states, (including improved sanitation and water supplies to rural communities, as well as improved roads and communication infrastructure);
- The rate, extent and location of population growth in the basin, and the need for this to be accompanied by the achievement of food security;

- Poverty reduction (especially amongst rural communities) driven by improved levels of socio-economic development and increased employment;
- The magnitude of resource flows (e.g. water and electrical power) from the basin to other parts of the three basin states;
- The magnitude of possible resource inflows to the basin from adjacent areas;
- The degree of economic modernization or level of adherence to traditional (i.e. current) resource management patterns; and
- The levels of coordination between the three basin states.

Each of these eight components is explored in greater detail in the following tables, which contain both symbolic and narrative descriptions of possible contrasting trajectories for the components, considered over a 20 to 30 year planning horizon. These trajectories can then be combined to compose a set of relevant scenarios regarding the possible future of the basin. An examination of each of the tables will reveal that not all the potential combinations of component trajectories are internally self-consistent. The development of coherent scenarios will require the thoughtful selection and assemblage of possible trajectories for each component, as well as a clear understanding of the likely implications of each choice for the water resources of the Okavango River Basin.

The following table lists the symbols used to represent the three potential trajectories that are possible for each component, and provides a brief description or explanation for each symbol. Each arrow symbol would then indicate: an increase, decrease, or no change from current water use patterns, as described below.

→	No significant change from current levels of water use or exploitation (i.e. rates of water use, or effluent production, are indistinguishable from current levels).
↗	There is a significant increase (> 5%) in the quantity of water used and/or effluent produced by this component.
↘	There is a significant decrease (> 5%) in the quantity of water used and/or effluent produced by this component.

Achievement of appropriate development antecedents

→	↗
Removal of land mines in the Angolan region of the basin progresses slowly due to a shortage of resources, and the rehabilitation of the Angolan road network proceeds very slowly. No additional road development occurs in northwest Botswana and northeastern Namibia and traffic densities remain low.	De-mining activity in the Angola region progresses quickly and efficiently. Angolan roads are rehabilitated and new roads are constructed. Road networks in northwest Botswana and northeastern Namibia expand to carry the increased road traffic (both tourist and commercial vehicles).

Improved distribution of power and other services to all basin states

→	↗
No additional (new) road or power line development occurs in Angola, northwest Botswana or northeastern Namibia. Residents continue to rely on existing (poor or	Roads are rehabilitated and reconstructed in Angola, whilst existing road networks are extended in northwest Botswana and northeastern Namibia. New power lines supply all basin communities with

inadequate) levels of water supply, sanitation, electrical power and communication infrastructure. Community health levels remain relatively low.	adequate electrical power. All communities receive reliable supplies of potable water and improved sanitation systems. Community health levels improve across the basin.

Population growth and food security

→	↗
Few refugees or displaced persons return (or are returned) to the Angolan portion of the basin. Population growth in the Namibia and Botswana portions of the basin remains at a steady (low) level, despite the ravages of HIV and Aids. Populations are unable to grow all of the food they require and at least some of their needs for food must be met by external agencies.	All Angolan refugees and displaced persons return (or are returned) to the Angolan portion of the basin. Population growth rates in the Angola, Namibia and Botswana portions of the basin remain at high levels, despite the increasing prevalence of HIV and Aids. The populations are able to grow all or most of the food they require to maintain community health levels and minimal supplies of food need to be imported from outside the basin.

Poverty reduction and socio-economic development

→	↗
Communities living in the Angolan, Namibian and Botswana portions of the basin remain at their current (marginal) levels of socio-economic development, with high levels of poverty and unemployment. Livelihoods, especially of rural communities), remain at subsistence levels and considerable reliance is placed on locally available natural resources for water, food, fuel and shelter, continuing current patterns of resource exploitation. Communities living in urban centers rely heavily on government and aid grants for food, employment and housing. High levels of poverty and poor levels of community health prevail throughout the basin.	Rapid levels of socio-economic development have led to improved livelihoods and increased employment across all urban and rural communities in the basin. Increasing numbers of basin residents enter the formal economy and forego reliance on subsistence agriculture. Commercial agricultural activities form the backbone of the local economy; more small-scale manufacturing enterprises are emerging to produce products from the local natural resources. Basin residents have access to improved supplies of water for their basic and productive needs, whilst improved sanitation and energy services are available to all residents in the basin. Community health levels are high and reliance on government and grants in aid are diminishing.

Magnitude of resource flows from the basin

→	↗
Residents of the basin are the main recipients of all resource development activities (related to water, food and energy) within the basin. Few resources are removed from the basin for use or deployment elsewhere; most benefits (e.g. cash, utility) arising from resource use patterns are retained within the basin.	Patterns of resource development (especially water, food and energy) within the basin are integrated into national and/or basin-wide resource development patterns. This aims to meet the needs of basin residents, and other users located in the three basin states. Benefits derived from these patterns of resource use are shared widely.

Magnitude of resource flows into the basin

→	↗
Residents of the basin receive no inflows of resources (water, food, electrical power) from developments located outside the basin. No additional supplies of water, food or electrical power are available to supplement the supplies of these commodities that are derived from existing river flows, or to substitute and/or extend those that are derived from in-basin development options based on locally available resources.	Inter-basin water transfers bring in additional quantities of water to the Cuito River from the Kasai River to the north, whilst the improved national and regional electrical power network in each basin state provides sufficient electricity for all communities within the basin. Supplemented flows in the Cuito River ensure that flows in the lower Okavango River do not decline below agreed levels; and rural communities are able to continue with their normal livelihood activities. The importation of water improves the reliability of supplies.

Economic modernization versus customary resource management options

→	↗
Residents in the basin continue their traditional patterns of locally focussed resource management activities, including rain-fed and recessional agriculture, free-range livestock management, artisanal fishing and food and fibre gathering. Local livelihoods continue to depend on seasonal climatic features and river flows. Land tenure is still controlled by traditional leadership or central government. The roles played by women and the youth in community matters remains at current situation.	Basin state governments and basin residents choose to modernize resource management activities through increased development of irrigated agriculture, confined or feedlot-based livestock management, commercial fishing practices, and the importation of food and fibre where this is required. There is a marked increase in industrial and service sector activity within the basin. Many new productive activities require additional supplies of water and electrical power; these are derived either from improved water resource management activities within the basin, or are sourced externally.

Basin-wide co-ordination of activities

→	↗
Each basin state continues to pursue independent processes of resource management decision-making based on national priorities. Regional (SADC and AU) and basin-wide priorities do not necessarily regulate or inform decision-making processes, which focus instead on national priorities of self-sufficiency in the supply of food, water and energy. Each basin state follows its own trajectory regarding the different scenario components, regardless of the interests and concerns of its neighbours.	The three basin states create a coordinated resource management decision-making body or authority for the Okavango basin. Each basin state aligns its national and basin development trajectory with that of its neighbours regarding the other scenario components. An accepted benefit-sharing strategy is formulated and implemented for the entire basin, ensuring that each basin state gains appreciable benefits from the mutual arrangement. National development priorities and legislative instruments are harmonized between neighbouring states to facilitate improved management

Assembling Components into Scenarios

The trajectories associated with these scenario components can be assembled into scenarios in countless combinations. It is possible to imagine the totality of each individual combination will have an impact on the status of water resources in the basin. The following table lists the symbols used to represent the three potential integrated impact of scenario components on water utilization in the basin. Each arrow symbol would then indicate: an increase, decrease, or no change from current water use patterns, as described below.

→	No significant change from current levels of water use or exploitation (i.e. rates of water use, or effluent production, are indistinguishable from current levels).
↗	There is a significant increase (> 5%) in the quantity of water used and/or effluent produced by this component.
↘	There is a significant decrease (> 5%) in the quantity of water used and/or effluent produced by this component.

Using these definitions for individual scenarios components and their combined impact of water resource utilization it is possible to develop useful planning scenarios for the basin.

Current Account or Baseline Condition

When developing scenarios as part of a resources planning exercise, it is normal practice first to develop a scenario that describes the current or existing baseline conditions. This scenario, which can also be referred to as a "current account" or the "business as usual" storyline, is then used as a point of reference for evaluating the implications and potential consequences of possible alternative scenarios on the basin's water resources. In most river basins, where some level of development has already taken place at the time when the planning effort is initiated, defining an accurate baseline can sometimes be a complicated task. The Okavango River basin, on the other hand, is largely undeveloped and free from past medium- or large-scale water development activities. The current account for the Okavango River basin water resources can be described in the following matrix.

Developme nt antecedents	Improved services supplied	Population growth	Poverty reduction	esource utflows from basin	Resource inflows to basin	conomic odernization	Manageme nt co-ordination	Water Utilization
→	→	→	→	→	→	→	→	→

The situation described in this matrix is one where much of the preparatory work required to restore the Angolan portion of the basin for re-settlement and rehabilitation of refugees remains incomplete. As a result, it would not be feasible for large numbers of refugees to return to the Angolan portion of the catchment since there is little likelihood that they would be able to meet their daily basic needs for water, food, shelter and energy. Similarly, the presence of large numbers of land mines and other unexploded items of military ordinance would prevent or hinder development projects. At this time, investments in social and economic development projects leading to dramatically different patterns of resource use and consumption are still in the planning stage and have not had a significant impact on the lives of the basin's existing inhabitants who for the most part still practice traditional patterns of resource management. However, there is an increasingly strong commitment among all the basin state governments to coordinate their individual development efforts in the catchment. If this scenario were to continue unchanged over the course of the 20-30 year planning horizon, there would be little change in current patterns of run-of-

river water utilization and very little additional water resource development would need to occur. In addition, the important social, economic and ecological processes at work in the basin would remain largely unaltered.

While the current account provides a useful point of reference for comparing the impacts of other scenarios, the pressing needs for social and economic development in the Okavango River basin suggest that it is unlikely to remain unchanged for longer than a few years at most. As such, alternative future scenarios must also be formulated and their potential impacts on water resources in the Okavango River basin need to be considered carefully.

Out of Basin Resource Flows Without In-Basin Development

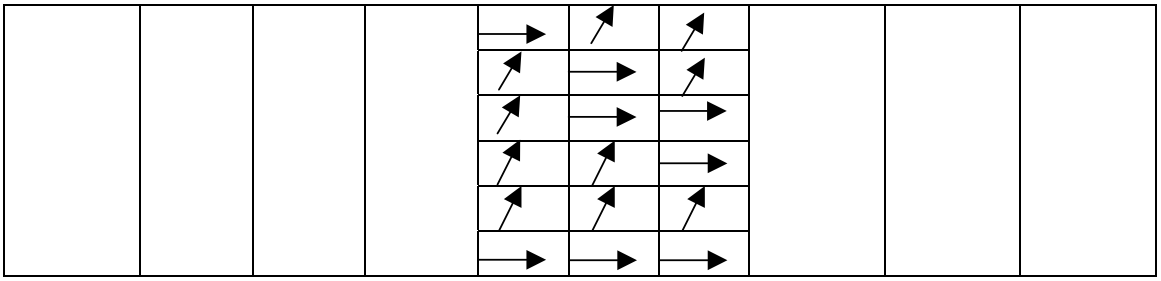
One class of potentially useful scenarios for the basin is built upon the assumption that the development antecedents needed to allow development to take place within the in basin do not materialize over the 20-30 year planning horizon. This trajectory would likely preclude a substantial increase in population growth rates and would also suggest that large-scale socio-economic development is unlikely to occur in the catchment. However, this would not necessarily preclude an increase in resource outflows from the basin (e.g. water and electrical power). If this situation were to occur under a high level of basin-wide coordination, one scenario matrix within this class would be represented as follows.

Developme nt antecedents	Improved services supplied	Population growth	Poverty reduction	esource utflows from basin	Resource inflows to basin	conomic odernization	Manageme nt co-ordination
→	→	→	→	↗	→	→	↗

By way of illustration, increased resource flows from the basin in Angola could take the form of hydropower production for markets in other parts of Angola. In Namibia, the proposed abstraction of water at Rundu (for distribution elsewhere in Namibia) and the proposed Popa Falls hydropower project have already been identified as potential development projects that would increase resource outflows from the basin. In Botswana, water from the Okavango Delta and its tributaries and outflow rivers has previously been viewed as a potential source of supply for diamond mining activities at Orapa, whilst additional secure supplies of water are also needed to meet the growing demands for water for the town of Maun and for other communities around the periphery of the Okavango Delta. However, the core assumption that is implicit in this scenario, is that the cumulative impact of any proposed actions would first have to be evaluated at a whole catchment scale and that this would fully consider the goals and objectives of each of the basin states proposing these projects.

It is also possible that, in the absence of basin-wide coordination, each of the basin states could initiate projects that seek to direct resource outflows from the basin in response to national development objectives, and which are not weighted individually or cumulatively against catchment-scale impacts. This creates the rather more complicated scenario matrix depicted below. Within this single scenario matrix there are eight potential sets of sub-scenarios related to independent investment projects that could be designed to increase resource outflows from the basin to other parts of the individual basin states.

Developme nt antecedents	Improv ed services supplie d	Populatio n growth	Poverty reducti on	Resource outflows from basin			Resource Inflows to basin	Economic modernizati on	Managemen t co-ordination
→	→	→	→	A	N	B	→	→	→
				→	↗	→			
				→	→	↗			



In-basin Development

If the necessary preconditions (development antecedents) for in-basin development are put in place, then a wide array of new potential scenarios become possible. One interesting scenario class is based on the assumption that population growth occurs in each basin state, but the level of socio-economic development and economic modernization vary from country to country, reflecting the individual economic strengths and development needs of each country. The scenario for increased levels of socio-economic development and the continuation (i.e. maintaining the status quo) of traditional economic activities can be illustrated in the following matrix.

Developme nt antecedents	Improved services supplied	Population growth	Poverty reduction	esource utflows from basin	Resource inflows to basin	conomic odernization	Manageme nt co-ordination
↗	↗	↗	↗	→	→	→	→

In the case where both socio-economic development and economic modernization also occur, the scenario matrix would be illustrated as follows below.

Developme nt antecedents	Improved services supplied	Population growth	Poverty reduction	esource utflows from basin	Resource inflows to basin	conomic odernization	Manageme nt co-ordination
↗	↗	↗	↗	↗	→	↗	↗

These scenarios differ in terms of their assumptions regarding resource management in that the first scenario contemplates the provision was water, sanitation and potentially hydropower services, whilst the second scenario would anticipate additional water requirements for irrigated agriculture, confined livestock management and potentially other industrial development opportunities. In addition, pre-feasibility studies are already underway to evaluate the technical and economic feasibility of bringing in additional water supplies from the Kasai River system to the Cuito River tributary of the Okavango River basin. If such a development were to take place, the arrow symbol indicating the current level of (water) resource inflows to the basin would alter from its current position of zero resource inflows, to one that would reflect the increased water inflows in the above matrix. This situation would also apply to the next scenario, namely: maximum resource development (shown below).

Maximum Resource Development

Another possibility is that high levels of population growth, socio-economic development, and economic modernization in the basin occur alongside increased resources outflows from the basin and, possibly, increased flows of water resources into the basin. Assuming that high levels of management co-ordination exist in the basin, this scenario would manifest as illustrated in the following matrix.

Developme nt antecedents	Improved services supplied	Population growth	Poverty reduction	esource utflows from basin	Resource inflows to basin	conomic odernization	Manageme nt co-ordination
↗	↗	↗	↗	↗	↗	↗	↗

The core assumption underlying this scenario is that the basin states would coordinate their socioeconomic development plans, economic modernization activities and water development investments in a collaborative manner that would produce mutually beneficial results, with broadly acceptable levels of impact occurring as a result of each option chosen. Should the collaborative process fail to materialize or be regarded as ineffective, then each basin state could again decide to follow its own trajectory in terms of any of the critical components, producing the very complicated scenario matrix as depicted below.

Developm ent antecedent s	Improv ed services supplied	Populati on growth	overty eduction	Resource outflows from basin			Resource inflows to basin			Economic modernizati on			Management co-ordination
↗	↗	↗	↗	A	N	B	A	B	N	A	B	N	↗
				All possible permutations									

Assigning Management Strategies to Scenarios

It is clearly implicit in each of the possible scenarios presented above, that some (as yet undefined) level of manipulation or alteration of the hydrological system will occur. These manipulations would typically seek to meet the specific needs for water that are associated with each development option by abstracting an appropriate quantity of water from the system. Taken together, these manipulations of the hydrological system can be classified conveniently as supply-side management strategies. The possible range of such supply-side management strategies is described and their potential implications are discussed in a companion document that details potential management interventions in the basin. It is also important to note that for any given level of water supply that may be required to meet the needs of development projects, it is also possible to define a suite of associated demand-side management strategies. Therefore, assigning a suite of appropriate supply-side and demand-side management strategies to each scenario helps to complement the detailed descriptions of each scenario. In turn, the relative impact of each of these specific actions can then be evaluated using an appropriate water resource planning model.

Such a model would need to consider the location, scale and operating logic of each management strategy in the context of the prevailing hydrological conditions in the basin (including seasonal variations and extreme events). An appropriate model can also be used to design and define specific operational constraints (usually presented as "operating rules" for each water supply option) to ensure that the impacts of the suite of management strategies can be minimized to an acceptable level, as agreed upon by each of the basin states. Finally, the outputs of the water resource planning model are also used to define the necessary monitoring and control strategies that would be needed to ensure that all water users comply with the conditions that may be imposed upon them by the relevant water resource management authority

or agency. These monitoring protocols would also form the basis for independent auditing processes that would be designed to confirm that water resource management in the Okavango River Basin is both effective and efficient.

Conclusions

The presentation of the use of scenarios in resource planning is intended to provide a framework for the *Sharing Water* project. We anticipate that the project participants will assist in defining a range of scenarios to which appropriate management strategies can be assigned. These then will become the focus of early applications of a water resources planning model selected by OKACOM. Once this model is configured it will be possible to engage in an analysis of the tradeoffs associated with particular development scenario/management strategy storylines. The results of this tradeoff analysis will provide essential insights for the actors involved in contemplating the future of the Okavango River Basin. In all likelihood, early results will lead to more refined scenario/management strategy narratives that can iteratively move the actors in the basin towards a consensus on future development in the catchment.

Appendix Q.

Sharing Water Data Collection Matrix

Theme	Sub theme	Region	File name	Data source	Description	Status
Boundaries	Constituency	Namibia	Kavango constituencies	Delimitation Commissions	Digital interpretations of the boundaries of the 9 constituencies of Kavango. Some boundaries follow roads or other static features, while others are straight lines that join sets of co-ordinates. The boundaries are those established in 2003 and replace e	Have in database
Boundaries	District	Angola	Angolan districts	Digital Atlas of Africa produced by United States Geological Survey.	Angolan municipalities, equivalent to districts or sub-provinces	Have in database
Boundaries	District	Botswana	Botswana districts	HOORC	Adminstrative districts of Botswana	Have in database
Boundaries	District	Botswana	Ngamiland District	HOORC	Boundaries of Ngamiland District, Botswana	Have in database
Boundaries	Focal area	Okavango Basin	Okavango Basin focal area	RAISON	Boundaries drawn on the watershed that determines the catchment area in Angola and a 20 kilometre 'buffer' area around the river and Delta in areas where there is no active flow. The watershed boundaries were traced off Landsat	Have in database
Boundaries	Grid	Okavango Basin	Okavango Basin grid	RAISON	A one-degree grid around the Okavango stretching from 11 to 22 South and 15 to 25 East	Have in database
Boundaries	International borders	Africa	Africa & southern africa	Digital Chart of the World (DCW)	International boundaries in Africa and southern Africa (south of the equator)	Have in database
Boundaries	Province	Angola	Angola provinces	Digital Atlas of Africa produced by United States Geological Survey.	18 administrative provinces of Angola	Have in database
Boundaries	Region	Namibia	Kavango Region	Atlas of Namibia	Boundaries of the Kavango Region, Namibia	Have in database
Boundaries	Region	Namibia	Namibian Regions	Atlas of Namibia	Boundaries of the 13 regions of Namibia	Have in database
Boundaries	Sub-Watershed	Botswana	Sub watershed map of Botswana	ALCOM	Botswana 1:105 scale	Have, not in database
Boundaries	Sub-Watershed	Namibia	Sub watershed map of Namibia	ALCOM	Namibia 1:105 scale	Have, not in database
Boundaries	Sub-Watershed	Namibia	Sub watershed map of Namibia	ALCOM	Namibia 1:104 scale	Have, not in database
Boundaries	Sub-Watershed	Angola	Sub watershed map of Angola	ALCOM	Angola 1:105 scale	Have, not in database
Boundaries	Sub-Watershed	Angola	Sub watershed map of Angola	ALCOM	Angola 1:104 scale	Have, not in database
Boundaries	Sub-Watershed	Namibia	Sub watershed map of Botswana	ALCOM	Botswana 1:104 scale	Have, not in database

Climate	*Evaporation*	*Angola*	*Angola evaporation*	*WERRD*	*Angola Monthly*	*Do not have*
Climate	*Evaporation*	*Botswana*	*Botswana evaporation*	*WERRD*	*Botswana Monthly*	*Do not have*
Climate	*Evaporation*	*Namibia*	*Namibia evaporation*	*Stephen Elenor*	*Namibia Monthly*	*Do not have*
Climate	*Evaporation*	*Namibia*	*Namibia evaporation*	*WERRD*	*Namibia Monthly*	*Do not have*
Climate	Evaporation	Okavango Basin	Evaporation per month	Various	Class A pan evaportation rates in millimetres. In Angola: from Marques, R. 1998. Climate, hydrology and water resources: Angolan sector. Report for OKACOM Diagnostic Assessment. GEF Project Brief. For Maun from HOORC and Botswana Met Services. However, t	Have in database
Climate	*Insolation*	*Angola*	*Angola insolation*	*Ministry of Mail and Comm.*	*Angola Daily*	*Do not have*
Climate	*Insolation*	*Angola*	*Angola insolation*	*Ministry of Mail and Comm.*	*Angola Monthly*	*Do not have*
Climate	*Insolation*	*Botswana*	*Botswana Insolation*		*Botswana Daily*	*Do not have*
Climate	*Insolation*	*Botswana*	*Botswana Insolation*		*Botswana Monthly*	*Do not have*
Climate	*Insolation*	*Namibia*	*Namibia insolation*		*Namibia Daily*	*Do not have*
Climate	*Insolation*	*Namibia*	*Namibia insolation*		*Namibia Monthly*	*Do not have*
Climate	*Precipitation*	*Angola*	*Angola precipitation*	*Ministry of Mail and Comm.*	*Angola Monthly*	*Do not have*
Climate	*Precipitation*	*Angola*	*Angola precipitation*	*Ministry of Mail and Comm.*	*Angola Daily*	*Do not have*
Climate	*Precipitation*	*Angola*	*Angola precipitation*	*Pete Heynes*	*Angola Daily*	*Do not have*
Climate	*Precipitation*	*Angola*	*Angola precipitation*	*WERRD*	*Angola Daily*	*Do not have*
Climate	Precipitation	Angola		NOAA	Angola Daily	Have, not in database
Climate	*Precipitation*	*Botswana*	*Botswana daily precip*	*HYCOS*	*Botswana Daily*	*Do not have*
Climate	*Precipitation*	*Botswana*	*Botswana precipitation*	*MetServ-Gaborone*	*Botswana Monthly*	*Do not have*
Climate	*Precipitation*	*Botswana*	*Botswana precipitation*	*MetServ-Gaborone,*	*Botswana Daily*	*Do not have*
Climate	*Precipitation*	*Namibia*	*Namibia precipitaion*	*Weather Bureau*	*Namibia Daily*	*Do not have*
Climate	*Precipitation*	*Namibia*	*Namibia precipitaion*	*WERRD*	*Namibia Daily*	*Do not have*
Climate	Rainfall	Angola, Botswana, Namibia, South Africa	Average rainfall per station	Various	Average annual seasonal rainfall at 413 rainfall stations in Angola, Botswana, Namibia and South Africa. Original records obtained from the Global Historical Climate Network database, and the Botswana and Namibia Meteorological	Have in database
Climate	Rainfall	Botswana, Namibia	Rainfall seasonal totals	Various	Long-term seasonal totals for Maun, Shakawe, Andara and Rundu. Seasons last from July to June.	Have in database
Climate	Rainfall	Namibia	Rainfall daily data	Namibia Meteorological Services	Daily rainfall records for selected stations in Kavango.	Have in database
Climate	Rainfall	Okavango Basin	Average rainfall zones	RAISON	Average annual seasonal rainfall across the Okavango Basin, based on an interpolation of annual average rainfalll at stations (see Average rainfall per station.zip) in and surrounding the Basin. Averages are given in the field "Range" in 100 millimetre in	Have in database
Climate	Rainfall	Okavango Basin	Rainfall and discharge per catchment	RAISON	Average rainfall was estimated from interpolated mean annual rainfall figures in each catchment (Okavango catchments.shp). Multiplying average rainfall and catchment areas provided estimates of total volumes of rainfall per catchment. Discharge percentage	Have in database
Climate	Rainfall	Okavango Basin	Rainfall variance	RAISON	Co-efficient of variation of rainfall across the Basin. Interpolation of the standard deviation of annual totals calculated from records obtained from the Global Historical Climate Network database, and the Botswana and Namibia Meteorological Services.	Have in database
Climate	Rainfall	Okavango Basin	Rainfall histograms	Various	Monthly rainfall records at 23 stations across the Basin, from data in the file "Rainfall monthly totals.xls". Original records obtained from the Global Historical Climate Network database, and the Botswana and Namibia Meteorological Services.	Have in database
Climate	Rainfall	Okavango Basin	Rainfall monthly totals	Various	Monthly rainfall averages and monthly totals per year. Original records obtained from the Global Historical Climate Network database, and the Botswana and Namibia Meteorological Services.	Have in database
Climate	Rainfall	Southern africa	Rainfall southern africa	RAISON	Average annual seasonal rainfall south of the Equator, based on an interpolation of data provided in the Digital Atlas of Africa produced by United States Geological Survey.	Have in database
Climate	*Relative Humidity*	*Angola*	*Angola humidity*	*Ministry of Mail and Comm.*	*Angola Monthly*	*Do not have*
Climate	*Relative Humidity*	*Angola*	*Angola humidity*	*Ministry of Mail and Comm.*	*Angola Daily*	*Do not have*

Climate	*Relative Humidity*	*Botswana*	*Botswana monthly relative humidity*	*HYCOS*	*Botswana Monthly*	*Do not have*
Climate	*Relative Humidity*	*Botswana*	*Bostswana daily humidity*	*HYCOS*	*Botswana Daily*	*Do not have*
Climate	*Relative Humidity*	*Namibia*	*Namibia monthly humidity*	*HYCOS*	*Namibia Monthly*	*Do not have*
Climate	*Relative Humidity*	*Namibia*	*Namibia daily humidity*	*HYCOS*	*Namibia Daily*	*Do not have*
Climate	*Relative Humidity*	*Namibia*	*Namibia relative humidity*	*Weather Bureau*	*Namibia Daily*	*Do not have*
Climate	*Temperature*	*Angola*	*Angola temperature*	*Ministry of Mail and Comm.*	*Angola Daily Ave*	*Do not have*
Climate	*Temperature*	*Angola*	*Angola temperature*	*Ministry of Mail and Comm.*	*Angola Daily Max*	*Do not have*
Climate	*Temperature*	*Angola*	*Angola temperature*	*Ministry of Mail and Comm.*	*Angola Daily Min*	*Do not have*
Climate	Temperature	Botswana		HOORC	Botswana Daily Ave	Have, not in database
Climate	Temperature	Botswana	Botswana temp daily min	HOORC	Botswana Daily Min	Have, not in database
Climate	Temperature	Botswana	Botswana temp daily max	HOORC	Botswana Daily Max	Have, not in database
Climate	*Temperature*	*Botswana*	*Botswana temperature*	*MetServ-Gaborone*	*Botswana Daily Ave*	*Do not have*
Climate	*Temperature*	*Botswana*	*Botswana temperature*	*MetServ-Gaborone*	*Botswana Daily Min*	*Do not have*
Climate	*Temperature*	*Botswana*	*Botswana temperature*	*MetServ-Gaborone*	*Botswana Daily Max*	*Do not have*
Climate	Temperature	Botswana, Namibia	Temperatures	Namibia and Botswana Meteorological Services	Daily minimum and maximum temperatures at Rundu, and for Rundu and Maun average and highest maximums and average and lowest minimums.	Have in database
Climate	*Temperature*	*Namibia*	*Namibia daily temperature*	*J. Mendelsohn*	*Namibia Daily Ave*	*Do not have*
Climate	Wind	Namibia	Windspeed,Rundu	Namibia Meteorological Services	Monthly wind speed and directions at Rundu	Have in database
Climate	*Wind Speed*	*Angola*	*Angola wind speed*	*Ministry of Mail and Comm.*	*Angola Daily*	*Do not have*
Climate	*Wind Speed*	*Angola*	*Angola wind speed*	*Ministry of Mail and Comm.*	*Angola Monthly*	*Do not have*
Climate	Wind Speed	Botswana	Botswana daily windspeed	HOORC	Botswana Daily	Have, not in database
Climate	*Wind Speed*	*Botswana*	*Botswana wind speed*	*HYCOS*	*Botswana Daily*	*Do not have*
Climate	*Wind Speed*	*Botswana*	*Botswana monthly wind speed*	*HYCOS*	*Botswana Monthly*	*Do not have*
Climate	*Wind Speed*	*Namibia*	*Namibia wind speed*	*HYCOS*	*Namibia Daily*	*Do not have*
Climate	*Wind Speed*	*Namibia*	*Namibia monthly wind speed*	*HYCOS*	*Namibia Monthly*	*Do not have*

Demography	Age pyramid	Botswana	Age pyramids 1991,Ngamiland	HOORC	Age and sex structure of the population in Ngamiland district, Botswana in 1991	Have in database
Demography	Age pyramid	Namibia	Age pyramids 1960-1999,Kavango	CSO	Age and sex structure of the population in Kavango region in 1960, 1970, 1991 and 1999, and numbers of Kavango language speakers inside and outside Kavango	Have in database
Demography	Age pyramid	Namibia	Population census 2001,Kavango	CSO	Age and sex structure of the population, and employment and sources of income urban and rural areas in Kavango region in 2001	Have in database
Demography	Health1	Botswana, Namibia	HIV infection rates,Kavango & Ngamiland	Ministry of Health in Namibia & Botswana	HIV infection rates in Kavango region in Namibia and Ngamiland district in Botswana in 1992, 1994, 1996, 1998, 2000 and 2002. The rates are those of a random sample of infected women tested during ante-natal visits to hospitals	Have in database
Demography	Household size	Botswana	Demography from SIAPAC,Ngamiland	SIAPAC	Number of people per household, level of education and main occupation of household members in a sample survey in Ngamiland in 2001, from Social Impact Assessment and Policy Analysis Corporation (SIAPAC). 2001. Rural Development Policy Review Nationwide C	Have in database
Demography	Household size	Okavango Basin	Household sizes,3countries	Various	Number of people per household or family in Angola, Botswana and Namibia. Sources are given in the Excel file	Have in database
Demography	Languages	Okavango Basin	languages	RAISON	Map of the languages distribution in the Okavango Basin focal area. 4. Compiled from Milheiros, M. 1967. Notas de etnografia Angolana. Instituto de Investigação Cientifica de Angola; Redinha, J. 1962. Distribuiçã etnica de Angola. Edição Do Centro de Info	Have in database
Demography	*Migration*	*Botswana*	*Botswana migration*		*Botswana*	*Do not have*
Demography	People density	Angola	people density-angola	UNEP/GRID-Sioux falls	Angola population density per square kilometre in 1990. See additional information contained in the MS Word file included in the zip file.	Have in database
Demography	People density	Botswana	people density-botswana	Atlas of Botswana	Population densities in 1991 as mapped and presented by Morebodi, B.B.H. 2001. Botswana National Atlas. Department of Surveys and Mapping, Gaborone	Have in database
Demography	People density	Namibia	people density-kavango	RAISON and various	Population density per square kilometre in 2000, estimated by linking to each household the average number of people per household in each enumeration area, as analysed from the 1991 Population and Housing Census data. Positions of households were mapped	Have in database
Demography	People density	Okavango Basin	people density-focal area	RAISON	Population density per square kilometre in the Okavango Basin focal area, approximately in 2001, derived from people density-kavango.shp for Kavango, and for Ngamiland, numbers of people recorded in the 2001 census (population per locality,ngamiland.xls)	Have in database
Demography	*Population*	*Angola*	*Angola Age/Gender*	*Cabinete "DO PLANO"*	*Angola Age/Gender*	*Do not have*
Demography	*Population*	*Angola*	*Angola Age/Gender*	*Nat'l Inst. for Statistics*	*Angola Age/Gender*	*Do not have*
Demography	*Population*	*Angola*	*Angola Rural/Urban population*		*Angola Rural/Urban*	*Do not have*
Demography	Population	Botswana	Botswana total population	CSO	Botswana Total	Have, not in database
Demography	Population	Botswana	Botswana rural/urban population	CSO	Botswana Rural/Urban	Have, not in database
Demography	Population	Botswana	Botswana Age/Gender	CSO	Botswana Age/Gender	Have, not in database
Demography	Population	Botswana	Botswana total population	HOORC	Botswana Total	Have, not in database
Demography	*Population*	*Botswana*	*Botswana rural/urban population*	*HOORC*	*Botswana Rural/Urban*	*Do not have*
Demography	*Population*	*Botswana*	*Botswana Age/Gender*	*HOORC*	*Botswana Age/Gender*	*Do not have*
Demography	Population indicators	Namibia	Demographic rates, kavango	CSO, MOHSS	Child and infant mortality, fertility rate and life expectancy in the Kavango Region. Child and infant mortality rates were estimated from and by the Demographic and Health Surveys (DHS) in 1992 and 2000, while life expectancy and fertlity figures are fro	Have in database

Demography	Population indicators	Namibia	Demographic indicators, kavango	CSO, Namibia	Population sizes in Kavango Region 1911-2001, dependancy ratios, number of people per household and gender of the head of household. Sources are given in the file	Have in database
Demography	Population numbers	Angola	Population data from IUCN,Angola	IUCN	Estimates of the number of people in each province in Angola in 1991. From IUCN. 1992. Angola: Environment status quo assessment report., IUCN Regional Office for Southern Africa, Harare 1992.	Have in database
Demography	Population numbers	Botswana	Populatioin census 1981,1991,2001-	CSO, Botswana	Number of people per different localites in Ngamiland district in 1981, 1991 and 2001	Have in database
Demography	Population numbers	Botswana	Population per locality,Ngamiland	CSO, Botswana	Number of people per census locality in Ngamiland district in 2001 population census	Have in database
Demography	Population numbers	Namibia	People per constituency2001, kavango	CSO, Namibia	Number of people per constituency and number of people per household in 2001 in the Kavango region. From 2001 population census	Have in database
Demography	Population numbers	Okavango Basin	Population estimates,Angola part of Okavango basin	RAISON	Estimates of the number of people living in the Angolan part of the Okavango basin focal area	Have in database
Demography	Population numbers	Okavango Basin	Population data,Kavango & Ngamiland	Various	Number of people in Kavango region in Namibia and Ngamiland district in Botswana 1904-2001, and note on number of people in Cuangar, Mucusso and Dirico	Have in database
Environmental	*DDT Use*	*Angola*	*Angola DDT use*		*Angola*	*Do not have*
Environmental	*DDT Use*	*Botswana*	*Botswana DDT use*		*Botswana*	*Do not have*
Environmental	*DDT Use*	*Namibia*	*Namibia DDT use*	*Human Development Report*	*Namibia*	*Do not have*
Environmental	*Deforestation*	*Namibia*	*Namibia deforestation*	*J. Mendelsohn*	*Namibia Maps (GIS)*	*Do not have*

Farming	Crops	Angola	cleared land-angola	RAISON	Cleared land as maped from LandSat TM7 satellite images taken in 2000-2002	Have in database
Farming	Crops	Botswana	cleared land-ngamiland	HOORC	Cleared land as mapped from satellite images. Dates of imagery unknown.	Have in database
Farming	Crops	Botswana	Agricultural Statistics 1968-98,Ngamiland	Ministry of Agriculture	Assorted figures on crop and livestock farming from annual Ministry of Agricultural surveys. Consult Hannelore Bendsen, HOORC for more information.	Have in database
Farming	Crops	Namibia	Food consumption,Kavango	CSO, Namibia	Values of different sources of cereal, meat and fish (home produced, not home produced and mixed) per sample household from 1994 Income and Expenditure Survey. Commodoties starting wth "C" are obained with cash, those starting with "K" are obtained in-kin	Have in database
Farming	Crops	Namibia	Mahangu seed types,Kavango	CSO, Namibia	Percentage of households planting different types of Mahangu seeds and reporting different kinds of crop pests, from annual agricultural surveys between 1996 and 1999	Have in database
Farming	Crops	Namibia	cleared land in 1972-kavango	DSM	Cleared land as mapped from aerial photos taken in 1972 and shown on the 1972 1:50,000 map series	Have in database
Farming	Crops	Namibia	cleared land in 1996-kavango	DSM	Cleared land as mapped from aerial photos taken in 1996 and shown on the 1996 1:50,000 map series	Have in database
Farming	Crops	Namibia	HH planting different crops per zone,Kavango	Lux Development	Percentage of households planting different crops in four zones reported during 1999 sample survey of households	Have in database
Farming	Crops	Namibia	cleared land in 1943-kavango	RAISON	Cleared land as mapped from aerial photos taken in 1943. Original negatives obtained from DSM, printed, scanned, geo-referenced, and then polygons of cleared land were digitised from the images	Have in database
Farming	Crops	Okavango Basin	crop zones	RAISON	Crop production falls into four broad zones: maize predominates in the north-west, manioc in the north-eastern catchment of the Cuito River, millet in the central zone centered on Kavango.	Have in database
Farming	Livestock	Africa	tsetse fly range	Atlas of Botswana	The distribution of the Tsetse fly in Africa and in Ngamiland and Namibia in more detail	Have in database
Farming	Livestock	Botswana	cattle crushpens-ngamiland	HOORC		Have in database
Farming	Livestock	Botswana	commercial ranch-	HOORC	Boundaries of the commercial farms in	Have in database
Farming	Livestock	Botswana	Cattle and field sizes,Ngamiland	Ministry of Agriculture	The relation between the number of cattle owned by a household and the number of hectare cultivated. From Van Hoof, P.J.M., Kirkels, M.A.L.J., Riezebos, H.Th., Schledorn, J.L.M. & de Wit, M.J.M. 1991. Socio-economic baseline survey and land suitability an	Have in database
Farming	Livestock	Botswana	Livestock numbers1955-2002,Ngamiland	Ministry of Agriculture, Botswana	Number of livestock in Ngamiland, Botswana 1955-2002	Have in database
Farming	Livestock	Namibia	Livestock diseases from schneider,Kavango	H. Schneider	Notes and figures on livestock diseases in Kavango Region, from Schneider, H.P. 1994. Animal health and veterinary medicine in Namibia. AGRIVET, Windhoek.	Have in database
Farming	Livestock	Namibia	Livestock ownership,Kavango	Lux Development	Household size and average number of cattle and goats, origianal household data from 1999 Lux Development survey, and assorted analyses on ownership and marketing of livestock	Have in database
Farming	Livestock	Namibia	Livestock numbers1980-2001,Kavango	MAWRD, Namibia	Number of livestock in Kavango Region, 1980-2001, estimates or counts of animals during annual vaccination campaigns	Have in database
Farming	Livestock	Namibia	Cattle bought by Meatco92-02,Kavango	MEATCO	The number of cattle bought by MEATCO in the Kavango rRegion each year 1992-2002	Have in database
Farming	Livestock	Namibia	kavango goat density	RAISON	Goats per square km. Goat densities were estimated by first calculating average numbers of animals per household from the Lux-Development 1999 population survey data in four zones. These averages were then attached to point data for all rural households (	Have in database
Farming	Livestock	Namibia	kavango cattle density	RAISON & Veterinary Services, MAWRD	Cattle density per square km in 2001. The number of animals recorded at each crushpen was obtained from the directorate of veterinary services. The estimate of density was made by spreading the numbers of animals over a radius	Have in database
Farming	Livestock	Namibia	Cattle-people ratio,Kavango	Various	Number of cattle in relation to the number of people 1951 to 2001, from veterinary statitsics (see 'Livestock numbers1980-2001,Kavango.xls) and population censuses (see 'Demographic indicators, kavango.xls')	Have in database

Farming	Livestock	Okavango Basin	Note on cattle density in Basin area	RAISON	A note on how the cattle density for the basin area is calculated	Have in database
Farming	Livestock	Okavango Basin	cattle density	RAISON, and various	Rating of cattle density in 2001 for the Okavango Basin. For classes of density, see the file: Note on cattle density in Basin area.xls. For Ngamiland, areas were copied from the report 'Scott Wilson & The environment and development group, 2000. Environm	Have in database
Farming	Livestock	Okavango Basin	all fences	RAISON, various	The veterinary fences in Namibia and Ngamiland, Botswana.	Have in database
Farming	Livestock	Okavango Basin	HH having different no of cattle+goats	Various	Households having different numbers of cattle and goats. 14. For Ngamiland, figures are from Van Hoof et al (see Note 4); while for Kavango data are from a Population Survey of the Kavango Region by Lux Development in 1999. The ownership of goats seems lo	Have in database
Geology	*Classification*	*Angola*	*Angola geology*	*Institute of Geology*	*Angola Maps (GIS)*	*Do not have*
Geology	*Classification*	*Angola*	*Angola geology maps*	*Ministry of Geo. & Mines*	*Angola Maps (GIS)*	*Do not have*
Geology	*Classification*	*Botswana*	*Botswana geology maps*	*HOORC*	*Botswana Maps (GIS)*	*Do not have*
Geology	Delta1	Botswana	old fluvial sediments	RAISON	Approximate boundaries of old fluvial sediments digitized from Landsat images and guided by information in Thomas, D.S.G. & Shaw, P.A. 1991. The Kalahari Environment. Cambridge University Press, Cambridge.	Have in database
Geology	Dunes	Okavango Basin	dunes	RAISON	Positions and orientation of dunes digitized off Landsat images	Have in database
Geology	Faults	Botswana	geological faults	RAISON	Approximate positions of faults around the Okavango Delta, digitized from Landsat images and guided by information in Gumbricht, T., McCarthy, T.S. & Merry, C.L. 2001. The topography of the Okavango Delta, Botswana, and its tectonic and sedimentological i	Have in database
Geology	Geology	Okavango Basin	basin geology-new		Simplification of geological features in the Okavango Basin from digital map of the the geology of Africa south of the equator compiled by the South African Council of GeoSciences	Have in database
Geology	Kalahari basin	Southern africa	kalahari basin deposits		Kalahari age sediments extracted from digital map of the the geology of Africa south of the equator compiled by the South African Council of GeoSciences	Have in database
Geology	*Mineral Resources*	*Angola*	*Angola mineral resources*		*Angola Maps (GIS)*	*Do not have*
Geology	*Mineral Resources*	*Botswana*	*Botswana mineral resources*		*Botswana Maps (GIS)*	*Do not have*
Geology	*Mineral Resources*	*Namibia*	*Namibia geology*	*J. Mendelsohn*	*Namibia Maps (GIS)*	*Do not have*
Geology	Relief	Namibia	kavango relief		Smoothed interpolation of elevation points in the 1:50,000 map series for Kavango produced by the DSM in 1972.	Have in database
Geology	Relief	Okavango Basin	basin elevation	RAISON	Interpolation of the GOTOPO 1-km interval grid data set of spot elevations. Original spot heights provided by Digital Atlas of Africa produced by United States Geological Survey.	Have in database
Geology	Relief	Southern africa	african elevations	RAISON	Interpolation of the GOTOPO 1-km interval grid data set of spot elevations. Original spot heights provided by Digital Atlas of Africa produced by United States Geological Survey.	Have in database

Hydrology	*Aquifer Extent*	*Angola*	*Angola acquifer*		*Angola Extent (Map)*	*Do not have*
Hydrology	*Aquifer Extent*	*Botswana*	*Botswana acquifer*		*Botswana Extent (Map)*	*Do not have*
Hydrology	*Aquifer Yield*	*Angola*	*Angola acquifer yield*		*Angola Yield*	*Do not have*
Hydrology	*Aquifer Yield*	*Botswana*	*Botswana acquifer yield*		*Botswana Yield*	*Do not have*
Hydrology	Delta	Botswana	Delta Annual floods1995&2001		Extent of flooding in July/August 1995 and 2001 from an interpretation of LandSat TM quicklooks done by Johan le Roux for the Okavango Profile project	Have in database
Hydrology	Delta	Botswana	delta rivers	HOORC	Major distributary channels in the Okavango	Have in database
Hydrology	Delta	Botswana	delta wetlands	HOORC	Permanent and seasonal swamps of the Okavango delta	Have in database
Hydrology	Delta	Botswana	Delta monthly flood1999	RAISON	Interpretation of NOAA images of inundated areas in the Delta during 1998 and 1999. Analysis by Johan le Roux for the profile project.	Have in database
Hydrology	Delta	Botswana	Delta average monthly floods	RAISON, and various	Adapted from McCarthy, J. 2002. Remote sensing for detection of landscape form and function of the Okavango Delta, Botswana. Ph D. thesis. Royal Institute of Technology,	Have in database
Hydrology	Discharge/Stage	Angola	Angola stage/discharge	Ministry of Energy & Water	Angola Daily	Do not have
Hydrology	*Discharge/Stage*	*Angola*	*Angola stage/discharge*	*Nat'l Directorate of Water*	*Angola Daily*	*Do not have*
Hydrology	*Discharge/Stage*	*Botswana*	*Botswana stage/discharge*	*HOORC,*	*Botswana Daily*	*Do not have*
Hydrology	*Discharge/Stage*	*Botswana*	*Botswana stage/discharge*	*HYCOS*	*Botswana Daily*	*Do not have*
Hydrology	*Discharge/Stage*	*Namibia*	*Namibia stage/discharge*	*HYCOS*	*Namibia Daily*	*Do not have*
Hydrology	*Flood Extent*	*Angola*	*Angola flood extent*		*Angola Event*	*Do not have*
Hydrology	*Flood Extent*	*Botswana*	*Extent of Floods in the Okavango Delta*	*Ben Loximax*	*Delta*	*Do not have*
Hydrology	*Flood Extent*	*Botswana*	*Botswana flood events*	*HOORC*	*Botswana Event*	*Do not have*
Hydrology	*Flood Extent*	*Namibia*	*Namibia flood extent*		*Namibia Event*	*Do not have*
Hydrology	*Flow Requirements*	*Africa*	*Aquatic Ecosystems*		*Aquatic Ecosystems*	*Do not have*
Hydrology	*Flow Requirements*	*Navigation*	*Flow requirements for navigation*		*Navigation*	*Do not have*
Hydrology	*Flow Requirements*	*Okavango Basin*	*Flow requirements for fiber*		*Fiber Collection*	*Do not have*
Hydrology	*Flow Requirements*	*Okavango Basin*	*Flow requirements for fishing*		*Fishing*	*Do not have*
Hydrology	*Flow Requirements*	*Okavango Basin*	*Flow requirements for food*		*Food Collection*	*Do not have*
Hydrology	Groundwater	Namibia	Borehole no3-kavango	BIWAC	Nitrate concentration in groundwater in Kavango, compiled from water sample data in boreholes. For more information see Hydrogeology from Bittner_Kavango.doc	Have in database
Hydrology	Groundwater	Namibia	Borehole pl-kavango	BIWAC	Pieziometric levels of groundwater in Kavango, compiled from borehole data. For more information see Hydrogeology from Bittner_Kavango.doc	Have in database
Hydrology	Groundwater	Namibia	Borehole so4-kavango	BIWAC	Sulphate concentration in groundwater in Kavango, compiled from water sample data in boreholes. For more information see Hydrogeology from Bittner_Kavango.doc	Have in database
Hydrology	Groundwater	Namibia	Flow system-kavango	BIWAC	Approximate boundaries of zones characterized by different underground water flow directions. For more information see Hydrogeology from Bittner_Kavango.doc	Have in database
Hydrology	Groundwater	Namibia	groundwater level-kavango	BIWAC	Interpolated levels of groundwater below ground in the Kavango. For more information see Hydrogeology from Bittner_Kavango.doc	Have in database
Hydrology	Groundwater	Namibia	Groundwater tds-kavango	BIWAC	Total dissolved solids in milligrams per litre, in Kavango, compiled from water sample data in boreholes. For more information see Hydrogeology from Bittner_Kavango.doc	Have in database
Hydrology	Groundwater	Namibia	Groundwater yield-kavango	BIWAC	Average yields from boreholes measured in cubic meters of water pumped to the surface per hour. For more information see Hydrogeology from Bittner_Kavango.doc	Have in database
Hydrology	Groundwater	Namibia	Hydrogeology from Bittner_Kavango	BIWAC	Summary report and maps on the geohydrology of Kavango, produced under contract to RAISON for the Kavango Profile.	Have in database
Hydrology	Groundwater	Namibia	Boreholes from luxdev-kavango	Lux Development	Data from a survey of 651 water points in Kavango conducted in 2001 by Tom Tolmay for Lux Development. Contains a variety of attributes on the use and functioning of water	Have in database
Hydrology	Groundwater	Namibia	Borehole chemistry-kavango	MAWRD, Namibia	Chemistry data for water samples for about 600 boreholes in Kavango	Have in database
Hydrology	*Groundwater Elevation*	*Angola*	*Angola groundwater elevations*		*Angola Elevations*	*Do not have*
Hydrology	*Groundwater Elevation*	*Botswana*	*Botswana groundwater elevations*		*Botswana Elevations*	*Do not have*
Hydrology	*Groundwater Elevation*	*Namibia*	*Namibia groundwater elevations*		*Namibia Elevations*	*Do not have*
Hydrology	*Groundwater Pumping*	*Angola*	*Angola groundwater pumping*		*Angola Pumping*	*Do not have*
Hydrology	*Groundwater Pumping*	*Botswana*	*Botswana groundwater pumping*		*Botswana Pumping*	*Do not have*

Hydrology	*Groundwater Pumping*	*Namibia*	*Namibia Pumping*	*Lund Engineering DWA*	*Namibia Pumping*	*Do not have*
Hydrology	*Groundwater Pumping*	*Namibia*	*Namibia Pumping*	*Lux Developers*	*Namibia Pumping*	*Do not have*
Hydrology	*Groundwater Pumping*	*Namibia*	*Namibia Pumping*	*Shirley Bethune*	*Namibia Pumping*	*Do not have*
Hydrology	*Navigability*	*Angola*	*Angola navigability*		*Angola*	*Do not have*
Hydrology	*Navigability*	*Botswana*	*Botswana navigability*		*Botswana*	*Do not have*
Hydrology	*Navigability*	*Namibia*	*Namibia Navigability*		*Namibia*	*Do not have*
Hydrology	Pans	Botswana	makgadikgadi	RAISON, HOORC	Approximate limits of Makgadikgadi pans, Mababe Depression and Ngami Lake digitized from Landsat images	Have in database
Hydrology	*Q v Bedload*	*Angola*	*Cubango Q v bedload*		*Cubango*	*Do not have*
Hydrology	*Q v Bedload*	*Botswana*	*Delta Q v Bedload*		*Delta*	*Do not have*
Hydrology	*Q v Bedload*	*Namibia*	*Panhandle Q v Bedload*		*Panhandle*	*Do not have*
Hydrology	*Q v Bedload*	*Quito*	*Quito Q v bedload*		*Quito*	*Do not have*
Hydrology	Rivers	Angola	Water volume-Angola	OKAKOM	Volume of water recorded at several stations along the Cubango and Cuito rivers in Angola for the period 1961/62 to 1973/74. These stations are Kavango, Menongue, Caiundu, Chinhama, Cuchi, Cutato, Mucundi and Quiriri.	Have in database
Hydrology	Rivers	Botswana	Water discharge at Maun1968-2001	HOORC	Water levels and estimates of discharge on the Thamalakane River at Maun	Have in database
Hydrology	Rivers	Botswana	Water monthly flow at Mohembo1933-2002	HOORC	Monthly water volume in millions of cubic metres recorded at Mohembo 1933-2002.	Have in database
Hydrology	Rivers	Namibia	okavango habitats-namibia	DSM, Lux Development	Wetlabd habitats between Mohembo and Katwitwi from the 1:50 000 K maps of Kavango	Have in database
Hydrology	Rivers	Namibia	Okavango water consumption	MAWRD, Namibia	Estimates of present and planned water use from the Okavango River at various sites in Namibia	Have in database
Hydrology	Rivers	Namibia	water volume at mukwe	MAWRD, Namibia	Original daily estimates of water volumes of water carried by the Okavango at Mukwe every year 1949-1999	Have in database
Hydrology	Rivers	Namibia	Water volume at rundu	MAWRD, Namibia	Volume of water carried by the Okavango every year 1949-2002	Have in database
Hydrology	Rivers	Okavango Basin	monthly river volumes for all stations	Namibia, MAWRD. Angola, OKAKOM. Botswana, HOORC	Average monthly volume of water carried by the Okavango and the Cuito. Measurement are taken at Rundu and Mukwe in Namibia. Mohembo and Maun in Botswana. Kavango, Menongue, Caiundu, Mucundi in Angola. The angolan data covers only the period 193/64 to 1	Have in database
Hydrology	Rivers	Okavango Basin	Water annual volume for all stations	Namibia, MAWRD. Angola, OKAKOM. Botswana, HOORC	Volume of water carried by the Okavango and the Cuito every year 1933-2002. Measurement are taken at Rundu and Mukwe in Namibia. Mohembo and Maun in Botswana. Kavango, Menongue, Caiundu, Chinhama, Cuchi, Cutato, Mucundi and Quiriri in Angola. The Angolan	Have in database
Hydrology	Rivers	Okavango Basin	exs+prop water extraction	RAISON	Approximate positions of existing and proposed schemes (irrigation, hydroelectrical or town supply) to extract water from the Okavango river	Have in database
Hydrology	Rivers	Okavango Basin	okavango catchments	RAISON	Okavango river catchment and sub-catchment areas. Areas of active drainage were digitzed off LandSat images, while a 20 kilometer buffer area was generated around permanent rivers and the Delta (Panhandle, Permanent and Seasonal Swamps) in areas where the	Have in database
Hydrology	Rivers	Okavango Basin	okavango drainage	RAISON	Rivers and major tributaries of the Okavango river system. The field 'River-type" provides a classification: V - Incised Valley, M - Valley marshland, F - floodplain valley, D - fossil drainage line, E - ephemeral river, S - major delta channel. Largely d	Have in database
Hydrology	Rivers	Okavango Basin	okavango perennial rivers	RAISON	Perennial rivers of the Okavango river system. The field 'River-type" provides a classification: V - Incised Valley, M - Valley marshland, F - floodplain valley, S - major delta channel. Largely digitized off LandSat images.	Have in database
Hydrology	Rivers	Okavango Basin	River profiles	RAISON	Altitudinal profiles of the Okavango and Cuito rivers from the rivers' sources in Angola to the delta in Botswana, extracted from an interpolation of the GOTOPO 1-km interval grid data set of spot elevations. Original spot heights provided by Digital Atla	Have in database
Hydrology	Rivers	Southern africa	southern african lakes and dams	Digital Atlas of Africa produced by United States Geological Survey.	Selection of larger lakes and dams prepared by Tony Robertson, largely from the Digital Atlas of Africa produced by United States Geological Survey.	Have in database

Hydrology	Rivers	Southern africa	southern african rivers	Digital Atlas of Africa produced by United States Geological Survey.	Selection of larger rivers south of the equator, prepared by Tony Robertson, largely from the Digital Atlas of Africa produced by United States Geological Survey.	Have in database
Hydrology	*Stage-Discharge Relationship*	*Angola*	*Angola stage/discharge*		*Angola*	*Do not have*
Hydrology	*Stage-Discharge Relationship*	*Botswana*	*Bostwana stage-discharge*	*DWA*	*Botswana*	*Do not have*
Hydrology	*Stage-Discharge Relationship*	*Namibia*	*Namibia stage/discharge*		*Namibia*	*Do not have*
Hydrology	*Water Quality*	*Angola*	*Cubango water quality*		*Cubango*	*Do not have*
Hydrology	*Water Quality*	*Botswana*	*Delta water quality*		*Delta*	*Do not have*
Hydrology	*Water Quality*	*Namibia*	*Panhandel water quality*	*Eliot Taylor*	*Panhandle*	*Do not have*
Hydrology	*Water Quality*	*Namibia*	*Namibia Water Quality*	*Namibia SIS*	*Panhandle*	*Do not have*
Hydrology	*Water Quality*	*Namibia*	*Namibia Water Quality*	*NAMPOWER*	*Panhandle*	*Do not have*
Hydrology	*Water Quality*	*Namibia*	*Namibia Water Quality*	*Shirley Bethune*	*Panhandle*	*Do not have*
Hydrology	*Water Quality*	*Quito*	*Quito water quality*		*Quito*	*Do not have*

Land Use and History	*Irrigated Area*	*Angola*	*Angola irrigation maps*	*Castanheira Diniz?*	*Angola Maps (GIS)*	*Do not have*
Land Use and History	*Irrigated Area*	*Botswana*	*Botswana irrigated area*		*Botswana Maps (GIS)*	*Do not have*
Land Use and History	*Irrigated Area*	*Namibia*	*Namibia irrigation maps*	*Patrick Klintonberg DRFN*	*Namibia Maps (GIS)*	*Do not have*
Land Use and History	*Land Use*	*Angola*	*Angola land use maps*	*Castanheira Diniz*	*Angola Maps (GIS)*	*Do not have*
Land Use and History	*Land Use*	*Angola*	*Angola land use*	*HOORC*	*Angola Images*	*Do not have*
Land Use and History	Land Use	Botswana	Botswana land use maps	Dept. of Lands	Botswana Maps (GIS)	Have, not in database
Land Use and History	*Land Use*	*Botswana*	*Botswana land use*	*HOORC*	*Botswana Images*	*Do not have*
Land Use and History	*Land Use*	*Botswana*	*Botswana land use*	*HOORC*	*Botswana Maps (GIS)*	*Do not have*
Land Use and History	*Land Use*	*Botswana*	*Botswana land use*	*Rangeland Inventory Project*	*Botswana Maps (GIS)*	*Do not have*
Land Use and History	*Land Use*	*Namibia*	*Namibia land use maps*	*Directorate of Forestry*	*Namibia Maps (GIS)*	*Do not have*
Land Use and History	*Land Use*	*Namibia*	*Namibia land use*	*HOORC*	*Namibia Images*	*Do not have*
Land Use and History	*Land Use*	*Namibia*	*Namibia land use*	*Ministry of Env. & Tourism*	*Namibia Maps (GIS)*	*Do not have*
Land Use and History	*Urban Areas*	*Angola*	*Angola urban areas*		*Angola Maps (GIS)*	*Do not have*
Land Use and History	*Urban Areas*	*Botswana*	*Botswana urban areas*		*Botswana Maps (GIS)*	*Do not have*
Landuse and history	History	Namibia	kavango boundaries 1937-68	Atlas of Namibia	Extent of the Kavango Region, 1937-1968	Have in database
Landuse and history	History	Namibia	kavango boundaries 1968-92	Atlas of Namibia	Extent of the Kavango Region 1968-1992	Have in database
Landuse and history	History	Namibia	kavango boundaries 1992-98	Atlas of Namibia	Extent of the Kavango Region, 1992-1998	Have in database
Landuse and history	History	Okavango Basin	historical sites	Various	Approximate locations of Early to Middle and Late Stone Age sites and also early agriculture sites, from information in Lane, P., Reid, A. & Segobye, A. (eds). 1998. Ditswa Mmung: The archaeology of Botswana. Pula Press and The Botswana Society, Gaborone	Have in database
Landuse and history	Landmarks	Okavango Basin	landmarks	RAISON	Selection of the the most prominent landmarks in and around the Okavango Basin	Have in database
Landuse and history	Landuse	Botswana	ngamiland landuse-detailed	HOORC	Landuses in Ngamiland district, Botswana	Have in database
Landuse and history	Landuse	Namibia	kavango tribal admin offices	CSO	Approximate locations of tribal administrative offices in Kavango Region	Have in database
Landuse and history	Landuse	Namibia	kavango tribal areas	RAISON	Aproximate boundaries of the major tribal and language groups in the Kavango Region, based on an analysis of predominant languages in the 1991 population census in each enumeration area.	Have in database
Landuse and history	Landuse	Namibia	Kavango landuse areas	RAISON	Size in square kilometres and percentage of land for different uses in 'kavango landuse.shp'	Have in database
Landuse and history	Landuse	Namibia	kavango landuse	RAISON & various	Landuses in the Kavango Region. Boundaries come from a variety of sources. Those of conservation and urban areas and old large-scale farms (mainly in the Mangetti area) are most accurate, having been taken from gazetted descriptions and/or satellite image	Have in database
Landuse and history	Landuse	Namibia	kavango pressure on resources	Various	Overall pressure on natural resources as a result of the combined presence of people, livestock, the clearning of land and frequent burnt in the Kavango Region. Five variables were used: density of people, cattle, goats, land cleared for crops, and freque	Have in database

Livelihood	Craft	Namibia	Craft survey data description,kavango	RAISON	Summary analysis of the craft survey carried out in Kavango Region, 2001	Have in database
Livelihood	Craft	Namibia	Craft survey,kavango	RAISON	Survey on craft production and characteristics of craft producers done in Kavango Region, 2002. For more information see the file "Craft survey data description,kavango.doc".	Have in database
Livelihood	Employment	Namibia	Employment data from LuxDev surveys,kavango	Lux Development	Number of people employed by different sectors by gender and by urban-rural in Kavango in 1999. From Lux Development household	Have in database
Livelihood	Income	Botswana	Income sources from CBPP survey,Ngamiland	Ministry of Agriculture, Botswana	Most important sources of income in 1997. From Fidzani, B., Mlenga, W.S., Atlhopheng, M. & Shatera, M.M. 1999. Socio-economic effects of CBPP in Ngamiland. Ministry of Agriculture, Gaborone.	Have in database
Social services	Airstrip	Botswana	ngamiland airstrip	HOORC	Airstrips in Ngamiland district, Botswana	Have in database
Social services	*Education*	*Angola*	*Angola education*		*Angola*	*Do not have*
Social services	*Education*	*Botswana*	*Botswana education*		*Botswana*	*Do not have*
Social services	Education	Namibia	Adult levels of education in Kavango	CSO	Percentages of people aged 15 and older that have completed various levels of eduction	Have in database
Social services	Education	Namibia	buffer of 5km from schools	RAISON & MBESC	5 km buffer around schools open in 2002 to assess catchment areas and estimate the proportion of children that have ready access to	Have in database
Social services	Education	Namibia	Enrolments per year and grade, kavango	RAISON & MBESC	Enrolments in Grades 1 to 12 per year from 1992 to 2001	Have in database
Social services	Education	Namibia	Kids per zone and grade, kavango	RAISON & MBESC	Enrolments in Grades 1 to 12 per year from 1992 to 2001 in four geographical and socio-ecological zones of the Kavango region, as described in El Obeid, S & Mendelsohn, J.M. A preliminary profile of the Kavango Region in Namibia. Namibia Nature Foundation	Have in database
Social services	Education	Namibia	schools in 2002	RAISON & MBESC	Distribution of schools in the region in 2002	Have in database
Social services	*Health*	*Angola*	*HIV/AIDS*		*Angola*	*Do not have*
Social services	*Health*	*Angola*	*Malaria Rates*		*Angola*	*Do not have*
Social services	*Health*	*Botswana*	*HIV/AIDS*		*Botswana*	*Do not have*
Social services	*Health*	*Botswana*	*Malaria Rates*		*Botswana*	*Do not have*
Social services	*Health*	*Namibia*	*HIV/AIDS*	*Human Development Report*	*Namibia*	*Do not have*
Social services	*Health*	*Namibia*	*Malaria Rates*	*Human Development Report*	*Namibia*	*Do not have*
Social services	Health	Namibia	bilharzia-sites	RAISON & MOHSS	Percentage of infected pupils with intestinal and urinary bilharzia at 14 schools in Kavango. From Schutte, C.H.J. 2001. Final report on the results of the base-line survey to determine the extent of Schistosomiasis and soil-transmitted helminth problems	Have in database
Social services	Health	Namibia	buffer of 10km from health facilities	RAISON & MOHSS	10 km buffer around health facilities in Kavango to assess catchment areas and estimate the proportion of people that have ready access to health services	Have in database
Social services	Health	Namibia	finalariper1000	RAISON & MOHSS	The average incidence of Acute Respiratory Infections each year 1995-1999 in Kavango, as the number of new cases treated as outpatients per 1000 people (see El Obeid, S., Mendelsohn, J.M., Lejars, M., Forster, N. & G. Brulé. 2001. Health in Namibia: progr	Have in database
Social services	Health	Namibia	final-bldiarrper1000	RAISON & MOHSS	The incidence of diarrhoea each year 1995-1999 in Kavango, as the number of new cases treated as outpatients per 1000 people (see El Obeid, S., Mendelsohn, J.M., Lejars, M., Forster, N. & G. Brulé. 2001. Health in Namibia: progress and challenges. RAISON,	Have in database
Social services	Health	Namibia	health facilities in Kavango	RAISON & MOHSS	Distribution of health facilities in Kavango in 2001	Have in database
Social services	Health	Namibia	malaria-namibia	RAISON & MOHSS	The incidence of malaria each year 1995-1999, in Kavango, as the average number of new outpatient cases each year per 1,000 people. (see El Obeid, S., Mendelsohn, J.M., Lejars, M., Forster, N. & G. Brulé. 2001. Health in Namibia: progress and challenges.	Have in database
Social services	Health	Namibia	Rainfal and malaria, kavango	RAISON & MOHSS	Numbers of malaria outpatients treated compared to the average annual rainfall at Rundu, and other places in Namibia. Outpatient data over 5 years from 1995 to 1999 as analyzed by el Obeid, S., Mendelsohn, J.M., Lejars, M., Forster, N. & Brulé, G. Health	Have in database

Social services	Health	Namibia	teenage pregnancy	RAISON & MOHSS	The proportion of all mothers having antenatal care who were under the age of 15 or between 15 and 19 years in Kavango between 1995 and 1999. (see El Obeid, S., Mendelsohn, J.M., Lejars, M., Forster, N. & G. Brulé. 2001. Health in Namibia: progress and ch	Have in database
Social services	Police station	Namibia	kavango police stations	Atlas of Namibia	Police stations in Kavango Region, Namibia	Have in database
Social services	Post office	Namibia	kavango post offices	Atlas of Namibia	Post offices in Kavango Region, Namibia 2002	Have in database
Social services	Powerline	Namibia	kavango powerline	DSM	Electricity distribution in the Kavango region, Namibia	Have in database
Social services	Roads	Botswana	ngamiland roads	HOORC	Roads of Ngamiland district, Botswana	Have in database
Social services	Roads	Okavango Basin	orientation roads	RAISON and various	Roads in the Okavango Basin and surrounding parts of Angola, Botswana and Namibia, compiled from the sources listed in each country and from field work and satellite images in Angola. Namibian data from DSM.	Have in database
Socio-Economic	*Education*	*Namibia*	*Namibia education levels*	*Human Development Report*	*Namibia*	*Do not have*
Socio-Economic	*Water Use Rates*	*Angola*	*Angola agricultural water use*	*Ministry of Agriculture*	*Angola Agriculture*	*Do not have*
Socio-Economic	*Water Use Rates*	*Angola*	*Angola mining water use*	*Ministry of Industries*	*Angola Mining*	*Do not have*
Socio-Economic	*Water Use Rates*	*Angola*	*Angola agricultural water use*	*Nat'l Directorate of Water*	*Angola Agriculture*	*Do not have*
Socio-Economic	*Water Use Rates*	*Angola*	*Angola domestic water use*	*Nat'l Directorate of Water*	*Angola Domestic*	*Do not have*
Socio-Economic	*Water Use Rates*	*Angola*	*Angola mining water use*	*Nat'l Directorate of Water*	*Angola Mining*	*Do not have*
Socio-Economic	*Water Use Rates*	*Angola*	*Angola tourism water use*	*Nat'l Directorate of Water*	*Angola Tourism*	*Do not have*
Socio-Economic	*Water Use Rates*	*Botswana*	*Botswana agricultural water use*	*DWA*	*Botswana Agriculture*	*Do not have*
Socio-Economic	*Water Use Rates*	*Botswana*	*Botswana domestic water use*	*DWA*	*Botswana Domestic*	*Do not have*
Socio-Economic	*Water Use Rates*	*Botswana*	*Botswana mining water use*	*DWA*	*Botswana Mining*	*Do not have*
Socio-Economic	*Water Use Rates*	*Botswana*	*Botswana tourism water use*	*DWA*	*Botswana Tourism*	*Do not have*
Soils	*Characterization*	*Angola*	*Angola Erodability*		*Angola Erodability*	*Do not have*
Soils	*Characterization*	*Angola*	*Angola Percolation Rate*		*Angola Percolation Rate*	*Do not have*
Soils	*Characterization*	*Angola*	*Angola Soils Water Holding*		*Angola Water Holding*	*Do not have*
Soils	*Characterization*	*Botswana*	*Botswana Water Holding*	*J. Mendelsohn*	*Botswana Water Holding*	*Do not have*
Soils	*Characterization*	*Botswana*	*Botswana Erodability*		*Botswana Erodability*	*Do not have*
Soils	*Characterization*	*Botswana*	*Botswana Percolation Rate*		*Botswana Percolation Rate*	*Do not have*
Soils	*Characterization*	*Namibia*	*Namibia Erodability*		*Namibia Erodability*	*Do not have*
Soils	*Characterization*	*Namibia*	*Namibia Percolation Rate*		*Namibia Percolation Rate*	*Do not have*
Soils	*Characterization*	*Namibia*	*Namibia Soils Water Holding*		*Namibia Water Holding*	*Do not have*
Soils	*Classification*	*Angola*	*Angola soils maps*	*Castanheira Diniz*	*Angola Maps (GIS)*	*Do not have*
Soils	*Classification*	*Botswana*	*Botswana soils*	*HOORC*	*Botswana Maps (GIS)*	*Do not have*
Soils	*Classification*	*Namibia*	*Namibia soils m aps*	*Dept. of Ag.*	*Namibia Maps (GIS)*	*Do not have*
Soils	*Classification*	*Namibia*	*Namibia soil maps*	*Marina Coetzee*	*Namibia Maps (GIS)*	*Do not have*
Soils	Soils	Angola	south-east angola soils	RAISON	Soils around the Okavango basin in Angola. Digitized off map in Castanheira Diniz, A. & De Barros Aguiar, F.Q. 1973. Recursos em terras com Aptidão para o regadio na Bacia do Cubango. Instituto de Investigação Agronomica de Angola. No 33.	Have in database
Soils	Soils	Botswana	botswana soils	HOORC	Soils of Botswana	Have in database
Soils	Soils	Botswana	ngamiland soils	HOORC	Soils of Ngamiland district, Botswana	Have in database
Soils	Soils	Namibia	kavango soils	RAISON & Interconsult	Soils of the Kavango region, Namibia. Based on InterConsult. 2001. Natural resource mapping of the Kavango. Report for the Directorate of Environmental Affairs, Windhoek and additional units mapped by RAISON from the map of vegetation types.	Have in database
Soils	Soils	Okavango Basin	okavango basin soils	RAISON and various	Soils of the Okavango basin focal area, synthesized from other sets of soils data for Angola, Kavango and Botswana, with some additional interpretation from LandSat images and vegetation types.	Have in database
Soils	Suitability for	Angola	Angola soil suitability		Angola	Do not have
Soils	*Suitability for Irrigation*	*Botswana*	*Botswana soil suitability*		*Botswana*	*Do not have*
Soils	*Suitability for Irrigation*	*Namibia*	*Namibia soil suitability*		*Namibia*	*Do not have*
Topography	*Contour Maps*	*Angola*	*Angola topography*	*Inst. of Geodezia & Cart.*	*Angola 1:105 scale*	*Do not have*

Topography	*Contour Maps*	*Angola*	*Angola topography*	*Inst. of Geodezia & Cart.*	*Angola 1:104 scale*	*Do not have*
Topography	Contour Maps	Botswana	Botswana contour maps	Dept. of Survey & Mapping	Botswana 1:104 scale	Have, not in database
Topography	*Contour Maps*	*Botswana*	*Botswana topo maps*	*HOORC*	*Botswana 1:104 scale*	*Do not have*
Topography	*Contour Maps*	*Namibia*	*Namibia topography*		*Namibia 1:104 scale*	*Do not have*
Topography	*DEM*	*Angola*	*DEM of Angola*	*ALCOM*	*Angola 1:105 scale*	*Do not have*
Topography	*DEM*	*Angola*	*Angola topography*		*Angola 1:104 scale*	*Do not have*
Topography	*DEM*	*Botswana*	*DEM of Botswana*	*ALCOM*	*Botswana 1:105 scale*	*Do not have*
Topography	*DEM*	*Botswana*	*Botswana topography*		*Botswana 1:104 scale*	*Do not have*
Topography	*DEM*	*Namibia*	*DEM of Namibia*	*ALCOM*	*Namibia 1:105 scale*	*Do not have*
Topography	*DEM*	*Namibia*	*Namibia topography*		*Namibia 1:104 scale*	*Do not have*
Tourism	Hotel and lodge	Botswana	Accomodation facilities, Ngamiland	HOORC	Hotel, lodges and safari camps in and around the Okavango Delta; data provided by Joseph Mbaiwa, HOORC	Have in database
Tourism	Hotel and lodge	Namibia	Accomodation facilities, Kavango	RAISON	Hotel, lodges and safari camps in the Kavango Region.	Have in database
Tourism	Hotel and lodge	Okavango Basin	hotel, lodges, safari camps	RAISON and various	Positions (some accurate, others approximate, of hotel, lodges and safari camps in the Okavango basin.	Have in database
Tourism	Hunting	Namibia	hunting concessions	RAISON & MET	Hunting concessions in the Kavango region, Namibia. Based on boundary descriptions provided by Bey Beytel, MET	Have in database
Tourism	Parks	Okavango Basin	game park and reserve	RAISON & various	Game parks and reserves in and around the Okavango Basin. From Atlas of Namibia data, Digital Atlas of Africa produced by United States Geological Survey and HOORC.	Have in database
Tourism	Tourists	Botswana	Visitors to Moremi	HOORC	Number of visitors to Moremi park in Botswana. From 15. Mbaiwa. J.E. 2002. The socio-economic and environmental impact of tourism development in the Okavango Delta, Botswana. Harry Oppenheimer Okavango Research Centre, Maun.	Have in database
Tourism	Tourists	Namibia	Visitors to Mahango+khaudum	MET	The average monthly number of visitor' cars recorded at Khaudum and Mahango parks over the past 4 years	Have in database
Tourism	Tourists	Namibia	Visitors to Popa falls	MET	The average monthly number of visitors recorded to Popa Game Park 1998-2002, obtained from registers kept at Popa Falls	Have in database
Towns	Place names	Namibia	kavango placenames	RAISON & Lux-development	Selected towns, villages and small places in Kavango Region. Co-ordinates of mixed accuracy having been obtained from a variety of	Have in database
Towns	Place names	Okavango Basin	basin main places	RAISON	Major towns, villages and small places in Angola, Botswana, Zambia and Namibia. Co-ordinates of mixed accuracy having been obtained from a variety of sources	Have in database
Towns	Place names	Okavango Basin	basin placenames	RAISON	Selected towns, villages and small places in Angola, Botswana and Namibia. Co-ordinates of mixed accuracy having been obtained from a variety of sources	Have in database
Vegetation	*Deforestation*	*Angola*	*Angola deforestation*		*Angola Maps (GIS)*	*Do not have*
Vegetation	*Deforestation*	*Botswana*	*Botswana deforestation*		*Botswana Maps (GIS)*	*Do not have*
Vegetation	*Deforestation*	*Namibia*	*Namibia deforestation*	*Ministry Fish & Marine Res.*	*Namibia Maps (GIS)*	*Do not have*
Vegetation	Fires	Namibia	fire-years burnt, kavango	NRSC and Alex Verlinden	Number of times different places burnt during the past 13 years	Have in database
Vegetation	Fires	Namibia	kav-areas burnt each year and plant production	NRSC and Alex Verlinden	Percentage of Kavango's total area that burnt each year between 1989 and 2002	Have in database
Vegetation	Fires	Namibia	fires 1997, 2000, 2001, kavango	Simon Trigg and Johan le Roux	Burnt areas in 1997, 2000 and 2001. Maps are based on interpretation of NOAA satellite images which then allowed burned areas to be mapped	Have in database
Vegetation	Vegetation biomass	Namibia	Vegbiomass 1985-2002, kavango	MAWRD, Namibia	17 files of the maximum plant growth and production during summer or growing season interepreted from NOAA images. Processing by Marina Coetzee and Louis du Pisani, MAWRD. NOAA NDVI data from Institute of Soil, Climate and Water, Agricultural Research Cou	Have in database
Vegetation	Vegetation biomass	Okavango Basin	average vegbiomass, okavango basin	RAISON	Average plant growth over 17 seasons (Vgebiomass 1985-2003,okavango basin.shapes (zip)) between 1985/86 and 2002/2003 interepreted from NOAA images. Analyses done by Louis du Pisani (MAWRD) for RAISON; original NOAA NDVI data purchased from Institute of S	Have in database

Vegetation	Vegetation biomass	Okavango Basin	Vegbiomass 1985-2003, okavango basin	RAISON	17 files of the maximum plant growth and production during summer or growing seasons 1985/86 to 2002/2003.Analyses done by Louis du Pisani (MAWRD) for RAISON; original NOAA NDVI data purchased from Institute of Soil, Climate and Water, Agricultural Resear	Have in database
Vegetation	Vegetation types	Angola	vegetation types, kuando kubango	Dos Santos, R. M	Original map digitized from Dos Santos, R. M. 1982. Itinerários floristicos e carta de vegetação do Cuando Cubango. Estudos, ensaios e documentos 137. Instituto de Investigação Cientifica Tropical, Junta de Investigações Cientificas do Ultramar, Lisbon. C	Have in database
Vegetation	Vegetation types	Botswana	vegetationmap around detla	HOORC	Image of vegetation types around the Okavango Delta, Botswana	Have in database
Vegetation	Vegetation types	Namibia	vegetation types, caprivi	MET	Vegetation types of the Caprivi region, Namibia compiled from Mendelsohn JM & Roberts, CS. 1996. An Environmental Profile and Atlas of Caprivi. Directorate of Environmental Affairs, Windhoek, Namibia,	Have in database
Vegetation	Vegetation types	Namibia	vegetation types, kavango	MET	Vegetation types of the Kavango region, Namibia, from the report InterConsult. 2001. Natural resource mapping of the Kavango. Report for the Directorate of Environmental	Have in database
Vegetation	Vegetation types	Okavango Basin	vegetation types, okavango basin	RAISON	Vegetation types of the focal area of the Okavango Basin. Based on: Dos Santos, R. M. 1982. Itinerários floristicos e carta de vegetação do Cuando Cubango. Estudos, ensaios e documentos 137. Instituto de Investigação Cientifica Tropical, Junta de Investig	Have in database
Vegetation	Vegetation/Crop Type	Angola	Angola vegetation maps	Carlos Andrade?	Angola Maps (GIS)	Do not have
Vegetation	*Vegetation/Crop Type*	*Angola*	*Angola vegetation*	*HOORC*	*Angola Images*	*Do not have*
Vegetation	*Vegetation/Crop Type*	*Botswana*	*Botswana vegetation*	*HOORC*	*Botswana Images*	*Do not have*
Vegetation	*Vegetation/Crop Type*	*Namibia*	*Namibia vegetation*	*HOORC*	*Namibia Images*	*Do not have*
Water Management	*Current Infrastructure*	*Angola, Botswana, Namibia*	*Septic fields*	*Geobusiness Solutions*	*Septic Fields*	*Do not have*
Water Management	*Current Infrastructure*	*Angola, Botswana, Namibia*	*Wastewater*	*Geobusiness Solutions*	*Wastewater*	*Do not have*
Water Management	*Current Infrastructure*	*Angola, Botswana, Namibia*	*Return Flows*	*Geobusiness Solutions*	*Return Flows*	*Do not have*
Water Management	*Current Infrastructure*	*Angola, Botswana, Namibia*	*Diversions*	*Lux Developers*	*Diversions*	*Do not have*
Water Management	*Current Infrastructure*	*Angola, Botswana, Namibia*	*Septic Fields*	*Lux Developers*	*Septic Fields*	*Do not have*
Water Management	*Current Infrastructure*	*Angola, Botswana, Namibia*	*Wastewater*	*Lux Developers*	*Wastewater*	*Do not have*
Water Management	*Current Infrastructure*	*Angola, Botswana, Namibia*	*Return Flows*	*Lux Developers*	*Return Flows*	*Do not have*
Water Management	*Current Infrastructure*	*Off-Stream Storage*	*Off-Stream Storage*	*Geobusiness Solutions*	*Off-Stream Storage*	*Do not have*
Water Management	*Current Infrastructure*	*Off-Stream Storage*	*Off-Stream Storage*	*Lux Developers*	*Off-Stream Storage*	*Do not have*
Water Management	*Current Infrastructure*	*Okavango Basin*	*Diversions*	*Geobusiness Solutions*	*Diversions*	*Do not have*
Water Management	*Pressure on Resources*	*Angola*	*Angola pressure on resources*		*Angola Maps (GIS)*	*Do not have*
Water Management	*Pressure on Resources*	*Botswana*	*Botswana pressure on resources*		*Botswana Maps (GIS)*	*Do not have*
Water Management	*Urban Areas*	*Namibia*	*Namibia urban water use*	*J. Mendelsohn*	*Namibia Maps (GIS)*	*Do not have*
Water Management	*Water Use Rates*	*Namibia*	*Namibia pressure on resources*		*Namibia Domestic*	*Do not have*
Water Management	*Water Use Rates*	*Namibia*	*Namibia mining water use*		*Namibia Mining*	*Do not have*
Water Management	*Water Use Rates*	*Namibia*	*Namibia tourism water use*		*Namibia Tourism*	*Do not have*
Wildlife	buffalo	Botswana & Namibia	buffalo	Various	The relative density and distribution of buffalo. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. Env	Have in database
Wildlife	crocodile	Botswana & Namibia	crocodile	Various	The relative density and distribution of crocodiles. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource	Have in database

Wildlife	elephant	Botswana & Namibia	elephant	Various	The relative density and distribution of elephants. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. E	Have in database
Wildlife	game biomass	Botswana & Namibia	game biomass	Various	Total game biomass. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. Environmental assessment of veter	Have in database
Wildlife	Game population	Botswana	Delta wildlife populations	Botswana Department of Wildlife and National Parks	Numbers of animals of different species in the Delta estimated from aerial surveys during the dry and wet seasons of 1992, 1994, 1996 (only dry season), 1999 and 2001.	Have in database
Wildlife	giraffe	Botswana & Namibia	giraffe	Various	The relative density and distribution of giraffes.. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. E	Have in database
Wildlife	hippo	Botswana & Namibia	hippo	Various	The relative density and distribution of hippopotamus.. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 200	Have in database
Wildlife	impala	Botswana & Namibia	impala	Various	The relative density and distribution of impala. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. Envi	Have in database
Wildlife	lechwe	Botswana & Namibia	lechwe	Various	The relative density and distribution of lechwe. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. Envi	Have in database
Wildlife	*Populations*	*Angola*	*Angola wildlife population*	*Shell & BP*	*Angola Animals*	*Do not have*
Wildlife	*Populations*	*Angola*	*Angola bird population*		*Angola Birds*	*Do not have*
Wildlife	*Populations*	*Angola*	*Angola fish population*		*Angola Fish*	*Do not have*
Wildlife	*Populations*	*Botswana*	*Botswana bird population*		*Botswana Birds*	*Do not have*
Wildlife	*Populations*	*Botswana*	*Botswana fish population*		*Botswana Fish*	*Do not have*
Wildlife	*Populations*	*Namibia*	*Namibia wildlife population*	*DSS*	*Namibia Animals*	*Do not have*
Wildlife	*Populations*	*Namibia*	*Namibia bird population*	*DSS*	*Namibia Birds*	*Do not have*
Wildlife	*Populations*	*Namibia*	*Namibia fish population*	*DSS*	*Namibia Fish*	*Do not have*
Wildlife	*Populations*	*Namibia*	*Namibia wildlife population*	*Ministry of Env. & Tourism*	*Namibia Animals*	*Do not have*
Wildlife	*Populations*	*Namibia*	*Namibia bird population*	*Ministry of Env. & Tourism*	*Namibia Birds*	*Do not have*
Wildlife	*Populations*	*Namibia*	*Namibia fish population*	*Ministry of Env. & Tourism*	*Namibia Fish*	*Do not have*
Wildlife	reedbuck	Botswana & Namibia	reedbuck	Various	The relative density and distribution of reedbuck. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. En	Have in database
Wildlife	sitatunga	Botswana & Namibia	sitatunga	Various	The relative density and distribution of sitatunga. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. E	Have in database
Wildlife	tsessebe	Botswana & Namibia	tsessebe	Various	The relative density and distribution of tsessebe. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource Consultants. 2000. En	Have in database

Wildlife	waterbuck	Botswana & Namibia	waterbuck	Various	The relative density and distribution of waterbuck. Based on Botswana Department of Wildlife and National Parks aerial surveys, as reported by BRIMP (BOTSWANA RANGE INVENTORY AND MONITORING PROJECT) data sets and Scott Wilson Resource	Have in database
Wildlife	wattled crane	Botswana & Namibia	wattled crane	Peter Hancock, Maun	The relative distribution of wattle cranes. From an aerial survey report	Have in database

Appendix R.

To: ***Sharing Water*** **Database Subcommittee**
From: **Rich Walkling**
Date: **September 16, 2003**
Re: **Shared Database (Information Management System)**

This memo attempts to capture our current thinking on the shared database (or information management system[1]) and how we should proceed with this task. This is in part a response to Cornelis Vanderpost's request to "have some form of common understanding before the up-coming workshop in Angola." Some of this may seem redundant with the conversation we had at Kruger but I include it for the sake of being comprehensive. We'd like your feedback on everything that is mentioned below but most importantly on how best to present this information at the workshop in order to emerge with a clear direction soon after the workshop is over.

Background
In our cooperative agreement with USAID, NHI is obligated to provide an information management system with the following characteristics:

- Shared via compact disc or World Wide Web
- User-friendly
- Capable of identifying knowledge gaps
- Updateable by its users
- Built by the participants
- Housed at OKACOM's PMU
- Easily conveys information about the basin to stakeholders and water resource managers with a range of technical backgrounds
- Map-based geographic information system component that will allow users to retrieve trend information spatially

According to the cooperative agreement the information management system will include:

- Hydrologic and ecological data
- Maps
- Photographs
- Bibliographic materials

Additionally, all participants will be capable of:

- Adding additional information
- Navigating through the various components of the shared data base
- Using the information management system to understand trends and gaps in the data
- Using the information management system as collaborative learning tool

Status of Available Options
At the Kruger meeting in May, Brian Joyce presented several information management system options and a constructive conversation followed. Since then, Brian has been actively reviewing IMS options in greater detail, researching IMS and data collection activities currently underway in the basin, and communicating with John Mendelsohn, Thomas Gumbricht, and others involved in these activities.

[1] The word *database* has too many meanings and can complicate this discussion. I elect to use the more descriptive *information management system* in its place.

Based on our conversation at the Kruger meeting and subsequent discussions, our project team is still faced with a range of options. At one extreme is the option to focus our efforts on collecting and gathering the data and compiling it in a *meta*database (as suggested by Chris Brown).

At the other extreme is an information management system like the Klamath Resource Information System (KRIS) that Brian presented. It provides a structure to catalog and retrieve data both by subject and by geography, and provides a limited capacity to analyze, modify, and display data (functions that would otherwise be provided by external programs such as Excel, Access, or HYDATA). The downside to KRIS is that it requires configuring and compiling the data into a KRIS compatible format, constructing the GIS foundation in ArcView, and computer skills that our participants may not possess.

We have not committed one way or the other because there are still several unknowns:

- Level of computer skills amongst our participants
- Needs of participants relating to a shared information system
- Whether or not a metadatabase will satisfy our contractual obligations as stated above. The information management system is a very high profile output of this project and its contribution to collaborative learning amongst the participants will likely be one of the key lessons to apply to other trans-boundary river basin management exercises.

The debate at NHI has been lively and thorough. As stated above, we very seriously consider Chris Brown's input in favor of a metadatabase, but we are still weighing it against our contractual obligations and the potential to create a more graphic-based collaborative learning tool for the participants. Complicating this debate is the amount of additional work required to create this latter option.

Concurrent Work

We are also still aware of the importance of coordinating with existing efforts in the region. We must coordinate not only the products *but also the various timelines*. To this end we have been in contact with many parties including Thomas Gumbricht, Cornelis Vanderpost and John Mendelsohn to assure that what we create with them does not excessively overlap, redouble efforts, or conflict with the products NNF, HOORC and others have been and continue to create. (This memo is of course, part of that coordination.)

Especially critical at this early phase will be the coordination of the database structure (the physical structure of folders and files according to the different spatial data categories) between HOORC's, NNF's and our efforts.

Presentation at the Angola Workshop

The presentation we give at the workshop in Angola is critical to making our final decision as a project team regarding the information management system. We have allotted between 2 and 4 hours for a facilitated discussion and possible information management system exercises (that will also take place outside of the formal meeting times).

We'd like to have at least two of our options available in some general format to present and explore with the participants at the workshop in Angola. NHI would provide an existing KRIS database (for a California watershed) and structure some data retrieval and manipulation exercises. Chris Brown has suggested coordinating with John Mendelsohn's data collection and cataloging activities in the basin. From his description of the proposed work it sounds like it may be possible to have at least a prototype of John's metadatabase around which to structure some exercises.

The focus of the exercises and discussion would be on whether or not these systems match the computer skills of their intended users and if they provide functions that are deemed necessary.

From the participants, we would like to know more about:

- Their computer skills (from both a pre-workshop self-assessment and through informal exercises with the available information management systems)
- Their experience to date with information management systems
- Key characteristics they would like to/need to have in a shared information management system

From our project partners we would like:

- Detailed feedback on the accessibility and functions of an actual KRIS database versus a metadatabase.

This presentation to the participants is very sensitive because we are not interested in which information management system is more attractive. That answer is obvious: the one with the nicely displayed color maps and photos. What we're interested in is:

1) How likely is this information management system to be used in the basin over the long term; and
2) How effective will it be in guiding future management decisions?

These are a function (amongst other things) of how easy the information management system is to use and how easy it is to maintain. How we present these options and how we frame the discussion is critical to the quality of feedback we receive and the expectations we set.

We welcome any input you have on these matters. As we are already designing presentations and exercises for the workshop, the sooner we receive your input, the better.

Thank you for your consideration on this matter.

Appendix S.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Data Gaps Analysis

September 2004

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Data Available for River Basin Planning Models in the Okavango/Kubango River Basin

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I. Introduction

This memo describes the data available and key gaps in data necessary for river basin planning models in the Okavango/Kubango system, and also the process by which *Sharing Water* evaluated a range of river basin planning models. Specifically, the memo describes:

- Data compilation process and results
- Evaluation of river basin planning models
- Key data gaps
- Recommendations for filling data gaps

Funded by the U.S. Agency for International Development (USAID), the *Sharing Water* project constructed, among other project tasks, two related technical products. The first was a database of data and information distributed (online and in CD format) and shared freely amongst planners, researchers, decision-makers, and other stakeholders in the Okavango/Kubango basin. The second technical product was a prototype river basin planning model of the Okavango/Kubango system to demonstrate the utility of such models and the insights they could provide to management decisions.

The *Sharing Water* project engaged in an extensive data compilation activity for the benefit of populating the prototype model and creating the shared Okavango/Kubango Database. The shared database activity compiled over 200 data sets describing boundaries, climate, demography, farming, geology, hydrology, land use and history, livelihood, social services, soils, tourism, towns, vegetation, and wildlife in the Okavango/Kubango river basin. *Sharing Water* employed a subset of these data sets to populate its prototype river basin planning model of the Okavango/Kubango system.

II. Data Matrix Exercise

The first activity of both the shared database and the prototype modeling activities was the creation of a data matrix to track both the available data and the desired (i.e. "missing") data in the basin. The intent of this exercise was to determine the type and suitability of data available for both modeling and other research and management activities in the basin.

In May 2003, the *Sharing Water* Database Committee convened and drafted a "wish list" of data and information desirable for modeling of the Okavango river basin. The intent of the wish list was to begin to create an inventory of data required to develop a model of the Okavango River Basin. The wish list included not only data and information, but also priority levels and potential sources for data where applicable (as well as the desired geographical scale). The original wish list articulated data needs in the following categories:

- Topography
  - Contour Maps
  - DEM
  - Sub-Watershed Map
- Climate
  - Temperature
  - Precipitation
  - Relative Humidity
  - Wind Speed
- Land Use/Cover
  - Land Use
  - Vegetation type
  - Crop Type
- Geology
  - Classification
  - Mineral Resources
- Soils
  - Classification
- Hydrology
  - Discharge
  - Flood Extent
  - Stage-Discharge
  - Q v Bedload
  - Water Quality
  - Aquifer
- Water Management
  - Irrigated Area
  - Urban Areas
  - Current Infrastructure
- Socio-Economic
  - Population
  - Water Use Rates
- Environmental
  - Flow Requirements

The committee continued to update the "wish list" with both additional data and sources until it was presented to the project delegates in October 2003 at the *Sharing Water* Workshop in Luanda, Angola.. The intent of the presentation was three-fold: 1) to solicit input from delegates on additional desired data sets that should be included in the database; 2) to locate additional sources of data unknown to the database subcommittee; and 3) to promote awareness among delegates awareness and share available basin-wide and country specific data.

Soon after, *Sharing Water* began constructing the shared database on the basis of contributions from a variety of government and non-governmental organizations, institutions and individuals. Sharing Water primarily drew on two profiles entitled "Okavango River: The flow of a lifeline" and "Sand and Water: A Profile of the Kavango Region" by Dr. John Mendelsohn and Ms. Selma el Obeid. *Sharing Water* revised the data matrix to reflect both the inclusion of this data and the additional data needs stated by the project delegates at the Luanda workshop.

In March 2004 at the Namibia Workshop, *Sharing Water* distributed this updated data matrix to project delegates and encouraged them to review the matrix, suggest any additional data sets, and volunteer any data sets they might have. *Sharing Water* sent an additional email soliciting data sets from project delegates on June 16, 2004.

The final version of the shared database includes 203 datasets provided by *Sharing Water* project delegates and project partners (described in the table below). The datasets consist of geographic datasets (e.g. population distribution) and statistical datasets (e.g. rainfall records). In addition, the database includes a bibliography of literature resources, of which over 200 are available as pdf digital files.

Table 1: Summary of Data Sets Available in the Okavango/Kubango Shared Database

Theme	Subtheme	Angola	Namibia	Botswana	Basinwide
Boundaries	National	■	■	■	■
Boundaries	Sub-national	■	■	■	■
Boundaries	Sub-basin	■	■	■	■
Climate	Evaporation	□	□	■	■
Climate	Rainfall	■	■	■	■
Climate	Temperature	□	■	■	□
Climate	Wind	□	■	■	□
Demography	Age pyramid	□	■	■	□
Demography	Health	□	■	■	□
Demography	Household size	■	■	■	■
Demography	Languages	□	□	□	■
Demography	People density	■	■	■	■
Demography	Population indicators	□	■	□	□
Demography	Population numbers	■	■	■	■
Farming	Crops	■	■	■	■
Farming	Livestock	□	■	■	■
Geology	-	□	■	■	■
Hydrology	Groundwater	□	■	■	□
Hydrology	Rivers	■	■	■	■
History	-	□	■	□	■
History	Landuse	□	■	■	□
Livelihood	Craft	□	■	□	□
Livelihood	Employment	□	■	□	□
Livelihood	Income	□	■	□	□
Social services	Airstrip	□	■	■	□
Social services	Education	□	■	■	□
Social services	Health	□	■	■	□
Social services	Roads	□	■	■	■
Social services	Settlements	■	■	■	■
Soils	-	■	■	■	■
Tourism	Hotel and lodge	□	■	■	□
Tourism	Hunting	□	■	■	□
Tourism	Tourists	□	■	■	□
Towns	Place names	■	■	■	■
Vegetation	Fires	□	■	□	□
Vegetation	Vegetation biomass	□	■	□	■
Vegetation	Vegetation types	■	■	■	■
Wildlife	-	□	■	■	□
□	= No data in shared database				
■	= Data in shared database				

Of note in the table above are the critical data gaps in Angola. Even for some data sets available in Angola the information within is either limited to a short and now out-dated time series (in the case of hydrology), or constrained by categorization that is inconsistent with data sets elsewhere in the basin (in the case of soils). Some data for Angola, such as demography, are based on coarse estimates.

Sharing Water also compared these datasets against the findings reported in the draft Transboundary Diagnostic Assessment (TDA) performed by the UN Global Environment Facility (completed in

1998) to ensure that no significant data sets were missed. The comparison found that the data sets available in most categories of the Okavango/Kubango Shared Database were either comparable or slightly more comprehensive than those reported in the draft TDA (see Appendix for draft TDA data gaps summary). This difference is either due to several years of data gathering that occurred between the draft TDA and the shared database or due to qualitative generalizations used to characterize the data available in the TDA. In either event, *Sharing Water* concluded that its data gathering exercise for the benefit of the shared database and modeling activities was comprehensive.

III. Evaluation of River Basin Planning Models

Whether or not the data available in the Okavango/Kubango Shared Database was sufficient for a river basin planning model depended, in part, on the selected modeling platform.

In March 2004, *Sharing Water* initiated a process of building a consensus around the selection of a river basin planning model and developing a prototype model to be presented at the Kasane meeting in August 2004. *Sharing Water* created and deployed a model evaluation tool based on the definition of desirable model attributes and the scores assigned to individual models with respect to these attributes. The project sought the opinion of experts from the basin states in applying the model evaluation tool.

In the short time between the two workshops in April and August 2004, no consensus emerged on the most suitable model platform, although some agreement was reached on priority attributes and a set of models responsive to these model characteristics. To proceed with the development of a prototype model for training purposes, *Sharing Water* project staff selected the Water Evaluation and Planning System (WEAP) because:

- Project staff had extensive experience with this platform and possessed all of the necessary licenses.
- The platform could be distributed free of charge to participants in developing countries.
- The model was one of several models that appeared to be responsive to priority attributes using the model evaluation tool.

It should be highlighted, however, that WEAP has not been selected or approved as an official modeling tool for the Okavango River Basin. Instead, its use in the development of a prototype model is intended solely to demonstrate the potential utility of water resource planning models in the system.

IV. Description of WEAP Model Platform

Developed by the Stockholm Environment Institute, WEAP emphasizes resource conservation, demand management, water use efficiency, and the social, cultural and political impacts of water resources development. The modeling system provides an analytical framework to explore a wide variety of river basin management alternatives, including the gamut of traditional structural approaches and a wide array of emerging strategies that rely more heavily on institutional flexibility.

Rather than concentrating on the physics of flow at specific points in space and time, WEAP applies basic accounting principles to the analysis of river basins. These familiar concepts, combined with the ability to graphically divide a basin into reaches of interest, make these models much more accessible to the decision-makers and stakeholders in a particular river basin.

Operating on the principle of water balance accounting, WEAP can investigate alternative sets of conditions on the supply side, the demand side, or both. The investigation can include a detailed cost accounting of proposed actions, as well as linkages between a variety of model parameters via

driver/elasticity relationships. By investigating the integrated behavior of the system, the impacts of present and proposed actions on different parts of the system are evaluated.

WEAP incorporates water management strategies in a common framework, simulates the interrelationships between these various strategies, and explores their environmental and economic impact. Some of the elements available in WEAP include:

- Reservoir operation;
- Project cost accounting;
- Complex demand projection;
- Environmental flow requirements;
- Interbasin transfers;
- Conjunctive use and groundwater banking;
- Complex water rights structures;
- Hydrologic year type control;
- Groundwater-surface water interaction;
- Water reuse and return flow;
- Wastewater treatment and recovery; and
- Conveyance capacity constraints and losses.

WEAP is a water resource planning model based on the principle of mass balance. As such it requires sufficient data to represent the magnitude, timing and variation of available water supplies and a reasonable representation of water demand in the system. This includes the overall level of demand along with estimations of return flows to the water supply system. Information is also needed on the relative priority of satisfying different demands in times of shortage. WEAP also allows the user to model infrastructure such as dams and diversion works and requires data to describe the physical and operational characteristics of these facilities. WEAP can also impose a regulatory regime on the allocation of water and requires data to describe these arrangements.

V. Description of the Prototype Planning Model of the Okavango/Kubango River Basin

The prototype WEAP application of the Okavango River Basin was developed based on information contained in the shared database along with information gathered from other sources in the Basin. Basic categories of data used in developing the prototype model included surface water supply data and estimates of water demand under current conditions and a number of future scenarios. Surface water supply data was derived for a 13 year period (1960-1972) based on simulated stream flows for the Upper Okavango River Basin calculated using the Pitman model developed by the WERRD project.[1] These estimates, which were developed for 24 sub-catchments in the Okavango River Basin, were then adjusted so that the average annual accumulated flow past the Mukwe gauge in Namibia was equal to the observed record during the same 13 year period and during the longer 50 year period of record at that gauge. These three distinct surface water supply time series were used to develop a series of hydrologic scenarios. These time series will be introduced into a future version of the Shared Okavango Database.

Demand estimates were developed based on population data contained in the *Sharing Water* database along with parameters published in various reports. Parameters describing infrastructure were taken

[1] Denis Hughes of Rhodes University, Grahamstown, and the WERRD project, developed a Pitman simulation of the 24 sub-catchments in the Upper Basin. Dr. Hughes used available streamflow data from the Colonial period to calibrate the parameters in this rainfall-runoff hydrology model. We have used his simulated results to describe the surface water supply in each of these sub-catchments. The model has been set up so that flows from upper sub-catchments accumulates downstream and is augmented by inflow in lower sub-catchments.

from various published reports while regulatory regimes were developed based on early discussions with experts in the region. None of this data should be considered final. It was used solely to develop a prototype model for demonstration of the role of water resource planning models.

Several scenarios were introduced to the prototype model along with a series of management strategies to respond to anticipated levels of water demand. These scenarios were as follows:

- No Action: Considers remain as they are today.
- Scenario 1: Repatriation to the Angolan portion of the Basin and growth of in-basin water demand in Namibia and Botswana.
- Scenario 2: Scenario 1, along with the development of irrigated agriculture in the Angolan portion of the basin.
- Scenario 3: Scenario 2, along with the development of the Rundu Diversion to provide water for Central Namibia.

Scenario 3 was simulated with two assumed management strategies in place. There were :

- Management Strategy 1: Construct surface water storage capacity in the Angolan portion of the basin.
- Management Strategy 2: Management Strategy 1, along with a transfer of water into the Upper Cuito to augment Delta inflows.

VI. Remaining Data Gaps

As the current planning model is only a prototype, there are many improvements that could be made, including the introduction of improved data. Priority data improvements, include:

- Actual streamflow measurements made at various points in the catchment over extended periods of time.
- Data on groundwater availability and use.
- Data on water demand and use in a number of water use sectors, including irrigation, domestic water use, and industrial water use.
- Refined environmental flow objectives based on consideration of actual biophysical needs.
- Detailed descriptions of actual and planned water infrastructure.
- More detailed data on basin topography.
- Data on actual population distribution/resettlement and related water demand in Angola.

For a hydraulic model that will be used to describe the actual conditions in the river channels and floodplains, additional information is needed. This includes:

- Information on channel/floodplain geometry and topography.
- Measurements of flow velocity and stage.
- Information on the material that comprises the channel bed.
- Information on sediment transportation.
- Measurements of water quality constituents.

To improve the performance of the rainfall-runoff hydrology model, additional information is required, including:

- Reliable climate records of precipitation and temperature, along with humidity, evapotranspiration and wind speed data if available.
- Refined land use/land cover data.
- Improved data on topography/ improved digital elevation model.

Additionally, almost all existing data sets warrant further improvement in terms of the quality, the accuracy and the spatial coverage of the data.

VII. Recommendations for Filling Data Gaps

Sharing Water recommends four general actions related to filling data gaps. First, *Sharing Water* supports GEF's efforts to expand and finalize the draft TDA. Neither the draft TDA nor *Sharing Water's* database matrix was intended as complete, authoritative data gaps analysis. *Sharing Water* agrees with comments made at the Kasane Workshop by project delegates that the GEF Project Management Unit complete a full data gaps analysis that expands on both GEF's earlier work and *Sharing Water's* contribution. We encourage the PMU to prioritize this effort and complete it early in the project life cycle.

Second, *Sharing Water* supports GEF's efforts to collect additional data. In its project brief, GEF states:

> The compilation of existing data and new data sets that are needed will be fast-tracked to identify the minimum data sets to initiate the preparation of basin management models and subsequent negotiation and joint management. This compilation of water resource data will be done on the basis of priority and need concentrating on the glaring data gaps in Angola. Thereafter data will be selectively compiled on the basis of the most sensitive uses scenarios so that a realistic range of likely water management scenarios can be modelled and options prepared at later stage of project implementation.

We offer both the shared database and the list of priority data improvements (above) as starting points for GEF's efforts and support their recommendation to focus on filling critical data gaps in Angola.

Third, as the PMU is ultimately a project with a limited life span, *Sharing Water* strongly encourages the expansion of data collection efforts within existing government, research, and academic institutions in all three basin states. This expansion will require the dedication of additional funding, capacity building in data collection methods, data management, and data dissemination. Very promising contacts have been established in the context of the Sharing Water project with institutions in Namibia and Botswana, notably with the respective departments of Water Affairs and with the Namibia Nature Foundation (NNF) in Namibia and the Harry Oppenheimer Okavango Research Centre (HOORC) of the University of Botswana in Botswana. NNF and HOORC have committed themselves to participate in future Okavango database updating activities. More work is still required to establish similar contacts in Angola. HOORC has committed to serve as a central repository for data in the Okavango. It will endeavor to foster relations with data "nodes"; organizations in each basin country that will gather that country's data and transfer it to HOORC for public distribution and dissemination.

Finally, the *Sharing Water* project encourages all parties to adopt policies of open and free data sharing. *Sharing Water* has aggressively pursued a policy of sharing data freely amongst all interested parties for the benefit of joint fact-finding and improved decision-making. We anticipate that other parties in the basin will continue this policy into the future.

VIII. Appendix

The table below represents a summary of the data gaps identified in the draft Transboundary Diagnostic Assessment (TDA). These categorizations are based on qualitative descriptions available in the draft TDA and are subject to interpretation. The groupings are consistent with those in the TDA and not necessarily consistent with those in the data matrix exercise.

Table A.1: Summary of Data Gaps Identified by the Draft Transboundary Diagnostic Assessment

	Angola	Namibia	Botswana
General Catchment			
Climate	☐	◘	◘
Soils	☐	◘	■
Topography	◘	■	■
Hydrology, Hydraulics, and Geohydrology			
Hydrology	☐	◘	◘
River morphology	◘	◘	◘
Hydraulics	☐	☐	☐
Sediment Load/Sedimentation	☐	☐	◘
Groundwater	☐	■	◘
Water Quality			
Water Quality	☐	◘	◘
Water-borne Diseases	☐	◘	◘
Ecosystem			
Primary Production	☐	◘	◘
Secondary Production	☐	◘	◘
Mammals	☐	◘	◘
Fish	☐	◘	◘
Birds	☐	◘	◘
Reptiles	☐	◘	◘
Amphibians	☐	☐	☐
Invertebrates	☐	☐	☐
Hydrobiology	☐	☐	☐
SocioEconomics			
Demographics	◘	■	■
Economic Activities	☐	■	◘
Social and Economic Stratification	☐	☐	☐
Natural Resource Use	☐	☐	☐
Water Use	◘	■	■
Tourism	☐	◘	◘
Land Use	◘	◘	◘

☐ = No data/Out-dated data

◘ = Limited data

■ = More complete data

Appendix T.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Proposed Modeling Approach

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Introduction

This memo is intended to outline a potential modeling approach for the Sharing Water project. Defining an approach is an essential step in screening and ultimately selecting the modeling platform that will be adopted by the project, which is one of the Phase I project outputs. In order to provide context for our efforts to articulate an appropriate project modeling approach, this memo seeks to:

- Propose a standard set of terms that can be used to by the project participants to discuss modeling;
- Propose a niche for modeling conducted by the Sharing Water project within the wide spectrum of potential modeling activity in the basin; and
- Describe a potential strategy for selecting an appropriate modeling platform for the project.

The information included in this document is meant to stimulate dialogue among the project partners on these issues and is not the intended to represent the final conclusion on these points.

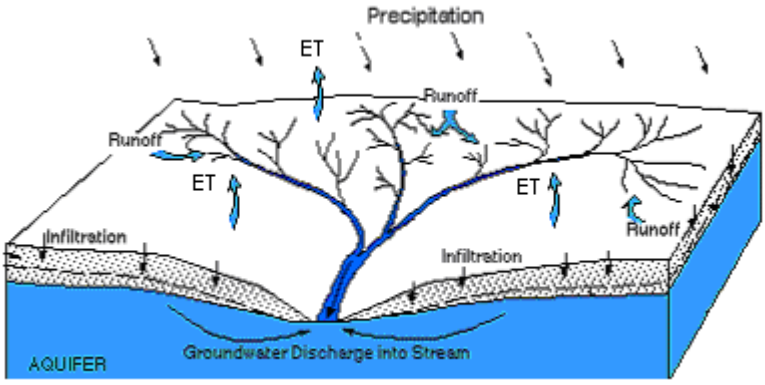
Defining Terms

In order to effectively implement the model selection task of the Sharing Water project, it is necessary to define a set of terms that can be used by project partners to discuss modeling. This section attempts to define such a common lexicon. In keeping with the current unaltered state of the Okavango/Kubango Basin, it begins with modeling terms related to the inherent physical processes at work in a watershed.

Hydrologic/Watershed Modeling

A hydrology model is a tool used to understand the relationship between climatic conditions in a watershed and the resulting streamflow in its rivers. The processes under consideration are depicted in Figure 1. At the most basic level, precipitation falls on the landscape and either infiltrates or runs off, depending on the moisture status of the watershed. Water that infiltrates is either transpired by plants or percolates below the root zone of plants in the basin. Percolating water can recharge an aquifer that interacts with rivers. Depending on whether the river stage or the water table is higher, this interaction can involve either seepage from the aquifer to a river (a gaining stream) or from the river to the adjacent aquifer (a losing stream). Water that runs off can either evaporate or find its way rivers. The resulting streamflow is the runoff that reaches a river plus or minus seepage gains or losses associated with stream-aquifer interactions.

Figure 1: Watershed Hydrology



It is the balance between these physical processes that controls the amount of water that ends up flowing in a river channel at a particular place and time. Several classes of models have been developed to describe this balance between hydrologic processes (see adjacent text box). Empirical models use statistical tools to develop relationships between measured precipitation and streamflow. Lumped parameter models approximate the relationship between rainfall and runoff by defining a series of parameters that approximate the various processes at work in a watershed. Physically based models solve the physical equations governing these processes.

Characteristics of Modeling Classes

These three general classes of models, empirical, lumped-parameter and physically based, have some basic properties regardless of whether they are being applied to watershed modeling or some other aspect of water resources or aquatic ecosystem analysis.

1. Empirical models require a long data records.
2. Empirical models conditions "as they were" during the period of record and are less suited to exploring how things would be different if conditions change.
3. Lumped parameter models require the definition of parameters that have ambiguous physical meaning and which cannot be measured.
4. Physically based models generally use numerical methods that can result in unstable models. Thought model parameters can, in theory, be measured; spatial variability complicates the development of this type of model.

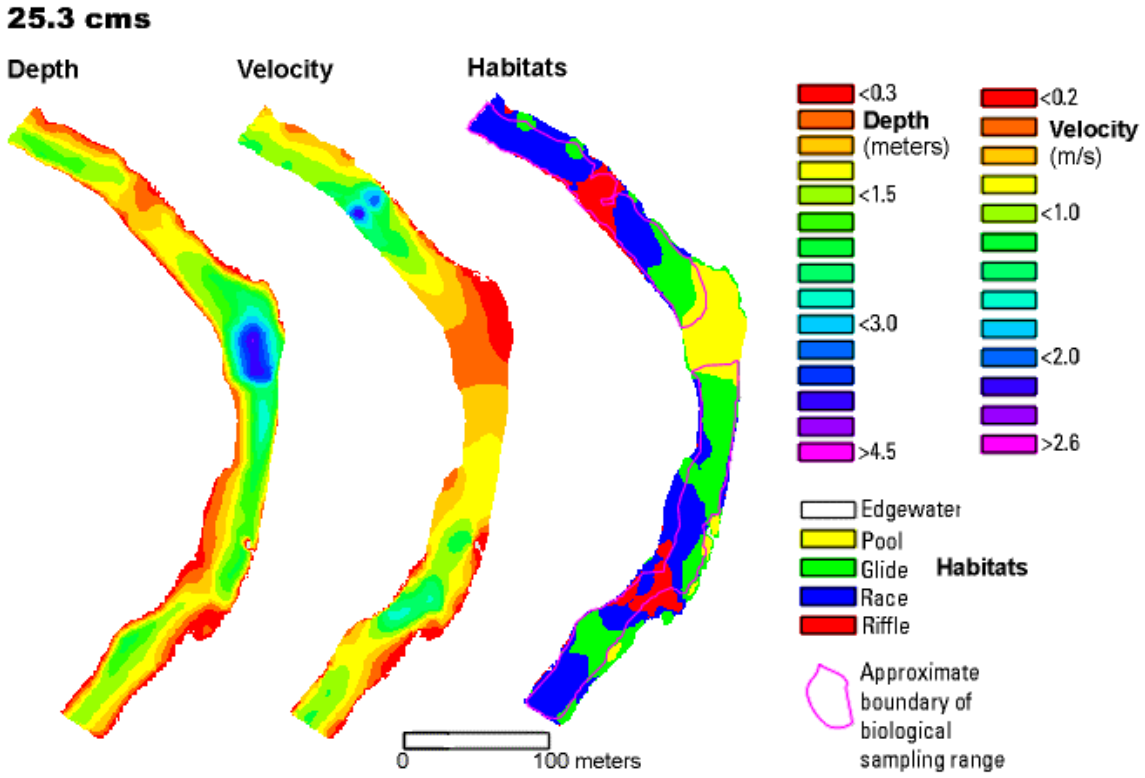
Stream Hydraulic/River Dynamics Modeling

Once water enters a river or stream another type of model is used to describe its movement within a channel. Depending on their characteristics hydraulic or river dynamics models can describe how much time it takes water in a channel to flow from one point to another, how fast the water is moving a various points in the channel, the depth of flow, and in cases where a river overtops its banks the extent and depth of inundation. The most rigorous physically based hydraulic models, which can account for all of these features, solve the equations that govern the flow of water. As in the case of watershed modeling, empirical models can be developed and provide some utility. This class of models has been used to develop relationships between the stream discharge and river stage and flood extent. Lumped-parameter approaches, such as the Muskingum method, have been used to describe the travel time of water flowing in a channel.

Figure 2 contains an example of the output that might be obtained from the application of a physically based hydraulic model. The availability of river dynamics models is important in understanding the relationship between conditions in a river and the status of ecosystems such as fish habitat, riparian vegetation communities, and wetlands via a number of biohydrologic processes related to water temperature, water quality, sediment movement, and plant recruitment and establishment. Understanding these relationships is the basis for establishing flow regimes, which

often include the definition of minimum instream flow requirements, which protect or restore important ecosystems.

Figure 2: River Hydraulics



Given the complexity of these biophysical processes it is difficult to establish firm rules about the flow regime that is required to protect or restore a target ecosystem. Much recent research has focused on developing tool to help determine these rules, including research on the Building Block Methodology in South Africa and the IFRM Method in the United States. Nonetheless, adaptive management strategies are often needed to fine tune these rules based on insights gained through actual monitoring of the system over time.

Water Resources Systems/Planning Models

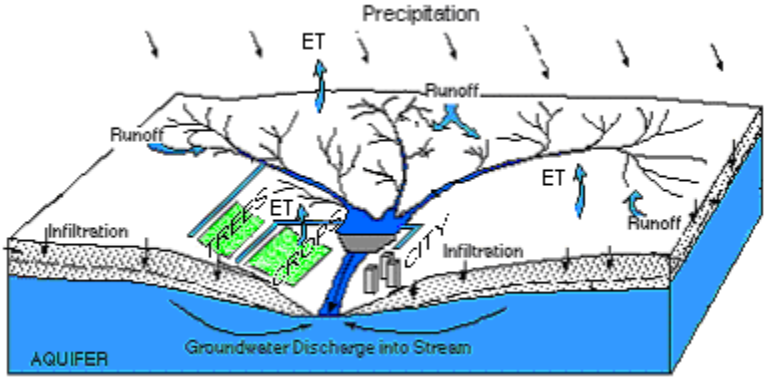
Obviously the need to establish rules governing an appropriate flow regime assumes that human intervention that perturbs the natural hydrology has either occurred or is being contemplated. Typically these interventions come in the form of hydraulic infrastructure constructed and operated to satisfy water demand, reduce the risk of flooding, and produce hydropower by storing and diverting the water flowing in a river. The implications of these physical and operational interventions are typically evaluated using water resources planning models.

The application of water resources planning models typically relies upon the development of scenarios that describe a range of future conditions in a watershed. Scenarios can be described as narratives descriptions of the future and include notions such as the population will grow, increasing wealth will lead to higher per capita consumption, development pressures will lead to the urbanization of formally agricultural lands, national development policies will prompt investment in the expansion of irrigated agriculture, a growing environmental ethos will place a higher priority on

the preservation of important ecosystems. Planning models typically translate these scenarios into mathematical expressions describing demand in the system, the constraints imposed on the satisfaction of this demand, and a series of management alternatives that respond to the general objectives implicit in the scenario. Planning models are run in either simulation or optimization modes. Under simulation, rules govern the allocations of water between competing demands, while under optimization water is allocated to uses with the highest economic value.

The tradeoffs implicit in any water allocation analysis are depicted in Figure 3. Here the irrigation of crops adjacent to the river may have been the first use of water in the basin. Later a city may have developed that relied upon the same water supply. Then the irrigation of trees with water from an upstream tributary may have been established. Finally a set of instream flow requirements for the river reach below a dam may have been defined. Under a rule-based simulation, in times of shortage the trees, as the latest use of water, might be cut off from surface water supplies first. If shortages persisted, some water sharing arrangement between the city and the crop irrigators might be implemented. Under optimization, in time of shortage water would be allocated to the most valuable use, presumably for commercial and industrial use in the city. In addition, an optimization routine would likely favor providing water for the irrigation of trees as opposed to crops. Rather than relying upon rules, optimizing planning models really upon the development of cost curves to solve the allocation problem. In both cases, the instream flow requirement is typically defined as a constraint on allocations.

Figure 3: Water Allocation in a Watershed



Typically water resources planning models treat the water flowing from the undeveloped upper part of the watershed as a boundary condition. That is some time-series of measured headflow is input to the model in order to investigate how the installed hydraulic infrastructure should be operated and the available water allocated. This implies that some network of stream gauging stations or a functional hydrology model of the upper watershed is available.

This long narrative definition of modeling concepts has been crafted so that the project partners can discuss an appropriate modeling approach for the Sharing Water Project using a common set of terms. This is important because the concept of water resources modeling can mean different things to different people. While project partners may prefer alternative definitions or uses of terms, those develop here are used to describe a potential niche for modeling activity undertaken by Sharing Water.

A Proposed Modeling Niche

As can be expected in a river basin that has remained largely untouched by hydraulic manipulation, only a limited set of analytical tools has been developed. Outside of the Okavango Delta, which has

been, or will be, modeled using the full spectrum of dynamics models (physically-based[1], lump-parameter[2], and empirical[3]), most modeling initiatives are in a planning or early development stage. This raises a pressing question: given that development pressures are mounting in the basin, what are the most useful analytical tools that the Sharing Water project could reasonable develop in the near future?

One response would be to undertake an effort to define the tolerance thresholds of important ecosystems in the basin to future deviations from the natural flow regime. In terms of the Delta, tools to understand the relationship between the flow regime and the status of the ecosystem are available. In the upper basin, however, a suite of river dynamics and biophysical process models would have to be developed in order to quantify these tolerance thresholds. This would be a substantial undertaking that would likely involve a large amount of data collection in order to complete.

Another response might be to undertake the development of a hydrologic model of the Okavango/Kubango River Basin. This response is motivated by the paucity of long term historical streamflows data in the system. This modeling focus is attractive, as the measured climate data in the upper basin for the period prior to the Angolan Civil War combined with more recent synthetic climate data developed from satellite images is likely sufficient to develop a lumped-parameter or physically based hydrology model of the basin. Either approach could allow for the development of streamflow estimates at critical points throughout the basin that would provide an essential input to river dynamics models.

Understanding the frequency, timing, duration and magnitude of streamflow in the unperturbed watershed is also an essential input to a water resources planning model. This type of model attempts to balance supply and demand under a range of future scenarios and therefore requires reasonable estimates of the available water supply. If streamflow estimates were available it would be possible to configure a water resources planning model to study the suitability of various management alternatives in terms of meeting the objectives, both for water supply and ecosystem protection, implicit in a range of future scenarios.

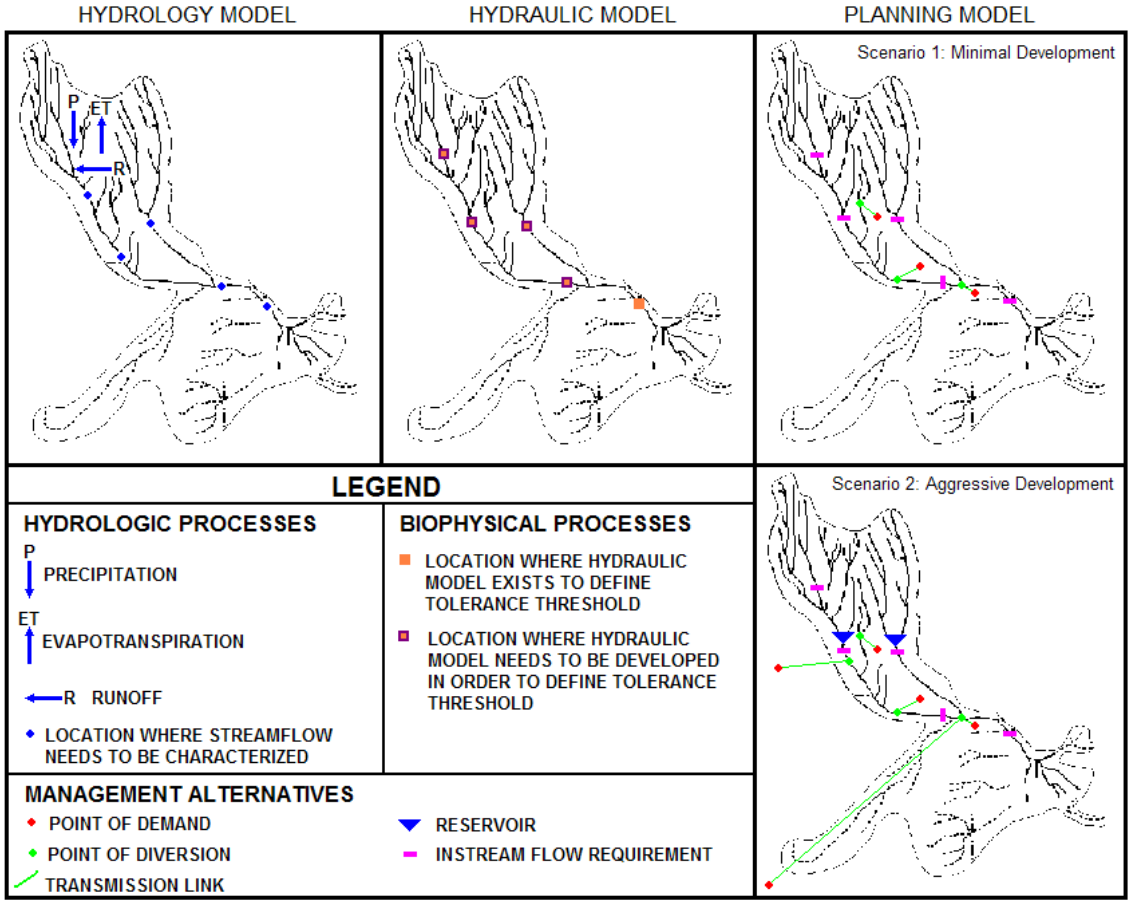
These various modeling options are depicted graphically in Figure 4. A hydrologic model would allow Sharing Water to characterize streamflow at a number of critical locations within the Okavango/Kubango Basin where little or no information is currently available. A hydraulic model could be used to further understand the physical dynamics of the Okavango/Kubango River and its associated Delta, and to develop tolerance thresholds that could guide future development in the basin. A planning model would allow the project participants to develop future scenarios for the Okavango/Cubango Basin and to investigate which management arrangements are best suited to achieve the objectives implicit in these scenarios.

I would argue that unless we have some sense regarding the hydrologic characteristics of the watershed, beyond that which is contained within the long-term gauges at Rundu and Mohembe that are located in the lower basin, it is difficult to imagine a useful application of either a hydraulic or a water resources planning model. However, once a reasonable representation of hydrology has been developed, it is possible to contemplate a modeling exercise whereby project participants begin to formulate future scenarios and associated management arrangements that could be the focus of water

[1] The WEERD project is working on a physically based model of the Delta.
[2] IUCN developed a lump-parameter model of the Delta as part of its review of contemplated in-Delta water management options.
[3] McCarthy published a statistical model relating Delta inflow to flooded area.

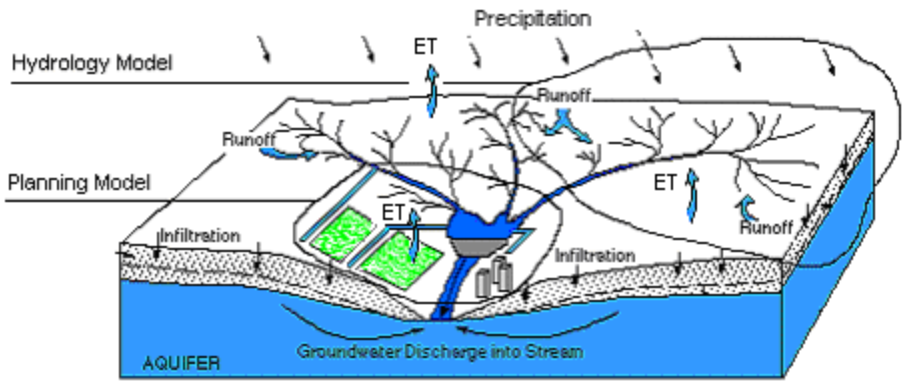
resources planning analysis. As the development of cost-curves is a very data driven exercise, I propose that the planning tool adopt a simulation or a rule based framework.

Figure 4: Range of Potential Modeling Activity for the Sharing Water Project



Early on this exercise may have to make some assumptions regarding the ecosystem tolerance thresholds that should constrain future development in the Okavango/Kubango Basin, and any water resources planning model adopted by Sharing Water should include the ability to easily introduce new flow requirements as information on bio-physical processes become available (depicted as instream flow requirements in Figure 4). Nonetheless, in my opinion, the effort needed to rigorously develop these tolerance thresholds exceeds the resources available to Sharing Water and will likely require many years of activity. The scope of the proposed modeling approach, which includes the application of hydrologic and planning tools, is summarized in Figure 5.

Figure 5: Proposed Modeling Focus of the Sharing Water Project



Selecting Models

Assuming for the moment that the proposed modeling focus is adopted for the Sharing Waters project, a methodology needs to be developed that can structure the selection process for an appropriate model or set of models. NHI having confronted the task of selecting an appropriate model in the past has developed an automated system for conducting model evaluation. This tool requires the user to rank model functionality in a number of categories and to prioritize which model functionality is the most critical to the task at hand. The tool then combines these two rankings to suggest the most appropriate modeling platform. NHI recently used this tool for a project in the bi-national Rio Grande/Bravo system to assist Mexican and American stakeholders to select a model for a long-range planning exercise.

This exercise focused largely on evaluating modeling platforms developed in Europe and North America. Other models have also been developed in Angola and South Africa. We are working with contacts in Angola and South Africa to gather the information required to evaluate the functionality of these tools. Once all of the information necessary to update the tool is available, NHI will facilitate a an exchange of ideas that leads to the development of our set of priorities regarding model functionality. Once these two sets of information are complete, the automated model evaluation system will be used to identify a limited set of models that will be the focus of final model selection by the project team.

Appendix U.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

River Basin Model Evaluation Process Initiated by the Sharing Water Project: Priority Attributes and Preliminary Scores

June 2004

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Context

At the second *Sharing Water* project workshop held in Windhoek in March 2004, a proposed water management analytical framework was presented to the participants. This framework included:

- A rainfall-runoff model to generate simulated sub-catchment scale streamflow time series from available climatic and land cover data;
- A water resource planning model of the upper catchment that uses these streamflow time series as input to a simulation of various water management scenarios; and
- A link to a model representing conditions in the Delta, in particular their relationship to inflows from the upper catchment.

Owing to the paucity of channel geometry and bed material information in the upper catchment, it was decided that the modeling framework for the project would not include detailed hydraulic analysis of conditions in specific river reaches. Nonetheless, the importance of water quality and sediment transport considerations in the basin suggested that some more reduced-form representation of these processes in the context of a planning model might be appropriate.

There has been general agreement, both during the workshop and during subsequent discussions, that this is an appropriate analytical framework for the project. In spite of this agreement, however, the *Sharing Water* project faces two distinct challenges in selecting a software platform upon which to construct the framework:

1. Fleshing out in greater detail the specific elements of the proposed analytical framework; and
2. Measuring the performance of specific models against these more detail considerations.

In response to these challenges, the *Sharing Water* project also initiated a water resource planning model evaluation process in Windhoek. This process was based on the use of a simple software system that allows the user to define and rank important attributes of potential models with respect to the analytical framework and to score individual models relative to these attributes (See Appendix A for more detail on the evaluation software). As this exercise is somewhat technical in nature, it was decided that only a limited group of experts would participate in evaluating software platforms. The following individuals have participated extensively in this exercise:

- Ontlogeste Dikgomo, Department of Water Affairs, Botswana
- Alasdair Macdonald, DHI, consultant to the Department of Water Affairs, Botswana
- Guido van Langenhove, Ministry of Agriculture, Water, and Rural Development, Namibia

Several other individuals in Botswana and Namibia provided useful input, but unfortunately no significant input was received from Angola due difficulties in engaging an appropriate expert. Attempts are currently being made to redress this situation.

Current Goals of the Model Evaluation Process

When the design of the *Sharing Water* project was finalized and Phase I of the project was initiated in 2003, the project management team anticipated that OKACOM would be in a position to evaluate a recommendation offered by the project regarding the use of models, consistent with the Commission's own modeling objectives. The assumption was that *Sharing Water* would be able to secure an approval from OKACOM for the selection of a single model platform that would be used

in Phase I of *Sharing Water* to develop a prototype model of the Okavango River system (used primarily to demonstrate the utility of planning models) and which in Phase II would be refined to serve as an engine for a robust water management scenario screening exercise[1].

As it turns out, this assumption was perhaps overly optimistic and it will not, in fact, be possible to secure OKACOM approval for a specific model platform in a timeframe that will allow for the development of the prototype model in advance of the final Phase I workshop in August 2004. As such, the goals of the model evaluation process have been slightly modified. They are:

1. Identify two or three modeling platforms that appear to have the potential to support robust water management scenario screening in the Okavango River Basin.
2. Document the process leading to the identification of these models so that OKACOM benefits from the early analysis conducted by the *Sharing Water* project once they their own process of model evaluation and selection.
3. Suggest a single model that can be efficiently deployed for the development of the prototype model called for during Phase I of the *Sharing Water* project.

While perhaps less ambitious than the original goal of identifying and selecting a single model, these objectives are more consistent with the current status of institutional development in the Okavango River Basin[2].

Steps Taken in Implementing the Model Evaluation Process

Between the workshop in Windhoek and the date of this report, the following steps have been taken to initiate and advance the model evaluation process:

1. Distributed the model evaluation software system to regional experts to solicit their input on the software itself, the relative priority of the model attributes included in the software, additional attributes of importance, and scores for particular models with which they are familiar.
2. Assembled and distributed all readily available information on the modeling platforms included in the model evaluation software system.
3. Created a matrix that can guide the assignment of scores to each individual model.
4. Developed a preliminary set of scores for each of the modeling platforms included in the software.

This report summarizes the insights gained during the implementation of these steps and lays out a workplan for completing the model evaluation process.

Priority Model Attributes

Based on input received from experts in Botswana and Namibia the ranked priority of model attributes is summarized in Table 1, along with the priority ranking assigned by the *Sharing Water*

[1] The details of Phase II are currently the subject of negotiations between the Sharing Water project management team and USAID, the project funder.
[2] As the goals are much more limited, this should help minimize the doubt expressed by one participant in the model evaluation process that the use of the software system will give meaningful results.

technical team[3]. It should be pointed out that experts from the region were not always clear what was meant by the name of a particular attribute[4]. Each of them provided their interpretation and comments in Table 2.

Table 1: Assigned Priority Attributes

CATEGORY	ATTRIBUTE	PRIORITY			
		Angola	Botswana	Namibia	*Sharing Water*
Usability	Build and Compare Scenario		1	3[B]	4
	Graphical User Interface/ Transport Data Structure		2	7[B]	3
	Variable Time Step		18	17[D]	15
	Extensive Graphics capability		12	8[B]	10
	User community in Southern Africa/Available technical support		14	2[A]	9
	Affordable licensing arrangement		3	1[A]	1
	Portuguese and English versions		4	18[E]	2
Integration	Generate output that can be easily used by other software (eg Excel)		13	9[B]	17
	Ability to integrate with existing databases		15	10[B]	12
	Ability to integrate with spatial data stored in GIS		17	11[B]	11
Functionality	Reservoir operations/Hydropower		8	5[B]	5
	Climate Driven Demand		6	12[B]	8
	Internal Hydrology		5	4[B]	6
	Groundwater utilization/stream-aquifer interactions		7	6[B]	7
	Sediment Transport/Geomorphic processes		10	14[C]	13
	Water Quality		9	13[C]	14
	Flood Routing/Inundation		11	15[D]	18

[3] David Purkey ranked the attributes. Brian Joyce, who applied the scoring matrix in order to score the models included in the software system, had no information on how others had ranked the model attributes prior to assigning the scores.

[4] One wrote "a few points of the evaluation are not completely clear" and one wrote that the definition of priorities depend on "what is meant by attributes like internal hydrology".

	Wastewater treatment		16	16[D]	16

[A.] Sine quo non conditions
[B.] Essential features
[C.] Useful features
[D.] Features seemingly of little relevance
[E.] Policy Issue

The experts from Botswana also identified the reputation of the organization behind the model and the their commitment to long-term development of the software platform as a priority model attribute. The expert from Namibia raise dmany important points related to the "Internal Hydrology" attribute, which put more value on a particular catchment scale rainfall-runoff model than the relative importance of directly integrating hydrologic calculations into a water resource planning model. These comments are summarized in Appendix B. For purposes of prioritizing model attributes, however, "Internal Hydrology" implies in that rainfall-runoff calculations, and the possibility of introducing climatic and land use/land cover variability into future scenarios, are made internal to the planning model.

Table 2: Comments Related to Specific Attributes

CATEGORY	ATTRIBUTE		
		Botswana	Namibia
Usability	Build and Compare Scenario		Should include: 1.Water allocation rules that are very flexible e.g. zones in reservoirs dependent on month, dependent on natural flows etc. 2. Internal optimization. 3. Flexibility to model minimum flows as internal demands 4. Inclusion of water curtailments according to water availability and demand classification. 5. Demands that are depended on natural flows – necessary to model environmental flows.
Functionality	Reservoir operations/ Hydropower		My understanding is that these go together. This should not include hydrological basin modeling, but statistical features for stochastic flow sequences, systems analysis, simulation with output statistics, evaporation losses, diffuse demands, land use effects.
	Internal Hydrology		
	Groundwater utilization/ stream-aquifer interactions		

	Sediment Transport/ Geomorphic processes		These can be modules or parallel models.
	Water Quality		
	Wastewater treatment	It is not clear what is intended by wastewater treatment – surely not a process model, rather the analysis of the impact of various wastewater treatment processes.	

At the current time, no attempt has been made to reconcile differences between the priority rankings developed in Botswana, Namibia and by the *Sharing Water* project technical team. An attempt at reconciliation will be made once input has been gathered from Angolan experts.

Model Scoring Guidelines

In order to facilitate the scoring of models included in the model evaluation software system, the *Sharing Water* project technical team drafted a set of scoring criteria. These are described in Table 3. An attempt was made to define scoring criteria that are sufficiently explicit to allow for a clear differentiation between models that perform well (1), moderately (2), or poorly (3) against the set of attributes.

Table 3: Model Scoring Criteria

	1	2	3
USABILITY			
Build and compare scenarios	Store/compare scenarios internally	~~~~~~~~~~~~~	Scenarios stored and compared using external files and applications
Graphical user interface / Transparent data structure	Dynamic network on interface, click to data	Network on interface, no click to data	No Network on interface
Variable time-step	User defined	Multiple set options	Fixed single timestep
Extensive graphics capability	Useful graphs internal to model	~~~~~~~~~~~~~	Reliance on external applications for graphing
User community in Southern Africa / Available technical support	>5 applications in SADC	< 5 applications in SADC region	No applications
Affordable licensing arrangements	Free	<$5000.00	>$5000.00
Portuguese and English Versions	Available	Planned	None
INTEGRATION			
Generate output that can be easily used by other software (e.g. Excel)	Exports to Excel through interface	~~~~~~~~~~~~~	Exports to text files
Ability to integrate with existing databases	Read any database	~~~~~~~~~~~~~	Single defined database
Ability to integrate with spatial data stored in GIS	Access, Manage and Use GIS data	Use GIS data for graphics/Interface	No GIS
FUNCTIONALITY			
Reservoir operations / Hydropower	User defined operational logic	Model defined templates which account for flood control, hydropower, and water supply operations	Simple model templates that do not account for flood control, hydropower, and water supply operations
Climate driven demand	Yes	~~~~~~~~~~~~~~	No
Internal Hydrology	Yes	~~~~~~~~~~~~~~	No
Groundwater utilization / Stream-aquifer interactions	Distributed dynamic groundwater	Lumped parameter representation	Limited Groundwater
Sediment transport / Geomorphic processes	Dynamic representation	Lumped representation	Limited/None
Water Quality	Dynamic representation	Lumped representation	Limited/None
Flood routing / Inundation	Dynamic representation	Lumped representation	Limited/None
Wastewater treatment	Considers treating return flows	~~~~~~~~~~~~~~	Doesn't consider treating return flows

These are draft criteria that are subject to revision based on the input of experts in the region.

Preliminary Model Scores

Based on these criteria, one member of the *Sharing Water* technical team,[5] who was unaware of the attribute priority rankings defined by the experts from the region, used the background information on the models that he gathered and distributed to the experts in the region to score the models included in the model evaluation software system. Without the benefit of the scoring criteria matrix, experts from the region also scored models with which they were familiar, MIKE Basin in the case of Botswana and the WRYM/WRPM suite in the case of Namibia. Table 4 contains the scores assigned to each model. In the case of MIKE Basin the scores reflect the opinion of Botswana Expert #1/Botswana Expert #2/*Sharing Water* Technical Team. If only two scores are shown the Botswana experts agreed on the appropriate score. In the case of the WRYM/WRPM suite of models the scores reflect the opinion of the Namibia Expert/*Sharing Water* Technical Team.

[5] Brian Joyce, NHI Staff Hydrologist

Table 4: Preliminary Model Scores

	Mike Basin[1]	MODSIM	OASIS	RiBaSIM	RiverWare	SPATSIM	SWAT	WEAP	WRYM / WRPM[2]
USABILITY									
Build and compare scenarios	1/3	3	1	1	1	1	3	1	1/3
Graphical user interface / Transparent data structure	1/1	1	1	1	1	3	3	1	2/3
Variable time-step	1/1	2	1	1	1	1		1	2/3
Extensive graphics capability	1/3	1	1	1	1	3	3	1	3/3
User community in Southern Africa / Available technical support	1/1	3	3	3	3	1	3	2	1/1
Affordable licensing arrangements	2/3/3	1	3	3	3	2	1	1	1/2
Portuguese and English Versions	3/3	3	3	3	3	3	3	2	3/3
INTEGRATION									
Generate output that can be easily used by other software (e.g. Excel)	1/2	3	2	2	1	2	2	1	1/2
Ability to integrate with existing databases	1/3	3	3	3	3	3	3	3	1/3
Ability to integrate with spatial data stored in GIS	1/2	3	3	1	3	1	1	2	3/3
FUNCTIONALITY									
Reservoir operations / Hydropower	1/3	2	1	2	1	2	1	1	1/1
Climate driven demand	1/3	3	3	1	3	1	3	1	1/3
Internal Hydrology	1/3	3	1	1	1	1	1	1	1/3
Groundwater utilization / Stream-aquifer interactions	1/3	2	1	2	2	2	1	2	1/2
Sediment transport / Geomorphic processes	2/3/3	3	2	3	2	3	1	3	3/3
Water Quality	1/2	3	2	3	1		1	2	1/3
Flood routing / Inundation	2/1/3	2	2	2	2	2	1	3	3/3
Wastewater treatment	?/3/1	3	1	3	1	3	1	1	3/3

1. MIKE-Basin scored by Botswana experts and the *Sharing Water* technical team.
2. WRYM/WRPM scored by Namibia expert and the *Sharing Water* technical team.

Preliminary Identification of Suitable Models

Three sets of preliminary model rankings have been developed according to the country which provided input. The Botswana ranking uses the Botswana attribute priority ranking with the model scores provided by the *Sharing Water* technical team, with the exception of MIKE-Basin which was scored by the first Botswana expert. The Namibia ranking uses the Namibia attribute priority ranking with the model scores provided by the *Sharing Water* technical team, with the exception of the WRYM/WRPM suite which was scored by the Namibia expert. The *Sharing Water* ranking uses the attribute priority ranking with the model scores developed by the *Sharing Water* technical team. The results of this analysis are shown in Figures 1-3.

Figure 1: Preliminary Botswana Model Ranking

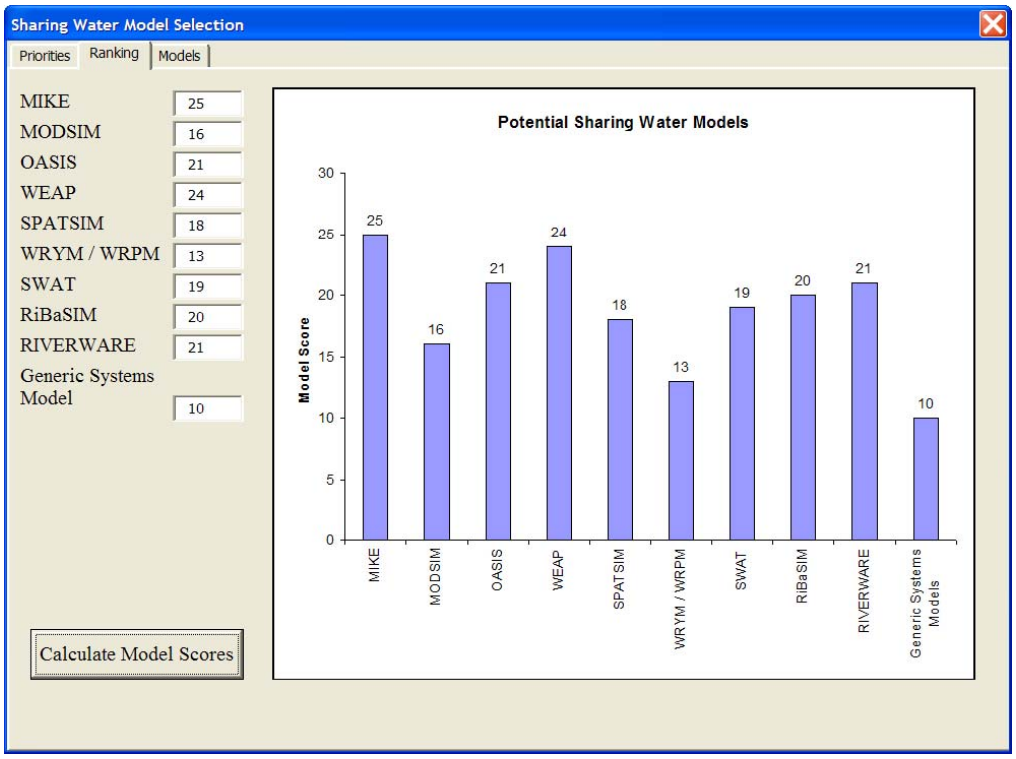


Figure 2: Preliminary Namibia Model Ranking

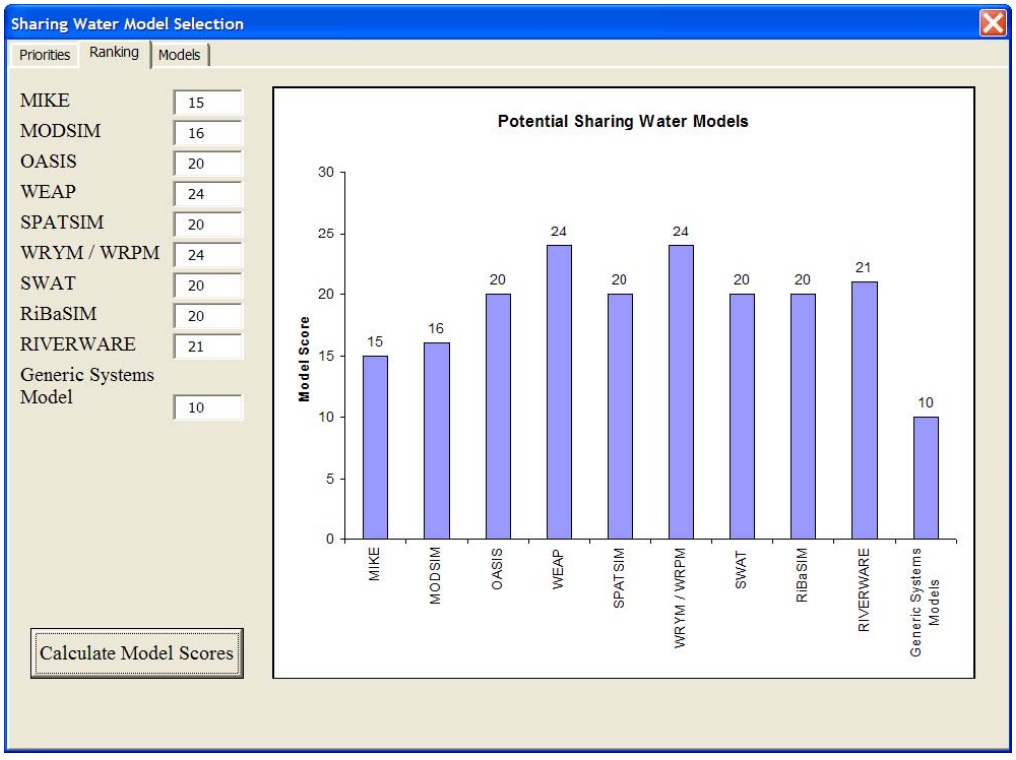
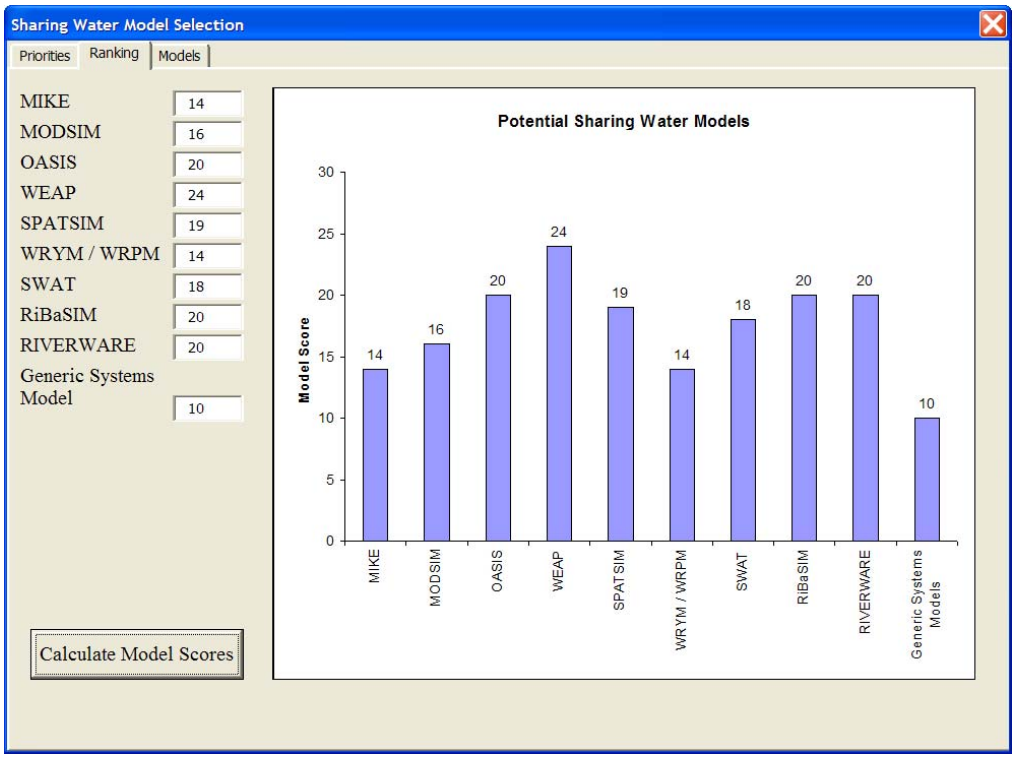


Figure 3: Preliminary *Sharing Water* Model Ranking



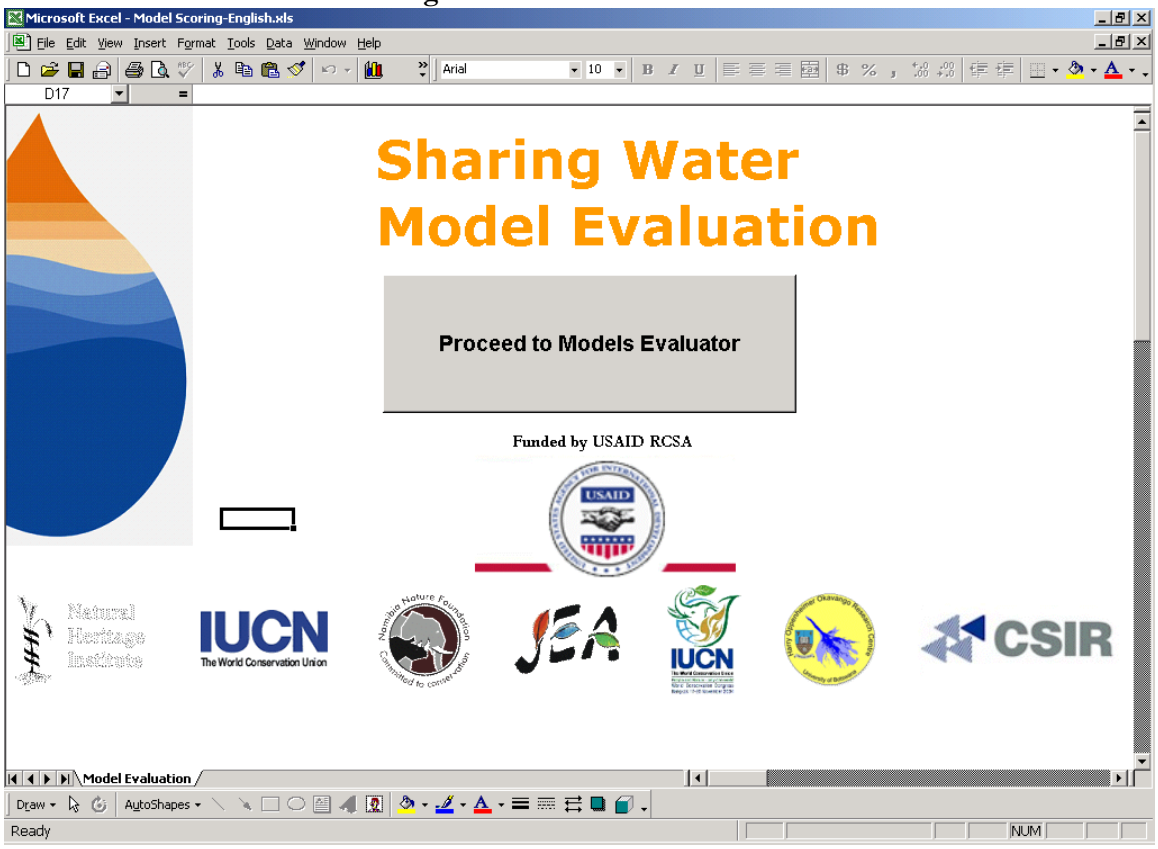
Most of the difference between the model rankings can be attributed to the dramatically different manner in which MIKE-Basin and the WRYM/WRPM suite were scored. These models probably need to be re-evaluated based on consultations between the regional experts and the *Sharing Water* technical team, with particular attention being paid to the model scoring criteria presented in Table 3. It seems, however that WEAP, RIVERWARE, RiBaSim and Oasis score relatively well against all three attribute priority rankings.

Appendix A: The *Sharing Water* Model Evaluation Software System

In order to facilitate a transparent and systematic evaluation of potential water resource planning model platforms, the *Sharing Water* project developed a very simple piece of software to manage the evaluation process. The program is a Microsoft Excel spreadsheet enhanced with some Visual Basic for Applications routines. This appendix presents the basic structure of the software.

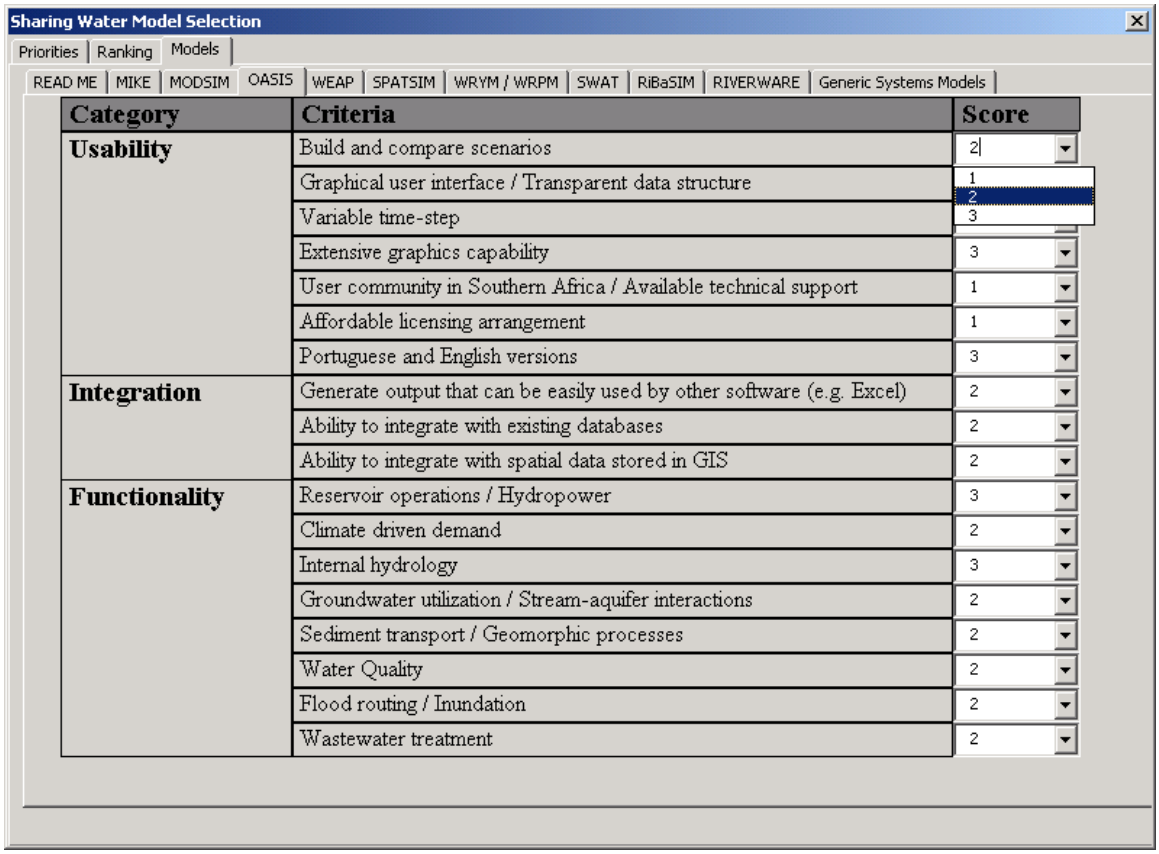
Figure 1 depicts the user interface that appears when the Excel spreadsheet entitled Model Scoring-English.xls is launched (the user will have to enable macros when prompted by Excel to do so). There is also a Portuguese version available, Model Scoring-Portuguese.xls.

Figure 1: Main User Interface



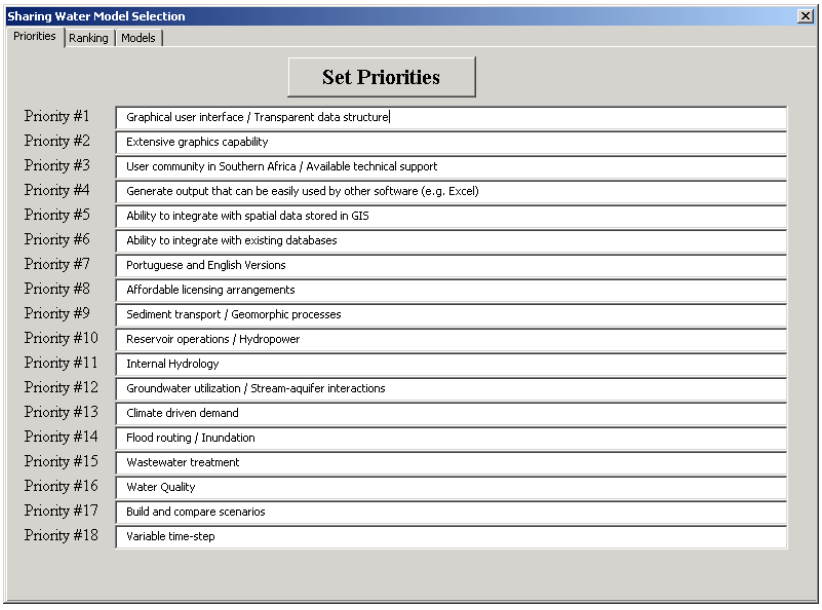
When the user clicks on *Proceed to Models Evaluator* a new interface appears that includes several tabs. The first is a *READ ME* tab that states that models included in the evaluation software are ranked on a scale of 1 to 3 with regard to a series of model attributes. Clicking on any of the model specific tabs for the models included in the evaluation software yields the interface depicted in Figure 2. This is where the user can apply the scale of 1 to 3 to individual models. This should be done for each of the modes included in the model system through a series of drop-down menus.

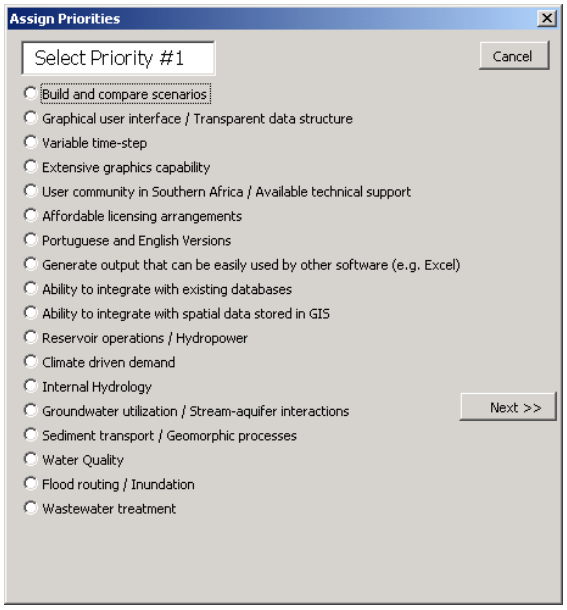
Figure 2: Model Scoring Interface



Clicking on the *Priorities* tab yields the interface shown in Figure 3, at left, which is used to set the relative priority of the attributes being used to evaluate the models.

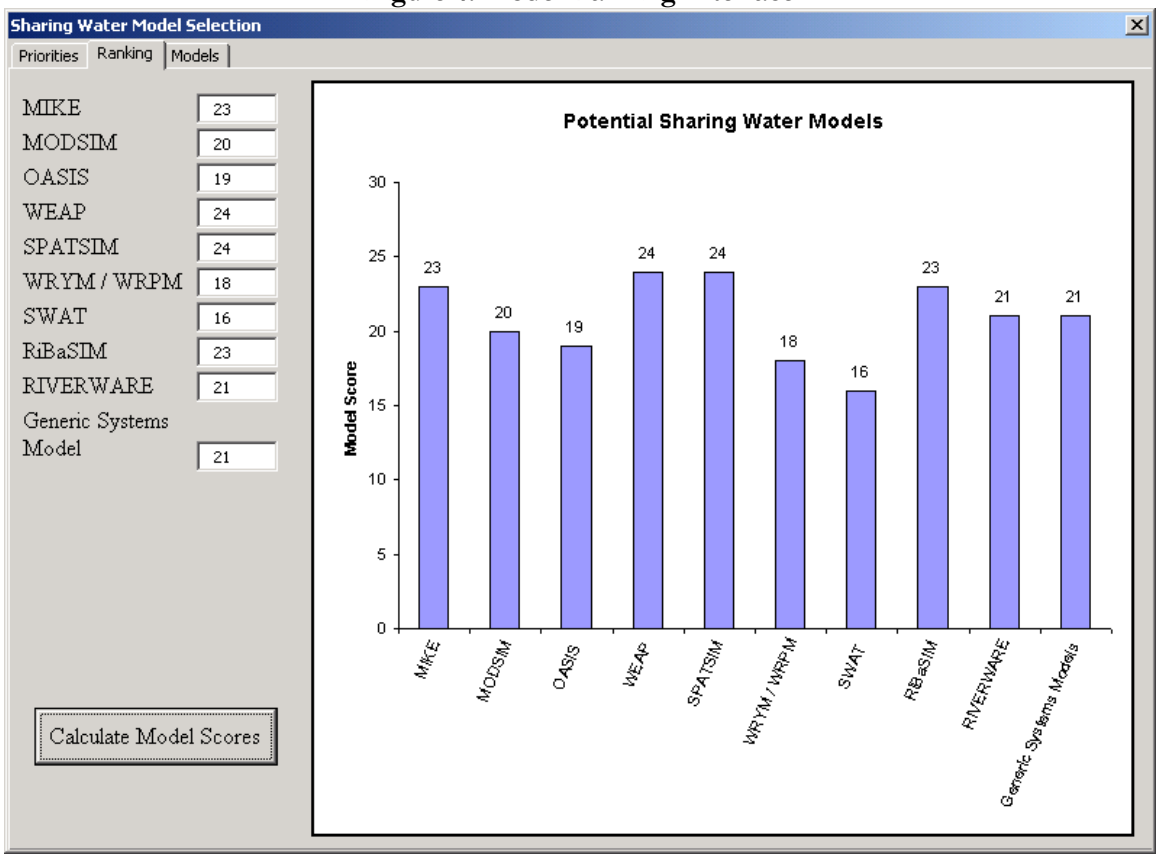
Figure 3: Model Attribute Ranking Interface





Clicking the *Set Priorities* button generates the interface shown at right in Figure 3. Using the radio buttons the uses selects the top priority attribute and then clicks on *Next* >> to proceed through a series of prompts to rank each of the attributes. Once all the attributes have been prioritized, clicking on the *Ranking* tab yields the interface shown in Figure 4.

Figure 4: Model Ranking Interface



The graphic in Figure 4 was actually generated by clicking on the *Calculate Model Scores* tab. It should be pointed out that the model scores and model attribute priorities used to develop this graph are completely arbitrary and as such the model ranking shown in the figure should not be assigned any importance.

At the current time both the models that are included in the model evaluation software and the attributes against which models are scored are set in the Visual Basic for Applications code. The *Sharing Water* project is willing to add both models and model attributes to the system if that is required to successfully complete the model evaluation process.

Appendix B: Summary of Comments on Catchment Hydrology Models from the Namibian Expert (edited for format, focus and clarity)

The usability of a hydrology model is very much dependent on the availability and reliability of the relevant data. The basic input sequence for a planning model is a set of concurrent flow sequences for a representative period at key sites. How will this be realized for the sub-catchments in the upper part of the Okavango Basin? Calibration and extension of rainfall/runoff modeling will require:

- Knowledge about catchment conditions at the time for which there is record - how has land use changed
- Rainfall records for the period of extension

Do we really have adequate hydrological information for the upper catchment? One will have to make certain assumptions, but ground verification by resumed flow monitoring in Angola should have the highest priority.

It was suggested to use the Pitman model for the hydrological modeling. Consultants once tried to introduce the model in Namibia, as part of the CAWMP (Central Area Water Master Plan), but that proved to be not a great success, and the model was left. Many version of the Pitman model create doubt as to all of the input parameters that will have to be: set to defaults; be eliminated; or be calibrated without much physical meaning. This raises question regarding the extrapolation power to model scenarios.

From the Namibian perspective, important model parameters should be:

- Areal rainfall surface fitting
- Antecedent conditions, monthly and/or yearly, to reflect vegetation effects on runoff
- Land use and vegetation changes [which can have a great effect on the cycles in the long historic records]
- Shift of daily rains at end of modeling period [if months] to next modeling period for flows.

A much simpler model than Pitman could be conceptually easier and perform as well or better. It may also be possible to re-shape Pitman so as to retain input parameters while adding built-in output flexibility and functionalities.

Appendix V.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Okavango Prototype Planning Model Report

September 2004

Funded by USAID
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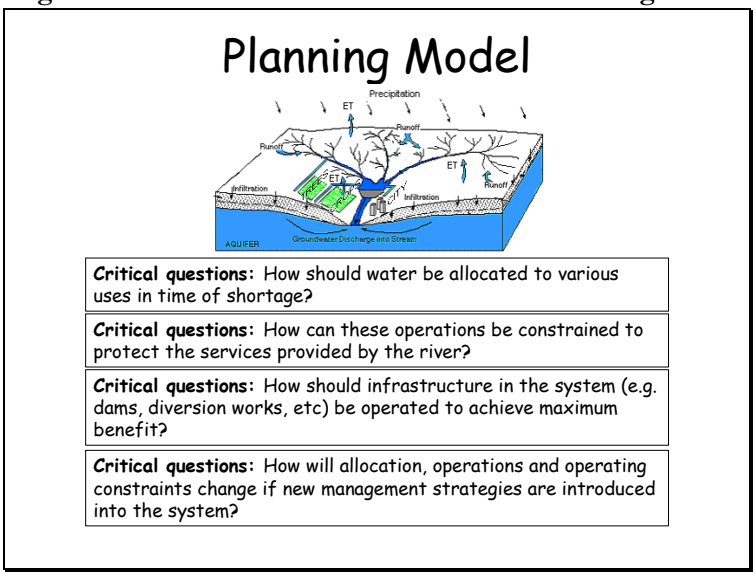
Award Year: 2003

SHARING WATER
OKAVANGO PROTOTYPE PLANNING MODEL REPORT

Introduction

One of the proposed elements of Phase I of the *Sharing Water* project was the development of a prototype water resources planning model of the Okavango River Basin (hereafter referred to as the prototype model) that could be used to demonstrate the utility of this type of tool in the context of ongoing consideration of management options for the shared water course. Figure 1 shows the kinds of questions that can be addressed using a water resources planning model. Such a model was developed in the WEAP (Water Evaluation and Planning System) environment and presented at the 3rd *Sharing Water* Project Workshop held in Kasane, Botswana on 9-12 August 2004. The workshop participants provided substantial and useful feedback on the draft prototype model. This document describes the final version of the prototype model that was prepared in response to this feedback. It describes both the input data and underlying assumptions used to define model runs that correspond to various assumed future scenarios and an associated water management strategy for the basin.

Figure 1: General Role of Water Resources Planning Model



Disclaimer

In selecting WEAP as the modeling environment for the prototype model, the *Sharing Water* project in no way intends to represent that this platform has been officially accepted as an analytical tool for the Okavango River Basin. Further, the prototype model rests upon a series of assumptions, which, while clearly articulated in this document, have not been exposed to rigorous vetting and discussion. As such, output from the prototype model should not be considered authoritative, although it is likely illustrative. Rather than focusing on particular model results, the prototype model should be evaluated with respect to the range of issues it can address and the role of a planning model in considering management options for the Okavango River Basin. Any and all suggestions on 1) how to improve the assumptions used in the prototype model, and 2) what new scenarios that could be included in the model, are both welcome and encouraged.

Hydrologic Scenarios

A central component of any water resource planning model is the time-series data used to describe the surface water availability in the river system under consideration. In an ideal case, long time-series of observed streamflow data gathered at distributed points throughout the catchment would be available to characterize the surface water supply. In the Okavango Basin, political instability in the upper catchment prevented the acquisition of such a record. As an alternative, simulated streamflows derived from a calibrated hydrology model that translates climatic data (precipitation, temperature, etc.) into estimates of flow in a river can be used to develop hydrologic time-series. This is the approach that was adopted in developing the prototype model. As with any simulation, however, these results are subject to error and uncertainly. As a result, the prototype model includes three different hydrologic time-series that can be used to investigate the performance of the water supply system under different assumptions about future climate and available water supplies.

For the Okavango River portion of the prototype model (the model includes separate representations for the Omatako and Swakop River systems as described below), the starting point for each of the hydrologic scenarios is an application of a modified Pitman Rainfall-Runoff Model developed at South Africa's Rhodes University (the original monthly Pitman Model is described in the 1973 report *A mathematical model for generating monthly river flows from meteorological data in South Africa* published by the University of the Witwatersrand)[1]. Output from this rainfall-runoff model was used in the prototype model to define incremental monthly average streamflow rates at the outlet of 22 sub-catchments in the Okavango River Basin, excluding the Omatako portion of the basin, using climatic data from the 13-year period between January 1960 and December 1972.[2]

The Pitman Model generates incremental streamflow values for each sub-catchment. Figure 2 shows the simulated incremental monthly average streamflow values associated with the Cuchi and Mukwe sub-catchments (indicated with black dots). Similar time-series are available from the modified Pitman Model for all of the other sub-catchments depicted in Figure 2, once again with the caveat that values for the Omatako system are characterized based on a different data set. While it may be surprising to see that the incremental monthly average flows at Mukwe are rarely non-zero, recall that the largest amounts of precipitation fall in the northern portion of the basin. These incremental streamflows accumulate in the downstream direction resulting in increasing cumulative streamflow estimates. This is demonstrated in Figure 3, which is the predicted cumulative monthly average streamflow at Mukwe derived from the modified Pitman Model.

[1] The rainfall-runoff simulation results were made available thanks to the generous support of Dr. Denis Hughes of the Institute for Water Resources at Rhodes University.

[2] This period then, became the period of analysis in the prototype model, with assumptions about the future of the basin being translated back as if they had occurred during that period. This is an important point as clearly many of the future scenarios that will be evaluated in the prototype model will not have been in place in the 1960'a and 1970's. The best way to interpret this approach is that the hydrology of the period from 1960 to 1972 repeats itself at some point in the future.

Figure 2: Simulated Incremental Streamflow Analysis

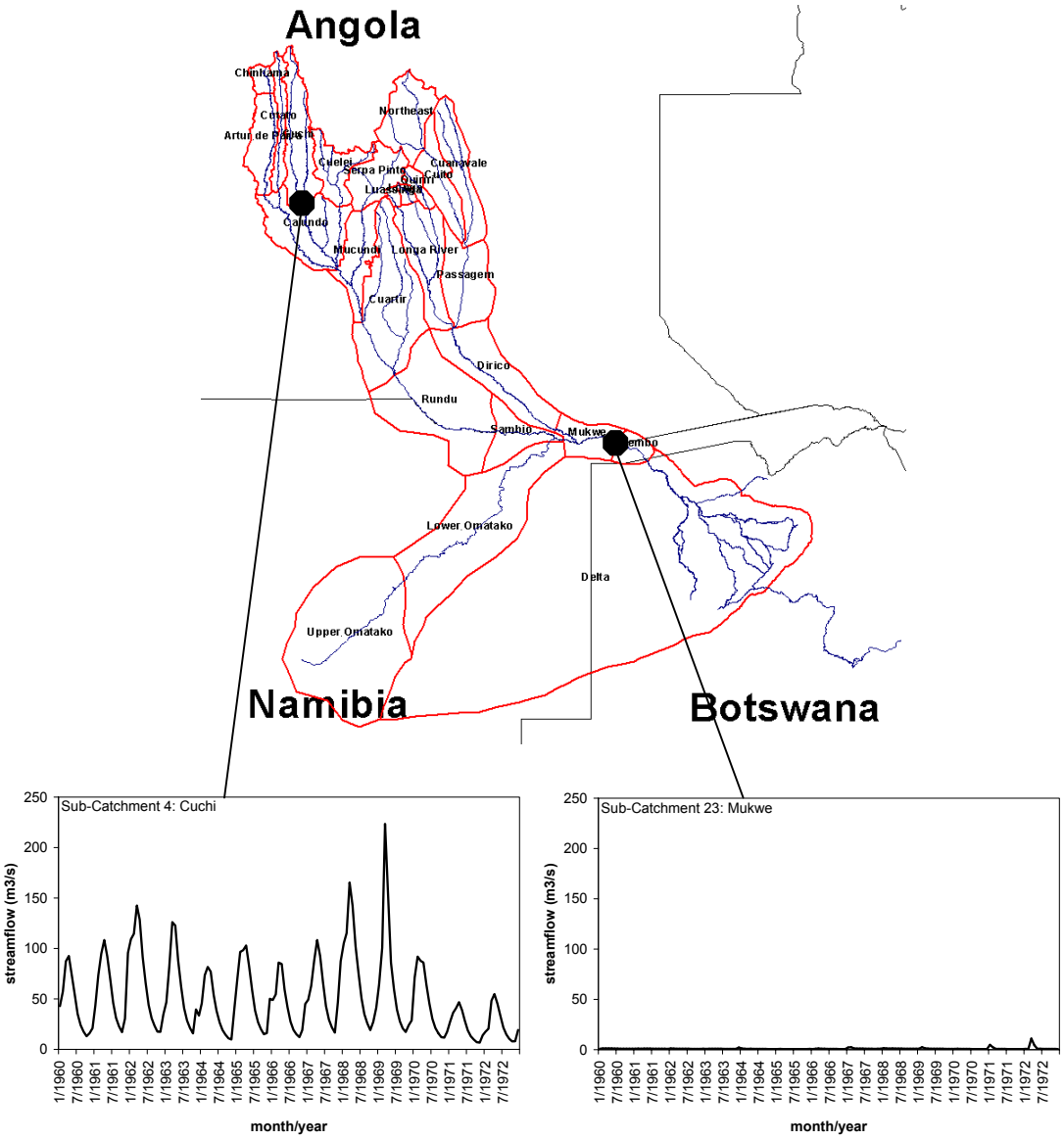
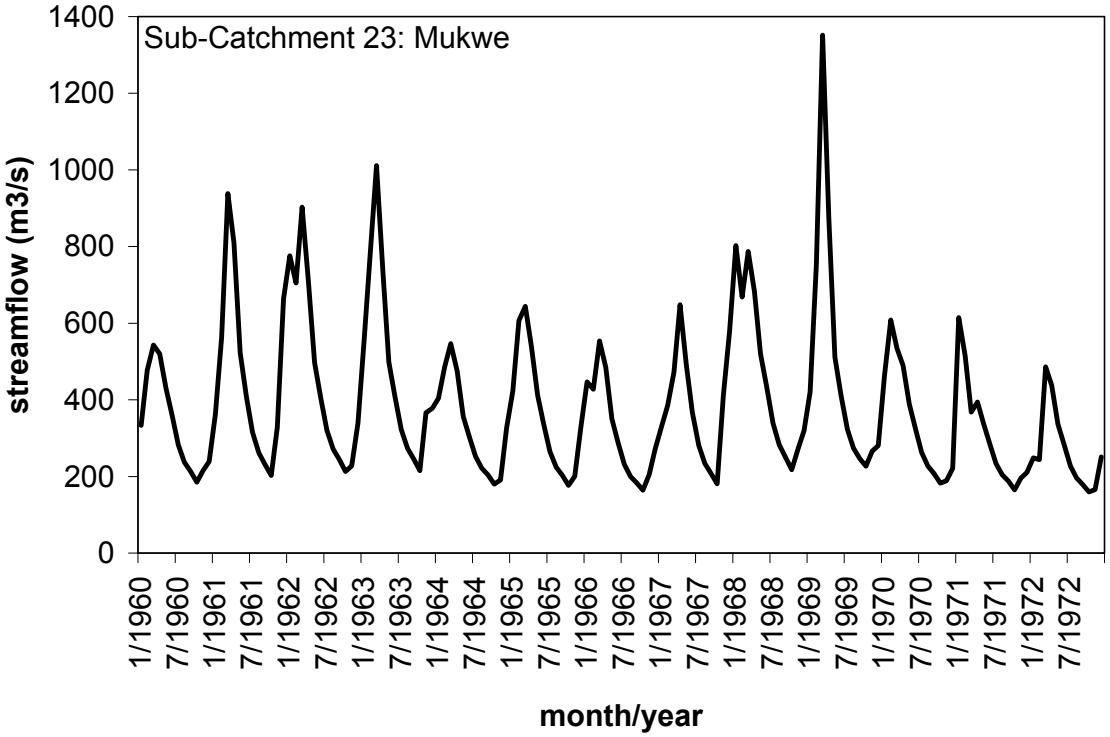


Figure 3 reveals that the simulated cumulative monthly average streamflow at Mukwe can reach as high as 1350 m^3/sec. The minimum simulated cumulative monthly average streamflow at Mukwe during the period of analysis from 1960 to 1972 is 159 m^3/sec. The hydrologic time-series depicted in Figure 3 represents one potential characterization of the available surface water resource in the Okavango River Basin.

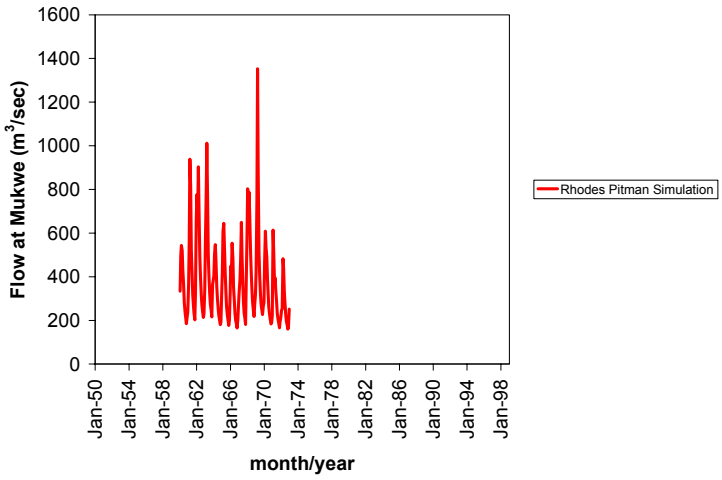
Figure 3: Simulated Total Monthly Average Streamflow at Mukwe



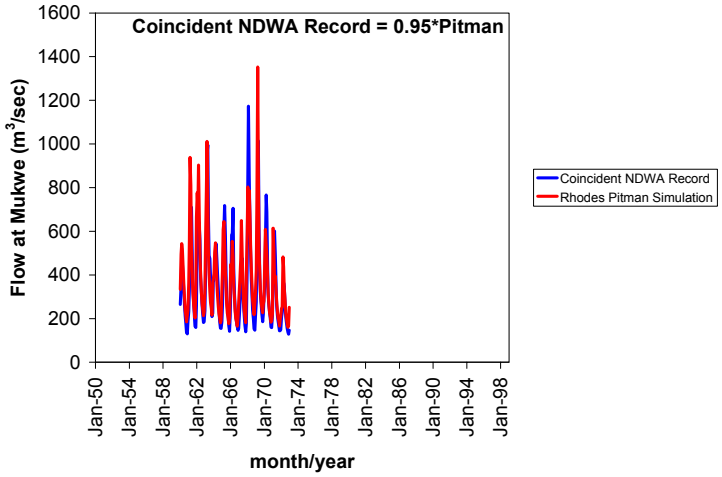
A good test of any simulated streamflow time-series is to compare it with available observed streamflow data. Fortunately, the Namibian Department of Water Affairs (NDWA) has maintained a flow gauging station at Mukwe for over 50 years. Figure 4 presents a comparison of the simulated monthly average streamflow at Mukwe derived from the modified Pitman Model, which is, once again, the accumulation of the simulated incremental monthly average streamflow from upstream sub-catchments, and the actual values recorded at the Mukwe gauge. The first panel (A) presents the same simulated monthly average streamflow data shown in Figure 3. The second panel (B) compares the simulated monthly average streamflows to the observed values at the Mukwe gauge for the same January 1960 to December 1972 time period. The final panel (C) compares these two time-series with the actual monthly average streamflow values observed over the entire period of record from 1950 through 2000. Although the simulated monthly average streamflow time-series derived from the modified Pitman Model captures the basic form of the observed record, there are differences that should be characterized and considered during the application of any water resource planning model.

Figure 4: Comparison of Simulated and Observed Mukwe Streamflows

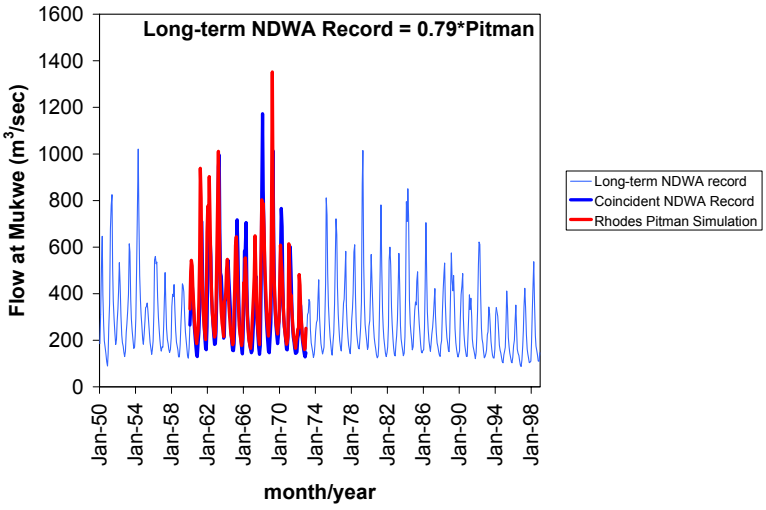
(A)



(B)



(C)



First, the simulated monthly average streamflow from the period January 1960 to December 1972 consistently over-predicts the flow during the low flow months, as is demonstrated by the fact that the red line in (B), the simulated values, is consistently above the blue line, the observed values, during the months of September, October and November. In fact the minimum observed monthly average flow at Mukwe during this period is 128 m^3/sec as opposed to the 159 m^3/sec predicted by the simulation. Overall, however, the average annual flow at Mukwe calculated from the observed data is roughly 95% of that predicted by the modified Pitman Model. When observed flows from the entire period of record are considered, on the other hand, the deviation between the simulated and observed monthly average streamflow values increases, largely because there appears to be a downward trend in the annual low flow condition since the early 1980's. When the entire 1950 to 2000 period of record is considered, the minimum observed monthly average streamflow drops to approximately 87 m^3/sec and the average observed annual flow at Mukwe drops to only 79% of that predicted by the modified Pitman Model.

Figure 4 suggests that it may be useful to develop a set of alternative hydrologic time-series to characterize available surface water supplies in the prototype water resources planning model. Figure 5 depicts one alternative hydrologic time-series constructed from the incremental monthly average streamflows for the sub-catchments in the Okavango River Basin derived from the modified Pitman Model. In this alternative hydrology, the simulated incremental monthly average stream flow values are multiplied by a factor of 0.79. The result is that while the form of the simulated cumulative monthly average streamflow time-series for the Okavango River Basin, as represented in Figure 5 by the simulated flows at Mukwe, remains unchanged from the original hydrologic time-series; the values are shifted downward, corresponding to the drier overall conditions suggested by the observed long-term record at the Mukwe gauge. This is a second potential characterization of the available surface water resource in the Okavango River Basin, hereafter referred to as Alternative Hydrology 1.

Another approach in developing an alternative characterization of available surface water supplies is to consider that wet and dry years need not occur intermittently as depicted in Figure 5. Indeed, the most challenging times for water managers occur when extend sequences of dry years occur one after the other. To represent this possible drought condition, in Figure 6 the Alternative Hydrology 1 streamflow values in each year have been reorganized from the wettest to the driest water years. The result, Alternative Hydrology 1A, provides a third potential characterization of the available surface water resource in the Okavango River Basin. Assuming the prototype model will be used to simulate future increases in demand, the use of Alternative Hydrology 1A would create the situation whereby surface water supplies are most limited at the point in time when simulated demand is at its highest level.

Figure 5: Month Average Streamflow at Mukwe for the Pitman Simulation and Alternative Hydrologiy 1

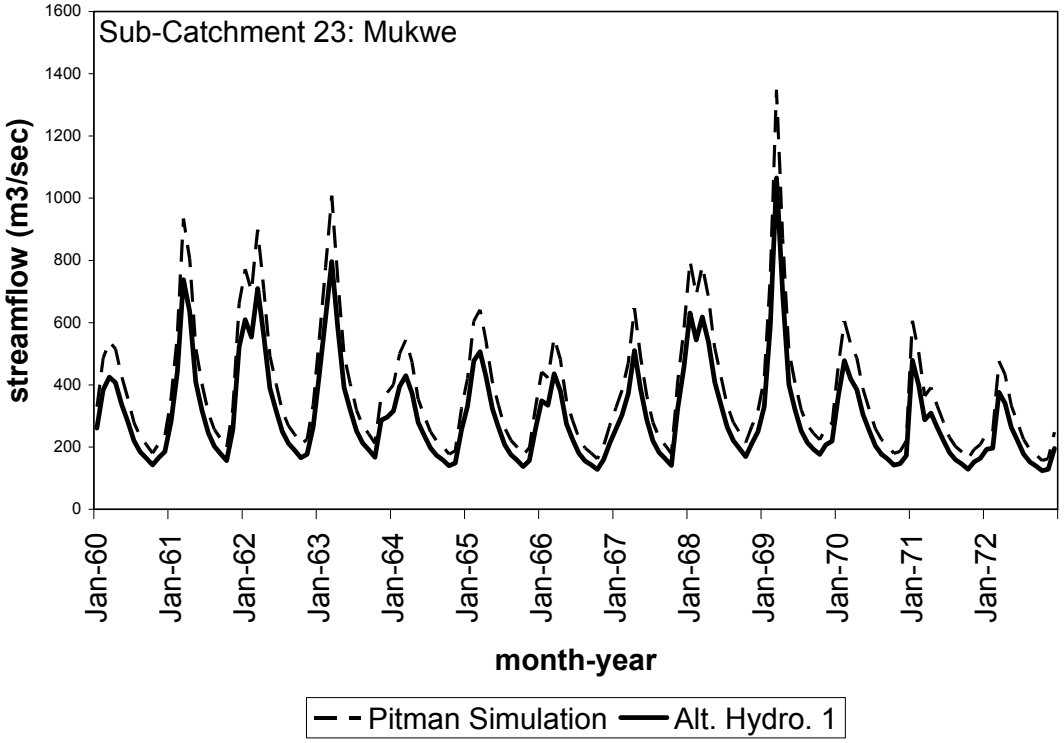
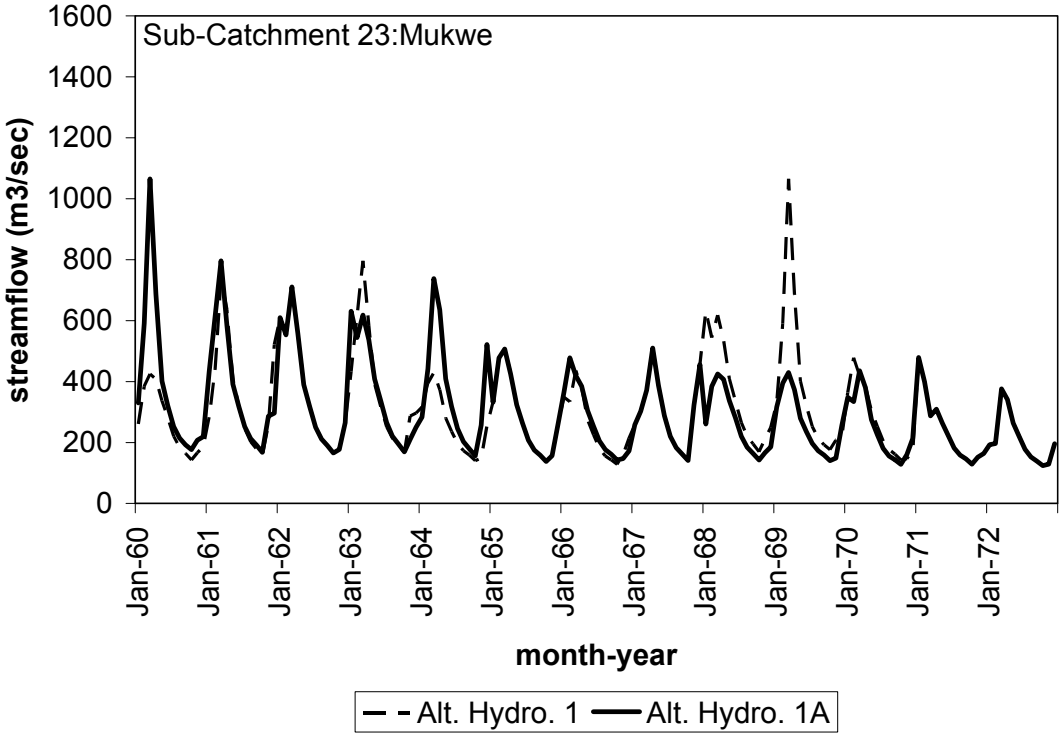
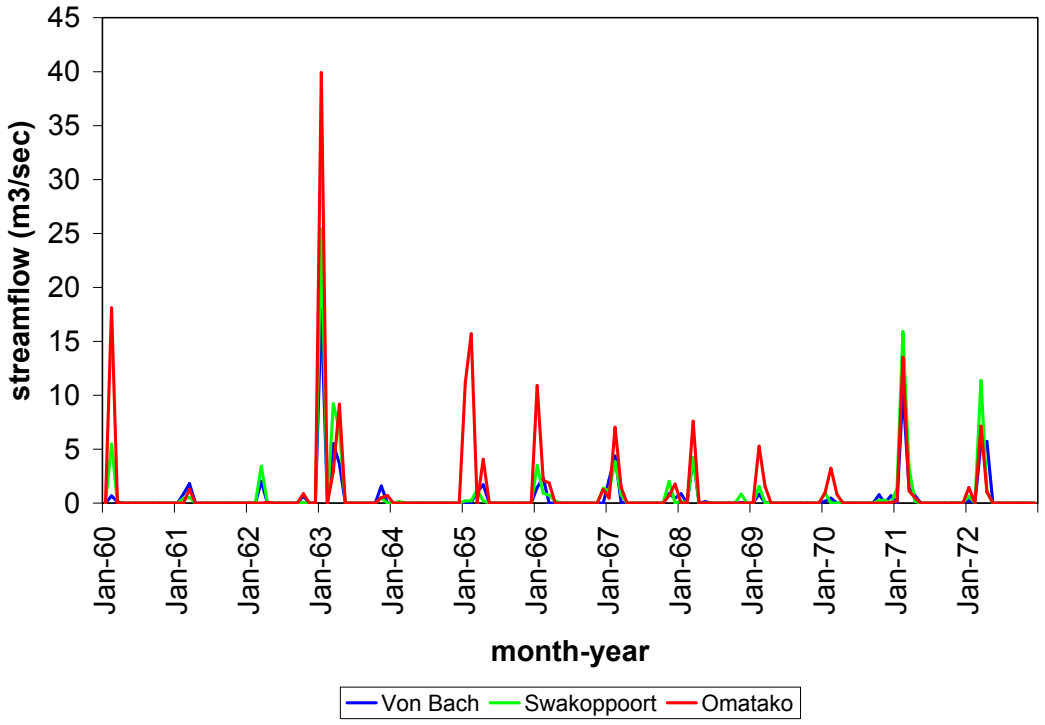


Figure 6: : Month Average Streamflow at Mukwe for Alternative Hydrologies 1 and 1A



As mentioned above, a separate characterization of streamflow conditions in the the Swakop River, a major component of the Central Namibia water supply system, and the Omatako River, an Okavango Tributary and another source of surface water supply for Central Namibia, is used in the prototype model. This characterization is based on flow records developed by the NDWA. The flow in these two rivers is currently regulated by the operation of Von Bach and Swakoppoort Dams on the Swakop River and Omatako Dam on the Omatako River. The NDWA provided reservoir inflow records for these facilities for the period between January 1960 and December 1972[3]. Some of these records were developed from observed streamflows while others were derived from the application of a hydrology, or rainfall-runoff, model. These values, shown in Figure 7, were coupled with the values derived from the application of the modified Pitman Model in the Okavango Basin in order to create what is referred to as the Base Hydrology in the prototype model[4].

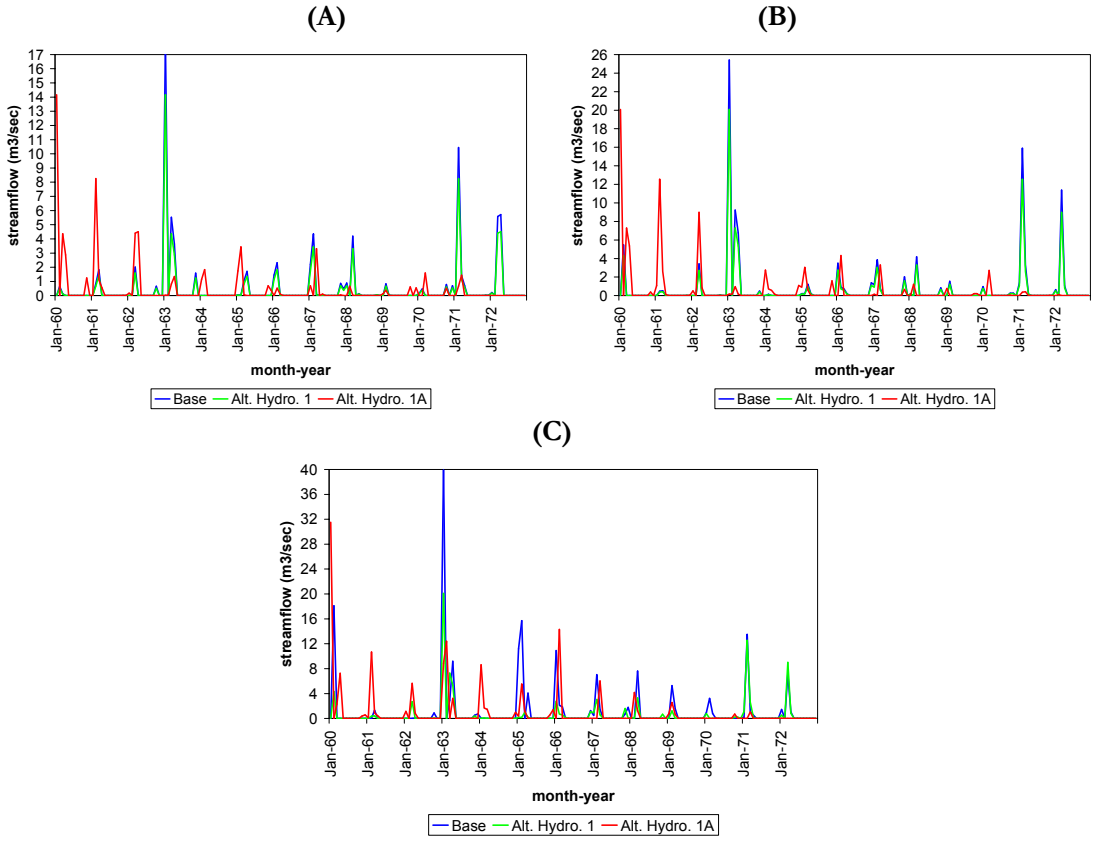
Figure 7: Observed Reservoir Inflows in the Central Namibia Water Supply System



In order to create hydrologic data for the Swakop and Omatako systems for use in Alternative Hydrology 1, the flows depicted in Figure 7 were multiplied by the same 0.79 factor that was used to adjust the simulated monthly average flows for the Okavango portion of the model. Annual collections of monthly average flows were then sorted from wettest to driest water years to create the data needed to complete Alternative Hydrology 1A. The time series of flows into Von Bach, Swakoppoort and Omatako Reservoirs used in the prototype model are shown in Figure 8.

[3] Many thanks to Mr. Guido van Langenhove of the NDWA for making these data available.
[4] Inflow data for Swakoppoort Dam, which is located downstream of Von Bach, are from the intervening catchment between the two facilities. Any spills and/or releases from Von Bach will increase the inflow to Swakoppoort.

Figure 8: Assumed Reservoir Inflows under the Base Hydrology, Alternative Hydrology 1, and Alternative Hydrology 1A for Von Bach (A), Swakoppoort (B) and Omatako (C) Reservoirs



The hydrologic time-series developed for use in the prototype model are based on assumptions that do not reflect a rigorous approach to hydrologic analysis. While they are entirely in keeping with the goal of demonstrating the potential utility of a water resource planning model of the Okavango River system, they do clearly point out the need to:

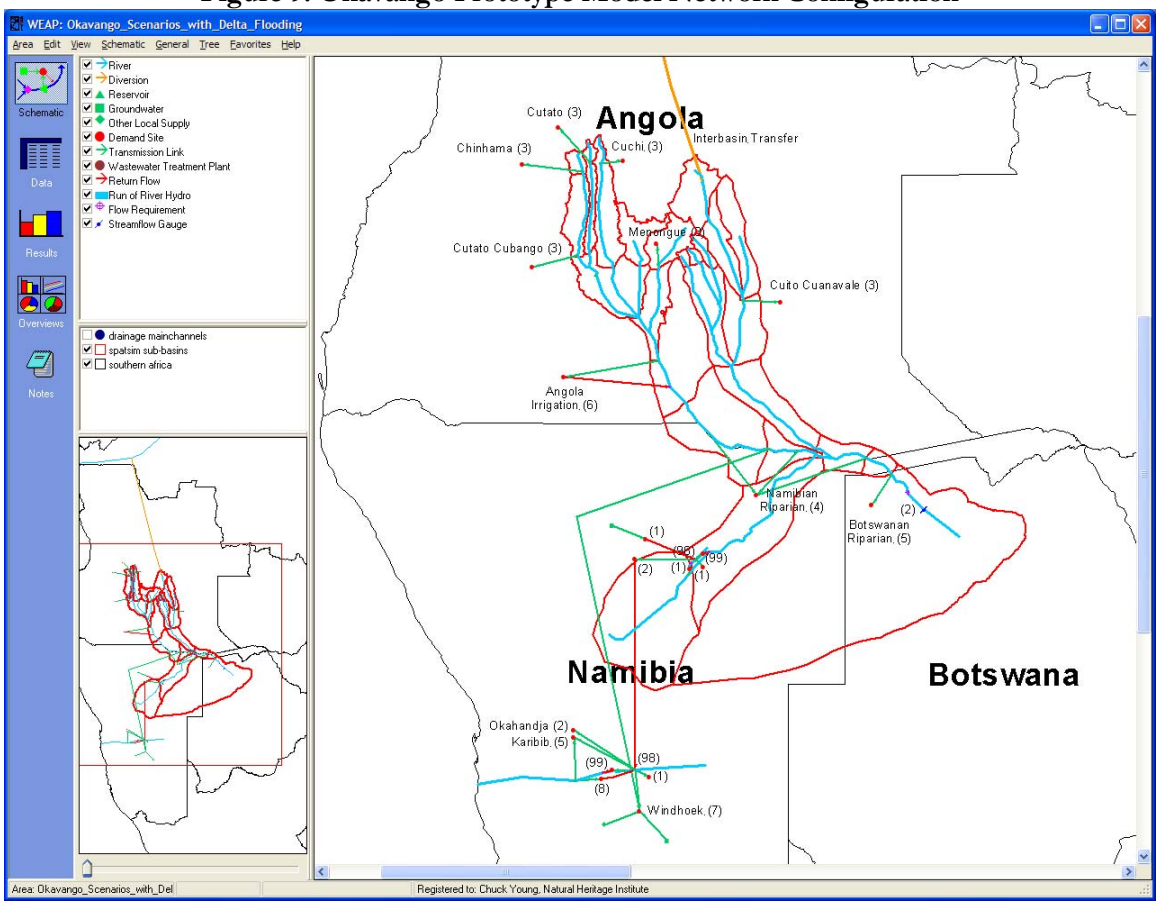
1. Perform rigorous hydrologic analysis of flows in the system in advance of;
2. Developing a record of observed streamflows for the entire catchment.

These tasks should be the focus of upcoming activity in the basin conducted as part of several current and anticipated projects in the basin. It is in the interest of all parties in the basin to agree on a plausible set of hydrologic time-series that can be used to characterize available surface water supplies in any water resource planning model used in the basin.

Basin Development Scenarios And Management Strategies

Several future water development scenarios and a single potential management strategy have been included in the prototype model. Each scenario tiers off of a description of the current state of the system, which is referred to in WEAP as the Current Accounts. Figure 9 depicts the network configuration developed for the prototype model.

Figure 9: Okavango Prototype Model Network Configuration



Current Accounts

This section describes the assumptions made in defining the Current Accounts. As stated above, Current Accounts is a description of a water resource system as it currently exists. In the case of the Okavango River Basin prototype model this description includes, in addition to the hydrologic time-series presented above:

- The demand associated with the major population centers in the Angolan portion of the basin;
- The demand associated with riparian portion of the basin in Namibia;
- The demand associated with the riparian portion of the basin in Botswana; and
- The Central Namibia water supply system infrastructure and its associated demand.

Table 2 describes the assumptions used to characterize current water demand in the major population centers in the Angolan portion of the basin.

Table 2: Current Accounts Water Demand in the Angolan Potion of the Basin

Urban Center	Population	Per Capita Use	Total Use
Chinhama	68,000	7.3 m^3/per/yr	0.496 Mm^3/yr
Cuchi	120,000	7.3	0.876
Cuito Cuanavale	68,000	7.3	0.496
Cutato	120,000	7.3	0.876
Cutato Cubango	80,000	7.3	0.584
Menongue	144,000	7.3	1.051
Basinwide	600,000		4.380

The population estimate of 600,000 individuals in the Angolan portion of the basin was offered by Angolan delegates attending the 3rd *Sharing Water* workshop held in Kasane, Botswana. The assumed water use rate translates to a daily total consumption rate of 20 l/day. This is well below the figure of 100 l/day reported by the FAO that was used in the draft prototype model and which was found to be unreasonably high by delegates at the Kasane workshop.

In the riparian portions of the basin located in Namibia and Botswana, an estimated aggregate water demand for the domestic and agricultural sectors was used to define the Current Accounts. A figure of 18 Mm^3/yr was used in Namibia while a demand of 4 Mm^3/yr was assigned for Botswana. The Namibian figure represents the total permitted extractions from the Okavango, not the actual current consumption, which is apparently closer to 6 Mm^3/yr. However, the consensus among the Namibian delegates in Kasane was, that as the higher level of use is allowable, it should be modeled.

Under Cuurent Accounts the allocation priorities for water from the Okavango River system are as follows:

1. Meet demand in the Angolan portion of the basin
2. Meet demand in the Namibian Riparian Zone
3. Meet demand in the Botswanan Riparian Zone.

This allocation priority seeks to reflect the fact that no binding allocation regime is in place in the basin and that upstream users will have first access to available surface water supplies. In Current Accounts there is no link between the Central Namibian water supply system and the Okavango River Basin, although the Central Namibian system is included in Current Accounts in anticipation of future scenarios and management strategies that link demand in Central Namibia to the surface water supplies in the Okavango River system.

Currently the Central Namibian water supply system relies upon four primary sources of supply:

- Wastewater reclamation works that provide 0.6 Mm^3/month of supply.
- A local aquifer that can provide up to 0.5 Mm^3/month of supply.
- Three integrated surface water reservoirs on the Swakop (Von Bach and Swakoppoort Dams) and Omatako (Omatako Dam) Rivers.
- A remote aquifer at Grootfontein in the north of the country that can supply up to 1.49 Mm^3/month of supply[5].

[5] This rate corresponds with the total annual supply of 21.604 Mm^3/year used in the Lower Likely Scenario Defined in the *Feasibility Study on the Okavango River to GrootFontein Link of the Eastern National Water Carrier* published by Water Transfer Consultants in August 1997, reduced by annual conveyance losses of 1 Mm^3/year

The prototype model assumes that three points of demand are served by the Central Namibia water supply system: Karibib, Okahandja, and Windhoek. Table 3 presents the assumed monthly demand for these three sites.

Table 3: Monthly Demands in Central Namibia

month	Karibib	Okahandja	Windhoek
January	0.15 Mm^3/month	0.19 Mm^3/month	1.9 Mm^3/month
February	0.15	0.17	1.7
March	0.15	0.19	1.875
April	0.15	0.18	1.825
May	0.15	0.18	1.825
June	0.15	0.17	1.7
July	0.15	0.17	1.7
August	0.15	0.17	1.7
September	0.15	0.18	1.8
October	0.15	0.2	2.0
November	0.15	0.2	2.0
December	0.15	0.2	2.0
Annual Total	1.8 Mm^3	2.2 Mm^3	22.2 Mm^3

The Central Namibian supply preferences defined in Current Accounts are as follows: For Karibib:

1. Use Swakoppoort Dam storage up to a rate of 0.2 Mm^3/month.
2. Use Von Bach storage to meet any remaining demand up to a rate of 0.2 Mm^3/month.

For Okahandji:

1. Use Von Bach storage up to a rate of 0.25 Mm^3/month.

For Windhoek:

1. Use all of the available reclaimed water.
2. Use local groundwater in the following amounts:
    a. 0.5 Mm^3/month if Von Bach is at less than 30% of capacity
    b. 0.25 Mm^3/month if Von Bach is between 30 and 50% of capacity
    c. 0.1 Mm^3/month if Von Bach is between 50 and 80% of capacity
    d. No local groundwater use if Von Bach is at more that 80% of capacity.
3. Use Von Bach storage up to a rate of 2.5 Mm^3/month.

The priorities for allocation from Von Bach Dam are as follows:

1. Meet Okahandja demand
2. Meet Karibib demand
3. Meet Windhoek demand
4. Carry-over storage in Von Bach

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and demands along the conveyance infrastructure of 2.721 Mm^3/year, and distributed evenly between the 12 months of the year.

The priorities for allocation from Swakoppoort Dam are as follows:

1. Meet Karibib demand
2. Transfer up to a 1.0 Mm^3/month to Von Bach Dam when Von Bach storage is less than 50% of capacity.
3. Carry-over storage in Swakoppoort

The priorities for allocation from Omatako Dam are as follows:

1. Transfer up to a 5.4 Mm^3/month to Von Bach Dam when Von Bach storage is less than 90% of capacity.
2. Carry-over storage in Omatako

No flood control reservation was modeled in any of these three dams, although simulated spills will occur when all allocations have been made and inflows push storage past full capacity.

Groundwater is pumped from the Grootfontein Aquifer and is transferred to storage in Omatako Dam at a rate of 1.49 Mm^3/month when dead storage levels are reached in Swakoppoort (1.573 Mm^3) and Omatako (3.575 Mm^3) Dams. In this way, remote groundwater serves as a secondary source of supply relative to surface water stored in the Central Namibia reservoirs. In practice, this means that any water transferred from Grootfontein to Omatako is sent on to storage in Von Bach and likely on to satisfy demand in Central Namibia.

A placeholder minimum instream flow object for flow into the Okavango Delta has been included in Current Accounts, in anticipation of future scenarios and management strategies which will require minimum delta inflows. The monthly requirement is set to 0 m^3/sec in Current Accounts to reflect the fact that no regulatory regime currently exists to enforce a minimum delta inflow standard. The minimum delta inflow object has been assigned a higher priority than consumptive demands in the system. As a result, when minimum monthly flow values are included in a particular scenario or management strategy, they will have the potential to constrain upstream surface water extractions and use.

An associated feature of the Current Accounts is a link to a regression model that simulates the flooded extent in the Okavango Delta as a function of this year's inflow, last year's inflow and this year's precipitation on the delta[6]. The form of the regression model is:

$$A(\mathrm{km}^2) = 0.79 \times Q(10^6 \mathrm{m}^3) + 5.59 \times P(\mathrm{mm})$$

$$+ 0.059 \times L(\mathrm{km}^2) - 817$$

where:

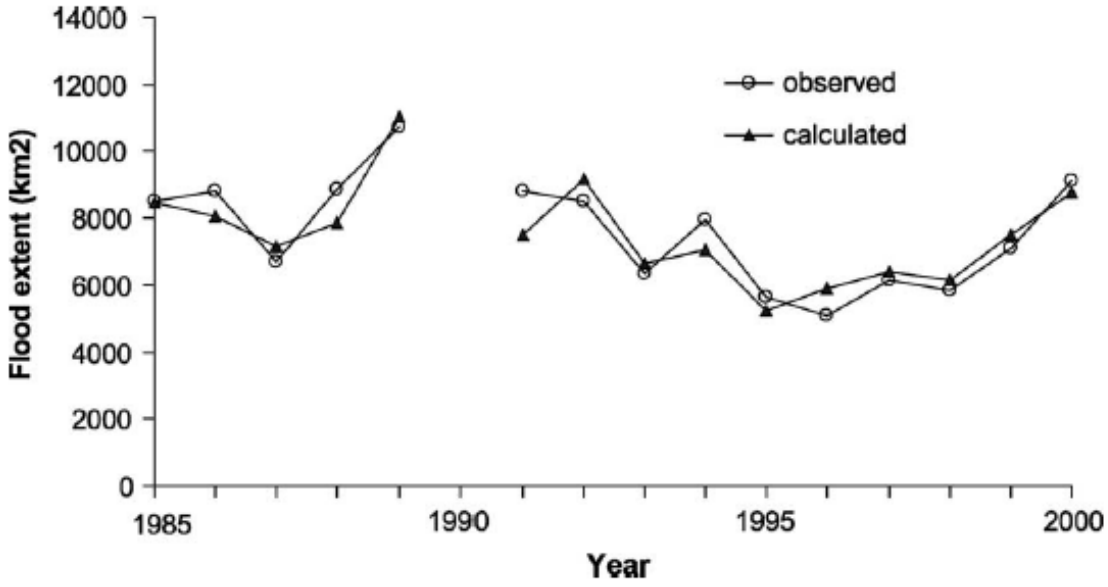
A	=	The extent of flooding during the current year
Q	=	Total delta inflow between November and August
P	=	Total precipitation on the delta between November and August
L	=	The total extent of flooding during the previous year

In the prototype model, the preceding expression is evaluated each year at the end of August when all required input data are available. The ability of the regression model to assess the actual extent of

[6] Gumbricht, T., P. Wolski, P. Frost, T.S. McCarthy. 2004. *Forecasting the spatial extent of the annual flood in the Okavnago delta, Botswana*. **Journal of Hydrology**. 290 (2004) 178-191.

flooding in the Okavango Delta is depicted in Figure 10. The use of this regression model in the prototype model is not intended to represent an endorsement of this approach to characterizing the potential impacts of upstream water management changes on the delta ecosystem. Instead, it serves to demonstrate the role that a water resources planning model of the upper basin linked to an ecological assessment model of the Okavango Delta can play in understanding the potential tradeoffs associated with the range of water management scenarios.

Figure 10: Flooded Extent in the Okavango Delta base on the Regression Model Developed by Gumbricht et al. 2004



Base Case: No Action

The base case included in the prototype model is the No Action alternative whereby all of the management assumption described in Current Accounts remain unchanged during a 13-year simulation using the base hydrologic time-series. For the No Action Base Case, and all other scenarios, the three reservoirs in the Central Namibian system were all assumed to be a 20% capacity to begin the simulation.

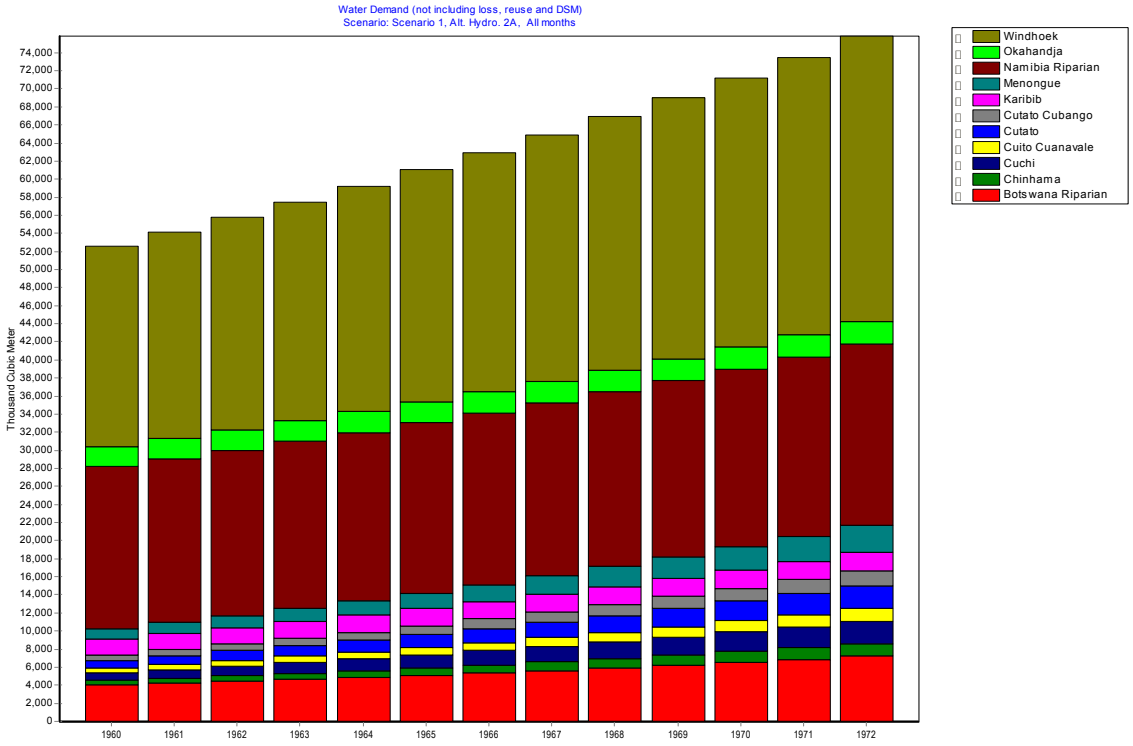
Scenario 1: Growth in Existing Demand

This scenario assumes that all existing demands in the system increase over the course of a 13-year simulation. In the Angolan portion of the basin, the assumption is that population doubles to a total of 1.2 million inhabitants as refugees return to the basin following the cessation of civil unrest. Per capita water use rates are assumed to grow at a rate of 3% per year from 7.3 to 10.4 m^3/person/year to reflect a steady increase in the level of development and associated water use in Angola. Demand in the Namibian riparian zone was assumed to increase slightly up to 20 Mm^3/year by the end of the 13-year period to reflect the fact that much of the permitted use in the region is not currently utilized and that only a slight increase in demand is needed to anticipate future increases in water use. For Bostwana's riparian demand, an assumed growth rate of 5% per year increased the demand from 4 to 7.3 Mm3/year, as many of the communities in the region have expressed an interest in increasing their access to Okavango River supplies, particularly for irrigation on the margins on the Okavango Panhandle and Delta.

As in the No Action Base Case, no link is made between water demand in Central Namibia and the Okavango in Scenario 1. In Central Namibia, water demand was assumed to grow at 1% per year at Karibib and Okahandji to reflect the relative stability of water use patterns in this region. Demand at Windhoek was assumed to grow at a rate of 3% per year. While this rate is probably high, it serves to create unmet demand in the later years of the simulation. In later scenarios, it will be assumed that this demand can be satisfied by a diversion from the Okavango. This assumption is not meant to suggest that such a diversion towards Central Namibia is a forgone conclusion. However, as Namibia has, expressed clear interest in developing the Okavango for use in the central part of the country it would beuseful to demonstrate how a water resources planning model can be used to weight the satisfaction of this demand against other objectives in the basin. In keeping with this approach, later prototype model scenarios the priority of any diversion towards Central Namibia is lower than the priority assigned to in-basin demands.

Figure 11 depicts the assumed Scenario 1 demand growth in all parts of the prototype model. Scenario 1 was run with each of the three proposed hydrologic time-series: Base; Alternative Hydrology 1; and Alternative Hydrology 1A.

Figure 11: Assumed Increase in Demand in the Okavango River Basin and the Central Region of Namibia



Scenario 2: Growth in Existing Demand, Angola Irrigation, Okavango Link to Central Namibia

This scenario represents a significant change from the No Action Base Case. Once again the demand growth depicted in Figure 11 is assumed to occur, with the addition of a substantial demand associated with the growth of irrigated agriculture in Angola. The assumption is that the irrigated area in Angola grows to 50,000 ha by the end of the 13-year simulation and that the annual irrigation

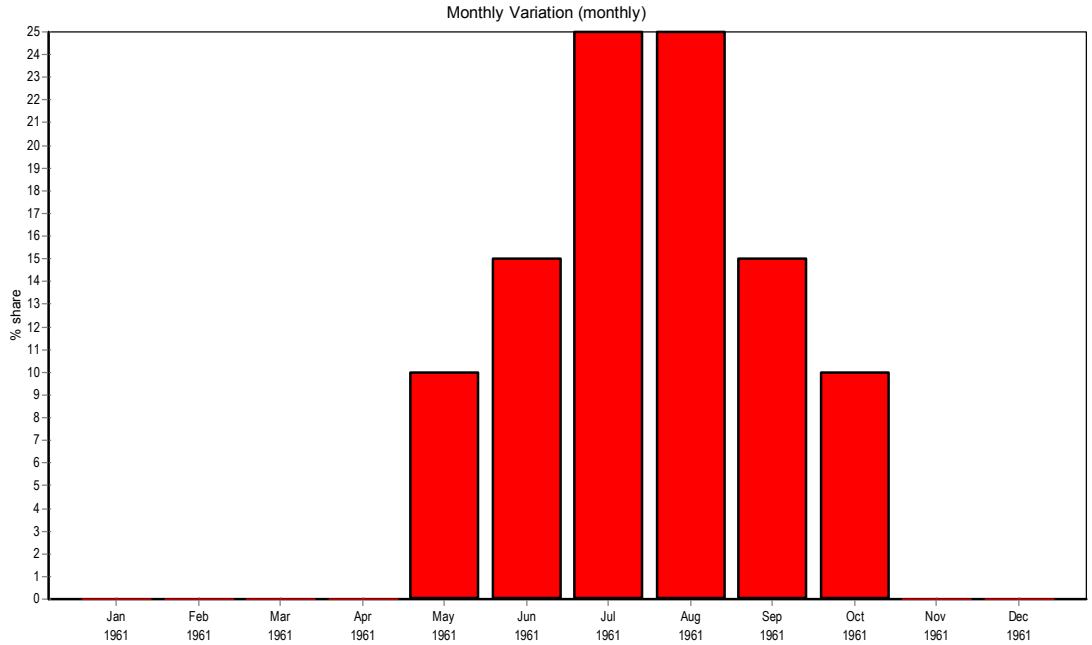
demand is 7000 m^3/ha. Based on these assumptions, the annual irrigation demand is Angola is as described in Table 4:

Table 4: Annual Angolan Irrigation Demand

Year	Irrigated Area	Requirement	Demand
1960	0.0 ha	7000 m^3/ha	0.0 Mm^3
1961	4167	7000 m^3/ha	29.2
1962	8333	7000 m^3/ha	58.3
1963	12,500	7000 m^3/ha	87.5
1964	16,667	7000 m^3/ha	116.7
1965	20,833	7000 m^3/ha	145.8
1966	25,000	7000 m^3/ha	175.0
1967	29,167	7000 m^3/ha	204.2
1968	33,333	7000 m^3/ha	233.3
1969	37,500	7000 m^3/ha	262.5
1970	41,667	7000 m^3/ha	291.7
1971	45,833	7000 m^3/ha	320.8
1972	50,000	7000 m^3/ha	350.0

It is further assumed that this demand is concentrated during an irrigation season that runs from May to October. The assumed distribution of demand during this period is shown in Figure 12. Finally, the allocation priority assigned to Angolan irrigation is lower that that used for the existing in-basin demands.

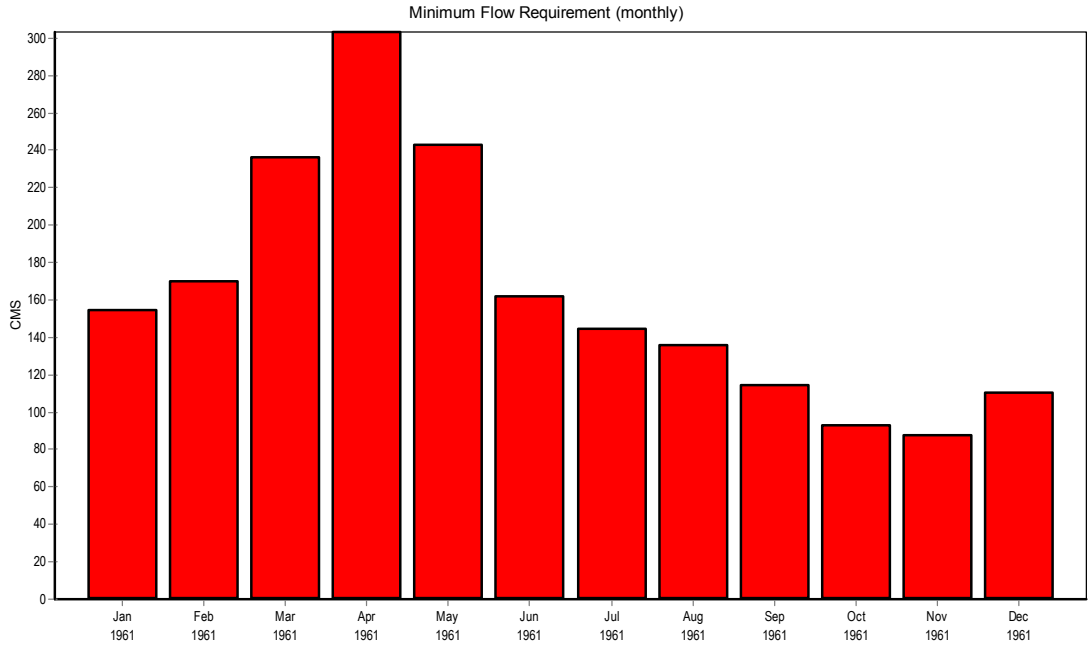
Figure 12: Distribution of Demand Across the Irrigation Season In Angola



This scenario also creates the link between the Okavango River and demand in Central Namibia by activating a transmission link between the river at Rundu and the Windhoek demand node[7]. This supply has been assigned the lowest preference, so it will only be tapped if all other supplies available in Central Namibia fail to satisfy Windhoek demand. The capacity of the link is set at 2.51 Mm^3/month based on the assumption that the remainder of the 4.0 Mm^3/month of available capacity from northern sources will be used to convey groundwater pumped at Grootfontein. As mentioned above, the priority assigned to this diversion is lower than that assigned to both existing in-basin demands and the assumed Angola irrigation. The diversion is located downstream of the assumed Angola irrigation return flows which are assumed to be 20%. As such, even in low flow conditions, the diversion may be possible if there are sufficient return flows. In addition to the Base Hydrology, this scenario is run using Alternative Hydrology 1 and 1A.

A second version of this scenario using Alternative Hydrology 1A assumes that a minimum instream flow standard is established for inflow to the Okavango Delta. The assumed standard is very simple, namely, delta inflow should not fall below the minimum observed monthly average flow at Mukwe. While the prototype model has the potential to utilize more sophisticated instream flow standards, the pattern depicted in Figure 13 is sufficient to demonstrate the utility of this aspect of the prototype model. As previously mentioned, the priority assigned to the delta inflow standard is higher than that assigned to other demands in the system and, as such, it may constrain deliveries to satisfy these demands.

Figure 13: Assume Minimum Okavango Delta Inflow Standard



[7] In reality, any Okavango River diversion will not be conveyed directly from Rundu to Windhoek. Instead it will first be delivered into storage in Omatako Reservoir and distributed using the infrastructure already in place to move water from Omatako to Central Namibia. In future versions of an Okavango River planning model the opportunities and constraints associated with the decision to divert water at Rundu will likely be more complex than the assumption in the prototype model that diversions pass directly to Windhoek. They need to be more fully integrated into the description of the water infrastructure in northern Namibia.

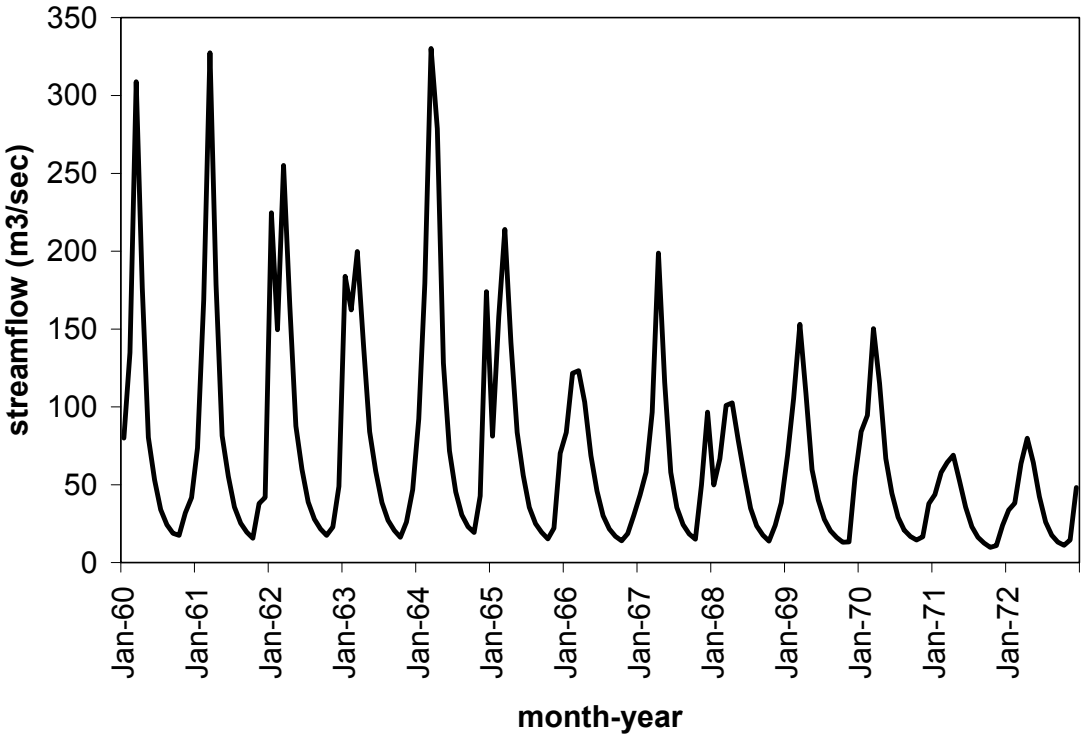
Management Strategy 1: Angolan Surface Storage

One potential response to the higher level of demand assumed in Scenario 2 is to construct surface storage in the upper portion of the basin. The assumed reservoir in this management strategy is located downstream of the confluence of the Kubango and Cutato Rivers. Figure 14 shows the combined incremental streamflow from these rivers at their confluence under Alternative Hydrology 1A. The peak flow rate in March 1964 translates to a volumetric inflow of 868 Mm^3/month.

While the assumed capacity of the proposed reservoir, 2500 Mm^3, is probably larger than any single reservoir in Angola would be, it represents a composite of the estimated storage at several potential reservoirs sites investigated by the Portuguese colonial authorities. It is assumed that the reservoir will have a flood reservation of 100 Mm^3 down to 2400 Mm^3 such that any incursions into the zone between 2400 and 2500 Mm^3 will result in a flood control release. The dead pool is assumed to lie at a storage level of 100 Mm^3. In addition, the simulated operations will cut back by 50% on releases to meet downstream demands when the storage on the proposed reservoir falls below 250 Mm^3.

The proposed management strategy is simulated using the demands described in Scenario 2, Alternative Hydrology 1A, and the minimum Delta Inflow requirements shown in Figure 13.

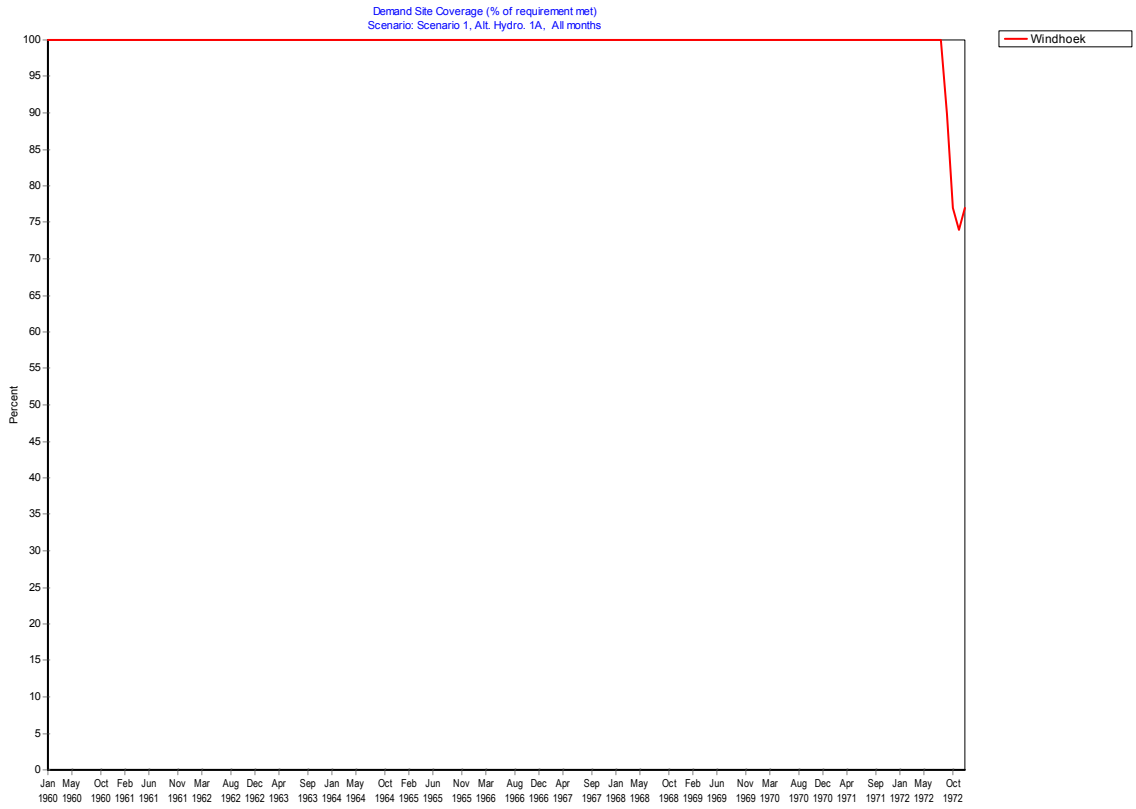
Figure 14: Incremental Streamflow Generated Upstream of the Proposed Upper Basin Storage Facility under Alternative Hydrology 1A



Simulation Results

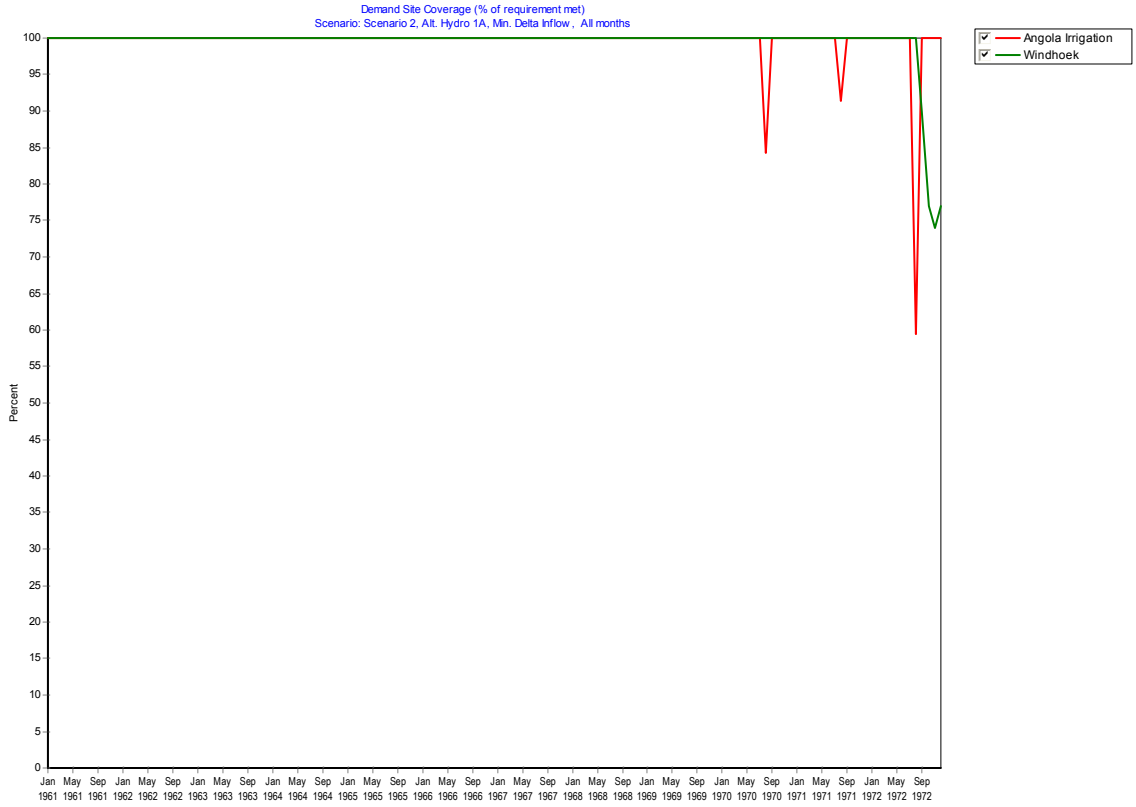
Based on the sequence of assumptions presented above, the prototype model of the Okavango River Basin generated a series of results regarding conditions in the system. From the perspective of a water manager, the most important result is whether or not it was possible to satisfy the assumed demands. In fact, the prototype model suggests that all growth in existing demand (Scenario 1) can be accommodated, except under Alternative Hydrology 1A where the driest years coincide with the highest projected levels of demand. In this case, the supply available in the Central Namibian water supply system fails to satisfy all of the demand at Windhoek in 1972 when a total annual shortfall of 2.310 Mm^3 occurs (out of a total projected annual demand of 31.652 Mm^3). Figure 15 shows the Scenario 1 monthly demand coverage at Windhoek under Alternative Hydrology 1A.

Figure 15: Demand Coverage, Scenario 1, Alterative Hydrology 1A



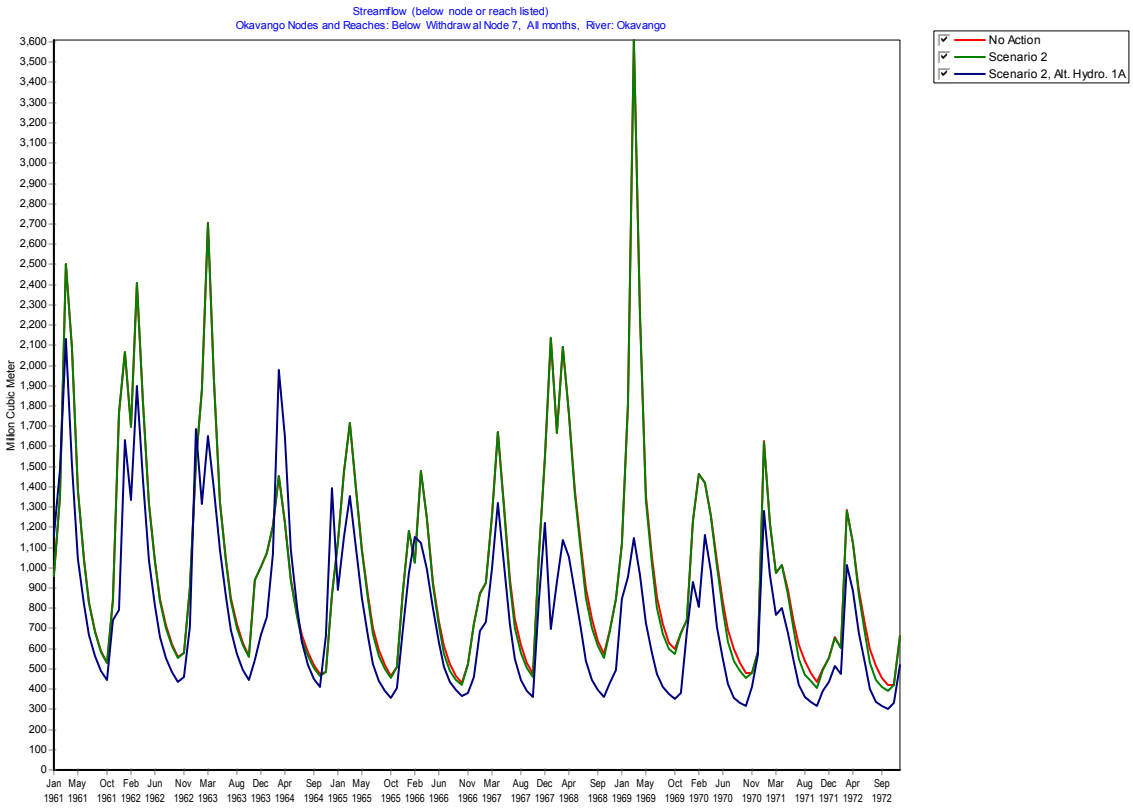
Under Scenario 2, where the link between the Okavango River and demand in Central Namibia is established and irrigation development occurs in Angola, the demand shortfalls are eliminated, even under Alternative Hydrology 1A. But when the minimum Okavango Delta inflow requirements are included, both Windhoek and Angolan irrigation experience demand shortfalls, as depicted in Figure 16. However, the ability to store water that comes with the construction of upper basin surface water storage in Management Strategy 1, allows for the satisfaction of all Scenario 2 demands, even when a minimum flow standard is set for the delta.

Figure 16: Demand Coverage, Scenario 2, Alterative Hydrology 1A, with Minimum Okavango Delta Inflow Requirements



However, from the perspective of an ecosystem manager, the critical consideration is how much water is flowing into the Okavango Delta and how this translates into conditions in the delta ecosystem. Figure 17 shows the simulated delta inflow for the No Action Base Case and Scenario 2 based on the Base Hydrology, and Scenario 2 based on Alternative Hydrology 1A. The growth of irrigation demand in Angola over the course of the simulation results in a slight decline in delta inflow in the latter part of the 13-year period under Scenario 2. The decline is further accentuated under Alternative Hydrology 1A when the largest demands coincide with the driest years.

Figure 17: Simulated Delta Inflows, No Action Base Case, Scenario 2, and Scenario 2 under Alternative Hydrology 1A



In terms of the flooded extent, the impact of upstream irrigation development is relatively minor. Figure 18 shows the simulated decrease in delta flooding when Angolan irrigation and the link between the Okavango and Central Namibia are included in Scenario 2. The implication is that according to the regression model used in the prototype model, the Okavango Delta will remain relatively resilient in terms of the annual extent of flooding in the face of demand increases assumed in Scenario 2. It is entirely possible; however, that the change in delta inflow shown in Figure 17 may have a more pronounced impact on some other aspect of the Delta ecosystem. Investigating this possibility will require links to other analytical tools for the Okavango Delta.

The imposition of a delta inflow requirement in Scenario 2 in conjunction with Alternative Hydrology 1A, which creates the demand shortfall depicted in Figure 16 does create a minor improvement in the flooded extent of the delta, as is shown in Figure 19, which plots the simulated increase in Delta flooding. Whether this improvement justifies the creation of a demand shortfall is exactly the kind of question that will be debated in the policy arena and for which the insights provided by a water resource planning tool such as the prototype model will prove invaluable.

Figure 18: Decrease in Delta Flooding between the No Action Base Case and Scenario 2

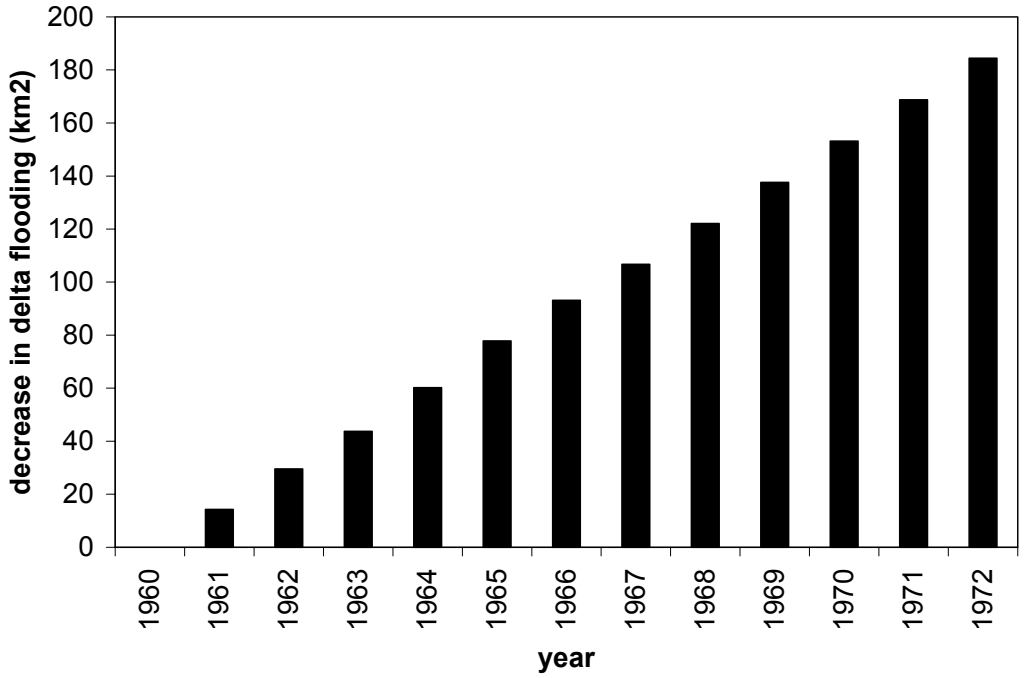
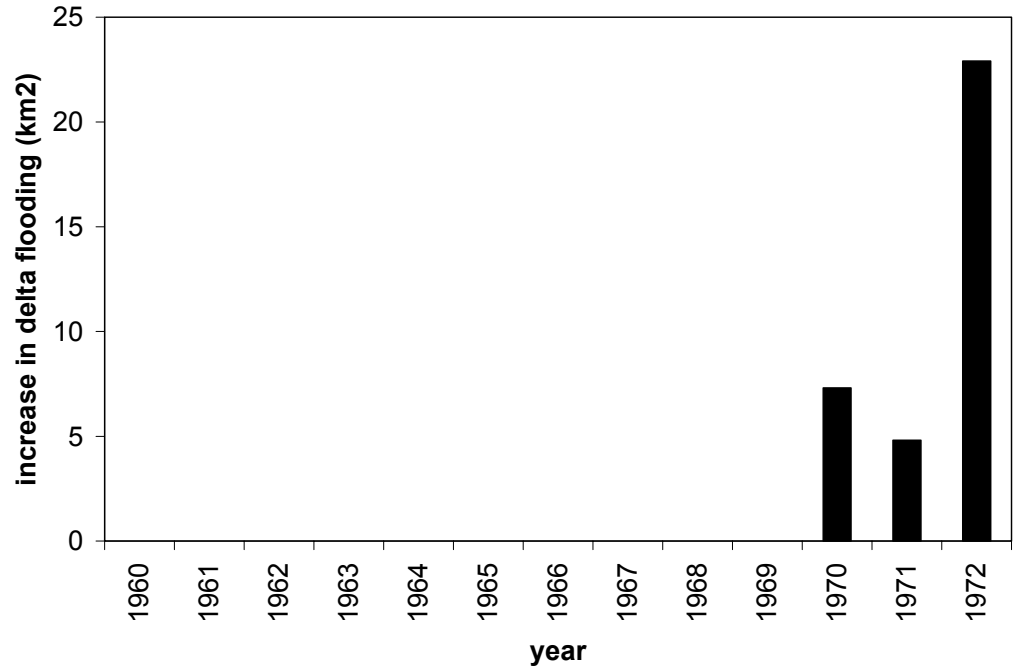


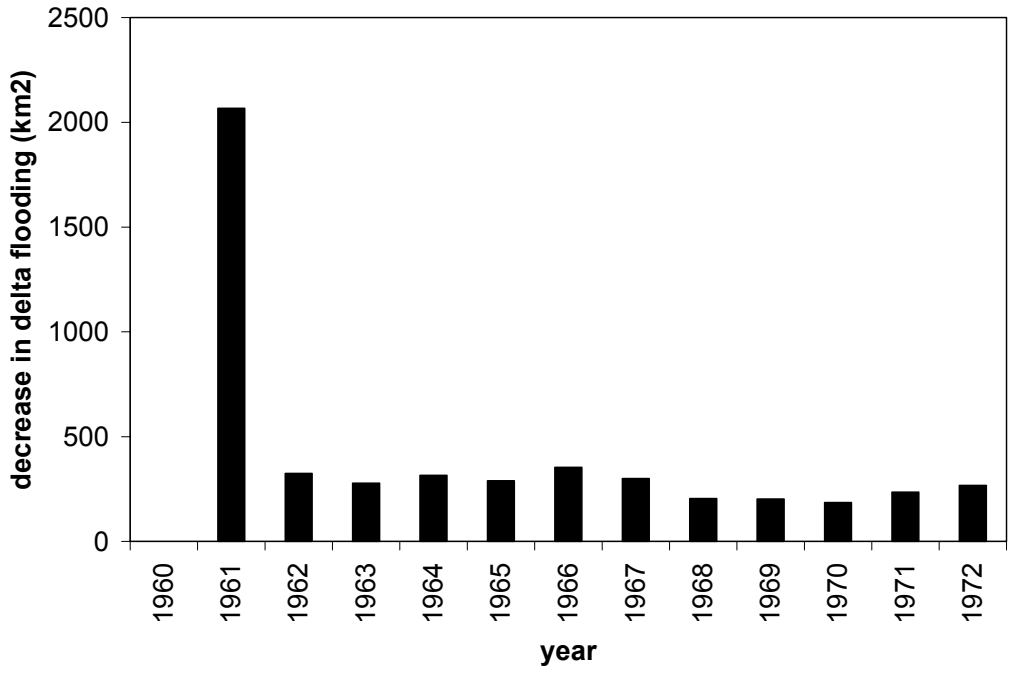
Figure 19: Increase in Delta Flooding under Scenario 2, Alternative Hydrology 1A, with the Imposition of a Minimum Delta Inflow Requirement



A final example of the sometimes counter-intuitive insights that can be gained from the application of a water resources planning model is derived by the simulation for Management Strategy 1, which

includes the construction of a surface water storage facility in the Angolan portion of the basin. Recall that this management strategy allows for the satisfaction of all demand in the system, including the unmet demand in Windhoek and the growing irrigation sector in Angola, while at the same time assuring the minimum level of delta inflow. The result, however, its that only the minimum delta inflow is provided as there is the capacity to store additional flows that previously would have flowed unimpeded into the delta. Figure 20 shows the degree to which the flooded extent in the delta decreases as a result of upstream dam operations. The large decrease in flooded extent during 1961 is associated with the filling of the newly created reservoir. A planning model can be used to improve the balance between infrastructure operation, demand satisfaction, and ecosystem integrity through the development and testing of alternative future scenario for the basin and associated management strategies.

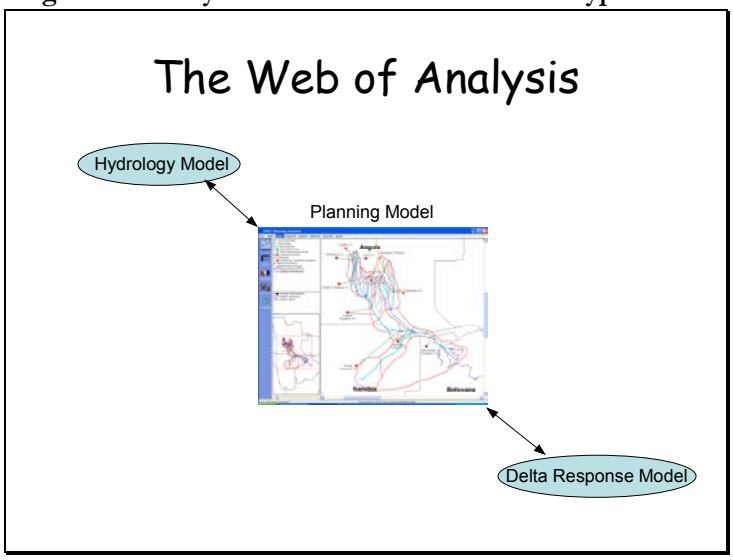
Figure 20: Decrease in Delta Flooding Associated with the Construction and Operation of the Surface Water Storage Facility in Angola



RECOMMENDATIONS AND CONCLUSIONS

Up to this point the prototype model has been deployed along the analytical sequence shown in Figure 21. The modified Pitman Model and the analysis of data for the Swakop and Omatako Rivers provides hydrologic input to the prototype water resource systems model which in turn provides simulated delta inflows under a number of scenarios to the Gumbricht model of the flooded extent in the delta. The potential role of such an analytical tool is obvious, the ability to understand the tradeoffs between the wide array of potential management options for the Okavango River system.

Figure 21: Analysis Conducted with the Prototype Model

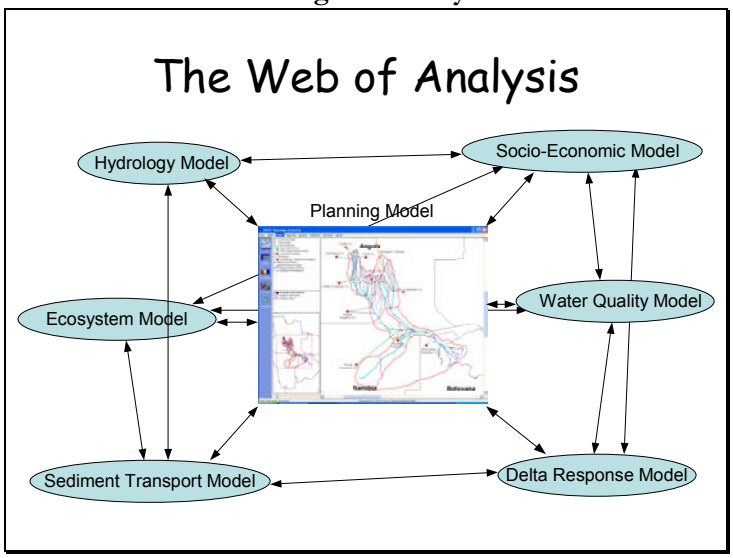


This does not suggest that the prototype model has been perfected to the point that it is ready to fully fill this analytical niche. Several issues should be addressed in the coming months. These include:

1. The establishment of hydrologic time-series that cover the full range of potential hydrologic futures and which are mutually accepted by all parties in the basin.
2. The consensus definition of additional scenarios that are both wider in scope and deeper in detail than those already included in the prototype model.
3. The definition of all of the critical indicators of ecosystem health, both in the Delta and in the mainstem river system, so that the appropriate array of ecological tools, which might include the regression model of flooded extent, can be developed and deployed.

Tasks 2 and 3 from the above list, in particular may require the use of analytical tools that have not yet been included in the prototype model. The best way to evaluate the tradeoffs implicit in the possible future management scenarios may be to use some sort of socio-economic model. This might help refine the questions of whether a particular consumptive use in the upper basin is justifiable relative to the economic and aesthetic of a vibrant and resilient ecosystem in the Okavango Delta. The resiliency of the delta and the mainstem ecosystem could, in turn, require analysis of water quality, sediment transport and habitat conditions. In the end, however, some form of the prototype planning model will lie at the center of future analysis as this is where the range of potential management scenarios are defined and evaluated. Although once an acceptable set of scenarios is defined, some direct analytical linkages between the individual analytical tools in the assembled suite of models will be established. Figure 22 demonstrates how the chain of logic represented by the prototype model could be extended into a web of analysis.

Figure 22: Schematic Representation of the Ultimate Analytical Framework for the Okavango River Ssytem



In order to develop this web of analysis, several steps need to be taken. These include:

1. The definition of critical socio-economic priorities in the basin.
2. The identification of critical components of ecosystem vitality in both the Okavango Delta and the mainstem river system.
3. The selection of analytical tools that can assess these critical considerations.

The Okavango Delta Management Plan under development in Botswana provides a model of how these steps can be accomplished that could perhaps be applied to the basin as a whole.

Appendix W.

SHARING WATER

Towards a Transboundary Consensus on the Management of the Okavango River

Gender Scope of Work

Funded by USAID
Cooperative Agreement 690-A-00-03-00126

Award Year: 2003

Gender Scope of Work

Background

The Sharing Water Project is an 18-month USAID cooperative agreement (Feb. 2003 – August 2004) that is being implemented by the Natural Heritage Institute with several international and local partners (please see attached Project Brief). It is a joint fact-finding process amongst the diverse stakeholders of the Okavango River Basin in Angola, Namibia and Botswana. The project will provide stakeholders with a transparent, user-friendly data management system and initiate the development of a decision-making model.

In addition, Sharing Water will support the development of an Integrated Management Plan by the Permanent Okavango River Basin Commission (OKACOM). The goal of the plan is equitable and sustainable sharing of the waters of the Okavango Basin. The success of the plan and transboundary water governance depends upon more participatory decision-making, shared analytical tools and transparent policies related to information.

The success of the OKACOM plan also depends on recognizing shared and divergent interests and developing strategies to manage actual and potential conflicts. Gender is one important factor related to water management and use. From a substantive perspective, women and men may have different perspectives on the collection, use and management of water for home and land use purposes. From a representation and participation perspective, men and women may not have equitable representation within the institutions and committees that govern water use. In addition, women and men may not have the same presentation, advocacy and technical skills to effectively convey their perspectives to water decision-makers. Accordingly, water decision-makers may not always hear the interests of sub-groups of women (as well as some sub-groups of men). As water management scales up to the trans-boundary level, it is increasingly critical for decision-makers to operate with complete information about water use by different stakeholders and gender differences between water stakeholders.

Accordingly, Sharing Water is seeking gender expertise to help build the capacity of the project staff and partners. The objectives of this expertise would include:

- Building the capacity of project staff and partners to identify and address the gender issues related to transboundary water planning and management.
- Building the capacity of project staff and partners to address gender issues at different stages in the project cycle, i.e., planning, implementation and evaluation.
- Providing periodic technical support to project staff and partners after the initial workshop so as to reinforce the skills learned.

General Scope of Work

- Contribute necessary gender mainstreaming tools to help ensure the broad regional ownership that is needed for the success of the Sharing Water Project.
- Provide advice on how to balance time constraints within the project with needs for broad-based participation and consultation against the rush to deliver the project deliverables.
- Facilitate an effort to pinpoint lead and support on gender training and tracking gender-related progress over the life of the project.
- Highlight opportunities to ensure equitable male-female participation in the Sharing Water Project and ensure that tools and management options do not have skewed negative impacts by gender.
- Guide project partners, as a group, to be more explicit about who will be involved or consulted for Sharing Water activities. Consult on the creation of a tracking and record-keeping system and on who will lead/support in these activities.
- Ensure that all stakeholder analyses address activities, resources, and roles of different groups (e.g. women, men, youth, elderly) including an understanding of the relative power of women and men in managing such resources
- Consult on remedial action to improve participation if there are significant gender-based differences. In other words, look for a broader set of data to develop management strategies.
- Make sure that women's and men's interests and knowledge are not "averaged" in a representation of community voices.
- Establish in the introduction, funding, and/or other encouragement of specific upstream enterprises both women's and men's needs are considered and addressed.

Specific Tasks

- Review documentation of preliminary gender sensitivity review and project orientation completed at Sharing Water's 1st meeting (see Gender Outputs Report).
- Coordinate the collection of information on gender resources/ contacts (e.g., complete names, expertise, current contact information) that were identified during the 1st meeting by all project partners. Facilitate organization of these resources and determine for which tasks they might advance.
- Preparation of interactive presentations on the gender issue specifically related to the planning, implementation and evaluation activities of the Shared Water Project. These activities could be introduced during the workshop in Namibia in March 2004 and reinforced during the July workshop in Maun, Botswana.
- Report on gender-related recommendations for the Sharing Water staff and partners.
- Research and provide gender-related input for the shared database (Completed for Sharing Water 1st meeting, see Gender Outputs).
- Provide gender-related input to the planners of facilitation workshops.
- Provide gender-related input on strategies for stakeholder meetings and comment on draft report on modeling parameters.
- Provide gender-related input on methodological approach for Task 7 legal and institutional report.
- Provide gender-related input on how to include gender considerations into option generation and maximum joint gain analysis.
- Assist Sharing Water to identify specific constraints that may differentially affect women.

- Provide gender-related input on design of training session on the database and model, as well as discuss of how to ensure that women participate.
- Develop gender-related lessons learned for final PowerPoint presentations.
- For training, combine a short needs assessment with the pre-training test of knowledge, skills and attitudes to understand and better tailor training to gender differences.
- Remind partners periodically about their gender-related commitments. Postcards or short e-mails could be sent out prior to each workshop to remind each person.
- Review and potentially add to Project Progress Indicators – both qualitative and quantitative – and consult on how to track and measure them with accuracy to produce valuable and meaningful analyses