



ANNUAL REPORT

Resilience in the Limpopo Basin

Program (RESILIM)

October 2013 – September 2014



[Photo: Women from the Kgesti ya Tsie Women's group illustrate how they press the oil from the marula kernel. Credit: Lara Rall, RESILIM Program]

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ACRONYMS

APS	Annual Program Statement
CBRNM	Community Based Natural Resource Management
CDS-ZC	Centre of Sustainable Development of Coastal Zones
COMESA	Common Market for Eastern and Southern Africa
CSAG	Climate Systems Analysis Group
CSIR	Centre for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DG	Director General
DST	Department of Science and Technology
DWA	Department of Water Affairs
GCM	Global Climate Models
GIS	Geographic Information System
GLTFCA	Great Limpopo Transfrontier Conservation Area
GWP-SA	Global Water Partnership-Southern Africa
ICP	International Cooperating Partners
IWRM	Integrated Water Resource Management Plan
JPTC	Joint Permanent Technical Committee
KCS	Kalahari Conservation Society
KYT	Kgesti ya Tsie Women's Trust
LEDET	Limpopo Department of Environment and Tourism
LIMCOM	Limpopo Watercourse Commission
NCCRS	National Climate Change Response Strategy
NGO	Non-government Organization
RESILIM	Resilience in the Limpopo River Basin
SACF	Southern Africa CBNRM Forum
SADC	Southern Africa Development Community
SAREP	Southern Africa Regional Environmental Program
SAWC	Southern African Wildlife College
TAG	Technical Advisory Group
UNEP	United Nations Environmental Program
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WENSA	Wildlife Enforcement Network of Southern Africa
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

As reported in Year One, RESILIM together with its consortium partners developed a life-of-program Monitoring and Evaluation Plan that supports USAID's Performance Management Plan. The development of the Monitoring and Evaluation Plan was guided by the USAID Global Climate Change Standard Indicators, to ensure that the RESILIM program contributes to USAID's high-level goal of increased sustainable growth in specific target areas.

This annual report presents progress in relation to the RESILIM Program indicators as established in the Monitoring and Evaluation Plan with a highlight of achievements in a) reducing climate vulnerability and b) improving conservation and management of priority ecosystems. The report further discusses the major activities in Year Two, any problems or challenges encountered and remedial actions taken, successes and lessons learned, and ongoing collaboration with the implementing partners of the RESILIM Cooperative Agreement, and the way forward for the RESILIM program.

HIGHLIGHTS

Climate vulnerability reduced

In Year Two RESILIM significantly surpassed the target set for training stakeholders in water conservation and water demand management¹. The RESILIM program is always looking for opportunistic activities that are both in line with program indicators and that will get traction on the ground. Upon a request for support, RESILIM partnered with the South Africa Department of Water Affairs² in Limpopo Province to train the 119 community members, of which 89 were women, in water quality and waste management to increase their capacity to better conserve water and biodiversity at a local level in the Limpopo. See *2.1.5 Training stakeholders in water conservation and water demand* for more details.

RESILIM also achieved its target of **producing two scientific reports**³ to improve the science for decision-making and the development of climate change adaptation strategies.

- a) As reported in Year One, RESILIM conducted a risk and vulnerability assessment of the basin and in Year Two, RESILIM produced a draft synthesis report from this assessment to improve the science for decision-making and the development of climate change adaptation strategies. See *Basin Baseline Vulnerability Assessment* under [2.1.1 Risk, Vulnerability and Resilience in the Limpopo River Basin](#).
- b) In Year Two, RESILIM also provided the Centre of Sustainable Development of Coastal Zones (CDS-ZC) with the science-based information needed to select a replantation site for

¹ Indicator C.1.5 *Number of stakeholders trained water conservation and water demand management*

² After the National Elections in South Africa in 2014, the department has changed to the Department of Water and Sanitation. However, in this report, reference will be made to the department as it was known for most of Year Two, the *Department of Water Affairs*.

³ Indicator C.1.3 *Number of scientific studies/ technical reports published or conference presentations given as a result of RESILIM program assistance for research programs*

mangrove rehabilitation in the Limpopo River Estuary. See [2.1.3.1 Building the resilience of mangrove ecosystems in the Limpopo River estuary](#).

RESILIM also **piloted three scalable climate change adaptation projects** in the basin to build the resilience of people and ecosystems in the basin and reduce the climate change vulnerability of the basin. RESILIM partnered with the:

a) CDS-ZC to support mangrove ecosystem restoration and conservation. See [2.1.3.1 Building resilience of the mangrove ecosystems in the Limpopo River estuary](#) for more detail.

b) Southern Africa Wildlife College (SAWC), an independent training institution to address the need for skilled conservation managers in southern Africa, to develop resilience building training modules to provide professional and technical training to local communities to build the capacity of individuals and institutions of influence to enhance the development and implementation of initiatives that improve the socio-ecological resilience of the basin. See [2.1.3.2 Developing resilience building training through the Southern African Wildlife College](#) for more detail.

c) Kalahari Conservation Society (KCS) to support a women's group Kgetsi ya Tsie (KYT), which produces marula oil, to improve the quantity and quality of their oil production for export to the western market and in doing so build the resilience of these women to the impacts of climate change. See [2.1.3.3 Diversifying livelihoods through marula oil production](#) for more detail.

RESILIM also supported the **development of the Botswana National Climate Change Strategy and Policy**. In Year Two, RESILIM's Chief of Scientist was part of the Technical Reference Committee responsible for the development of Botswana's National Climate Change Policy and Strategy. RESILIM further supported the development of the strategy by facilitating the **training of 24 members of the technical reference committee in climate vulnerability and mapping** to ensure the increased capacity of the committee to integrate a climate change adaptation strategy into a long-term Climate Change Strategy and Policy. This training followed on the successful pilot of similar training to policy-makers from the Limpopo and the Okavango Basin in Cape Town earlier in Year Two. Five stakeholders from the Limpopo River Basin attended the training. See [2.1.6 Building the capacity of policy-makers through training in climate change vulnerability](#) for more information.

On various occasions RESILIM **reached stakeholders in the basin to increase their knowledge and raise their awareness** of the impacts of climate change adaptation measures and promote the access and use of science-based information for decision-making:

a) In a one day workshop, 46 delegates participated in the validation of the risk and vulnerability assessment. See *Validation of risk and vulnerability assessment* under [2.1.1 Risk, Vulnerability and Resilience in the Limpopo River Basin](#).

b) A total of 57 stakeholders were reached through the training needs assessments conducted by SAWC through RESILIM's support in the development of resilience building training. See [2.1.3.2 Developing resilience building training through the Southern African Wildlife College](#) for more details.

Conservation and management of priority ecosystems improved

In Year Two, RESILIM exceeded the target set the number of stakeholders trained in natural resources management and biodiversity conservation practices⁴:

- RESILIM trained **29 members of KYT** in best practices on mass production of marula oil, including sustainable natural resource harvesting, techniques in safety and hygiene in oil processing and more, through an exchange visit to a successful marula oil production organization in Swaziland. See [2.1.3.3 Diversifying livelihoods through marula oil production](#).

This training can be scaled up to other areas in the basin to build the resilience of other communities and reduce their vulnerability to climate change. In the following year, lessons learned from RESILIM's support to KYT will be documented in various formats and made available to other stakeholders in the Limpopo River Basin and other river basins.

- RESILIM, through SAWC also trained **82 women in natural resource-based enterprise development** linked to local livelihoods and conservation. The course linked to CBNRM looked at how marginalized women can build their resilience to the impacts of climate change through building plant-based enterprises. See [2.1.3.2 Developing resilience building training through the Southern African Wildlife College](#).

The lessons learned and the recommendations from the training report give RESILIM and other potential partners, guidance on the way forward for natural resource-based enterprise processes. The lessons learned will also be taken into the development and enhancement of the existing SAWC modules to be resilience building focused and is linked to the issues of climate change adaptation and biodiversity conservation, targeting transboundary land use and conservation management.

Although RESILIM did not plan to support the development of a management plan that promotes integrated natural resource management⁵ in Year Two, RESILIM was able to support the development of a management plan for weed management in the basin. The Joint Permanent Technical Committee (JPTC), established through a bilateral agreement between Botswana and South Africa to coordinate their efforts to improve natural resource management practices that mitigate threats to biodiversity, requested RESILIM's continued support with the purchase of aerial photographs of the Limpopo River on the borders of South Africa and Botswana to determine the status of the water hyacinth infestation in the Limpopo River. Following the interpretation of the photographs, the JPTC was able to **draft a management action plan for water quality and aquatic weed monitoring** that integrates natural resource management. See [2.2.4 Water quality and aquatic weeds monitoring and management](#).

In Year Two, RESILIM, through its support to CDS-ZC, mapped the river estuary to determine the status of mangrove vegetation and as reported above, provide the science-based information for sound decision-making. This **assessment** assisted CDS-ZC to make an informed decision in selecting a replantation site and **improve their natural resource management practices that**

⁴ Indicator C.2.3 Number of stakeholders trained in natural resources management and biodiversity conservation practices as a result of RESILIM program support

⁵ Indicator C2.5 Number of management plans promoting integrated natural resources management officially proposed, adopted, or implemented for vulnerable hotspots as a result of project support

mitigates the threats to biodiversity in the Limpopo River Basin. See [2.1.3.1 Building the resilience of the mangrove ecosystems in the Limpopo River estuary](#) for more information.

As part of the development of resilience training through the SAWC, RESILIM delivered specialized governance **training to 28 community members** from the Makuleke village to shift from a representational governance structure to a participatory structure that promotes transparency and accountability, which allows for increased resilience in the face of climate change and degrading natural resources. The trainees were trained in how to govern high variable, stochastic and natural-resource dependent ecosystems. See [2.1.3.2 Developing resilience building training through the Southern African Wildlife College](#).

See [Annex One](#) for a full Monitoring and Evaluation Report.

CHALLENGES

Relocation of field office

As reported in Year One, RESILIM relocated the field office from Maputo, Mozambique to Pretoria, South Africa. The initial thought was that it would be beneficial for RESILIM to be close to the LIMCOM Executive Secretariat in Maputo as the program is designed to support LIMCOM and will regularly engage the LIMCOM Executive Secretariat. However, an unfavorable working environment such as regular power outages, internet failures and others, including the fact that the LIMCOM Executive Secretariat was in a tenuous position made effective and efficient work progress challenging. RESILIM, with USAID's consent, made the strategic move to relocate the field office to Pretoria, with a supporting field office in Gaborone, Botswana.

The RESILIM program moved from its start-up phase into implementation phase in the midst of the relocation with no final PMP or baseline set for program indicators. Moving into Year Two, RESILIM worked closely with USAID and its consortium partners, to refine and finalize the PMP and set ambitious targets for each indicator⁶ for the life of the project.

The relocation from Mozambique to South Africa, which included the recruitment of new local staff, impacted the speed which RESILIM was able to develop the necessary partnerships and arrangements to reach RESILIM's targets such as the pilot of at least ten climate change adaptation projects of scale.

Limited functionality of LIMCOM

As mentioned above, the RESILIM program is designed to support LIMCOM. RESILIM has, however, experienced major challenges in engaging LIMCOM to ensure their buy-in and ownership of various RESILIM outputs, delaying RESILIM's partners in moving forward with their deliverables such as in-country consultations for the development of the basin-wide disaster risk reduction strategy, the development of basin-wide communication strategy, and others.

RESILIM has been able to secure a number of meetings with the LIMCOM technical committee who advises the commissioners, but the technical team was unable to make clear decisions at these

⁶ The targets accumulate over the five years of the RESILIM program.

meetings. LIMCOM still does not have a permanent Executive Secretariat, who has the vital functionality of the coordination of commissioner meetings and pushing for decision-making. The launch of LIMCOM in July 2014 as brought potential for change and forward movement on this front, but little has thus far changed since the celebration.

CURRENT EFFORTS AND NEXT STEPS

RESILIM is in the process of reviewing its Annual Program Statement (APS) based on RESILIM's performance in the past two programmatic years as guided by the program indicators. The purpose of the APS is to call for innovative and cost-efficient proposals for climate change adaptation and biodiversity conservation initiatives in the four riparian countries that will build the resilience of people and ecosystems in the basin. RESILIM wants to ensure that, moving forward, the APS is addressing the areas where the program is lacking progress or results.

As mentioned above, RESILIM is experiencing challenges in moving forward with certain deliverables, due to the limited functionality of LIMCOM. One such deliverable is the development of a basin-wide communication strategy for LIMCOM to improve the transboundary management of the basin, and guide knowledge management and awareness raising of climate-related issues in the basin. In the coming months, RESILIM together with its consortium partners Global Water Partnerships Southern Africa (GWP-SA) and Overseas Strategic Consulting (OSC) are developing a "Plan B" to get the traction needed⁷ in the promotion of access and use of science-based information for stakeholders, while at the same time supporting LIMCOM and its implementing partners in building their communications capacity. See [2.3.2 Support to LIMCOM: building communications capacity](#).

LESSONS LEARNED

Need for RESILIM presence in all four countries

This past year RESILIM learned that there is need for continuous presence on the ground in all four countries. As reported in Year one, it is a challenge for RESILIM to work across four countries in such a large geographical area⁸. RESILIM has an office in Pretoria, South Africa and an office in Gaborone and it proved to be easier to manage projects within those two countries. In Mozambique and Zimbabwe, where RESILIM does not have a permanent presence, the program finds it challenging to for instance, facilitate or design activities or mobilize communities.

Need for coordination and integration

The RESILIM program identifies partners in the four countries such as non-government organizations (NGOs), private companies, government departments, and others to design activities that build the resilience of people and ecosystems in the basin. RESILIM, however, has a limitation in how partners can be engaged through its deliverable-based, contracting mechanisms. RESILIM found that there is no motivation for its partners to engage on activities that promote coordination and integration of

⁷ Indicator C.3.3 *Number of people reached through awareness campaigns to promote access and use of science-based information for stakeholders* and Indicator C.3.4 *Number of knowledge management and communication strategies/materials for integrated and sustainable water management officially proposed or adopted to promote integration of climate change as a result of RESILIM program support*

⁸ The Limpopo River Basin covers an area larger than 416 000km².

other relevant activities in the basin, due to the emphasis the contracting mechanisms place on deliverables. RESILIM finds there can be a lack of the bigger vision to coordinate and integrate activities to cost-effectively build the resilience of the basin.

I INTRODUCTION

The Resilience in the Limpopo River Basin (RESILIM) Program is a five-year USAID-funded program committed to improve the lives of communities and the sustainability of ecosystems in the basin. The Limpopo River Basin stretches over the four countries of Botswana, Mozambique, South Africa and Zimbabwe where millions of people face water shortages, increased floods, and declines in crop productivity as climate change further stresses an already dry region. Transboundary cooperation between the four riparian countries and additional action is needed to prevent further degradation of critical river ecosystems that support livelihoods in the basin.

RESILIM's key counterpart and stakeholder is the Limpopo Watercourse Commission (LIMCOM), a sub-structure of the Southern Africa Development Community (SADC) and an advisory group to provide a forum for four riparian countries to collaborate, coordinate, and cooperate on Limpopo water-related challenges. In parallel to collaborating with LIMCOM, RESILIM provides support to the national-level institutions that comprise the transboundary organization.

RESILIM's mission is to improve the resilience of communities and ecosystems in the basin by working closely with various partners to offer communities alternative livelihood options and ground-breaking natural resource management strategies.

The program's objectives are to:

- Reduced climate change vulnerability of the Limpopo River Basin
- Improved the conservation and management of ecosystems
- Improved capacity of stakeholder in the basin to manage water and ecosystem resources

RESILIM is working closely with its consortium of partners to ensure these objectives are achieved. RESILIM partners include:

- Global Water Partnership – Southern Africa (GWP-SA), an intergovernmental water resource management network that supports the sustainable development and management of water resources at all levels in Southern Africa;
- OneWorld Sustainable Investments (OneWorld), a regional climate change entity with experience in developing and implementing climate change programs and strategies across Sub-Saharan Africa;
- Overseas Strategic Consulting (OSC), a certified small business that provides strategic communications programs with measurable results throughout the world.

The above listed objectives of the RESILIM program makes up the three components of RESILIM's work.

2 YEAR TWO PROGRESS RELATIVE TO RESULTS

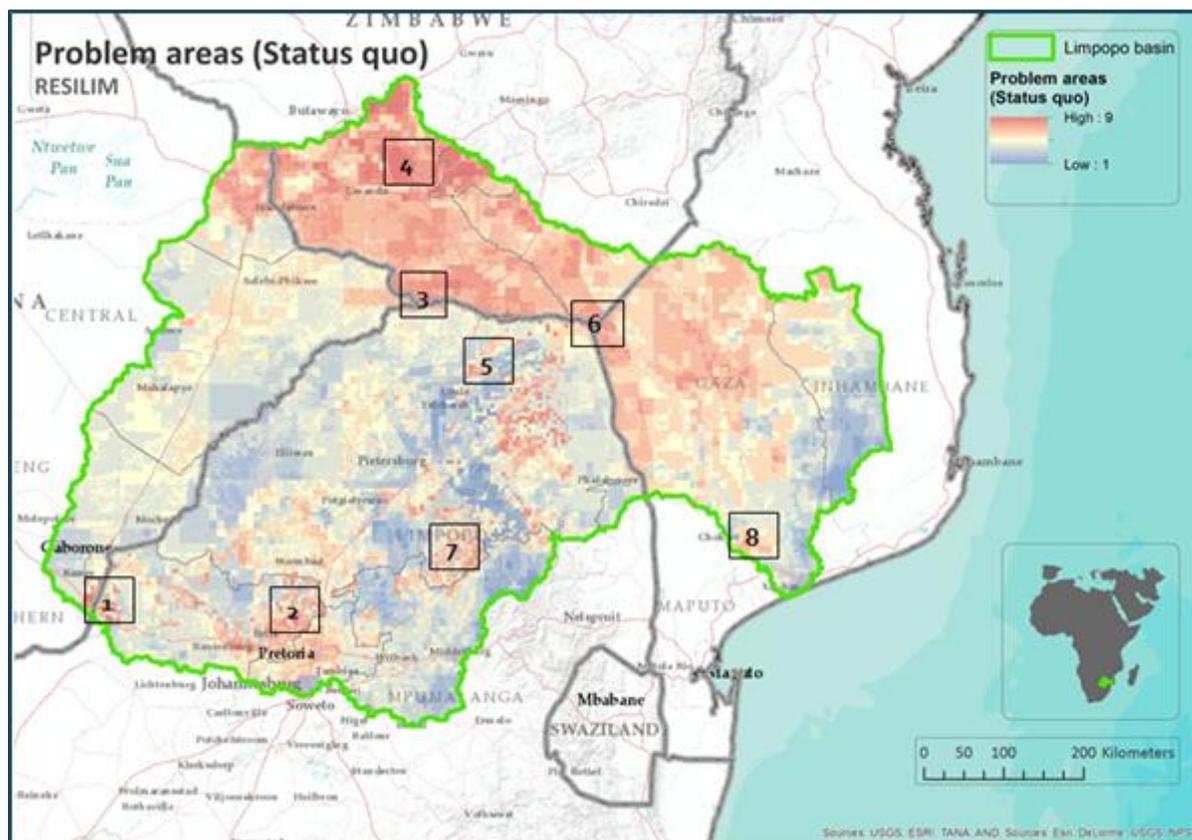
2.1 COMPONENT 1: CLIMATE VULNERABILITY OF THE LIMPOPO RIVER BASIN REDUCED

2.1.1 Risk, Vulnerability and Resilience in the Limpopo River Basin

Basin Baseline Vulnerability Assessment

As reported in Year One, RESILIM, through its consortium partner OneWorld, conducted a desktop risk and vulnerability analysis to better understand climate-related risks to ecosystems and people living in the basin. The analysis resulted in the identification of eight representative case study areas of high vulnerability in the basin. The purpose of the descriptions and prioritization of these vulnerable areas, which represent basin-wide impacts of climate change, is to provide a means through which the RESILIM program may assist LIMCOM in developing effective responses to the challenges of climate change, ecosystem degradation and vulnerable livelihoods.

The study however notes these case studies have multiple dimensions of vulnerability and they are not the same in each place. Therefore different approaches are needed in different locations.



The eight highly vulnerable areas in the basin, as identified in the risk, vulnerability and resilience assessment

1. Upper Limpopo (Botswana and South Africa)
2. Pretoria North (South Africa)
3. Shashe-Limpopo River Confluence (Botswana, Zimbabwe and South Africa)
4. Upper Umzingwane (Zimbabwe)
5. Soutpansberg (South Africa)
6. Pafuri Triangle (South Africa, Mozambique, Zimbabwe)
7. Lebowa – Middle Olifants (South Africa)
8. Lower Limpopo (Mozambique)

Climate impacts and the political economy

In order for RESILIM to develop resilience to climate change impacts across the basin, the program must draw on a deeper local understanding of systems and dynamics, and how these do or do not telescope up to larger scales where they can achieve real transformative change.

In Year Two RESILIM built on the above mentioned analysis and looked at the political economy that governs the basin as a system to better understand how decisions are made, where the power of decision-making lies, and how current and projected vulnerability to climate change might impact the basin's political economy. The study recognizes that climate change adaptation requires an understanding of how climatic and socio-economic conditions are likely to evolve.

The study drilled down its research to each of the eight representative case studies to analyze the biophysical, economic, and socio-political systems which characterize each of these case studies, to better understand what climate change means for the basin. This was done by exploring the best and worst case scenarios of climate change impacts in each of these highly vulnerable areas. See [Annex Two](#) for more information on the methodology for the analysis on the climate impacts and the political economy in the Limpopo River Basin.

The above mentioned analysis found that the LIMCOM, established in 2003 and ratified in 2011 by the national water departments of the four riparian countries for the purpose of collectively managing the water resource, is still in its infancy. Therefore most management and technical power still resides with the national water departments of the four countries, meaning that national vested interest continues to prevail.

The study also found that there are no data and information sharing protocols or mechanisms in place between the four riparian countries and no national or transboundary strategies on climate change adaptation.

Recommendations for adaptations of scale in the basin

The results were compiled in a draft synthesis report which included recommendations for climate change adaptation innovations of scale. The findings and knowledge gained informed RESILIM and OneWorld, in the exploration and suggestion of alternative approaches to increase sustainability in the context of resolving the drivers of vulnerability that require system-wide interventions in that are not necessarily in, but not limited to, the representative case study areas of vulnerability.

Suggestion for areas of focus

Suggestions of focus	Why	Expected results
High-altitude catchments	The annual runoff per unit area from the upland catchments is 100 times that of the low-lying areas of the basin. Therefore, the protection of biodiversity and ecosystems, especially along the mountain ranges, results in the most optimal generation of high quality runoff from rainfall – this includes the removal of alien woody vegetation which is invading these well-watered upland catchments.	Most optimal generation of high-quality run-off from rainfall. Leads to biodiversity and ecosystem conservation.

Ecosystem and biodiversity conservation	Conservation of ecosystem functioning and biodiversity have the payoff of conserving ecosystem services, thereby increasing the resilience of downstream settlements and economic activities to dry periods.	Positive benefits for sustainability of dam and larger reservoir storage.
Improvement of water quality in headwaters of the Olifants and Crocodile catchments such as neutralization of acidic decant from coal mines and keeping close attention to new mining ventures	Improved quality of water in the river system means a greater quality of water is available to a) maintain aquatic ecosystems and b) abstract water for domestic use and farming systems.	Increased water availability across the whole system.
Improved land-use management to ensure a vegetated land surface	Increased vegetative cover combats and is adaptive to higher air temperatures brought on by global warming. This strategy is also adaptive to local climate changes that include greater intensity of convective system rainfalls, which are what drives erosion and sediment transport. Changes in cultural approaches to land management, as well as farming systems and land tenure would be required.	Reduced erosion and sediment transfers.
		Reduce risk of desertification; can result in cooler temperatures; mitigating climate change effect.
Improve early warning systems	Large amount of work is needed to reduce the human impact and severe displacement of people when major floods occur in the Lower Limpopo region. The Lower Limpopo River floodplain is intensively cultivated due to farming systems. Floods are unavoidable and people will continue to farm in the floodplain. Therefore, effective responses should target how and where settlements are located, how early warnings are distributed and what appropriate responses are in the face of an oncoming flood.	Communities able to react to disaster in time.
Policy reforms to improve governance systems and practices	Policy reforms considered in the South African water sector should reconsider issues such as the proposed acceleration of the mining use of water. Overuse and pollution are the key threats to ground water resources. More rigorous control on water abstraction and careful monitoring and management of land surface are required.	Robust policies proposed to 4 riparian governments to better manage the LRB for all the countries' benefit.

RESILIM found through the risk and vulnerability assessment is that climate change impacts on the Limpopo basin should not be considered in isolation, but within the context of the nexus of water, livelihoods and ecosystems, a fundamental pre-requisite for resilience building in the basin. Also apparent is that there is no single adopted way to conduct a risk and vulnerability assessment. It was therefore important to get buy-in from USAID and other relevant stakeholders with regards to the methodology used to do a risk and vulnerability assessment of the basin.

RESILIM, through the risk and vulnerability assessment also learned that there is already a significant body of scientific evidence that demonstrates the need for accelerating the building of climate change resilience, the improved protection and management of biodiversity, and improving livelihoods of people living in the basin. However, this evidence is not fully integrated, and the lack of coherence makes it difficult to pinpoint the priority actions that would strengthen resilience in the basin

through increasing water flows, and improving water quality. Identifying these entry points and subsequent action for enabling water flows requires knowledge of the critical thresholds or tipping points in the basin, as determined on an ecosystem and livelihoods basis.

Communication materials

RESILIM packaged the science-based information and knowledge in the form of various tools for practical application to identify basin-level ecosystem thresholds and guide the change needed to strengthen resilience. RESILIM produced different communication products and other awareness raising materials in the form of posters, banners and a PowerPoint presentation to share the outcomes of the risk and vulnerability assessment to date with a technical audience, or to use during training in risk and vulnerability mapping. The products are designed to be accessible, easily disseminated, and adaptable as subsequent research and analysis further inform RESILIM findings.

RESILIM developed two policy briefs for LIMCOM and other regional entities focusing on systems analysis with the purpose of a) informing policy makers in the Limpopo River Basin of the work that was carried out and that is relevant to their efforts in building resilience in the basin, and b) to distil the key messages in the policy briefs into a clear set of recommendations for future planning. The policy briefs focus on guidelines to build resilience to climate change impacts in the basin and Integrated Water Resource Management strategies for resilience building. See [Annex Three](#) for the key messages of the policy briefs.

Lastly, RESILIM developed training materials such as maps and hand-outs, as well as a trainer's guide that can be used as a useful tool to present the risk and vulnerability assessment to stakeholders in the basin and train participants on how to use the maps and analysis in decision making processes. This training material was used and tested by RESILIM and OneWorld during a training workshop for the Technical Reference Committee responsible for the development of the Botswana Climate Change Strategy in April 2014. Refer to [2.1.6 Building the capacity of policy-makers through training in climate change vulnerability and mapping](#).

The risk and vulnerability assessment was a desktop review and served as the evidence-base for a stakeholder participatory process to validate and ground-truth the findings of the assessment.

Validation of risk and vulnerability assessment

RESILIM initially planned, as per the RESILIM Annual Work Plan for Year Two, to conduct a series of participatory, consultative workshops and individual meetings in the second quarter of year two of the program to validate and ground-truth the findings of the risk and vulnerability assessment. RESILIM developed a stakeholder engagement plan which focuses on the eight hotspots identified in the risk and vulnerability assessment. RESILIM, however, decided to change and adopt a different approach which quickly became evident as a more efficient way forward – consultation of multi-sectorial stakeholders and experts in two regional workshops. The regional workshops, facilitated by RESILIM through OneWorld, took place in Hwange, Zimbabwe in May 2014 and Maputo, Mozambique in July 2014 respectively. The stakeholder engagement developed insights into each region as to the possibilities for interventions to increase resilience. The stakeholder engagement further widened and deepened the understanding of climate impacts and their drivers, potential thresholds of impact, and priority needs to address these in order to build resilience. See [Annex Four](#) for the key outcome messages from the two workshops.

Moving forward into Year Three, RESILIM, working closely with its consortium partner OneWorld, is developing an investment strategy for the building resilience in the basin. This investment strategy document will incorporate the key messages that came out of the above mentioned validation workshops, and aims to be relevant in that it will acknowledge the capacity constraints of some of the basin-wide institutions and the political context of the water in the basin.

The beneficiaries of the strategy are the inhabitants of the basin; the custodians of the strategy are SADC and LIMCOM; and the strategy is targeted towards investors that can invest in various pillars derived from the risk and vulnerability assessment e.g. securing high altitude catchment/rich biodiversity areas, water quality, restoration of degraded areas, and others. Investments will be targeted towards improving the resilience and enhancing adaptive livelihoods in the Limpopo River Basin.

2.1.2 Limpopo Basin Strategic Plan for Reducing Vulnerability to Floods and Droughts

As mentioned earlier, LIMCOM is a primary beneficiary of the RESILIM program, and the program is designed to support the commission in achieving its objective of “advising the contracting parties and provide recommendations on the uses of the Limpopo, its tributaries and its waters for purpose and measures of protection, preservation and management of the Limpopo”⁹. As per the program’s design RESILIM is supporting LIMCOM with the development of a Limpopo Basin Strategic Plan for Reducing Vulnerability to Floods and Droughts, which will detail recommendations and mechanisms for the facilitation and implementation of the above mentioned strategic plan, under the auspices of 2011 – 2015 LIMCOM Integrate Water Resource Management (IWRM) Plan, with the intent of reducing the vulnerability of human settlements and ecosystems to floods and droughts in the Basin in the face of climate change.

RESILIM, through GWP-SA presented the methodology at the 5th Ordinary LIMCOM Technical Task Team Meeting in December 2013 to ensure the commission’s buy-in and ownership of the Action Plan. The outcome of the meeting was the endorsement of the methodology by the LIMCOM technical task team. See [Annex Five](#) for the methodology for the development of the Limpopo Basin Strategic Plan for Reducing Vulnerability to Floods and Droughts. The LIMCOM Technical Team agreed that the LIMCOM Flood Forecasting Technical Team will be the focal points for this work, which will bring in contacts from the Disaster Management Units of each riparian country.

In Year Two RESILIM, through GWP-SA, continued to develop a methodology to map the vulnerability of the river basin to floods and droughts. The methodology recognizes the Risk and Vulnerability Assessment carried out by OneWorld and the identification of eight representative case study areas most vulnerable to climate change in the basin. RESILIM and GWP-SA will scale down climate change vulnerability from basin level to local level in order to identify zones within the eight cast study areas that are affected by flooding and drought, and also to gauge the capacity of the communities to cope with the risk of flooding or drought.

⁹ Limpopo Watercourse Commission Agreement 2003.

The methodology proposes a Household Economy Approach¹⁰ with four interactive steps to generate specific adaptive strategies suitable for each zone. See [Annex Six](#) for the methodology.

Moving forward into Year Three RESILIM and GWP-SA will build on the UN-Habitat 2007 report as per the methodology detailed in [Annex Five](#). RESILIM, through GWP-SA will continue with in-country consultations with LIMCOM focal points and other stakeholders from various sectors such as disaster management, climate services, water managers and other key sectors impacted by droughts and floods, consolidate the information and draft an action plan which will be concluded into a final plan following regional consultations. In the development of the action plan, the methodology will be applied to the community climate-induced disaster management action plan for six villages in the Bobirwa sub-district in eastern Botswana, an initiative co-implemented by the Botswana Red Cross, Kalahari Conservation Society, and RESILIM. The methodology is also relevant on one of the representative case study areas identified in the risk and vulnerability assessment due to its transboundary nature: the Pafuri Triangle.

RESILIM will also continue to work with LIMCOM to promote the development of a "disaster task team", who can work closely with RESILIM and other key stakeholders in the development of the above mentioned action plan and also build the capacity of LIMCOM, national commissioners, and other identified institutions and stakeholders. Based on the action plan, RESILIM will respond to identified awareness-building needs through RESILIM communications initiatives, as well as build the capacity of national disaster institutes to drive forward disaster risk reduction initiatives via their respective plans and strategies, as a part of a basin-wide strategy.

2.1.3 Climate change adaptation projects of scale to build the resilience of people and ecosystems in the basin

In Year Two RESILIM piloted resilience-building projects of scale that sustainably improved livelihoods and natural resource management and built the capacity of local organizations.

2.1.3.1 Building the resilience of the mangrove ecosystems in the Limpopo River estuary

According to a research paper by Giri et al¹¹, predictions suggest that 100 percent of mangrove forests could be lost in the next 100 years if the present rate of loss continues. Mozambique is the 13th most mangrove-rich country in the world and although mangroves are found elsewhere in Mozambique, the only mangrove ecosystems found in the basin is found in the Limpopo River. The mangroves in this estuary sustain key ecosystems that produce innumerable goods and services to those who live around the mangroves, especially the Zonguene Village. The mangrove population and the ecosystem it sustains has, however, been degraded over time by both anthropogenic factors such as land use change, growing population leading and overharvesting for fuel and construction, as well as non-anthropogenic factors, such as more frequent high floods. According to the Centre for

¹⁰ The HEA is based on Amartya Sen's theory of exchange entitlements and economic theories of risk (Seaman et al., 2010; Devereux, 2001). It was first developed and used by major international agencies during the 1990s to assess the impact of shocks, such as natural disasters, on food security and livelihoods; it is now accepted as a standard methodology and is widely used by WFP, USAID, FAO, national governments and other donors.

¹¹ Giri C, et. al, 2011. "Status and distribution of mangrove forests of the world using earth observation satellite data", *Global Ecology and Biogeography*, Vol. 20. pg. 154 – 159.

Sustainable Development of Coast Zones (CDS-ZC)¹², the majority of this mangrove area is degraded and three of the eight species of mangroves once found in the river estuary have vanished. Since 2010 the center assisted communities in replanting mangroves, but have only been able to replant 30 hectares, which accounts to less than 10% of the degraded area.

In Year Two RESILIM partnered with the center to support the restoration, conservation and improved resilience of the mangrove ecosystem, and in doing so improve the livelihoods of the people dependent on the mangroves and the ecosystems is sustains, through the below activities.

Mapping of the Limpopo River Estuary

In Year Two RESILIM, with the technical assistance of a GIS Specialist, mapped the Limpopo River Estuary to determine the status of the mangrove vegetation in the estuary and inform possible conservation and replantation areas.

Vegetation Structures:

The mapping exercise established three mangrove vegetation categories which varied from degraded¹³, disperse¹⁴ and dense¹⁵. Results show that in the past nine years the degraded mangrove vegetation category increased from just less than 100 hectares to just more than 130 hectares.

The study recorded five species of mangroves in the estuary, with one of the five species being on the brink of extinction having only one tree in the estuary, representing 0.2% of trees measured.

Mangrove fauna:

Mangrove fauna recorded more than a 120 species of fish belonging to 52 families. Other mangrove fauna includes various species of crabs, shrimps, mussels, mollusks, and filter feeders such as rock oysters, barnacles, mud creepers and mud whelk.



ABOVE: Mangroves are highly productive, biodiversity rich forest ecosystems adapted to survive in the harsh interface between land and sea. Communities use mangroves for timber, firewood, construction materials. The roots of the mangroves provide a habitat and nursery environment for many birds, bees and aquatic animals, including fish, prawns and crabs. It protects coastlines from tsunamis, storm surges, and erosion and break down pollutants in the water.

¹² Balidy, H. *Technical Activities Presentation*. PowerPoint Presentation. CDS-ZC. Xai-Xai, Mozambique.

¹³ Degraded mangrove vegetation areas refer to an area previously populated by mangrove and nowadays influenced by flow patterns.

¹⁴ Dispersed mangrove vegetation areas refers to mangroves under stress or with low regeneration rates, patches of bare soil are mixed with mangrove vegetation communities

¹⁵ Dense mangrove vegetation areas refers to mostly dwarf mangroves

Mangrove seed collection

Seed collection, commenced in April 2014 and is an on-going activity. The seeds are planted in black bags and nursed at the community nursery until strong enough to be replanted at the selected replantation site.

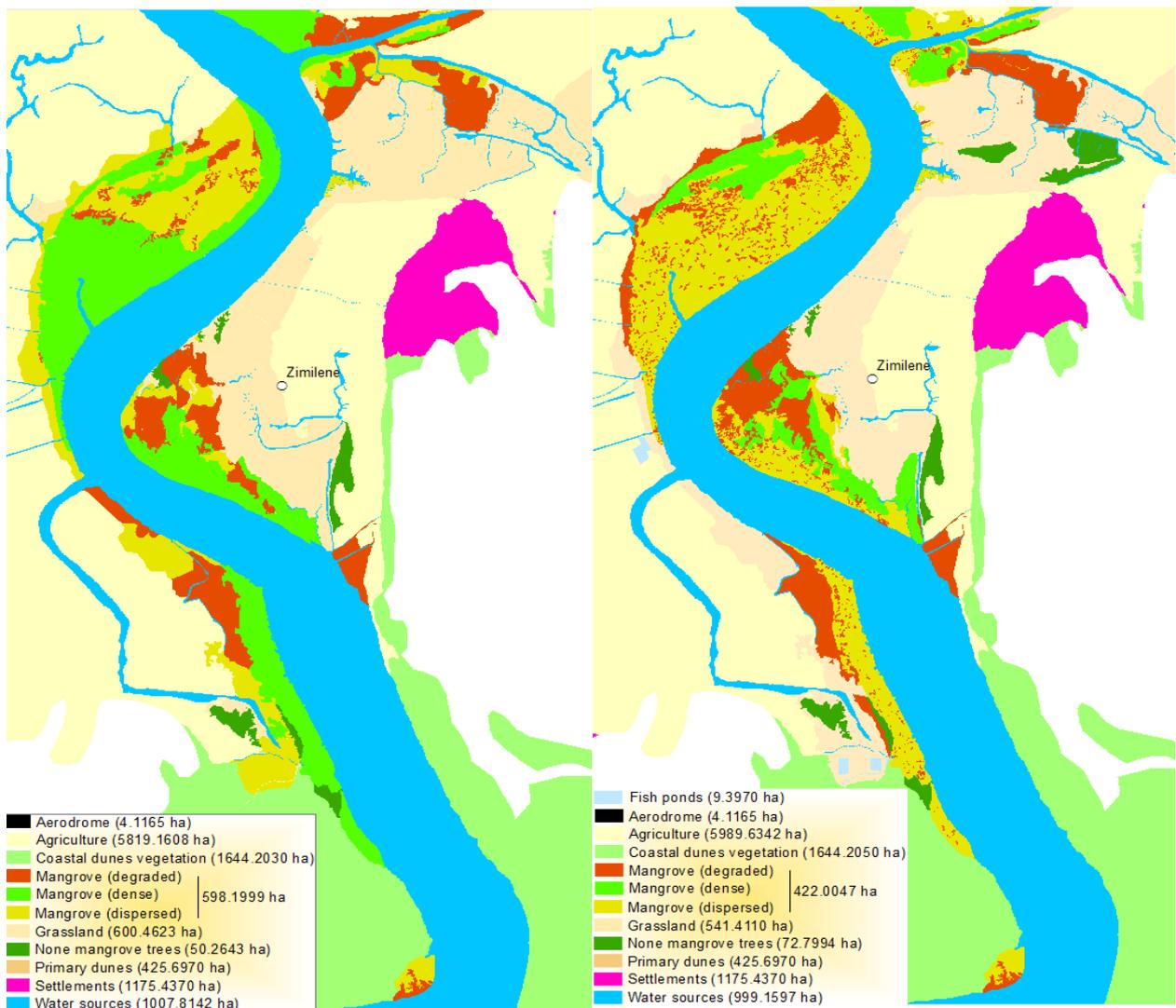


Left: The nursery cultivates all eight species of mangroves once found in the Limpopo River Estuary for replantation. **Middle:** About ten community members work at the nursery of which most are women. **Right:** Translated to English, the sign reads: MICAOS (Ministry of Coordination of Environmental Affairs), CDS (Centre for Sustainable Development) of Coastal Zones, Community Mangrove Nursery, Zonguene.

Current land use/cover

An imagery analysis, based on digital and visual interpretation indicated ten land cover/use types in the Limpopo River estuary, namely Aerodrome, Agriculture, Coastal dunes vegetation, Mangrove vegetation, Fish ponds, Grassland, No mangrove vegetation, Primary dunes, Settlements, Water sources.

Image 1: Land use/land cover 2005 and 2014 in the Limpopo River Estuary respectively



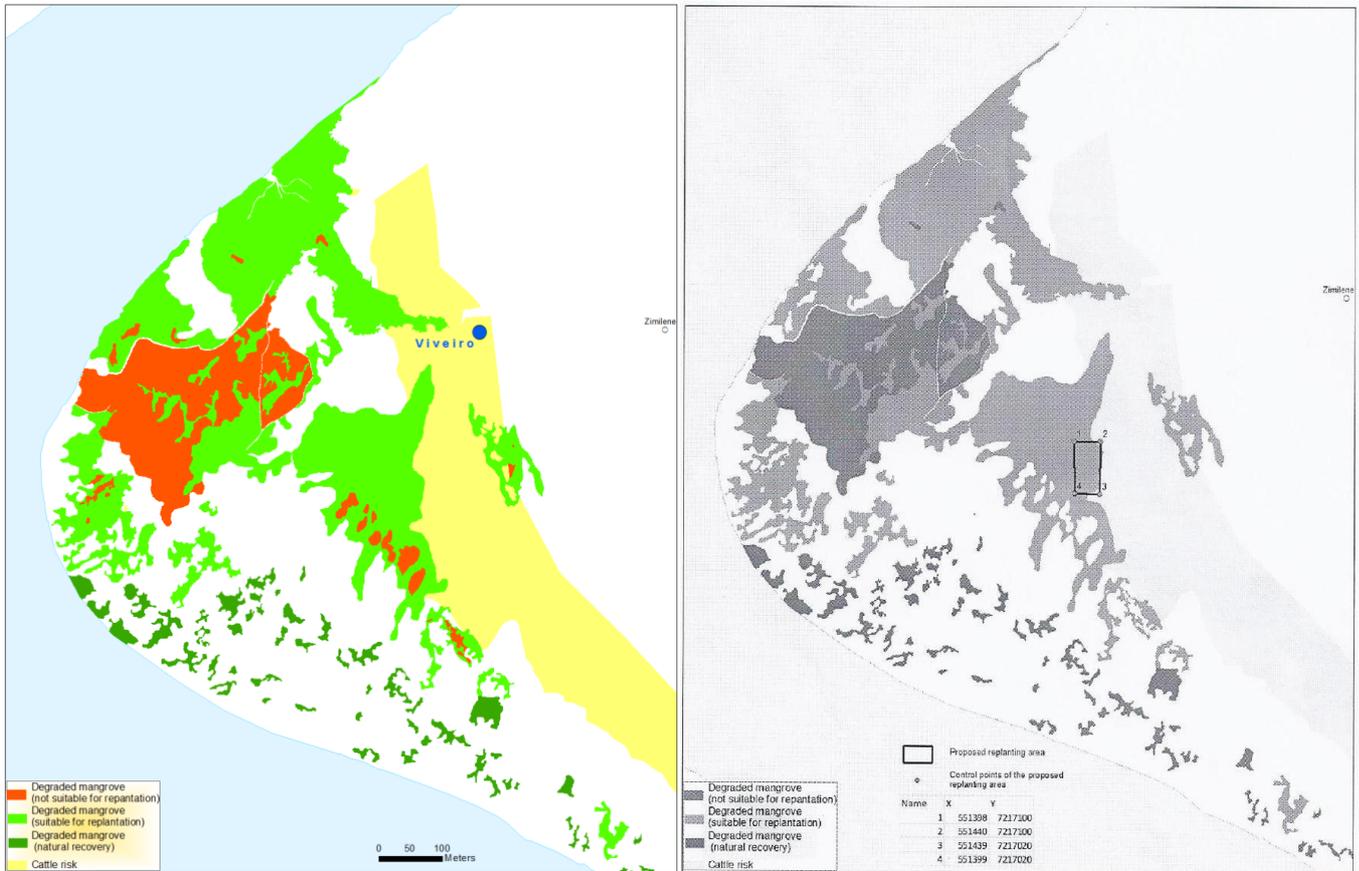
Results show that mangrove vegetation decreases at an annual rate loss of 3.5%. Mangrove vegetation reduced from a total area of almost 600 hectares to just more than 420 hectares, resulting in a relative change rate of 31.4%. The decline in mangrove vegetation may be associated with the blocking of drainage canals, hence the decrease of water flow, an increase in harvesting by the communities for firewood and an increase cattle grazing in mangrove vegetation which does allow regrowth to take place. The frequency of floods in the mangrove and the estuary area, with a specific reference to the 2000 and 2013 floods, overwhelmed mangrove vegetation in the estuary with a large volume of sediment that altered soil conditions for mangrove development. An increase in areas with no mangroves is documented at 50 hectares in 2005 and more than 70 hectares in 2014.

However, the overharvesting of mangroves for firewood and potential trampling by cattle are now better managed based CDS-ZC engagement with communities in the region.

The GIS mapping exercise identified 133 hectares where mangroves vegetation is degraded. The mapping indicates recommended a site of 11.95 hectares for replantation with RESILIM support and another 62.50 hectares that is suitable for replantation in the future. The rest of the 133 hectares are either not suitable for replantation or is recovering naturally.

Image Two: (Left) Based on the lessons learned from the mapping, the GIS specialist produced a map indicating areas suitable for mangrove replantation

Image Three: (Right) The location selected for replantation, with approval from RESILIM.



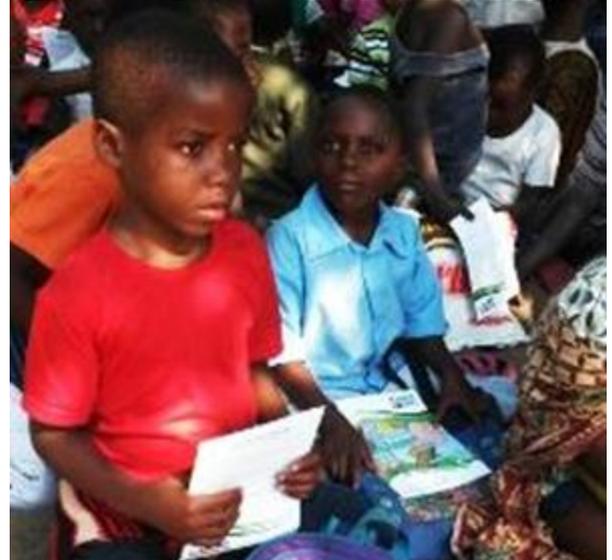
RESILIM and CDS-ZC also officially launched their partnership in June 2014 in Mahielene, a village in Xai-Xai, Mozambique. Attendees included representatives of the Provincial Directorate of Environmental Affairs of Gaza, and the Agriculture Directorate of Gaza, traditional leaders, and 60 adult community members and about 40 youth. RESILIM took the opportunity to raise awareness in the form of comic strips, about the importance of mangrove conservation, and also articulated USAID's commitment to conserve key ecosystems and improve the livelihoods of communities living in the basin.

Moving forward into Year Three RESILIM is conducting an economic and environmental evaluation of the mangrove ecosystems to determine the monetary value of the mangrove ecosystem to aid land-use decision-making.

The economic evaluation will also provide science-based information for the design and production of communication materials to raise awareness about the imperative for mangrove biodiversity conservation.

RESILIM together with CDS-ZC will train local community members and other stakeholders in the use of best practices on mangrove management and conservation in order to improve ecological integrity and resilience to climate change in areas of biodiversity significance such as the Limpopo River estuary.

As mentioned, the replantation site has been selected. Replantation, including the reintroduction of the three species of mangroves extinct from this estuary, will commence in Year Three.



Above: The launch of the CDS-ZC and RESILIM partnership included a field visit to the mangrove replantation site and the mangrove community nursery; distribution of awareness materials and formal proceedings articulating the USAID RESILIM program's support and commitment to the restoration and conservation of mangrove ecosystem in the Limpopo River Estuary.

2.1.3.2 Developing resilience building training through the Southern African Wildlife College

RESILIM and the Southern African Wildlife College (SAWC) entered into a partnership in January 2014 to develop resilience building training. The college provides professional and technical training in sustainable conservation in co-operation with local communities. It has established and supports national and cross-border conservation as to promote ecosystem conservation.

RESILIM is working closely with its partner SAWC, to deliver a critical mass of intellectual and technical capital to the Southern Africa region, specifically to institutions and individuals of influence, so that their skills can be directed towards the development and implementation of initiatives that enhance the socio-ecological resilience of the basin as a system.

To do so, RESILIM and the college conducted training needs assessments in the four riparian countries of the basin with the purpose of guiding RESILIM and SAWC on what training approaches would be most effective relative to the question of resilience in the basin. The assessments also identified gaps in SAWC's current training curriculum and methodologies that can be addressed to enhance the training modules with a focus on building resilience. See [Annex Seven](#) for more information on the methodology of the training needs assessments.

Upon completion of the TNAs, SAWC and RESILIM convened a meeting of key stakeholders in the basin to analyze the results of the needs assessment and plan for specialized trainings and enhance six of SAWC's existing training modules to incorporate findings and recommendations from the stakeholder analysis meeting.



Above: RESILIM and SAWC took the opportunity to officially launch the partnership at the Stakeholders Engagement Workshop. **Back, from left to right:** Dr Brian Child (University of Florida), Kule Chitepo (RESILIM), Dr Alan Gardiner (SAWC), Andries Shihlangu (Manyeleti Community). **Front, from left to right:** Musonsa Ngulube (USAID Southern Africa), Sandy du Plessis (SAWC). **Below:** Dr Brian Child shares the findings of the TNAs with from stakeholders the basin.



At the stakeholder engagement meeting, SAWC presented the findings from the training needs assessments, indicating that the strongest demand is for courses that involve field training, especially training-by-doing.

Here the favored subject areas relate to community governance and resource economics, although the assessments found there is a generally high demand for all training-by-doing courses. The four top-ranked training-by-doing courses are:

1. Situation analysis, including participatory mapping, livelihoods and governance dashboard surveys;
2. Participatory governance including constituency-building, participatory revenue allocation and control;
3. Resource economics, including assessing the financial and economic value of land uses and protected areas; and
4. Human wildlife conflict.

The most popular SAWC courses were Community Based Natural Resource Management (CBNRM), followed by Biodiversity Management and GIS training.

Following final workshop and the launch of the SAWC and RESILIM partnership the Kruger 2 Canyon Newspaper¹⁶ reported on the launch and the stakeholder engagement workshop. See the online article at: http://kruger2canyon.linmedia.co.za/details/20-06-2014/making_our_fragile_environment_more_resilient/25309.

Following the outcome of the assessments, RESILIM through SAWC piloted participatory governance training at the Makulekhe village; and trained 82 women in the area of women's natural products micro-enterprises.

The governance trainees were trained how to facilitate the development of a dashboard survey questionnaire, listing which issues they think are important outcomes of CBNRM and important aspects of governance that needs to be measured. Through this the trainees learned the importance of building an understanding and relationship with the Communal Property Association so that they can be able to accept the findings from the survey because the results might be negative or positive. The training showed that the dashboard is not about finding fault, but it is a tool to measure the success and faults of the specific program so as to best implement adaptive management in areas where there is lack of governance or mismanagement. Participants learned that the dashboard works like a traffic light that gives warning and prepares groups to successfully move forward.

'Learning by doing' at village included:

- a) Analyzing community livelihoods and vulnerabilities using livelihoods surveys and participatory rural appraisal for community and environmental history, land use mapping, and stakeholder analysis.
- b) Assessing community governance using the governance dashboard.
- c) Developing participatory governance through equitable benefit distribution.
- d) Training of the roles, responsibilities and duties of Community Based Organizations/bodies
- e) Developing constitutions for participatory governance, together with conformance and performance monitoring systems.
- f) Developing adaptive community development and land use action plans using situation analyses, scenario analysis and log-frame based community planning and management.

¹⁶ Kruger2Canyon has a circulation figure of 8000. (<http://www.abc.org.za/Pages.aspx/Details/5>)

SAWC also trained the community members in the development and monitor of sustainable development indicators, adaptive management and multi-stakeholder governance processes. SAWC will potentially be able to replicate the governance training model in a form of further resilience village sites in other parts of the basin in following years based on lessons learnt from this first year implementation of the SAWC-RESILIM partnership.

RESILIM, through SAWC also trained 82 women in natural resource-based enterprise development linked to local livelihoods and conservation. The rationale for this is that large parts of the Limpopo Basin landscape are valuable at local level, especially to women and children who harvest useful indigenous plant resources. Women are the main indigenous plant users, but many of those uses are part of a daily survival strategy, rather than micro-enterprises that enable a move out of poverty. The course focused on the harvest and use of indigenous plants and insects. As many of these products, including insects and fungi, are from deep rooted trees which provides for a drought proofed “green social security” at a time of climate change.

The course linked to CBNRM and the outcomes, including “resilience-building”, and adaptation to climate change, took in account the importance of plant-based enterprises to marginalized women.

Moving forward into Year Three, RESILIM, based on the findings of the training needs assessments, will develop new training modules and tools, as well as enhance existing ones that will address the matter of “*Resiliency Building for Transboundary Integrated Water Resource Management through Biodiversity Conservation and Adaptation to Climate Change*”. This will be developed in close collaboration with conservation and climate change agencies and communities.

2.1.3.3 Diversifying livelihoods through marula oil production

RESILIM seeks to reduce communities’ vulnerability to climate change impacts through the diversification their livelihoods. Many of the basin’s inhabitants depend on natural resources and rain-fed agriculture for food and income to sustain their livelihoods. Rainfall in the basin, however, is highly variable making farming increasingly difficult. RESILIM is committed to building the resilience of communities to adapt to the impacts of climate change on their livelihoods mainly through CBNRM, which will result in communities having a range of options, other than rain-fed agriculture, available to sustain their livelihoods under different conditions.

In Year Two, RESILIM partnered with the Kalahari Conservation Society (KCS) to build the capacity of and train the Kgetsi Ya Tsie (KYT) trust. KYT is a CBNRM project with over a thousand women participants from 26 villages in Tswapong, eastern Botswana, which borders with the Limpopo Province of south Africa, meaning that best practices can be easily transferred across borders.

RESILIM together with KCS and the USAID-funded Southern Africa Regional Environmental Program (SAREP) identified challenges the trust faces in the production of high quality marula oil:

- the lack of a business plan guide
- a shortage of technical skills and equipment;
- poor hygienic practices around the handling and packaging of marula oil
- a limited focus on Tswapong area;
- shortage of kernels supply
- the shortage of space to house oil pressing facilities.

Other needs identified in capacity development included:

- training of the board, production management and the staff
- upgrading and improving the production line
- the development and improvement of infrastructure.

These women use their traditional, indigenous knowledge to harvest and produce a range of natural resource products such as marula oil. Production prior to RESILIM support, however, was done at a very small scale and not of adequate quality for export to the western markets.

During RESILIM’s second programmatic year, the program addressed KYT’s needs and supported the enhancement of the quality and quantity of the marula oil the trusts produces:

Exchange visit:

RESILIM supported a group of 29 KYT women to visit a successful community-based marula program in Swaziland to learn best practices on mass production of marula oil, such as the cracking of marula nuts, safety and hygiene in oil processing, and techniques for pressing and packaging the oil.



Above: Twenty-nine women from the KYT Trust in Botswana participated in the exchange visit to Swaziland in March 2014.

“The factory has to have regulations that are followed, safety clothing which is cleaned every time, cleaning of hands and feet every time one has gone out and take off the jackets when going to the toilet”;

“I have learnt the business is big and this means if I do my part then soon I would be a shareholder in a very big business empire”.

~Members of KYT after returning from their exchange visit to Swazi Secrets.

See [Annex Eight](#) for more information on the program of the exchange visit and the key feedback from the KYT women.



Before and After: Following the study tour, KYT has improved its safety and hygiene practices in oil processing.

Facilitation and coordination of the crushing of marula nuts

Following the exchange visit to Swaziland, RESILIM, through KCS supported the mobilization of the mass productions of kernels by the KYT Trust in the 26 villages. RESILIM facilitated the purchase of marula nuts from each village and engaged and contracted crushers as casual laborers to perform mass crushing, supervised by those KYT members who participated in the study tour, to ensure the application of best practices and enhanced quality of the oil.



Monitoring and evaluation of marula oil production process and quality

RESILIM periodically sampled and tested the marula oil at private laboratories prior to and after the exchange visit and the implementation of best practices and lessons learned to

determine the quality of the oil and any the oil contains any contamination. RESILIM provided KYT with a monitoring tool to ensure that the best practices and lessons learned during the exchange visit are implemented during oil production. The results from the monitoring tool showed that KYT is now taking better precautions in terms of the storage and the handling of the marula kernels to avoid contamination of the kernels and ensure better quality oil. From the lessons learned on best practices for safety and hygiene in oil processing, KYT is now storing the kernels in newly acquired containers in a warehouse and the oil is stored in a cold room at the KYT offices. The oil pressing machinery is regularly serviced and is cleaned by staff every day. The marula oil production process is also documented: from the purchase of the kernels, to allocating batch numbers to arriving kernels, to staff keeping an activity log.

According to the laboratory results the improved handling and storage arrangements at the factory to avoid contamination of the oil, and other hygiene and the safety techniques resulted in an improvement in the quality of the oil.

Purchase of centrifuge

RESILIM identified a centrifuge as the pivotal piece of equipment needed for the production of high quality oil. A centrifuge is a machine with a rapidly rotating container that applies centrifugal force to separate fluids from solids. The centrifuge helps to preserve the best properties of the oil to ensure that the oil meets the high quality standards required for export.

The centrifuge was purchased in June 2014 and handed over in July 2014 by Charge Michael Murphy from the US Embassy in Botswana to Honorable Dorcas Makgato-Malesu, the Botswana Minister of Trade and Industry, on behalf of KYT. Both the Botswana Daily News¹⁷ and the Monitor Newspaper¹⁸ featured RESILIM and the United States Government and its support to KYT.



Above: Honorable Dorcas Makgato-Malesu, the Minister of Trade and Industry, receives a signed certificate from Charge Michael Murphy from the US Embassy in Botswana to be displayed in the KYT factory. It reads, “This centrifuge was handed over on 10 July 2014 by Michael M. Murphy, Charge d 'Affairs, United States Embassy, Botswana, on to the Honorable Dorcas M. Malesu, Botswana Minister of Trade and Industry to build the resilience of the Kgetsi ya Tsie Community Trust.”

Business Planning Training

Other support to KYT included the training of 25 KYT members in business planning by the RESILIM Biodiversity Activities Manager, to determine cost production and the feasibility for ongoing trade in marula oil. The KYT women are now able to calculate the cost of production, outline the process of the marula oil production method and possible production targets and agree on the possible profit needed to carry KYT into the next season.

¹⁷ Botswana Daily News has a circulation figure of 65 000 (Fombad, C. 2011. Media law in Botswana. Page: 20. London: Kluwer Law International.)

¹⁸ The Monitor Newspaper has a circulation figure of 15 000 (Rooney, R. 2012. Characteristics of the Botswana Press. *Global Media Journal Africa Edition*. Volume 6(1) page 4).

Other findings and the way forward

This phase of RESILIM's support to KYT through KCS came to an end in September 2014. The RESILIM Monitoring and Evaluation Specialist assessed the program's support to KYT through a sub-contract to KCS. The purpose of the assessment was to determine whether targets have been met and processes that were engaged to deliver the targets. A comprehensive report with the findings of the assessment is forthcoming in the third year.

In preparation for the program's third year RESILIM identified key partners, such as Debswana¹⁹ and Selebi-Phikwe Economic Diversification Unit (SPEDU), to bring on board in terms of RESILIM's second phase of support to KYT.

2.1.4 Water Demand Management as an Adaptation Strategy in the Limpopo Basin

RESILIM met with GWP-SA in September 2014 to discuss the objectives of the transboundary water demand management assessment that will look at a cost-benefit and feasibility analysis on managing marginal waters for national planners, donors and development partners in Water Demand management. The workshop discussed the purpose, overview and objectives of the Cost-Benefit Analysis to enhance the concept. See [Annex Nine](#) for more information on the objectives and overview of the study.

2.1.5 Training stakeholders in water conservation and water demand management

Upon a request from the South Africa DWA, RESILIM supported the department with the launch of the Adopt-a-River initiative in the Vhembe District of the Limpopo Province. Adopt-a-River is an initiative by the DWA to promote aquatic ecosystem health, economic growth, human health, and co-dependent land and water use principles. The initiative also provides a work-based training program and encourages community participation in taking responsibility for the conservation of their environment. RESILIM trained 119 community members from around the area in Water Quality and Waste Management to improve water conservation and demand management responding to the impacts of climate change.



Above: The trainees received practical training in the field during the Water Quality and Waste Management Training

¹⁹ Following an assessment by SPEDU on how KYT can be transformed into a viable business, Debswana earmarked 750 000 pula towards the development of a 5-year strategy for KYT.

Lessons learned through a pre- and post-training assessment:

- Participants did not understand the link between waste management and water quality, or the link between water pollution and land pollution.
- Participants did not view themselves as part of a bigger river system, and therefore not responsible for the health of their neighboring communities.
- Participants displayed an attitude of non-responsibility when they discussed action that needs to be taken to protect water sources.
- Participants preferred to assign such roles to the government, and demanded to be employed if they were to work around water quality and waste management activities.
- A change in individual and group behavior is necessary for a responsible approach to natural resource management,
- Interventions which focus on changing the value systems and behaviors of people are important.
- Resilience building should include teaching communities to mainstream water quality and waste management into their community development activities and projects, and not rely on government alone
- There is a need to involve local traditional and civic leadership in resilience building.

Later in Year Two, RESILIM met with the department to refine the relationship. The meeting identified continuous awareness interventions as essential for enabling a fundamental mind shift amongst river communities. Challenges, however, include limited funding, pollution and dumping, lack of training and capacity building, and a need for sustainable entrepreneurial activities in the Adopt-a-River program. RESILIM will take the discussions further with the department in Year Three.

The unfortunate reality

The department identified the following as major issues leading to the high levels of pollution, while downstream villages use water from the river for household use:

- Absence of proper dumping sites leads to disposable nappies thrown into the river;
- the river is used by the community for washing laundry;
- The local mortuary business is cleans corpses in the river;
- Sewerage breakdown adds to pollution levels;
- pipes leaks next to sewerage works; and
- Medical waste is also finding its way into the

2.1.6 Building the capacity of policy-makers through training in climate change vulnerability

“There is a hunger for climate information. Climate information is currently being used in way that is leading to maladaptation. It is therefore crucial to mind the gap between scientists’ data and information, and the knowledge and basis for action which is needed by society”

~Bruce Hewitson, Director of the Climate System Analysis Group.

In October 2014, RESILIM together with SAREP hosted 5-day course on *Using Climate Information for Adaptation and Policy Development Course* by the Climate Systems Analysis Group (CSAG) from the University of Cape Town. From the Limpopo River Basin, four participants from Zimbabwe and one participant from Botswana, together with two team members from RESILIM participated in the workshop. The purpose of the workshop was to bridge the gap between climate data and information, and the knowledge needed for policymakers to influence the increased integration of

climate change adaptation strategies into long-term management plans and climate change adaptation policies, with a focus on the Okavango and Limpopo River Basins.



Above: The Minister of Environment, Wildlife and Tourism, Mr. Tshekedi Khama, paid an unexpected visit to the workshop to address the participants, emphasizing the importance to address climate change challenges, and to personally thank RESILIM for its support.

Below: A participant providing feedback on a group mapping exercise.



The training proved to be successful, and RESILIM continued to work closely with CSAG and OneWorld to incorporate the findings of the Risk and Vulnerability Assessment in the original climate change training, and trained the technical reference committee²⁰, consisting of 28 delegates overseeing the preparation of the Botswana National Climate Change Policy and Strategy, in climate change and risk and vulnerability mapping. The training by OneWorld looked at adaptive capacity as a critical success factor for building resilience to climate change. The objective of the training was to engage decision makers in applying the risk and vulnerability and systems analysis research outputs as decision making tools on climate policy and strategy development in the basin's four riparian countries.

The primary objective of CSAG's training sessions, together with climate change experts from Indigo Development and Change, was to expand the technical reference committee's understanding of the social, ecological, and climate vulnerabilities, climate processes and factors. See [Annex Ten](#) for more information on the content of the training.

According to the workshop evaluation, the trainees indicated that the interactive discussions and engagement with CSAG scientists and partners improved their level of knowledge on climate science, the drivers of climate change, and critical interpretation of climate information. The committee also reported to be satisfied with the balance of theory and practical exercise and indicated an increase in their abilities to review and assess the

upcoming National Climate Change Policy Strategy and Action Plan, and increased confidence in effectively guiding the policy formulation process for the region and contributing towards a sustainable development pathway for the country.

RESILIM also held a high-level dialogue back-to-back with the above mentioned training aimed at top level decision makers in the various ministries in Botswana, to present the latest knowledge about how the climate is changing. About 60 policy makers and members of the TRC attended. It focused on the relative climate change vulnerabilities and adaptation options for the region, but also specifically Botswana, and how government and communities can work together to increase the resilience of the most vulnerable sectors of society. The dialogue was also an opportunity for

²⁰ The RESILIM Chief Scientist also sits on the committee to ensure that resilience to climate change is incorporate in the strategy.

legislators and high level decision makers to question and discuss implications of a changing climate on Botswana.

Moving forward, in Year Three RESILIM plans to provide similar training to the Technical Committee responsible for the formulation of the Zimbabwe National Climate Change Response Strategy. This training will also be extended to Mozambique in the near future.

“I am aware and confident that the Technical Reference Committee’s understanding of climate change issues has been taken to another level which will allow them to interact well with consultants and offer informed guidance. For this we will forever be grateful”

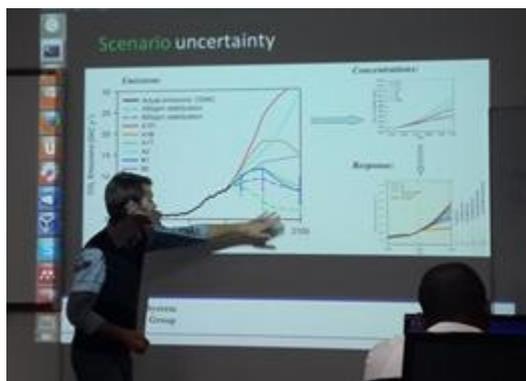
~ Mr. Tshekedi Khama, Minister of Environment Wildlife and Tourism, in a letter to RESILIM on the climate change training and high-level dialogue

2.1.7 Finalization of Zimbabwe National Climate Change Response Strategy

In 2012 the Government of Zimbabwe through the Ministry of Environment, Water and Climate initiated a process to formulate a comprehensive National Climate Change Response Strategy (NCCRS).

RESILIM supports the integration of climate change adaptation strategies into long-term management plans and policies. For that reason RESILIM, together with other International Cooperating Partners (ICPs) such as the United Nations Development Program (UNDP), United Nations Children’s Fund (UNICEF), GWP-SA, Environment Africa, and the Common Market for Eastern and Southern Africa (COMESA), supported the Institute of Environmental Studies (IES) with the co-facilitation of a workshop in Kariba, Zimbabwe to finalize the strategy. Participants from across the country reviewed the third draft of the strategy to ensure the strategy accurately reflects the interests, concerns, and views of all key stakeholders in the country on issues of climate change, adaptation and mitigation. The outcome of the workshop was a finalized draft of the strategy and an action plan which will be submitted by the IES to the Ministry of Environment, Water and Climate for approval.

Following the workshop, RESILIM took the initiative to coordinate and organize a meeting between the ICPs to discuss the next phase of support to the Ministry of Environment, Water and Climate and the IES with regards to the implementation of the NCCRS and Action Plan. At the meeting ICPs indicated their interest in continued support to the implementation of the NCCRS. Upon an invitation from UNICEF to attend the *Towards Resilient Urban Communities* conference in Harare, Zimbabwe in September 2014, RESILIM took the opportunity at this conference to meet with the



ABOVE: Lectures and presentations by CSAG during the climate and vulnerability training in Cape Town, varied from group discussions on the landscape of climate; the downscaling of large scale climate data; risk and vulnerability assessments; interactive games; and case studies. **BELOW:** Participants received a certificate of participation. After the workshop, participants indicated their enriched appreciation and understanding of not only the environment but also the economic and social sectors of the basin which are more exposed and sensitive to the threats of climate change.



ICPs to resource and discuss possible cost-sharing, to the NCCRS task team as the next phase of support, similar to the training provided to the Botswana Climate Change Response Strategy Technical Reference Committee mentioned above. RESILIM was able to secure collaboration commitment from UNICEF and IES.

2.2 COMPONENT 2: CONSERVATION OF BIODIVERSITY AND SUSTAINABLY MANAGE HIGH-PRIORITY ECOSYSTEMS INCREASED

2.2.1 Environmental flows in the Limpopo River Basin

An environmental flows study is important for LIMCOM's water allocation protocols and decisions under the current 2011 – 2015 LIMCOM IWRM Plan and it is crucial for RESILIM that LIMCOM's water allocation protocols and decisions consider ecosystems and other high priority biodiversity areas in the basin as water users. In Year Two RESILIM identified the need for an environmental flows study to better understand the linkages between hydro-ecological and socio-economic relationships under climate change scenarios, and to improve natural resource management practices that mitigate threats to biodiversity.

One of the gaps already identified in the monograph study is the lack of in-depth research and data collection as only eight sites were used in the basin during a single season to collect the data needed for analysis.

However, progress has been delayed due to a request from LIMCOM to wait for the completion of its monograph study and include it in the environmental flows assessment. The Monograph study was completed and the review of environmental flows will continue in Year Three.

Moving forward, RESILIM will utilize the monograph study as a basis, and conduct a participatory analysis to obtain input from key stakeholders to establish priority areas in the basin for the environmental flows assessment. RESILIM will also host a feedback workshop to ensure consensus with LIMCOM, and the departments of environment and of water affairs from the four countries, as well as key representatives from the private sector and communities. RESILIM will facilitate the workshop in such a way that it results in a concrete action plan.

2.2.2 Biome-based vulnerability assessment and mapping

The degradation of land and ecosystems is a rapidly emerging threat to biodiversity as a result of climate change. Within South Africa the Department of Environmental Affairs' (DEA) Biodiversity Sector engaged in an extensive process to understand the sector's interaction with climate change. The determination of which resources are most vulnerable will enable managers to better set priorities for conservation action, while understanding why they are vulnerable provides a basis for developing appropriate management and conservation responses.

The savanna biome falls within the borders of the Limpopo River Basin. It is "South Africa's largest biome, covering 32.9% of the country's surface area. It provides ecosystem services such as carbon sequestration, provision of fodder to livestock grazing and soil retention. Savanna ecosystems possess significant wild faunal diversity that supports nature based tourism revenue and subsistence livelihoods such as food, medicinal plants and construction materials, in addition to cultural regulating and supporting services. Water and grazing resources provision is a feature of the savanna ecosystems." (Department of Environmental Affairs, 2013: 18)¹

In Year Two, DEA requested support from RESILIM to develop an integrated climate change response strategy for the savanna biome²¹ as part of the completion of a biome-based vulnerability assessment. The assessment will look at how the savanna biome, species and ecosystems in the biome will be affected by projected climate changes over the medium to long term.

RESILIM is supporting the development of an adaptation and implementation plan for the savanna biome which straddles South Africa, Botswana and Mozambique, as it is within RESILIM's mandate to improve natural resource management practices that mitigate threats, such as climate change, to biodiversity in the basin. Although the initial adaptation and implementation plan will only focus on the savanna biome within South African borders, there is potential for best practices to be replicated or up-scaled to trans-boundary level.

RESILIM and DEA are still in the process of discussing the concept paper to ensure alignment with RESILIM's program objectives and DEA's environmental strategic plan. In September 2014, DEA hosted and RESILIM facilitated a workshop to a) source inputs into the draft concept for the development of integrated climate change response strategies for the Savanna Biome. The workshop continued to identify potential activities to undertake to develop comprehensive policy and planning framework on climate change in the Limpopo River Basin, such as the development of an appropriate strategy for responding to conservation and sustainable development imperatives, and building the capacity of stakeholders to ensure resilience to the impacts of climate change. Participants included delegates from RESILIM, DEA, the South African National Biodiversity Institute (SANBI) and the Council for Scientific and Industrial Research (CSIR).

See [Annex Eleven](#) for more information on the process so far on the development of an overall Biome Adaptation Frame work for South Africa.

Moving forward, RESILIM will use the critical outputs from the workshop to inform a proposal to secure funding for the concept. Once the concept has been completed, SANBI will develop a detailed work plan.

2.2.3 Community Based Natural Resource Management that builds resilience

CBNRM is an approach under which communities are responsible for managing their natural resources such as biodiversity, water, land and more, within a designated area. The communities utilize, protect and conserve natural resources within established guidelines or according to a detailed agreed plan, for economic and environmental benefits.²²

The Southern Africa CBNRM Forum (SACF) is an umbrella organization that provides a platform for people, communities or different types of organizations and institutions to discuss various issues, and to draw lessons and mobilize resources needed for addressing CBNRM aspects. It also provides a platform for stakeholder dialogue, facilitation, and exchange of information, co-ordination and co-operation on community-based management of natural resources. The seven key countries that are

²¹Other biomes in South Africa include the Albany Thicket, Desert, Forest, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama-Karoo, and Succulent Karoo Biomes.

²² World Bank, 2011. Community Based Natural Resource Management. *Sourcebook: Agriculture Investment*. [Online]. Available at: <http://bit.ly/IiQpqp> [Accessed 21 April 2014].

currently involved in SACF in the region are Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe and South Africa, although not actively involved.²³

The Regional CBNRM Capacity Building Program for Southern Africa, managed by the World Wildlife Fund (WWF) Zambia is, however, coming to an end in December 2014. RESILIM sees this as an opportunity to support the SACF to build on the current CBNRM Capacity Building Program and influence the integration of resiliency into CBNRM in the region as a way to improve natural resource management practices that mitigate threats to biodiversity and conserve biodiversity and sustainably manage high-priority ecosystems. As mentioned before, many of the basin's inhabitants depend on rain-fed agriculture and the natural resources in their close environment to sustain their livelihoods. RESILIM recognizes CBNRM as an effective approach to diversify livelihoods and build the resilience of people to climate change.

As both RESILIM and WWF have observed through their work in Southern Africa, the improvement of both CBNRM and climate resiliency are important prerequisites for institutional strengthening, training, and performance monitoring, evaluation, and dissemination, all of which are key to the long-term results and efficacy of resiliency efforts in the region.

The forums and networks, the working groups, and the exchange visits the SACF coordinates can be utilized to instill the concept of resilience into the SACF. See [Annex Twelve](#) for more details on the possible areas of cooperation.

Moving forward, RESILIM is scheduled to meet with WWF, Zambia in Lusaka early in Year Three to finalize the discussion on RESILIM's support.

2.2.4 Water quality and aquatic weeds monitoring and management

RESILIM is supporting the Joint Permanent Technical Committee (JPTC), with a specific focus on water quality and invasive aquatic weeds management between the borders of South Africa and Botswana.

In the Limpopo River Basin water hyacinth is spreading down the Crocodile, Letaba, and Olifants Rivers, in Mpumalanga downstream into the Limpopo Catchment, clogging up irrigation intakes for agriculture, and posing a threat to biodiversity and the livelihoods of people dependent on the water resource.

²³ Southern Africa CBNRM Forum (SACF), 2014. *The Southern Africa CBNRM Forum (SACF)*. [Online]. Available at: <http://www.sacfnetwork.org/index.php/component/content/article/19-about-us/6-welcome-to-sacf> [Accessed 24 April 2014]

With support from RESILIM, the task team, appointed by the JPTC to investigate the status of the water hyacinth in the rivers between South Africa and Botswana, was able to collect the necessary information, through a combination of aerial photographs and the findings of a survey done in September 2013 from Olifants Drift confluence up to the Zanzibar border post, to identify hotspots where urgent action is required.



Above: Water hyacinth infestation spread for about 700 meters upstream of the weir in the African Ranch section of the Limpopo River Basin in December 2013.

The impacts of water hyacinth

Water hyacinth reduces the light and oxygen in the water which makes it difficult for aquatic plants to survive. Animal life that are dependent on a diversity of plant life for survival, in turn, die out. Fishermen are affected, irrigation intakes are clogged up, yachting, rowing and canoeing comes to a halt and tourism is at risk. It multiplies at an alarming rate, its seeds can remain active for over 20 years, it is free floating and therefore highly mobile and it hibernates in the dry season and resuscitates in the rainy season.

“Water hyacinth is “arguably the most damaging water weed in South Africa and possibly the world.”

~ Debbie Sharpe from Working for Water Program under South African DEA

The task team found that a total area of about 180 000m² of the 290 kilometers surveyed is infested with this invasive aquatic weed. It is, however, important to note that the status of the water hyacinth infestation is constantly changing as water hyacinth is flushed downstream with each flood season, posing a major risk of water hyacinth infestation floating downstream in to Zimbabwe, and possibly Mozambique.



From pest to profit?

RESILIM together with the Botswana Department of Water Affairs (DWA) tested the feasibility of using water hyacinth as a source of biomass for charcoal in Olifants Drift, Botswana. The testing proved to be successful and RESILIM will continue to work closely with the Botswana DWA to solicit buy-in from communities on the concept to ultimately reduce the demand for firewood and therefore reduce deforestation, while at the same time better manage the invasive aquatic weed. Moving forward RESILIM will work with the Botswana DWA to refine the charcoal making process and prove its feasibility. This will involve working with a selected community who is impacted by the negative effects of water hyacinth. If viable, the process will be documented and distributed throughout the basin where water hyacinth

RESILIM convened several meetings for the JPTC to meet and discuss water quality issues and the technical aspects of the control and management of water hyacinth in the basin, and to strengthen the bilateral relations between the two countries, the long-term goal being to establish a joint water quality and water hyacinth monitoring program, including a joint database. The outcome of the meeting was a draft joint work plan.

Moving forward, RESILIM will facilitate a work session in Year Three to refine the work plan and have it endorsed by both parties. RESILIM will also facilitate a joint site-visit of the Hartbeespoort Dam for both parties to appreciate the water quality and water hyacinth issues.

RESILIM’s work around the water hyacinth management, as reported under *Water quality and aquatic weeds monitoring and management*, featured in RESILIM’s partner, GWP-SA’s

annual magazine for 2014, the **Water Dialogue, Cooperation & Partnerships**. GWP-SA indicated that they do not currently have a system in place to assess the readership numbers. The magazine, however, is distributed around Southern Africa through country events and the Country Water Partnership events. See [Annex Thirteen](#) for the article.

2.2.5 Southern Africa Wildlife Enforcement Network to combat illegal wildlife trafficking

According to TRAFFIC²⁴ at the first Wildlife Enforcement Network for Southern Africa (WENSA), the annual global value of illegal wildlife trade is an estimated \$20 billion. The current wave of poaching and wildlife trafficking impacting southern Africa threatens not only its wildlife but also the domains of rule of law, security, economic growth and development.

The RESILIM program is committed to mitigate threats to biodiversity caused by poaching by supporting the integration of resilience building into national biodiversity strategies. Therefore, in 2013, RESILIM together with SAREP, hosted a dialogue between representatives from civil society, governments, private sectors, wildlife authorities, law enforcements and more, from Southern Africa and abroad, to solicit support for the establishment of a WENSA.



Above: Over 60 people from all over southern and eastern Africa attended the Wildlife Enforcement Network in Gaborone, Botswana in October 2013.

Participants heard that the establishment of a wildlife enforcement network is a direct and proactive response against poaching and wildlife trafficking and that new sophisticated partnerships are needed to be forged both inside and among governments to coordinate the efforts of wildlife authorities, law enforcement, customs and border officials, and other security forces to fight wildlife trafficking. The WENSA would be comprised of civil societies, governments and private sector organizations from countries in southern Africa. As agreed with USAID and stakeholders present in the workshop, RESILIM was tasked to coordinate national level consultations in Mozambique, Zimbabwe and South Africa, with SAREP doing the same in Botswana, Angola, and Namibia, to ensure the buy-in from the various

Lesson learned: Through engagement with various stakeholders in the basin RESILIM learned that enforcement is not the only way to mitigate threats to biodiversity such as poaching, but that livelihood issues and community involvement should be taken into consideration. Moving forward, RESILIM is therefore exploring other options of mitigating threats to biodiversity by poaching. For example, the rhino poaching issue in southern Africa will be considered as part of the biodiversity threat analysis around GLTFCA that will be initiated in Year Three.

²⁴ Newton, D. 2013. *The Global Trade in Wild Plants and Animals*, PowerPoint Presentation, TRAFFIC, Pretoria.

countries and its stakeholders.

It has, however, been a major challenge for RESILIM to support national level consultations and facilitate the establishment of national-level wildlife enforcement networks, including the identification of focal points and representatives for the WENSA. Due to the complexity of coordinating the different security establishments in each country such as military, police, customs, security services in the private sector, and more, RESILIM has not been able to make much ground on this. RESILIM, together with CAMPFIRE²⁵, met with the Director General (DG) of the Zimbabwe Parks and Wildlife Authority to discuss RESILIM facilitating the in-country consultations in Zimbabwe, and was able to secure another meeting between USAID Southern Africa, USAID Zimbabwe, the US Embassy in Zimbabwe and the DG. At this meeting the DG committed to meet with the Zimbabwe Minister of Environment, Water and Climate to further the discussions.

2.2.6 Integrated livelihood diversification strategy for Great Limpopo Transfrontier Conservation Area

In Year Two, RESILIM initiated discussions with the Animal and Human Health for the Environment and Development (AHEAD) and the International Coordinator of the Great Limpopo Transfrontier Conservation Area (GLTFCA), including the TFCA Joint Management Board ²⁶ (JMB) around conducting a biodiversity threats analysis in the GLTFCA, to inform the integration of resilience building into the GLTFCA's ten-year Strategic Action Plan. Through this, RESILIM aims to improve the biophysical conditions of a biological significant area in the basin.

²⁵ Community Areas Management Program for Indigenous Resources is community based natural resources management (CBNRM) program developed by the Government of Zimbabwe through the Ministry of Environment and Natural Resources Management

(http://campfirezimbabwe.org/CBNRM/index.php?option=com_content&view=article&id=46&Itemid=55)

²⁶ The GLTFCA JMB is the coordinating structure that brings together representatives from the three countries, South Africa, Mozambique and Zimbabwe that manage the GLTFCA.

The Great Limpopo TFCA links the Limpopo National Park in Mozambique, the Kruger National Park in South Africa, the Gonarezhou National Park, Manjinji Pan Sanctuary and Mailpati Safari Areas in Zimbabwe, as well as the two areas between Kruger and Gonarezhou, namely the Sengwe communal land in Zimbabwe and the Makuleke region in South Africa.

The TFCA is home to various endangered species such as the white and black rhino, the wild dog and a number of rare antelope species such as the roan, sable and tsessebe, making it a key biodiversity area with immense challenges around conservation within the Limpopo River Basin.

Biophysical environment of the GLTFCA:

- 147 mammals species
- 500 plus bird species
- 110 plus reptile species
- 2 000 plus plant species



Following various engagements, RESILIM is also supporting the GLTFCA in its process of developing a medium to long-term integrated livelihood diversification strategy to build the resilience of communities living in the buffer zones of the park. RESILIM is also collaborating with the GLTFCA to pilot scenario planning in the Pafuri Triangle. This is an opportunity for RESILIM to initiate activities at local level that will reduce human-wildlife conflict in the buffer zones. This will be done in coordination with RESILIM-Olifants, who is also working in the GLTFCA to ensure a common approach, the sharing of lessons and the efficient use of USAID resources.

2.3 COMPONENT 3: CAPACITY OF STAKEHOLDER TO MANAGE WATER AND ECOSYSTEM RESOURCES IMPROVED

2.3.1 Training in climate change adaptation to community conservation trusts

The risk and vulnerability analysis of the basin shows that the headwaters of the Limpopo are getting drier, the growing period is getting shorter, frequency of flash floods is increasing and acute soil erosion. In July 2014, RESILIM in partnership with the Environment Heritage Foundation and the Global Environment Facility conducted a workshop in Francistown, Botswana with about eight community conservation trusts in and around the Francistown area to raise awareness on climate change and resiliency building. The purpose of the workshop was to:

1. To build the capacity of Community Conservation Trusts and Environmental Non-Governmental Organizations to understand the concept of Climate Change and its potential impacts.
2. To provide understanding of conservation initiatives that can buffer climate change impacts.
3. To share information with participants on funding opportunities for community level interventions addressing conservation and climate change adaptation and mitigation.

4. To explore various actions or steps taken by communities, and institutions to adapt to and mitigate climate change impacts in the sub-basin.
5. To identify gaps and develop capacity needs for further enhancement of people's resilience in the sub-basin.

The trusts also had the opportunity to explore different funding opportunities and how they can access funding to address the impacts of climate change and build their resilience to the impacts of climate change.

2.3.2 Support to LIMCOM: building communications capacity

As mentioned in the *Introduction*, LIMCOM is RESILIM's key stakeholder and the program is designed to support LIMCOM. In Year Two, RESILIM identified a basin-wide communication strategy as a vital tool for LIMCOM to improve the transboundary management of the Limpopo River Basin. The challenge, however, is that LIMCOM is currently unable to drive this strategy due to its limited organizational functionality. RESILIM will therefore adjust its work plan to accommodate the delay while still seeking to leverage ongoing public dialogue on resilience issues. Until LIMCOM is able to actively participate in the development of the communication strategy, RESILIM and its consortium partners, GWP-SA and OSC, will undertake various preliminary activities intended to build momentum and acquire the experience that will enable LIMCOM, once ready to take leadership, to quickly and easily engage in the larger communications program.

Moving forward, RESILIM together with OSC will facilitate technical knowledge-sharing and raise awareness with a broad audience across the basin. RESILIM will also work closely with GWP-SA to develop an action plan to build the communications capacity of selected basin organizations to engage and promote dialogue and awareness issues in the Limpopo River Basin. See [Annex Fourteen](#) for more information on the objectives of the planned activities.

2.3.3 The Limpopo River Basin Atlas: Our changing environment

RESILIM participated in a conceptualization workshop for the Limpopo River Basin Atlas in Bulawayo, Zimbabwe. The workshop included presentations on LIMCOM, RESILIM, GWP's Water, Climate and Development program, and GRID-Arendal to set the scene on the Limpopo River Basin and unpack the development of the atlas. The outcome of the workshop was a clearer understanding of the scope of the atlas, a suggested process and methodology to develop the atlas, identified capacity building and training needs, and a clarification of the roles and available support from the different partners present at the workshop.

RESILIM will continue to engage GWP-SA and GRID-Arendal supporting the initiative to develop a communication material that will raise awareness of especially policy makers of the impacts of climate change and adaptation measures. The development of the atlas will include activities such as contract and train authors; conduct a desktop study to collect available data, the production and documentation of maps, graphics and other visuals; and more.

2.3.4 Information and Data Management

RESILIM together with the United Nations Environmental Program's (UNEP) Regional Office for Africa facilitated an Information and Data Management workshop to underpin natural capital assessments and ecosystem resilience, as RESILIM supports knowledge management, raising awareness and building capacity for institutions pertaining to integrated and sustainable water management, as well as adapting to climate change, to improve the capacity of stakeholders to manage water and ecosystem resources.

The purpose of the workshop is to improve access to the national data, statistics and indicators needed for managing natural capital and building more resilient ecosystems. The workshop brought together practitioners and experts from African Governments, largely drawn from the ministries of environment and from statistical offices, as well as regional economic bodies, to review the current state of data and information on natural capital and ecosystem resilience, the capabilities available for collating that data and how that data and information is presented and shared.

During the workshop, RESILIM had the opportunity to present the program, its objectives, and a summary of its activities to about 36 participants from across Africa, and UNEP shared a prototype system for collating, analyzing and presenting environmental information.

Moving forward, RESILIM and UNEP will continue discussions around the possibility of collaborating to establish an environmental database for information sharing in the basin.

2.4 PROGRAM AND STRATEGIC ALLIANCE DEVELOPMENT

RESILIM is always searching for opportunities to utilize various existing platforms to share knowledge and raise awareness to build the resilience of stakeholders at a local level to better manage water and ecosystem resources in the face of climate-related issues and to promote various climate change adaptation strategies.

Engagement with LIMCOM: During Year Two, RESILIM met with LIMCOM technical team twice. At the first engagement RESILIM gave the task team an update on the progress made in terms of planning a basin-tour for the LIMCOM commissioners. In Year One RESILIM first conducted a pre-basin tour of Botswana, South Africa and Mozambique and conducted a pre-basin tour of Zimbabwe in Year Two. The purpose of the pre-basin tour was to identify climate change-related issues to bring under the attention of the LIMCOM commissioners during a tour of the basin. The purpose of the basin tour would therefore be to highlight certain climate change, water and biodiversity issues such as catchment degradation, pollution, water supply, and irrigation schemes in the basin. The basin tour will also build the capacity of the LIMCOM commissioners and technical task team to better manage the basin's resources, conserve biodiversity, and improve ecosystems and people's lives in the basin.

RESILIM then presented a summary of the findings of the pre-basin tour at the 5th Ordinary LIMCOM technical task team meeting that took place in December 2013 in Victoria Falls, Zimbabwe. The technical team decided that the LIMCOM basin-tour would take place in two phases, visiting two countries during each phase. The task team agreed that the first phase of the tour could take

place in April 2014 and that the technical team will assemble a task team consisting of a representative from each country to work closely with RESILIM in putting together an itinerary. The technical team, however, has not set a date for the basin-tour yet. RESILIM also took the opportunity to update LIMCOM on current and planned activities for Year Two.

Moving forward into Year Three, RESILIM is continuing discussions with LIMCOM to schedule the basin-tour.

Global Water Dialogue: During the Global Water Dialogue in Lusaka, Zambia early in October, RESILIM had the opportunity to build and strengthen relationships with various stakeholders and partners in the Southern Africa region, and more specifically the Limpopo River Basin, such as OneWorld; the Southern Africa Development Community; Global Water Partnerships Southern Africa; Common Futures; Wild Fruits of Africa; the Food, Agriculture and Natural Resources Policy Analysis Network; the Orange-Senqu River Commission; and also media services such as Inter Press Service Africa and Channel Africa.

Traditional Leaders Meeting: RESILIM attended the Vhembe Traditional Leaders meeting in Venda, Limpopo Province, where the program was introduced to over 600 community leaders and members; government officials; traditional leaders; the village chief, Livhuwani Matsila; and the Venda King himself, Toni Mphephu Ramabulana. RESILIM recognizes the importance of indigenous knowledge to build resilience of ecosystems and livelihoods in the Limpopo basin through awareness campaigns and the sharing of indigenous, traditional knowledge.

USAID Southern Africa Strategic Meeting: The USAID Southern Africa strategic meeting took place in South Africa in November 2013. RESILIM took the opportunity to share with USAID Southern Africa its activities around the GLTFCA, such as the development of regional conservation training courses in resilience building with SAWC; initiatives to mitigate threats to biodiversity; the identification of the Pafuri Triangle as one of the climate vulnerability hotspots in the basin through a risk and vulnerability assessment, and more.

LIMCOM launch: Upon a request from LIMCOM, RESILIM facilitated a meeting in South Africa in early July 2014 for the LIMCOM technical team to plan and coordinate the LIMCOM launch. The launch successfully took place in Maputo on July 24. The highlight of the event was the signing of an agreement between the four countries that Mozambique is the host for the LIMCOM Executive Secretariat.

EcoForum Empowerment Session: In response to a request from USAID, RESILIM met with EcoForum²⁷ earlier this year to explore possible areas of collaboration, specifically with regards to increasing knowledge and awareness of climate change impacts and adaptation measures, and integrated and sustainable water management strategies and practices. RESILIM was consequently invited to attend a training workshop, the *Empowerment Session*, by EcoForum in Durban, South Africa. RESILIM received the opportunity to present the program in the form of a PowerPoint presentation to a room full of officials from the Kwa-Zulu Natal Department of Economic Development, Tourism and Environmental Affairs, members of the Gauteng Legislature, various local media outlets, and journalism students.

²⁷ EcoForum is a progressive organization that seeks to steer discussions and improve reporting on environmental and sustainable living issues which will then lead to better informed decisions and actions.

Limpopo Department of Environment and Tourism (LEDET): In September, RESILIM-B together with RESILIM-O met with members of LEDET to introduce the two programs to the department and explore possible collaborations to achieve RESILIM's objectives and implement responsible catchment management and environmental controls. The meeting agreed that RESILIM B and LEDET have a common interest in the Soutpansberg and the Pafuri triangle. It was decided that once the GLTFCA process got under way RESILIM would explore how the Soutpansberg and Vhembe Biosphere reserve could collaborate with RESILIM to increase land under improved biodiversity conservation for resilience.

OKACOM 20 Year Anniversary: RESILIM received a request from LIMCOM to support the commission with an exhibition stall at the event. RESILIM responded by setting up and attending to the stall during the celebrations.

RESILIM's Chief Scientist also participated in a panel discussion on how science can inform river basin organization management and planning and to share experiences from the Limpopo River Basin.



RESILIM distributed various materials from LIMCOM and RESILIM, including its partners GWPSA and OneWorld.

Global Development Lab: In September 2014 RESILIM, in response to a request from USAID, hosted a brainstorming meeting with the South African Department of Science and Technology (DST), the Water Research Council, Department of Water Affairs and Sanitation (DWS) and potential private sector partners. The purpose of the meeting was to brainstorm and discuss a signature water-related initiative that will improve the resilience of the communities and ecosystems in the Limpopo River Basin that can be implemented as part of the development of a Science, Technology, Innovation and Partnership project with the Global Development Lab²⁸. RESILIM presented and proposed a study to a) characterize the aquifer, b) develop joint management plan.

Moving forward, RESILIM will facilitate the development a final concept document and USAID will support related financing requirements for its implementation, including from the private sector.

South Africa National Science Week: Upon a request from USAID, RESILIM partnered with the South Africa Department of Science and Technology during South Africa Science Week 2014, to support the CSIR's Natural Resources Unit, in presenting a career oriented science lecture to about 75 students during an exhibition at CSIR and distribute materials on river health. See a brief report on the event at <http://www.ehrn.co.za/lowerolifants/news/20140805.php>

During RESILIM's second programmatic year, members of the team featured in an episode of the television reality series, *It's For Life*²⁹. The episode feature a snippet of the RESILIM program being introduced by the Chief of the Matsila Village as program that assist villages, such as the Matsila Village, with best practices on water management and conservation, and a program that works hand

²⁸ The USAID Global Development Lab is a new entity within USAID that seeks to increase the application of science, technology, innovation and partnerships to achieve, sustain and extend the Agency's development impact to help hundreds of millions of people lift themselves out of extreme poverty.

²⁹ It's for Life is an educational reality series that aim to develop the life skills of 3 chosen participants

in hand with rural development. See <https://www.youtube.com/watch?v=2EVAePAIplc> for the episode.

The **Inter Press Service News Agency** conducted an interview with RESILIM on the challenges communities in the basin face in terms of the availability of water, the disparities in water usage in the four riparian countries, and to elaborate on how the RESILIM program work to address these issues. The podcast is available at: <http://www.ipsnews.net/2014/01/limpopo-river-basin-many-rivers-enough-water/>

South Africa celebrated **National Water Week**³⁰ in March 2014. RESILIM supported the department with the production and distribution of awareness raising materials such as water bottles, umbrellas and promotional flyers with key messages on increasing one's resilience through improved water conservation, encouraging public participation in the protection of water resources in their area.



Above: RESILIM speaks about the importance of water conservation to sustainable manage water resources on the Shift program airing on SABC 2.

Apart from the training, as reported under *Training stakeholders in water conservation and water demand management*, RESILIM, also in celebration of National Water Week, supported the department with the launch of the Adopt-a-River initiative at the Matsila Village in the Limpopo Province of South Africa. Adopt-a-River takes a participatory approach by involving key role players such as communities, including municipalities, sector partners, tertiary institutions, schools, private sectors and others to raise awareness on water conservation. The USAID Southern Africa Deputy Mission Director and the USAID Southern Africa Project Development Specialist on Climate Change and Environment attended the festivities and were given the opportunity to address delegates from DWA, the Department of Cooperative Governance and Traditional Affairs, traditional leaders from the area, and about 300 community members.

During South Africa's National Water Week, RESILIM's Monitoring and Evaluation Specialist was featured on **Shift on SABC 2**, an educational talk show. RESILIM promoted the program and the support it is providing to DWA with the launch of the Adopt-a-River initiative as mentioned above. *Shift* indicates an adult viewership³¹ of about 776 000 people.

United Nations Environmental Assembly: Following the previously mentioned successful partnership with UNEP, as reported under [2.3.4 Information and Data Management](#), RESILIM was invited to and attended the United Nations Environmental Assembly in Nairobi in June 2014. RESILIM had the opportunity to meet with different players in the region such as environmental ministers, policy makers and other practitioners, to discuss collaboration on data management and information sharing.

³⁰National Water Week took place from 17 to 23 March 2014. The launch of the Adopt-a-River in celebration of National Water Week, however, took place in April to accommodate the Deputy Minister of Water Affairs

³¹ 15+ years old

ANNEX ONE: MONITORING AND EVALUATION REPORT

K R A	Activity	Indicators Output	Y2 Target	Actual Reach	Monitoring Report for Year Two
Component I: Climate change vulnerability of the Limpopo River Basin Reduced					
KRA I.I. Science, technology, and capacity for decision-making and development of climate change adaptation strategies improved	Risk and Vulnerability Synthesis Research	CI.3 Number of scientific studies/ technical reports published or conference presentations given as a result of RESILM program assistance for research programs	2	1	RESILIM commissioned OneWorld a local partner to produce evidence based scientific work on understanding the Risk and Vulnerability Assessment of the Limpopo River Basin.
	Mapping of Mangroves Vegetation in Limpopo River Estuary			1	In Year Two RESILIM, with the technical assistance of a GIS Specialist, mapped the Limpopo River Estuary to determine the status of the mangrove vegetation in the estuary and inform possible conservation and replantation areas.
	Adaptation projects of scale	CI.4 Number of scalable climate change adaptation projects piloted in the basin as a result of the RESILIM support(Output)	10	3	<p>In Year Two, RESILIM partnered with the Centre for Sustainable Development of Coastal Zones (CDS-ZC) in Mozambique, the Southern African Wildlife College (SAWC) in South Africa, and Kalahari Conservation Society (KCS) to pilot projects on the ground that will reduce climate vulnerability in the basin.</p> <p>RESILIM was only able to secure three out of the ten targeted partnerships for climate change adaptation projects. This can be allocated to the challenges the program faced in the beginning of Year Two with limited capacity in the form of human resources following the relocation from Maputo to Pretoria late in Year One, which affected the technical functionality of RESILIM. Many of the program activities for Year One moved into Year Two due to delays in progress caused during the relocation of the program's field office.</p> <p>Also, the proposals for climate change adaptation projects were received following the release of a targeted and very general Annual Program Statement (APS). Being the first release of the APS, the submission, review, and evaluation of the proposals to ensure alignment with the RESILIM program objectives were a learning curve for the new technical team.</p>

K R A	Activity	Indicators Output	Y2 Target	Actual Reach	Monitoring Report for Year Two
					Moving forward, RESILIM is realigning the APS to the program indicators and according to the targets set in the PMP, to ensure that RESILIM receives the targeted results on the ground. With a number of new staff on the RESILIM team, and following the test-run and lessons learned around the review and evaluation of applications for support, RESILIM has the increased capacity to release the APS and in return manage numerous applications,
KRA 1.2: Water conservation and demand management responding to climate change improved	Building capacity of stakeholders to integrate climate change adaptation in water conservation practices	CI.5 Number of stakeholders trained in water conservation and water demand management	30	119	The RESILIM program is always looking for opportunistic activities that are in line with program indicators and will get traction on the ground. Upon a request for support, RESILIM partnered with the South Africa Department of Water Affairs ³² in Limpopo Province to train 119 community members, of which 89 were female, in water quality and waste management to increase their capacity to better conserve water and biodiversity at a local level in the Limpopo.
KRA 1.3: Integration of climate change adaptation strategies into long-term management plans and policies increased	Botswana National Climate Change Policy and Strategy	CI.7 Number of climate change adaptation strategies approved or adopted by stakeholder groups as a result of RESILIM support	2	1	<p>RESILIM supported the development of the Botswana National Climate Change Policy and Strategy through providing training on climate change vulnerability and mapping to the Technical Reference Committee responsible for the development of the strategy. Based on the feedback from members of the committee during and after the training, the committee would be able to use the learnings from the training to make informed decisions thanks to an increased understanding of climate-related issues in the basin, and especially Botswana.</p> <p>The RESILIM Chief Scientist also sits on the committee to ensure that resilience to climate change is incorporate in the strategy.</p> <p>In Year Two, RESILIM supported the finalization of the Zimbabwe National Climate Change Response Strategy and Action Plan. RESILIM will provide similar training to the task team assigned to implement the strategy, but there has been some delay in getting the buy-in from the Ministry of Environment, Water and Climate. This activity has therefore moved into Year Three.</p>

³² After the National Elections in South Africa in 2014, the department has changed to the Department of Water and Sanitation. However, in this report, reference will be made to the department as it was known for most of Year Two, the *Department of Water Affairs*.

Component 2: Conservation and management of ecosystems improved					
KRA 2.1: Natural resource management practices that mitigate threats to biodiversity improved	Mapping of the Limpopo River estuary	C2.1 Number of assessments on conservation and management of ecosystems conducted as a result of RESILIM program assistance	2	1	<p>RESILIM through its partner, CDS-ZC conducted an assessment mapping the Limpopo estuary to assess the state of mangrove degradation from 2005 to 2014. The mapping exercise resulted in the development of GIS maps that detail the increase of mangrove degradation from about 99 hectares in 2005 to 133 hectares in 2014. This assignment and its results will assist CDS-ZC in the selection of a mangrove replantation site.</p> <p>At the start of Year Two, RESILIM received a request from the South Africa Department of Environmental Affairs to support the development of a climate change response strategy of the savanna biome, this would include a climate vulnerability assessment of biome. But the wheels of the government department turns slower than RESILIM, and one year later, RESILIM was only able to conduct the first of many stakeholder engagement workshops in the development of the strategy.</p> <p>Moving forward, RESILIM will work more closely with the department to ensure the technical soundness of the concept in order to avoid continuous back and forth between the department and the RESILIM program, and to ensure the development of a world-class biome based climate change response strategy.</p>
	KYT exchange visit	C2.3 Number of stakeholders trained in natural resources management and biodiversity conservation practices as a result of RESILM program support	30	29	RESILIM through its partner, the Kalahari Conservation Society, took 29 members of KYT women on an exchange visit to a successful marula production factory in Swaziland to learn best practices in natural resource management and biodiversity conservation.
	WINSOME (Women and Micro-Enterprises training)			82	RESILIM through its partner SAWC developed and piloted a learning-by-doing training for women on natural resource management and micro- and small enterprises. Eighty-two women participated in the training.

<p>KRA 2.2 Ecological integrity and resiliency to climate change in key/priority conservation areas improved</p>	<p>Mangrove ecosystem restoration and conservation in the Limpopo River estuary</p>	<p>C2.4 Number of hectares in areas of biological significance and/or natural resources showing improved biophysical conditions as a result of RESILIM program assistance</p>	<p>1500</p>	<p>74</p>	<p>As indicated under KRA 2.1 “Mapping of the Limpopo River estuary”, RESILIM is supporting the restoration and conservation of mangrove ecosystems in the Limpopo River estuary through its support to CDS-ZC. The GIS maps identified 133 hectares where mangroves vegetation is degraded. The mapping indicates recommended a site of 11.95 hectares for replantation with RESILIM support and another 62.50 hectares that is suitable for replantation in the future. The rest of the 133 hectares are either not suitable for replantation or is recovering naturally.</p> <p>RESILIM set an ambitious target of 1500 hectares showing improved biophysical conditions.</p> <p>As reported in Year One, RESILIM supported the Joint Permanent Technical Committee of the bilateral agreement between South Africa and Botswana responsible for managing water quality and water hyacinth issues between the two countries, to complete a joint water quality baseline report and present it to the JPTC. This exercise, together with the interpretation of aerial photographs should support the JPTC making informed decisions in terms of the water hyacinth and water quality management around the borders of South Africa and Botswana. The JPTC, however, has not been able to come to an agreement on the method of water hyacinth management.</p> <p>Due to unforeseen delays RESILIM was not able to set up enough partnerships to reach the target of 1500. As mentioned above, the APS will be realigned to target this indicator.</p>
<p>KRA 2.3: Integration of climate change adaptation and biodiversity in basin conservation and water resource management increased</p>	<p>Support and scale up to basin level joint water quality and aquatic weed monitoring programs</p>	<p>C2.5 Number of management plans promoting integrated natural resources management officially proposed, adopted, or implemented for vulnerable hotspots as a result of project support</p>	<p>-</p>	<p>1</p>	<p>In Year Two, RESILIM supported the Joint Permanent Technical Committee of the bilateral agreement between South Africa and Botswana responsible for managing water quality and water hyacinth issues between the two countries, with the purchase of aerial photographs. The aerial photographs assisted the JPTC to determine the intensity of the water hyacinth infestation from the Oliphant draft confluence to the Zanzibar border post, and identify where immediate intervention is needed.</p>
<p>Component 3: Capacity of stakeholders to manage water and ecosystem resources improved</p>					
<p>K R A</p>	<p>Activity</p>	<p>Indicators Output</p>	<p>Y2 Target</p>	<p>Actual Reach</p>	<p>Monitoring Report for Year Two</p>

KRA 3.1: Capacity of government(s) at various levels in to strengthen trans boundary management ,integrated water, ecosystem management , climate change adaptation policies and strategies improved	Specialized participatory governance training	C3.1 Number of stakeholders with increased capacity to address issues related to water and ecosystem management as a result of RESILIM program assistance	30	28	RESILIM through its partner SAWC conducted trained on how to govern high variable, stochastic and natural-resource dependent ecosystems.
	Climate Change and Vulnerability Training	C3.2 Number of government officials trained in transboundary natural resources management / climate change adaptation as a result of RESILIM program assistance	30	29	RESILIM, in partnership with the USAID-funded Southern African Regional Environmental Program to pilot training in climate vulnerability with participants from the Okavango and Limpopo Basin. Five people from the Limpopo River Basin attended. Following the success of this training, RESILIM delivered similar training to 24 members of technical reference committee responsible for the development of the Botswana Climate Change Response Strategy.
KRA 3.2: Knowledge and awareness of climate change impacts and adaptation measures increased	Risk and Vulnerability Assessment Validation Workshops	C3.3 Number of people reached through awareness campaigns to promote access and use of science based information for stakeholders as a result of RESILIM program assistance	1000	82	RESILIM facilitated two workshops to validate the findings of the Risk and Vulnerability Assessment. One workshop took place in May 2014 in Hwange where 46 stakeholders participated. The second stakeholder engagement workshop took place in July 2014 in Maputo, where 26 delegates participated.
	Information and Data Management Workshop			36	RESILIM together with the United Nations Environmental Program's (UNEP) Regional Office for Africa facilitated an Information and Data Management workshop to underpin natural capital assessments and ecosystem resilience.
	Raised awareness of climate related issues and the need for resilient communities through the Training Needs Assessments			57	Through the partnership with SAWC as mentioned above, RESILIM conducted training needs assessments with a total of 57 delegates to inform the development of resilience building training.

ANNEX TWO: METHODOLOGY OF CLIMATE IMPACTS AND THE POLITICAL ECONOMY ANALYSIS AND THE COMMUNICATION MATERIALS DEVELOPED

The desktop political economy analysis was conducted in two phases. The first phase included building on and adapting to recent analysis under the Regional Climate Change Program (RCCP), a program implemented by OneWorld, and current research on Transboundary Water Governance developed by the Danish Institute for Security Studies and OneWorld. The transboundary water analysis and the regional systems and political analysis assessed the implications of managing the effects of climate change under the prevailing institutional frameworks and political economies of southern Africa. These studies and analyses and workshops by RESILIM, gave rise to key questions that underpinned the desk review conducted in the second phase of this political assessment. The methodology further included interviews with stakeholders and experts in the basin system which informed the analysis. Comprehensive literature review was also conducted and some conclusions were drawn.

The analysis explored different routes climate and socio-economic development might take in the basin. One ensemble of global climate models (GCMs) projects that much of the basin will become drier; there will be fewer tropical cyclones and risks of flooding, but with more frequent droughts. The other ensemble considers a general slight wetting of the basin, but summer drying is consistent in both sets of ensembles of GCMs. The study suggests that this clash of views requires that decisions must be taken that is valid for whatever change in climate evolves. There is, therefore, a need to explore the worst and best case scenarios of climate change impacts in each of the presentative case studies hotspots in order to improve cooperation and governance to sustainably strengthen the ability to adapt these changes to the mutual benefit of the riparian countries.

RESILIM therefore placed a magnifying glass over each representative case study area, exploring the worst and best case scenarios of climate change impacts in each of these areas, through a 1st to 4th Order Impacts Framework. The framework looks at:

1st Order: What are the impacts and linkages between basic climate parameters?

2nd Order: What the direct impacts is has on the physical and chemical processes in the physical and biotic environment?

3rd Order: How this in turn affects the resulting ecosystem services and production potential?

4th Order: What is the impact on social and economic conditions?

Feedback exists between all four orders. See below Figure one to three for an example of the 1st to 4th Order with a focus on the highly vulnerable Upper Limpopo as a representative case study:

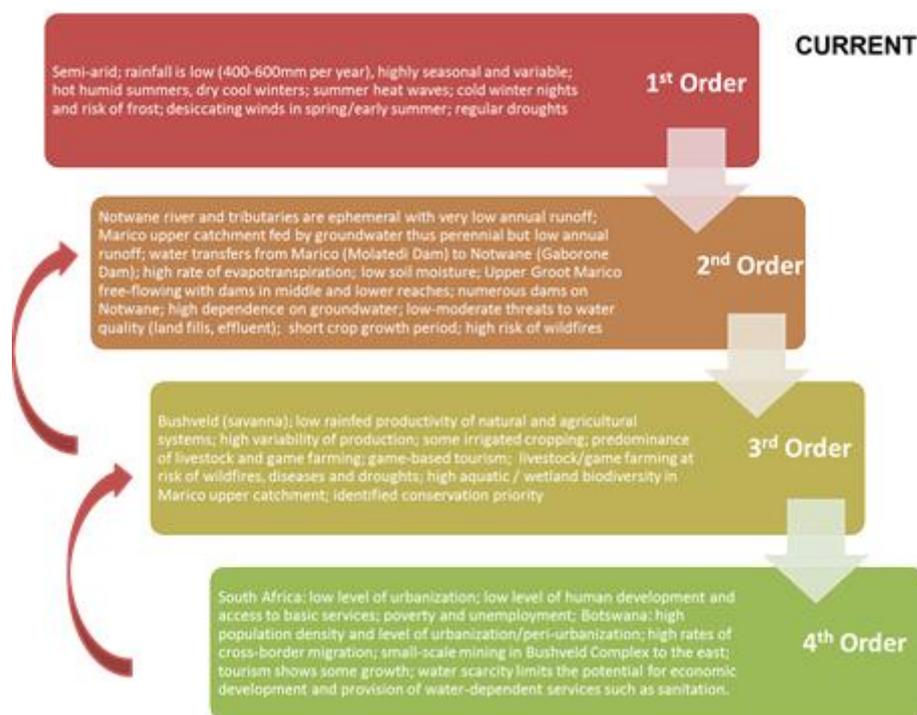


Figure 1: 1st - 4th Order of Upper Limpopo – Current situation

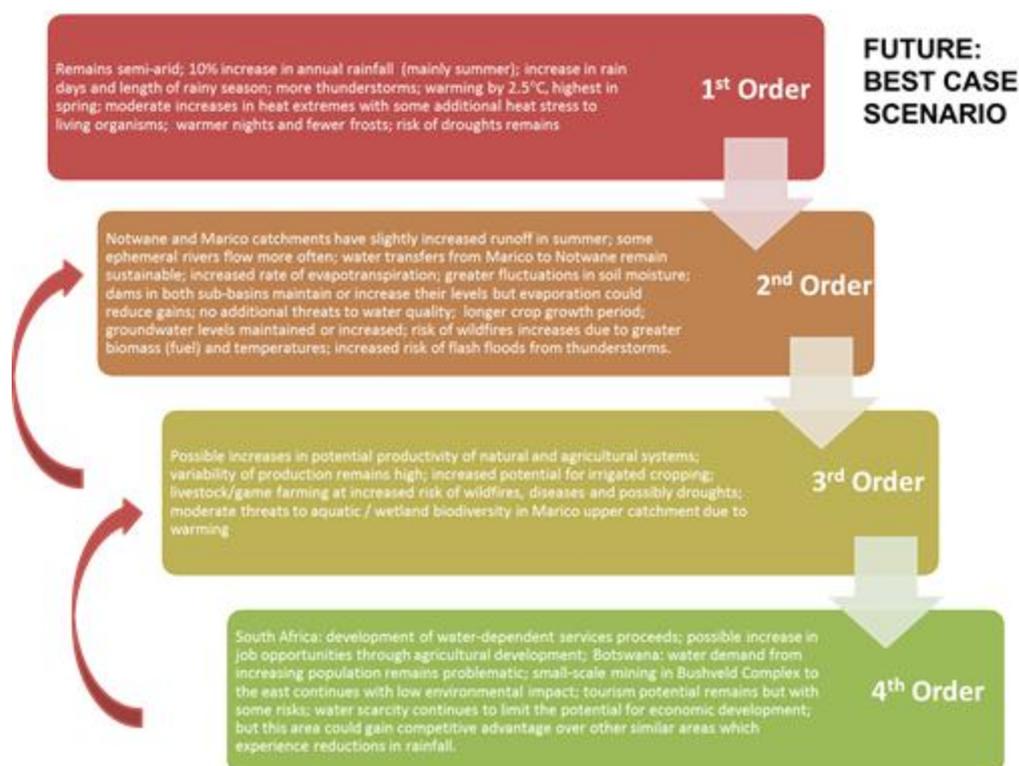


Figure 2: 1st - 4th Order of Upper Limpopo – Future: best case scenario

**FUTURE:
WORST CASE
SCENARIO**

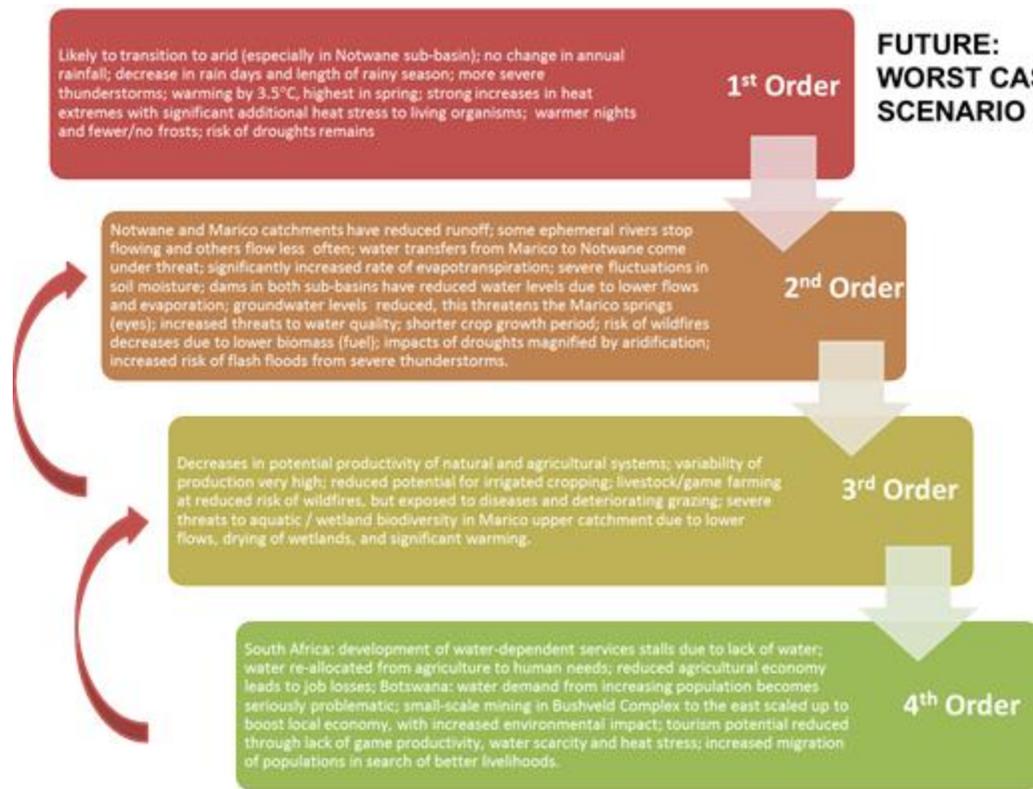


Figure 3: 1st - 4th Order of Upper Limpopo – Future: worst case scenario

Following a review and planning meeting with OneWorld and USAID, RESILIM developed a synthesis report, as well as other awareness raising communication products and materials for training in risk and vulnerability mapping. During the review and planning workshop, RESILIM also received input and consensus from USAID on the production of a synthesis report and other useful communication materials informed by the risk and vulnerability assessment.

The synthesis publication presents the final analysis, results and recommendations of the risk and vulnerability assessment in a simplified format for the purpose of assisting decision-makers in the basin and USAID in future planning at both national and trans-boundary levels.

The risk and vulnerability report was peer reviewed by Dr. Amy Sullivan, who at the time was with FANRPAN, and Todd Grahame Smith from the Strauss Institute in the US, as well as RESILIM's Technical Advisory Group (TAG) which includes Professor Jeremy Perkins, a biodiversity expert from the University of Botswana; and Professor Piotr Wolski, a hydrologist and climate expert from the University of Cape Town. The comments of the peer reviewers as well as the TAG members were incorporated in the synthesis publication to ensure the high quality of the report.

ANNEX THREE: KEY MESSAGES OF THE POLICY BRIEFS

High impact adaptations for the Limpopo River Basin System

1. A no- or low-regrets adaptation path facilitates the selection of solutions that simultaneously address possible future climate scenarios and are critical to sustainable development;
2. Conserving the basin's high altitude catchments is a sure way of securing water inflows;
3. Improving water quality through the 'polluter pays' principle is a critical policy intervention;
4. Strengthened early warning systems and disaster prevention are essential responses in the face of increased intensity and frequency of extreme events affecting livelihoods and Growth Domestic Products (GDPs); and
5. Reversing and controlling severe land degradation is critical to opening the water flows in the Limpopo River Basin, in addition to providing opportunities for job creation.

Integrated Water Resources Management to build resilience in the basin

1. Positioned as a high-impact adaptation strategy, the LIMCOM Integrated Water Resource Management (IWRM) Plan will be key to building resilience to climate change and should be explicitly acknowledged as such throughout the basin system;
2. Actions in one part of the basin have compounding impacts throughout the system, thereby reducing overall basin resilience— scale and regional integration is essential if high impact solutions are to be realized;
3. Empowered, decentralized water management — a core principle of IWRM — can be achieved through interpretive, critical analysis strategically disseminated to inform increasingly complex decision-making processes in the basin;
4. It is imperative that LIMCOM's IWRM Plan is renewed and revised to include additional resilience building aspects and responses to climate impacts;
5. The tenet of water conservation in high altitude rainfall catchments should be central to the revised IWRM Plan;
6. A coherent, cooperative strategy for reversing land degradation is needed to improve the basin's water quality and in preparing for the impacts of climate change;
7. The role of biodiversity as an indicator of a healthily functioning ecosystem needs to be formally recognized through policies around its restoration, conservation and preservation, implemented on a transboundary cooperative basis; and
8. Water pollution, both surface and ground, must be avoided— the principle of the 'polluter pays' cannot be a license to continue to pollute; simple measures include enforcing existing legislation on water licensing.

ANNEX FOUR: KEY MESSAGES FROM THE REGIONAL STAKEHOLDER WORKSHOP TO VALIDATE R&V ASSESSMENT

In supporting the Research Platform and the Animal and Human Health and Disease Great Limpopo Transfrontier Conservation Area (AHEAD-GLTFCA) with the facilitation of its annual conference, RESILIM secured a workshop at the conference to present and validate the risk and vulnerability assessment. The conference provided a useful platform to validate the R&V approach and outcomes, to deepen the understanding of R&V to climate change within the TFCAs, to consider ways of strengthening adaptive capacity in resilience building, and to consider planning and decision making for resilience in the TFCAs.

Participants included water, biodiversity, climate and trans-boundary cooperation experts, as well as civil society organizations, relevant government institutions and partner organizations, networks and programs.

More than 100 representatives from NGOs educational and training institutions, local authorities and others from across both TFCAs in the basin attended the conference. RESILIM also supported delegates from Mozambique to attend the conference (see photo).

The workshop validated that a systems-based approach to analysis and to deriving solutions is crucial and identified the following potential areas of support:

- a) Analysis of alternate livelihood strategies and their potential and feasibility;
- b) Support for the Institutional Reform Process;
- c) Support for integration of climate into park and TFCA development planning processes;
- d) Support for SADC in integrating climate and resilience building into their current process of establishing best practice guidelines from TFCAs; and
- e) Raising awareness of the important of improved water resource management in the Limpopo River Basin System in relation to conservation areas.

The above proposed interventions align with RESILIM objectives of reducing the climate vulnerability of the basin; improving the conservation and management of ecosystems; and improving the capacity of stakeholders to

The workshop agenda was structured over four sessions, designed for participatory interaction, to achieve the following objectives:

- 1) Apply and consider the usefulness of a Systems Approach to Resilience Building for TFCAs
- 2) Discuss the climate-water-biodiversity nexus in high impact adaptations and resilience building responses
- 3) Consider heightened vulnerability as means of building adaptive capacity for resilience building



FROM LEFT TO RIGHT: RESILIM supported Agosthino De Nazare, the National Director of Veterinary Services; Oraca Cuambe from ANAC; and Thomas Chaúque from the Limpopo National Park to attend the conference.

manage water and ecosystems.

RESILIM and OneWorld conducted a regional workshop in Maputo, Mozambique to validate the Risk and Vulnerability report and to acquire input from 26 stakeholders across the basin. The level of discussion throughout the workshop was in-depth, with a wide variety of challenges and solutions discussed for the Basin. Below is a synthesis of the discussions into the key messages that arose during the workshop, with particular emphasis on what is needed in the basin to enable future resilience building work:

The need for a basin-wide investment strategy to build resilience in the basin is evident. Despite diverse stakeholder interests in the basin, it is acknowledged that better management is required of the basin – which takes a systems approach to managing surface water, groundwater, ecosystems and humans into account – would benefit all countries in the long run.

Governance issues and the enabling environment are key focal points for the resilience in the basin. Adaptive capacity in the LRB relies heavily on the strength of decision making institutions in the basin. While there are other adaptive capacity variables such as technology, without strong institutional support the benefits of these other layers will be less impactful. Governance rather than technical details remain a strong agenda for the workshop group going forward.

The mandates of many of these decision-making institutions need to be revisited. Many of the basin's decision-making institutions are unclear over roles and responsibilities. Additionally, LIMCOM's current mandate should be re-visited in the context of what a capacitated institution would look like and the functions it should take. At present, LIMCOM's mandate is that of information sharer rather than decision maker, as is that of SADC. The SADC WD is also a necessary and critical lead stakeholder in this regard. Strengthening the SADC mandate in a way that includes measures to strengthen the accountability of the signatories of the LIMCOM agreement is important while ensuring clarity of roles and responsibilities amongst the key stakeholders in the LRB.

A basin-wide vision is required to get buy-in from the four riparian countries. A common vision for the basin is a precursor to any basin-wide strategy, and action to this end should take priority. If legislation is to change over how the river basins system is management, it is unlikely that integrated management will be favored if such a common vision is not present.

LIMCOM needs capacity in order to champion this basin-wide strategy. LIMCOM is well positioned to be the champion of such a basin-wide strategy, where its role as information sharer is adequate to address this requirement. However, capacity to fulfil this function is still needed as the institution remains embryonic.

Countries' engagement in a basin-wide strategy is essential. Engagement beyond that of on paper by the four riparian countries is an essential component of a basin-wide strategy, as well as LIMCOM (and to a lesser degree SADC's) power as an institution. LIMCOM should be seen as the four countries, and not as an independent player in the management of the basin. If LIMCOM lacks capacity to shift policy at the national level, then this is systematic of disengagement with the institution itself.

Regional cooperation is an important political pillar of the region, however, countries should address what water scarcity will mean for such agreements. While regional cooperation is looked to as an adaptive capacity layer in the basin, without adequate acknowledgement of the development future of the basin such agreements may become stressed. However, water scarcity does not necessarily predispose conflict. Further cooperation may just as naturally be an outcome of water scarcity, as might better management. Addressing the future of the basin in a regional

dialogue, with clear acknowledgement of the acute water stress in the LRB, is however an important way of avoiding conflict.

Analysis of trade-offs is weak and should be included in future planning. Analytical information is needed on what trade-offs can be expected, given future climate and development scenarios, and why some investments will yield greater social, ecological and economic returns than others. Population growth is one important driver of future change.

While the enabling environment is an important aspect of a basin-wide strategy, addressing current needs and requirements is as important. It is unclear as to how long a common vision in the political context of the basin would take. While it may be reached faster than expected given the level of commitment observed in the decision makers and stakeholders at the workshop, communities experience current challenges in the basin as a result of water scarcity, water pollution and land degradation.

Climate change is an additional stress factor in these communities. Climate change is having real impacts on communities and plays the role of exacerbating the current challenges of declining ecosystem health and poverty.

An approach which acknowledges the need to balance community needs on the livelihood economy level with those of the political level is required. The livelihood economy requires implementation of a range of actions to build resilience to these challenges while the political economy level requires changes in policy and the enabling environment. LIMCOM could play an essential role in coordinating the livelihood economy actions given its current mandate of information sharer.

The evidence base of work done to date is acknowledged as insightful and sufficient. The research in terms of the risk and vulnerability assessment, done in 2013 and 2014, paints a clear picture of the challenges in the basin. What is needed going forward is an understanding of how this research will remain useful and relevant.

Water scarcity is the key driver of vulnerability in the basin, with more severe water shortages predicted for the basin. Addressing water scarcity should thus be prioritized through both the political and livelihood approach to the basin.

Immediate steps should be taken to design and implement adaptation projects that protect the high lying catchment areas in the LRB, because this is where maximum value will be derived in this regard

The LRB leadership should apply to the GEF 6 for an adaptation project funding – the input leaves it open to the RESILIM team to pitch this application at either the policy or ground level interventions. This way a process of learning by doing can be started and a basin-wide project piloted.

In terms of responding to water scarcity on the ground, **rainwater harvesting, better groundwater management and water efficiency are important considerations.** In terms of strengthening community ownership and participation in LRB the ‘adopt a river project’ in South Africa may be a useful pilot project for the basin as a whole.

Policies and actions need to be harmonized across the different international, regional, national, local levels, and between countries.

The details of these proposed interventions require further development. This report presents the rationale and concept only. All interventions proposed align with the RESILIM objectives and design and are relevant to building resilience in the LRB as a system. In terms of information the way forward, however, these key themes are vital.

ANNEX FIVE: METHODOLOGY FOR DEVELOPMENT OF LIMPOPO BASIN STRATEGIC PLAN FOR REDUCING VULNERABILITY TO FLOODS AND DROUGHTS

The specific tasks of the above mentioned assignment are as follows:

- a) Familiarization of all relevant information resulting from the UN-HABITAT project, including relevant literature relating to IWRM, Vulnerability to Floods and Droughts, disaster risk reduction and management as they relate to the Limpopo river basin;
- b) Consult UN-HABITAT and project partners for additional information as well as LIMCOM (Commissioners, technical task teams and the executive secretary) to understand the expectation on the integrated water resource management strategic objectives;
- c) Review the project terminal evaluation report on the UN-HABITAT project and prioritise and build the recommendations into the proposed action Plan. Brief the RESILIM COP on the prioritized recommendations.
- d) Conduct in-country consultations with the key stakeholders and institutions dealing with the problems that are being addressed by the strategy with a view to verify them and build recommendations into the proposed action plan. Brief the RESILIM COP on recommendations that are being made to the proposed action plan.
- e) Review the country level climate change adaptation strategies in a view to identify the common challenges that are related to disaster risk reduction and water resources management;
- f) Based on the collated information and the consultant's own expertise, conduct a Diagnostic Problem Analysis (DPA) as to how the Limpopo Basin Strategic Plan for Reducing Vulnerability to Floods and Droughts (2007) could be integrated into the IWRM Plan (2011-2015) for LIMCOM.
- g) Facilitate two regional workshops (in Maputo or Johannesburg/Pretoria) to discuss the Inception Report, draft Action Plan (incorporating a common vision on climate change adaptation actions for Limpopo river basin).

The main output of this assignment will be a Limpopo Action Plan for reducing vulnerability to droughts and floods.

The Action Plan will detail recommendations and mechanisms for facilitation of implementation of the Limpopo Basin Strategic Plan for Reducing Vulnerability to Floods and Droughts, under the auspices of the IWRM Plan of LIMCOM with the intent of reducing the vulnerability of human settlements and ecosystems to floods and droughts in the Basin in the face of climate change. The recommendation (from LIMCOM) in the Limpopo IWRM Strategic Plan 2011 – 2015 implies working closely with LIMCOM in order to understand their expectations and how this Action Plan to reduce vulnerability to droughts and floods will feed into other existing and planned initiatives (like the Limpopo IWRM Strategy and the Limpopo Climate Adaptation Strategy).

Focus of the work is on two hazards – droughts and floods in the Limpopo River Basin. There is need to note that floods are sudden-onset hazards that come quickly causing losses and damages in vulnerable areas. Droughts are slow onset and impact can be felt for over a year. The following are also key phases in this assignment.

GWP-SA proposed the following steps to carry out the work:

Inception Phase: in order to build ownership and clarity of the work at hand with interested stakeholders it is proposed that the Inception Phase be extended to build a reference team of Focal Points within LIMCOM which will work with other relevant national entities. Time is also needed to align with on-going work in the region and also within the RESILIM program. GWP-SA is therefore proposing submitting a Draft Inception Report for discussion with RESILIM and then developing a Final Inception Report with an Implementation Plan in liaison with the Focal Points identified by riparian states through LIMCOM.

Phase 1: Survey and diagnostic analysis: Reviewing and updating the 2007 UN-HABITAT study through a climate change lens - implies having an understanding of the current climate and future climate change scenarios in the basin. Building on the diagnostic analysis carried out in 2007 study – in-country consultations will be carried out to update this work. The analysis will form the basis of the situational analysis for developing the actions to reduce vulnerability to floods and droughts.

Phase 2: Mapping Activities: Development of flood and drought hazard maps.

Phase 3: Development of Action Plan: Development of an Action Plan for Reducing Vulnerability to droughts and floods in the Limpopo River Basin.

ANNEX SIX: THE FOUR INTERACTIVE STEPS OF THE HOUSEHOLD ECONOMY APPROACH

There are four interactive steps in a household economy analysis. The first two are concerned with zoning or mapping a climate change vulnerable hotspot into flooding and drought risk zones, and grouping the population within these zones into sets of communities that share similar characteristics in terms of the impact of flooding and drought on these communities.

The assumption underlying these two steps is that the impact of flooding or droughts on a community is determined by two main factors: 1) geography and 2) economic status, relative to wealth. The methodology explains that while geography (where a household lives) determines climatic factors that may affect an area, and also the options for obtaining food and income, wealth generally determines a community's ability to exploit those options.

The third step involves developing a baseline picture or profile of the impact of flooding and drought on each identified flooding or drought zone.

The fourth and final step is to combine the information on baseline access with that on risk and response in order to generate specific adaptive strategies suitable for each zone. The methodology suggests that it will not only assist decision makers to implement targeted and informed interventions in the case of floods or droughts, but it will also feed upwards for transboundary responses in the Action Plan, and assist policy makers in targeting the most vulnerable areas and to identify strategies needed in order to reduce vulnerabilities and increase adaptive capacity.

The methodology includes guidelines on how to create maps of population densities within the zones, identify communities which are more vulnerable to the risk, and create profiles of each zone and formulating adaptation strategies so as to alleviate the impact of the risk.

Step 1: Delineation of Flooding and Drought Zones

The first step of the Household Economy Approach (HEA) is about defining geographical zones within a climate change (CC) vulnerable hotspot that are likely to be affected by either flooding or drought. It involves mapping out flooding and drought risk zones and understanding the communities (population densities) in these zones that are at high risk of a particular CC hazard. The approach includes identifying the factors (such as climatic, soils, proximity to rivers, etc.) that cause either flooding or drought and then to classify the identified zones into similar categories of very low, low high and very high risk areas. The CC vulnerability zones do not follow political administrative boundaries as their delineation is determined by natural factors like altitude, soil type, climatic factors, proximity to rivers and etc. A CC vulnerability zone map divides an area/country/basin into homogenous zones defined according to soil types, climate, altitude, proximity to rivers and slope. A CC vulnerability zone is, therefore, an area within which people share broadly the same means of production and living, and is likely to be affected by similar CC impacts. The main tool that is used to delineate flooding and drought risk zones is the Multi-Criteria Evaluation (MCE) using GIS.

A Multi-criteria Evaluation (MCE) is a method used to analyze a series of alternatives or objectives for the purpose of ranking them from the most preferable to the least preferable using a structured

approach (Eastman, 1996). The results of a MCE are often a set of weights linked to the various alternatives. The weights indicate the preference of the alternatives relative to each other. The ratings and classification for each of the climatic, environmental and other ancillary layers that are used in mapping flooding and drought, are ranked from very low to very high (using a scale of 1 to 5) based on the degree of vulnerability. Every layer is reclassified on these rankings, multiplied by their standard weight and then added to other layers to obtain the output risk map in a GIS setup. As a result, various climatic, environmental and ancillary map layers, as shown in Tables 1 & 2, are used to produce the output flooding and drought risk maps respectively. These layers are described as factors or criteria. A factor/criterion is the basis for a decision and can be measured and evaluated. The weights of the causative factors for each of both flooding and drought maps are determined using the pairwise comparison method in the context of a decision making process known as the Analytical Hierarchy Process (AHP).

A weighted overlay tool in GIS is then used to create the flooding and drought maps. Tables 1 & 2 gives the datasets required to map flooding and drought risk maps respectively. Possible sources of the datasets are also given in the tables.

Table 1: Flood mapping datasets and their sources

Dataset	Data source
Rainfall	FAO/SADC/FEWSNET/Met Departments
Soil	ARC/FAO
Altitude	DEM
Slope	Derived from DEM
Flow accumulation	Derived from DEM
Land use	CSIR/FEWSNET/Mapping Institutions
Proximity to water bodies	Derived from DEM

Table 2: Drought mapping datasets and their sources

Dataset	Data source
Rainfall	FAO/SADC/FEWSNET/Met Departments
Climate Moisture Index (CMI)	Calculated from precipitation & PET data
Slope gradient	Derived from DEM
Soil	ARC/FAO

Land use	CSIR/FEWSNET/Mapping Institutions
Proximity to water bodies	Derived from DEM

Historical rainfall, temperature and evaporation data will be used to create the climatic factor layers to factor-in the effect of CC on the resultant flooding and drought risk maps. The accuracy of the identified flooding and drought zones are verified by historical satellite imagery and historical flood and drought data. The accuracy can also be verified by interviewing key informants and ground truthing. Small political administrative units of wards of the hotspot area are overlaid on the delineated flood and drought risk maps to identify the most affected population zones for targeted management, intervention and decision making.

The principle underlying the understanding of CC vulnerability on communities is based on that an analysis of local livelihoods is essential for proper understanding of the impact of flooding and drought. A livelihood is the sum of ways in which people make their living (Chambers, 1995). Therefore, an understanding of livelihoods enables understanding the level and kind of impact likely to be faced by a community in case of CC hazard like flooding and drought.

Table 3 shows other ancillary data and software needed to CC vulnerability zones.

Table 3: Other ancillary datasets and essential software

Datasets/Software	Source
ArcGIS software	Available
Census data at provincial, district and ward level	SADC or riparian country
Political maps at provincial, district and ward at level	Available

Step 2: Population Breakdown: The second step is to break down the population within a particular flooding/drought zone into groups of communities according to their ability to exploit the local food and income options of the zone, and ability to cope with when a hazard strikes. Within any community, even one where everybody may be considered poor in absolute terms (i.e. compared to other better-off parts of the country or compared to those living in other countries) there will be differences between households. Different types of household live in different ways and are able to respond to external shocks (e.g. crop failures, price increase, loss of labour markets, etc.) in different ways (with differing levels of success).

Field work will be carried out in the hotspot zone collecting information on wealth, sources of food and income, patterns of expenditure, bad year coping strategies, and seasonal cropping calendar and changes observed on the environment. Data will be collected from district and community level key informants and community level focus groups. A wealth classification of the zones is made according to how communities are able to exploit the available options within a given zone. The ranking of a zone will be based on wealth aspects such as land holdings, livestock holdings, capital, education,

skills, and labor availability. The zones are classified as poor, middle or better off. A community whose zone is classified as poor will not be able to cope when a hazard strikes. The community in a middle class zone is able to cope to some extent, but the better off community will be able to cope to a larger extent

Step 3: Development of Baseline Picture (Profiling): This involves developing a baseline picture (profile) of the impact of flooding and drought on each identified flooding/drought zone. The analysis focuses on the fact that some of the communities' livelihoods patterns will change completely as a result of CC. Such changes include shortened growing season, decrease in livestock due to diseases and etc. Alternatives will have to be developed to alleviate the changes in livelihoods.

Step 4: Outcome Analysis: The fourth and final step is to combine information on baseline access with that on hazard and response in order to generate projections of future CC impacts, food and income access and impact on the environment. The processes will then facilitate the profiling of each identified CC vulnerability zone

The rationale behind this approach is that a good understanding of how people have survived in the past provides a sound basis for projecting into the future. The basic method of data collection in HEA focuses on the use of rapid rural appraisal (RRA) and participatory rural appraisal (PRA) tools and interview techniques.

The key methods and instruments in which data will be collected and analyzed include:

1. A household survey questionnaire
2. Group interviews of communities and key informants
3. A series of facilitated focus group meetings
4. Spatial analysis for mapping and for decision-making using GIS.
5. Demographic data analysis using statistical instruments like SPSS

ANNEX SEVEN: METHODOLOGY FOR THE TRAINING NEEDS ASSESSMENT FOR DEVELOPING RESILIENCE BUILDING TRAINING

The TNA in Mozambique, which took place in March 2014, introduced participants to the concepts of community-based natural resource management (CBNRM), participatory governance and training-by-doing, using examples from the region and especially from the Sabie Game Reserve. Each of the 11 training-by-doing courses was then described to the participants, who were asked to score the courses in terms of relevance, and also rank the top five courses in order of importance. Participants also completed a questionnaire which assessed, at a general level, what participants perceived to be their own training needs. Finally, the college is considering upgrading nine existing SAWC courses and participants were asked to identify gaps in the existing training courses and list other courses they considered necessary.

The TNAs investigated the following:

- At what levels the training is required; e.g. faculty and researchers, senior officials and policy makers, mid-level managers; landholders and communities.
- What form of land use and tenure in the ecosystem training the training should target ranging from private livestock and game ranchers to communal lands and protected areas?
- What are the strengths and gaps in existing SAWC training modules?
- Which training concepts, courses and modules are most appropriate for climate resilience in the region?

Through the use of questionnaires, participants had to rank the usefulness of the training needs and the demand for it. The TNA was focused on the interests of the stakeholders in the Limpopo catchment, especially communities who are vulnerable to climate change.

ANNEX EIGHT: RESILIM SUPPORT TO KYT

Exchange visit to Swaziland

The first day of the tour consisted of visits to the households of two women who crack marula nuts and provide Swazi Secrets with marula kernels ready for pressing. These visits educated the KYT women on effective methods to dry crush the nut while preventing the contamination of the kernel.

The second day of the tour included a visit to the factory where the pressing and packaging of oil for export to the international market and the production of marula cosmetic and beauty products for the local market takes place. The KYT women were educated on the importance of hygiene and sanitation in the factory to avoid contamination of the oil. Swazi Secrets demonstrated how the kernels are pressed twice – once to extract virgin oil and a second time to extract repress oil used for making soup.

The sanitation regulations in the factory outlined by Swazi Secrets:

- a) The use of hand sanitizers every time staff enters the factory
- b) Factory staff wear clean protective clothing which is inspected regularly
- c) Factory staff leave coats behind when leaving the factory
- d) Right of access to the factory reserved for authorized personnel only
- e) All good that enter the store room are finished products sealed in containers and ready for the market
- f) Machinery and other apparatus is cleaned and inspected before and after every use
- g) Batch numbers are used to track any contamination points during oil production

The women then paid a visit to the laboratory where PH level of the oil is tested and the results are attached to the oil meant for export. Lastly, the KYT women had the opportunity to see the production room where the oil is packaged as cosmetic oil, or used to make soup, lotion, hair conditioner or other cosmetic and beauty products.

Key feedback from participants:

- “Everything is important in marula processing including the debris from cracking and pressing;
- Treat the whole process as a business or employment and as such respect it by being clean at all times and keep your tools clean at all times;
- Use of maize meal bags that are not cleaned could contribute to you losing money as your kernels will be graded low in quality;
- It is important that we have advisers as board members and get advice when it’s useful and needed;
- It important to have a patron who will sell the Trust’s story and be the face of organization.
- [!] realized not only marula could make oil also Ximenia and many others;
- Being committed and loyal by all;
- Nurturing of new marula tree no matter where they are, is building a life for the future;
- Treat your time when cracking like office time. You just don’t drop everything just because your friend came over for small gossip;
- When cracking, don’t crush the nut, hit strategically on sides before you hit to crack;
- It is important and cleaner to crack and poke at once not crack and store for later poking;
- Materials or tools that are used like the cracking stones and containers should be cleaned immediately after use and at the start of use all the time and kept in clean areas;
- Don’t throw to the back of the house the stones after use only to remember them tomorrow;

- Dry stones in clean dry surfaces;
- Grading starts at cracking you have to put bigger stones together and small once together because the size determines the kernel size;
- It's important to affiliate with Phyto trade Africa; and
- Soaking and preheating are a hazard to lifespan of the Products”
~ Members of KYT women's group during exchange visit to Swazi Secrets in Swaziland.

Business plan training for KYT:

Objective

The objective of the workshop is to agree a fair and sustainable selling price for the marula oil that will be produced by KYT.

Method

The workshop will be an interactive process of building a picture of the production process and associated costs.

Issues to be covered:

1. List and calculate cost of production
 - a. KYT office costs
 - i. Rental
 - ii. Electricity and water
 - iii. Staff costs
 - iv. Stationery
 - v. Telephone/Computer
 - vi. Travel
 - b. Marula oil production costs (per 100kgs of oil)
 - i. Purchase price of kernels
 - ii. Transport and collection costs
 - iii. Crushing costs
 - iv. Packaging costs
 - v. Storage costs
 - c. Marula seed cake selling prices
2. Set out marula oil production method and possible production targets
 - i. Outline of process
 1. Amount of kernels needed for 1 kg of oil?
 2. Amount of seed cake produced from 1kg of kernels?
 - a. Outlet of seed cake? Income earned from Seed Cake?
 - ii. Timing of process – How long does it take to press one batch of oil?
 - iii. Possible targets with unlimited supply of kernels ie. If kernels were crushed from Monday to Friday for 8 hours a day using all the presses, how much oil could be made? How much kernels would be needed per week.
2. Agree possible “profit” to carry KYT through to next season.

Outcome

Agreement on:

- 1) Fair price to pay kernel producers
- 2) Fair price for KYT to sell oil.

Fair price for KYT to sell seed cake.

ANNEX NINE: WATER DEMAND MANAGEMENT ASSESSMENT

The purpose of the study is to carry out a cost-benefit analysis (CBA) on different Water Demand Management strategies (on-going and potentially new recommended ones) compared with a business as usual (BAU) approach. This is aimed at promoting climate resilience and water security in the Limpopo Basin. Water demand management is key in ensuring that the basin remains open and water is available for the ecosystem and other users. The CBA will assist water resources managers to present economic arguments on why it is important to invest in specific WDM strategies as a key water resources management intervention for enhancing resilience in the basin and allow decision-makers to make informed decisions on the various WDM strategies.

The objectives of the study are to:

1. Identify WDM projects that are being implemented in the basin (on-going)
2. Explore and identify potential WDM strategies that can be implemented in the basin to promote resilience
3. Propose methodology to undertake CBA for the WDM strategies
4. Carry out the actual cost-benefit analysis on the business as usual approach and on the different WDM strategies identified
5. Develop and disseminate economic arguments to decision-makers based on the CBA aimed at promoting cost-effective WDM strategies implementation in the basin

With an understanding of the potential hazards due to climate change in the Limpopo Basin (based on the RESILIM Risk and Vulnerability Studies and other related Climate Impact Assessments) alternative WDM strategies will be recommended to address the impact on water resources. A cost-benefit analysis will be carried out in order to make recommendations based on an economic analysis on which solution to invest. CBA will be carried out on the business as usual scenario and compared with a case where the WDM intervention is implemented.

In carrying out the CBA – the objectives of are defined and assumptions will be formulated based on the climate risk. Based lessons learnt from the WDM strategies which are being implemented in the basin and elsewhere constraints that need to be addressed to enhance resilience in the basin are identified. From these alternative WDM options that need to be put in place in the basin are selected – based on the methodology selected costs and benefits for each option will be estimated. This will allow us to compare the different WDM options to the BAU and amongst them – a sensitivity analysis taking into account a number of physical and economic parameters will be carried out allowing us to prioritize. This economic analysis will assist in highlighting the need for investment in WDM strategies compared to the BAU approach and also compare the different WDM strategies.

ANNEX TEN: TRAINING IN CLIMATE CHANGE AND RISK AND VULNERABILITY MAPPING

The sessions of the training in climate change and risk and vulnerability mapping the Technical Reference Committee of the Botswana National Climate Change Policy, covered theoretical concepts in climate science and adaptation, accompanied with practical examples of how climate change, and responses to climate change, can increase resilience and improve livelihoods.

The participants engaged in a number of interactive sessions that included presentations, exercises and discussions around central themes related to climate change adaptation in Botswana. Participants grappled with the broad challenges Botswana faces with regards to climate change. These challenges were used as examples in the group exercises to demonstrate the multi-disciplinary nature of the problems and potential solutions in mitigating and adapting to climate change.

Training sessions by CSAG covered:

- Understanding the climate system;
- an introduction to social and climate vulnerability;
- exploring the landscape of climate information, services and portals;
- introduction to climate information platforms and hands-on observed data (exercise);
- climate vulnerability risk ranking and climate change adaptation options;
- climate modelling and downscaling;
- looking at multiple lines of evidence that creates uncertainty;
- concepts of uncertainty;
- visualizing climate information;
- hands on future projections (exercise);
- climate adaptation options appraisal;
- decision making on national/provincial level; and
- case study group work.

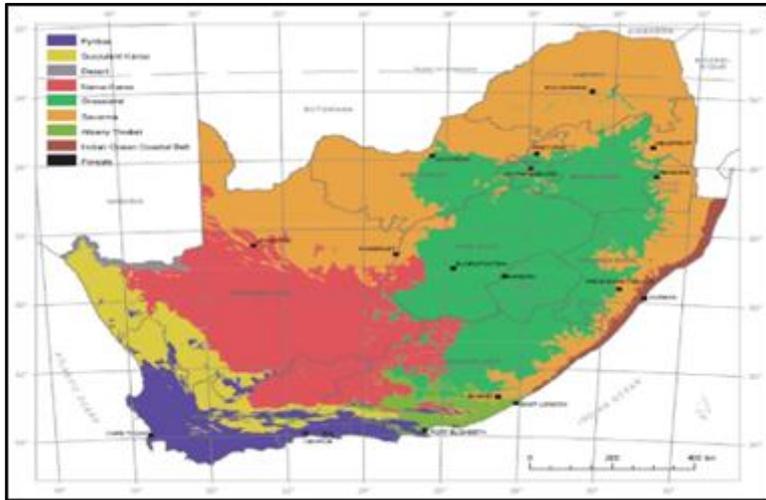
Training sessions by OneWorld covered:

- Overview and key concepts;
- Key results of the political economy analysis;
- Assessing the Impacts: Interactive mapping;
- Making a direct link to policy – Systems Analysis;
- What does climate change mean for Botswana; and
- Towards building resilience in Botswana and the Limpopo River Basin

ANNEX ELEVEN: DEVELOPMENT OF AN OVERALL BIOME ADAPTATION FRAME WORK FOR SOUTH AFRICA

In 2011, DEA contracted The South African National Biodiversity Institute (SANBI) to develop an overall Biome Adaptation Framework aimed at addressing climate change impacts and vulnerabilities of South Africa's biomes. The framework indicated three phases:

- a) Phase One: assessment of the extent of vulnerability of the nine South African biomes to the impacts of climate change;
- b) Phase Two: identification and development of appropriate response measures for the biomes; and
- c) Phase Three: development of the climate change adaptation plans for the nine South African biomes



Above: The biomes of South Africa (Source: Department of Environmental Affairs)

The DEA identified Council of Scientific and Industrial Research (CSIR) as the institution with the appropriate scientific expertise and capacity to co-ordinate Phase Three, with the technical support from SANBI.

The project plans to develop a comprehensive policy and planning framework for responding to climate change in the basin; develop an appropriate strategy for responding to conservation and sustainable development imperatives; and build the capacity and develop the human capital of stakeholders to ensure resilience to impacts of climate change.

The project will focus on three areas:

- 1) Planning and Policy
- 2) Making the case for biodiversity and ecosystem resilience
- 3) Capacity building through public awareness and education

ANNEX TWELVE: AREAS OF COLLABORATION WITH WWF

WWF proposes the following areas of cooperation with RESILIM:

Coordination: The full time National Forum Coordinators have access to broad networks of stakeholders at different levels. WWF claims that the coordinators are experienced and well established as convening organisations promoting information and lesson sharing. Forums can help organise one or two topical meetings per year on a relevant topic derived from shared areas of focus.

Working Groups: All forums have at least two functional working groups, which are a mechanism for enhancing member and expert participation in the affairs of the Forum. The working groups focus on agreed topics and design interventions for implementation. WWF proposes quarterly working group planning and review meetings of the relevant working groups on agreed initiatives. Community Based Enterprise and Management-oriented Monitoring Systems (MOMS) are proposed areas of focus for which specific tools and approaches have been developed under the regional CBNRM Programme. It is also proposed that CBNRM performance-monitoring and evaluation systems be considered to build on the stock taking reports and CBNRM Status Reports that national forums have been producing. This could involve updating them and focusing more on climate change adaptation and water management which have not been adequately covered. The approach could strengthen the relevance of the CBNRM approach and principles to climate change adaptation and water management.

Exchange visits: WWF has used exchange visits as a tool for promoting awareness, learning and sharing of experiences. Exchange visits were organised around specific themes and involved the selection of participants from the region to visit a specific site, selected for its value in providing lessons. Some visits involved many countries converging in one, e.g. participants from the region visiting Malawi for the baobab value chain, Zambia for bee keeping and Namibia for enterprise development. The other alternative involved a delegation from the Botswana Forum with the Minister responsible for Wildlife visiting Namibia to learn about the CBNRM policy and visit field sites to experience how CBNRM is implemented and how the policy will help.

Thematic areas for possible exchange visits are enterprise development, community based tourism, joint ventures, policy advocacy, communication and climate change adaptation.

ANNEX THIRTEEN: ARTICLE ON RESILIM SUPPORT TO JPTC ON WATER HYACINTH MANAGEMENT

GWPSA Water Dialogue 2014

Building resilience in the Limpopo River Basin

By Lara Rall, USAID RESILIM Outreach & Communications Specialist, RESILIM, Lrall@resilim.com

The Limpopo River snakes through South Africa, Botswana, and Zimbabwe, across Mozambique, until it reaches the Indian Ocean at Xai-Xai. Almost half of the Limpopo River Basin is in South Africa, which relies heavily on the basin to support industries such as agriculture, industry and tourism. Botswana imports water from neighbouring states to support a chronic water deficit, while a growing population in Gaborone increases demands for water. Major cities located in the basin, such as Pretoria and parts of Johannesburg, are rapidly growing and facing increasing challenges of poor water quality and insufficient water supply. In Zimbabwe and Mozambique, the majority of the



Water Hyacinth Plants that got trapped in the filtering facility set up by the Botswana Department of Water Affairs in 2013 in the Limpopo River at Moleyl Farm

population dependent on the water resource is rural, living with chronic poverty and food insecurity.

Climate change impacts, including hotter and drier conditions in some areas and increased floods and cyclones in others, are expected to become more pronounced in arid and semi-arid areas of Southern Africa, such as the Limpopo River Basin. This is a growing concern for more than half of the basin's population, which lives in rural areas and is dependent on rain-fed agriculture. Subsistence farmers are currently challenged with the consistent availability of adequate quality water to meet

food, livestock and household hygiene demands.

The situation also threatens economic development, particularly tourism based on water and wildlife.

Adapting to the impact of these changes is, therefore, absolutely necessary for sustainable development and biodiversity conservation in the region.

The Resilience in the Limpopo River Basin (RESILIM) is a USAID-funded program to support the four riparian governments in the basin in their collaborative efforts to enhance the resilience of people to the impacts of climate change and sustainably manage ecosystems in the basin.

The program recognises that climate change, biodiversity, water and livelihoods are inextricably linked and that one cannot build resilience of people or ecosystems by looking at one sphere in isolation, but rather by considering the whole nexus. One example of RESILIM efforts is its support of South Africa and Botswana in controlling the invasive water hyacinth.

A beautiful threat: Water Hyacinth spreads in the Limpopo

According to Debbie Sharpe from the Working for Water Programme under the South African DEA, the water hyacinth is "arguably the most damaging water weed in South Africa and possibly the world". In 2010, high floods washed water hyacinth into the Limpopo from the Crocodile River in South Africa. The plant is now spreading along the Limpopo between Martin's Drift and Zanzibar, and beyond.

The pest's primary impact is that it reduces light and oxygen in the water and changes the water chemistry, often resulting in fish kill. It is also known to provide a habitat for disease, promoting the proliferation of snails and mosquitos. It also affects flora and fauna negatively and increases water loss due to evapotranspiration. Water hyacinth is often known to invade bodies of water with high concentrations with of sewage, industrial effluent and runoff from fertilized agricultural land.

This highly-mobile, free-floating plant multiplies at an alarming rate by means of side shoots that break off and grow into new plants. Active colonies may double in size

every eleven to eighteen days. The seeds can remain active for over 20 years.

The Southern African Development Community (SADC) protocol on shared watercourse systems promotes collaborative action on alien aquatic species that destabilize trans-boundary ecosystems. According to the protocol, "Member states shall take all measures necessary to prevent the introduction of alien aquatic species into a shared watercourse system which may have detrimental effect on the ecosystem." The Botswana and South African Departments of Water Affairs initiated a bilateral process in 2009 to observe the spread of water hyacinth along nearly 300 kilometres of the Limpopo River that forms the boundary between the two countries.

In response to the trans-boundary threat of the water hyacinth, RESILIM received endorsement from the Limpopo Watercourse Commission (LIMCOM) to support bilateral integrated water resource management activities in the basin. Both government parties, in collaboration with RESILIM, have identified trans-boundary aquifer management, water hyacinth management, and water quality monitoring as potential areas of bilateral collaboration. RESILIM and the departments agreed that the two countries need to engage in quality monitoring field visits, share relevant research and management reports, and generate more information on the quantity and quality of the water resource itself through robust research and field-visits to validate data. With RESILIM support, activities and lessons learned from this bilateral cooperation will be shared among all basin countries.

On joint field visits, the Departments of Water Affairs in Botswana and South Africa analysed water samples and data and, with support from RESILIM, compiled a joint water quality baseline report. The report was presented to the Joint Permanent Technical Committee (JPTC) at a RESILIM-funded stakeholder workshop in Zanzibar, Botswana in 2013. Following discussions on the state of water quality in the Limpopo River Basin, and ongoing water hyacinth germination and proliferation, the workshop participants developed resolutions for the way forward.

A task team was established to collect information on the water hyacinth and water quality issues and identify hotspots where urgent action is required. In January 2014, RESILIM assisted the task team with the purchase of aerial photographs covering the South African and Botswana border. The task team combined the interpretation of the



The filter set up by Botswana Department of Water Affairs in 2013 in the Limpopo River at the Moleji Farm site to trap water hyacinth from moving down stream

aerial photographs with results from an extensive September 2013 survey of about 290 kilometres of the river, from the Olifants Drift confluence up to the Zanzibar border post, to determine the intensity of the water hyacinth, and select management areas for pilot interventions to mitigate the spread of water hyacinth downstream and other water quality issues.

From pest to profit:

As planning around the eradication of the water hyacinth continues, RESILIM is also exploring opportunities that could benefit local communities impacted by the negative effects of the invasive plant. One such possible opportunity is the briquetting of charcoal dust from water hyacinth. This could provide an alternative income to communities, provide an alternative source of biomass, improve access to the water resource, reduce the health risk associated with the presence of water hyacinth, and alleviation of pressure on other biomass fuel sources, such as wood, thereby reducing deforestation and associated soil erosion. The technical aspects, such as the harvesting and collection of the plant, drying, pyrolysis, mixing of resultant dust with binder, pressing into briquettes, and more, are yet to be fully developed and tested.

Other opportunities such as water purification, and biofuel, animal fodder, fertiliser, and fish feed production also points towards a possible system where the water hyacinth is not eradicated but managed as a resource.

ANNEX FOURTEEN: OBJECTIVES OF PRELIMINARY ACTIVITIES TO BUILD LIMCOM COMMUNICATIONS CAPACITY

The suggested activities are aligned to LIMCOM's mandate and RESILIM's program objective of improving the capacity of stakeholders to better manage water and ecosystem resources through an increase in knowledge management and raising awareness around climate-related issues and adaptation strategies and integrated water resource management. The goal of the activities would be to use communications to support effective trans-boundary decision-making. The objectives of the proposed preliminary activities are also consistent with RESILIM's integrated approach of building evidence for change, creating an enabling environment for decision-making and catalyzing sustainable action.

Objective 1: Facilitate technical knowledge-sharing and raise awareness with a broad audience across the basin

As noted in RESILIM's Year 2 work plan, significant scientific evidence exists on the need for action on climate change, resilience-building and the protection and management of biodiversity in the river basin. However, this evidence has not been integrated or presented in a way that inspires or facilitates decision-making. As such, activities under this objective are aimed at "putting research into practice" by ensuring that technical reports, studies and other products are available and accessible to key audiences in plain language and compelling formats. This will require both creating user-friendly content and developing channels to share and promote the information. The first priority would be to maximize the reach of RESILIM's own technical products, such as OneWorld's recent risk and vulnerability study, climate change adaptation and water management policy papers, and its anticipated climate scenarios, as well as GWP-SA's work on a revised disaster risk reduction strategy for the basin, and RESILIM-Oliphant's research on biodiversity threats. Materials related to RESILIM's identified hotspots and its subgrants (e.g., mangroves, marula production, and water hyacinth control) will also be a priority.

Initiatives such as the Limpopo Information System (LIMIS), the Limpopo River Awareness Kit (LIMRAK) and the Limpopo Monograph Study are sources of highly valuable technical information. With LIMCOM unable to play the role of convener, collaboration with other LRB projects has been challenging. To the extent possible, RESILIM should seek to play a collaborative role in helping translate technical information developed through these projects into accessible materials for key influencers across the basin.

In addition, RESILIM should draw on the wealth of relevant technical information produced by other river basin support projects, NGOs and universities. For example, RESILIM might collaborate with the International Union for the Conservation of Nature (IUCN) to ensure that its Water and Nature Initiative toolkits, which cover water management, climate change adaptation and other relevant topics, reach a wide audience across the basin.

Target audiences for this activity would be decision-makers and key influencers, including: LIMCOM commissioners and technical committee members, key national/provincial decision-makers, officials in relevant government departments or ministries; catchment councils, traditional and local leaders, NGOs, science/university community, leaders in other RBOs, donors, etc. Activities under this objective would be led by the RESILIM office with support from consortium partners GWP-SA and OSC.

Ideally, these initial efforts will help RESILIM, and in turn, LIMCOM, in identifying the best approach to developing a robust knowledge management system for basin stakeholders.

Next steps in implementing this objective would be to develop an inventory of available technical resources, identify channels for communication and fine-tune target audiences.

Objective 2: Build the communications capacity of select basin organizations to engage and promote dialogue and awareness of LRB issues

Communications and knowledge management are central elements of the RESILIM program, described in Component 3 of the results framework with a clear emphasis on capacity building. To catalyze information flows and build capacity, RESILIM should provide assistance to a small number of civil society groups in the basin to improve their ability to communicate on resilience issues. In keeping with the idea that these are pilot initiatives that could be scaled up in the context of a basin-wide LIMCOM strategy, these groups should represent a cross-section of organizations. They might include NGOs, trans-frontier conservation areas, research and policy organizations, catchment management authorities/councils, or other actors with a relevant mandate.

Funded through RESILIM's grant mechanisms, these partnerships might be linked to audiences associated with RESILIM hotspots. Communications should also be designed to meet the information needs of vulnerable groups such as women and children. Activities could, for example, involve public education programs for local communities on climate change adaptation or advocacy campaigns that facilitate stakeholder contributions to policy discussions on water management, such as LIMCOM's Integrated Water Resource Management plan.³³ Ideally, these partnerships will create a small network of champions who could communicate effectively on resilience issues.

GWP-SA would lead this activity, particularly in identifying and developing partnerships. The RESILIM office would provide management and guidance as well as technical support on grants. OSC would provide capacity building and training for partners on communications.

While a process needs to be undertaken to identify possible partners, candidates should be able to meet some of the following criteria:

- Commitment to the well-being of people and ecosystems across the Limpopo River Basin;
- Knowledge/experience on climate change adaptation, ecosystem protection and/or integrated water management;
- Existing capacity or ability to develop capacity to conduct effective communications, outreach or advocacy programs;

³³ LIMCOM's IWRM plan currently runs through 2015, but many expect that it will be extended as key elements have not yet been implemented.

- Credibility or potential to establish credibility with government officials and other key influencers;
- Strong presence and/or reach among target audiences, especially around RESILIM hotspots; and
- Existing administrative and financial management capacity.

Objective one, with its focus on decision-makers and key influencers, might be viewed as a “top-down” approach. This second objective is intended as a complementary “bottom-up” approach, ensuring community and grassroots engagement in resilience issues. By working in both “directions,” RESILIM can build new bridges between government decision-makers and civil society actors while also broadening public dialogue on climate change, ecosystem protection and integrated water management.

As a next step, GWP-SA has proposed a series of consultative workshops in each of the four countries to survey specific communications needs and begin identifying possible civil society collaborators.