Institutional Resilience Capacity Needs Assessment Report for the Limpopo River Basin

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Contents

1.1 The Capacity Needs Assessment ................................................................. v
1.2 The Basin and its People........................................................................... v
1.3 Water uses ................................................................................................. vi
1.4 Climate Change Impacts .......................................................................... vi
1.5 Institutional Framework for Water Governance ....................................... vi
1.6 Institutional Framework for Climate Impact Response ................................ vii
1.7 Key Opportunities for Resilience Capacity Building ................................. vii
1.8 Recommendations ................................................................................. vii

2 Chapter 1. Introduction and Background .................................................. 0
  2.1 Background ............................................................................................. 0
  2.2 Introduction ............................................................................................ 1
  2.3 Scope of the Assignment ......................................................................... 1
  2.4 Objective of the Capacity Needs Assessment ........................................... 2
  2.5 Need and Rationale for Capacity Needs Assessment ................................ 2
  2.6 Terms of Reference ................................................................................. 3

3 Chapter 2. Methodological Approach ........................................................... 4
  3.1 Defining Working Terms ....................................................................... 5
  3.2 Assessment Framework ......................................................................... 6
  3.3 Desired Institutional Resilience Capacities ............................................. 8

4 Chapter 3. Data and Information Analysis .................................................... 22
  4.1 Climate Impact Response and Water Nexus ........................................... 22
  4.2 Understanding of Climate Impacts in the Water Sector ............................ 23
  4.3 Understanding of Adaptive Institutions ................................................ 23
  4.4 Understanding Resilience ..................................................................... 23
  4.5 Rationale for Responsive Governance Institutions in the LRB ............... 23

5 Chapter 4. Key Findings ............................................................................ 24
  5.1 Botswana ................................................................................................ 33
    5.1.1 Summary of Climate Impacts .......................................................... 33
    5.1.2 Water Institutional Framework ....................................................... 35
    5.1.3 Climate Impact Response Institutional Framework ........................... 37
    5.1.4 Existing Opportunities for Botswana ............................................. 41
5.2 Mozambique .......................................................................................................................... 61
  5.2.1 Summary of Climate Impacts .......................................................................................... 61
  5.2.2 Water Institutional Framework ...................................................................................... 63
  5.2.3 Institutional Water Governance Framework ................................................................. 65
  5.2.4 Climate Impact Response Institutional Framework .......................................................... 68
  5.2.5 Existing Opportunities in Mozambique ......................................................................... 70
  5.2.6 Institutional organizational structure for climate change ............................................. 73
5.3 South Africa ............................................................................................................................ 88
  5.3.1 Summary of Climate Impacts ........................................................................................ 88
  5.3.2 Overview Socio-Economic Costs of Climate Impacts in South Africa ......................... 89
  5.3.3 Water Institutional Framework ...................................................................................... 90
  5.3.4 Climate Impact Response Institutional Framework .......................................................... 93
  5.3.5 Limpopo Green Economy Plan, Including Provincial Climate Change Response, 2013. 101
  5.3.6 Existing Opportunities for Capacity Building ................................................................. 105
5.4 Zimbabwe ............................................................................................................................... 114
  5.4.1 Summary of Climate Impacts ........................................................................................ 114
  5.4.2 Water Institutional Framework ...................................................................................... 115
  5.4.3 Climate Impact Response Institutional Framework .......................................................... 116
  5.4.4 Existing Opportunities and Gaps ................................................................................... 117
  5.4.5 Recommendations ......................................................................................................... 117
6 Chapter 5. LIMCOM – Capacity Needs for Building Institutional Resilience ...................... 118
  6.1 OKACOM ............................................................................................................................ 118
      6.1.1 Brief History on the Evolution of OKACOM .............................................................. 118
  6.2 Mandate and Institutional Framework .............................................................................. 127
  6.3 Recommendations for Capacity Strengthening ................................................................. 142
7 Conclusions ............................................................................................................................ 143
Abbreviations

ARAs  Regional Water Administration
CBOs  Community Based Organizations
CCU  Climate Change Coordination Unit
CGCMC  Centre for Management for the Climate Change Knowledge
CMAs  Catchment Management Areas
CMC  Catchment Management Committees
CERUM  Multiple Users Resource Centre
DGRH  Department of Water Resources Management
DMS  DMS: Department of Meteorological Services
DWA  Department of Water Affairs
FMD  Foot and Mouth Disease
FUNAB  National Environment Fund
GDP  Gross Domestic Product
GHGs  Green House Gases
IGCCC  Inter-Governmental Committee on Climate Change
IMCCC  Inter-Ministerial Committee on Climate Change
IWRM  Integrated Water Resources Management
IWRM-WE  Integrated Water Resources Management Water Efficiency Plan
Plan
LIMCOM  Limpopo Watercourse Commission
LRB  Limpopo River Basin
MEA  Multilateral Environmental Agreement
MCT  Ministry of Science and Technology
MMAs  Ministry of Women and Social Action
MOPH  Ministry of Public Works and Housing
NCCC  National Climate Change Committees
NCCAMS  National Climate Change Management Strategy
NDP  National Development Plan
NEDLAC  National Economic Development and Labour Council
NWRs  National Water Resources Strategy
OKACOM  Permanent Okavango Watercourse Commission
RESILIM  Resilience in the Limpopo Basin Program
UNFCCC  United Nations Framework Convention on Climate Change
VDC  Village Development Committees
WUC  Water Utilities Cooperation
WRB  Water Resources Board
ZINWA  Zimbabwe National Water Authority
### 1.1 The Capacity Needs Assessment

This capacity needs assessment aims to identify the institutional capacity needs for building institutional resilience in the management of the Limpopo River Basin. The specific institutional resilience desired capacities that are the focus of the discussion are:

i. External regime  
ii. Flexible resource management  
iii. Resources  
iv. Legitimacy and accountability  
v. Variety and diversity  
vi. Monitoring and evaluation  
vii. Identity  
viii. Forward thinking  
ix. Iterative approaches  
x. Mainstreaming  
xii. Knowledge management and institutional memory  
xxiii. Access to research, data information  
xiv. Internal agency and authority  
xxv. Collaboration and partnership  
xvi. Leadership  
xviii. Organizational structure  
xvii. Transparency and participation  
xix. Gender considerations

The above institutional capacities for resilience, are the capacities that are considered essential for resilience and are used as a starting point in measuring the extent to which an institution possesses the said capacities. They are also referred to as **desired capacities**: it is not essential that an institution should have all of them in totality and at the same time, however for an institution to be able to undertake resilient actions in response to climatic impacts, it has to have some of the desired capacities.

The capacity needs assessment covers the four riparian countries of Botswana, Mozambique, South Africa and Zimbabwe as well the transboundary institution, namely LIMCOM.

### 1.2 The Basin and its People

The Limpopo River Basin is shared by Botswana, Mozambique, South Africa and Zimbabwe. It has a total catchment area of approximately 416 000 km², with an average basin rainfall of 350mm per annum. The Limpopo River Basin is home to an estimated 18 million people.
1.3 Water uses

The Limpopo River Basin’s (LRB) ‘s estimated 18 million people place an onerous demand on the river basin in particular on the water through various uses. These uses include water use for mining, agriculture, domestic water supply in urban areas such as Gaborone, Johannesburg, Pretoria, Polokwane and Bulawayo, and, tourism whereby the LRB has large tracts of its areas being protected areas and national parks.

1.4 Climate Change Impacts

Studies undertaken within the LRB have indicated climate change is impacting negatively on the LRB and that there is need to ensure that there is adaptive capacity and that institutions that operate in the basin build resilience against the impacts of climate change. Some of the impacts experienced and anticipated are shortages of water, flooding, droughts, low investments in agriculture and low yields, water salinity encroachment, displacement of populations in flood prone areas, effects on accessing education during flooding periods, increase of poverty, effect on infrastructure and loss of life and income.

1.5 Institutional Framework for Water Governance

The structures for water governance in all the four riparian countries are established and in the process of transformation to meet the IWRM approach and principles and at transboundary level there is the Limpopo Watercourse Commission of 2003 which subsequently gave rise to the establishment of the LIMCOM Secretariat in 2008. Earlier structures are the Limpopo Basin Permanent Technical Committee (LBPTC) established in 1986 to advise member states on areas such as droughts, pollution, floods and water resources planning and development.

The national institutions for water governance all practice to varying degrees or have in place policies and plans for integrated water resources management: an essential premise for managing climate change through amongst others coordination; leveraging of resources; cross sectoral planning; collecting, collating, interpretation, packaging and sharing of information across and amongst the different water user sectors.

- Botswana – the Department of Water Affairs and the International Waters Unit are responsible for transboundary river basin management
- Mozambique – the National Directorate on Water, the International Rivers Unit and the Ara Sul are responsible
- South Africa – the Department of Water Affairs at national and provincial levels
- Zimbabwe – the Zimbabwe National Water Authority is responsible for transboundary river basin management
1.6 Institutional Framework for Climate Impact Response

The four riparian countries also have instituted their respective climate impact responses and articulated the institutional governance structures and processes related to climate change and how the institutional linkages with the water sector are framed. In all the riparian countries there is recognition of the cross cutting nature of climate change management and responsiveness. Botswana and Zimbabwe are in the process of finalizing their respective climate change response governance instruments.

1.7 Key Opportunities for Resilience Capacity Building

The national water and climate institutional frameworks are poised for addressing climate adaptation and resilience. LIMCOM’s governance instruments also seek to address and respond to climate change impacts. Opportunities are available inter alia in supporting knowledge management systems; scenario planning and budgeting for climate impacts; facilitating agreements on information and data sharing; exchange capacity building on water monitoring; database development, stakeholder engagement; mainstreaming resilience actions in program design; monitoring and evaluation; visioning processes; iterative planning; communication, sensitization and awareness on climate resilience, and, developing and use of tools for mainstreaming social inclusion and gender equity. Strengthening the transformation of national and local/basin systems and processes for meeting the climate resilience measures required to be effected at transboundary level is an important factor in resilience building. The operationalisation of the LIMCOM Secretariat provides an opportunity to mainstream climate resilience actions within the processes, systems and practices in its structures.

1.8 Recommendations

The specific recommendations for national actions and interventions are contained in the Tables and are designed to ensure transboundary climate change resilience capacity building. It is therefore recommended that the proposed national interventions be implemented. It is further recommended that the activities for the operationalisation of LIMCOM be undertaken to ensure that the transboundary institution has the human, financial, technological systems, processes and tools for facilitating and coordinating actions of adaptation and resilience building.
2  CHAPTER 1. INTRODUCTION AND BACKGROUND

2.1  Background

The Limpopo River Basin supports different demands for water including from industry, urban and rural populations, and as such water demands continue to rise in the face of dwindling water resources due to over allocation and increasingly variable water supply as a result of climate change impacts. The Resilience in the Limpopo Basin Program (RESILIM) supports the riparian countries of the basin in their efforts to improve shared management of water resources and equitably address the economic, environmental, and social needs of each country, thereby enhancing the resilience of the ecosystem and the people.

The RESILIM project seeks to contribute towards the reduction of climate vulnerability by promoting adaptation strategies for integrated, trans-boundary water resource management. Resistance to climate induced pressures can be established by building the capacity of local river basin organizations and communities to sustainably manage natural resources, simultaneously, high priority ecosystems will be preserved. One of the key capacities towards effective resilience to climate change impacts is the capacities of institutions, organisations and stakeholders to adapt to climate change and build resilience. In order to ensure resilience building it is necessary to undertake a process of understanding the capacity that is needed within the context of managing and utilizing the basin. Building climate resilience into development activities is key to achieving long-term sustainability.

A number of scientific studies on the Limpopo River Basin have been conducted and generally highlight the importance of climate change adaptation and actions that promote climate resilient growth and development. The responsibility for promoting climate resilient growth and development does not lie with one sector but is the responsibility of all who partake in activities within the basin. Therefore, climate resiliency must be incorporated in development planning processes and actions in order to provide a basis for guiding the actions of all actors. An important aspect of resilience building is ensuring social inclusion and gender equality at all levels of water governance and climate responsiveness in particular at community level. Women, youth, children and other vulnerable groups are the most likely to experience the impacts of climate change acutely including the challenges of floods and droughts. At the same time, they are the group most capable of creating change and adaptation within their communities. Women in particular, play a pivotal role in the provision, management and safe guarding of water. These roles need to be reflected accordingly in any activities related to management of water and climate resilience.

Studies have indicated that water resource limitations in all sectors (agriculture, tourism, mining and energy production) require a shift towards increased resource use efficiency, demand management and more sustainable consumption patterns to avoid driving social-ecological systems at all scales towards critical thresholds.
2.2 Introduction

This Report articulates the findings on the capacity needs for Botswana, Zimbabwe, Mozambique and South Africa in regard to strengthening climate resilience for the effective transboundary management of the Limpopo River Basin. The process for determining and identifying the capacity needs included literature review, conduct of interviews with national entities and LIMCOM. The interviews were conducted two levels: the first level being identification of national capacity needs to effectively participate in building resilience in the Limpopo River Basin. The second level being on the determination of capacity needs for LIMCOM to ensure that it undertakes its mandate on coordinating efficiently and effectively interventions on building/strengthening resilience within the Limpopo River Basin.

The main objective of the capacity needs assessment for strengthening resilience is to develop a common understanding of the institutional capacity needs and an over-arching institutional LRB climate resilience strengthening framework to guide decision-making in the basin and to identify opportunities for building resilience in ongoing development activities. Furthermore, the institutional capacity needs assessment process aims to assist in gaining stakeholder perspectives on immediate, short, medium and long term activities that can be carried to build climate resilience in the basin in the context and basis of the Risk and Vulnerability in the LRB: Mapping the Future of the Limpopo River Basin System – Investment Strategy, and, the LIMCOM IWRM Plan 2011-2015.

2.3 Scope of the Assignment

The scope of the assignment within the Limpopo River Basin is assessing the capacity needs of the institutions that manage the LRB and also those that play a role in the management or have activities impacting in the basin.

Figure 2: Assignment Scope
2.4 Objective of the Capacity Needs Assessment

The capacity needs assessment was commissioned to:

(i) review how institutions undertake resilience capacity building in relation to climate change impacts
(ii) identify capacity needs of the institutions reviewed
(iii) identify existing opportunities within institutions for designing of interventions that build and strengthen resilience to climate impacts
(iv) identify common challenges and opportunities for transboundary projects that enhance resilience capacities
(v) develop a capacity strengthening plan for transboundary institutional resilience building

2.5 Need and Rationale for Capacity Needs Assessment

The utility of a capacity needs assessment is understood to bring rigour and a systematic yet adaptable method of determining desired capacities (capacity needs) and assessing existing capacities (capacity assets). Additionally, a capacity assessment can assist in establishing capacity development priorities; and, in prioritizing capacity development interventions (as opposed to wishful shopping lists)

It provides the starting point for formulating a capacity development response. It helps prioritize capacity needs at two levels: longer-term strategic initiatives and quick impact initiatives that demonstrate results to political constituencies and help win fast-track approval. It establishes capacity baselines for measuring, monitoring and evaluating progress in capacity development.

Capacity assessments can serve a number of different purposes such as providing a starting point for formulating a capacity development response; act as a catalyst for action; confirm priorities for action; build political support for an agenda; offer a platform for dialogue among stakeholders; and provide insight into operational hurdles in order to unblock a programme or project.

The jurisprudence on capacity assessments indicate that desired capacities do not emerge from the capacity assessment but are defined before the assessment is conducted. It is therefore important to have a tool or guidance in place on practical desirable attributes, characteristics and descriptive concepts of what constitutes desired capacities that make an institution functional in the case of enabling resilience building in managing the impacts due to climatic changes. The assessment then helps analyze the gap between what is desired and what exists. The capacity assessment framework will be of limited use in designing a solution if the desired capacities are not properly defined. Literature also reveal that capacity assessment requires an understanding of the political and cultural context and a clear rationale for defining desired capacities.

A capacity assessment may be conducted at different points of the planning or programming cycle in a development intervention which may be a plan, strategy, programme or project. Often, capacity assessments are conducted in response to a felt and expressed need for capacity development as in this instance, the need to strengthen resilience in the LRB. It is hoped that this assessment will assist to determine or clarify what types of capacities need to be addressed and how in the context of addressing climatic impacts for better livelihoods, biodiversity conservation and better water resources management of shared water resources of the LRB.
A number of interventions have been undertaken within the RESILIM programme in support of the LRB and LIMCOM, these activities include stakeholder participation, supporting LIMCOM in addressing disaster risk reduction and implementation of pilot projects at community levels along the LRB as well as studies that provide evidence based interventions within the Limpopo Basin. The capacity needs assessment for building resilience capacity is therefore being conducted at an opportune period of time to determine structured, focused and targeted interventions and identify partnerships for dealing and managing the realities of the challenges posed by climate change from an institutional adaptive capacity perspective.

2.6 Terms of Reference

The terms of reference require the identification of resilience capacity building needs within the riparian country organizations that are responsible for managing the LRB or whose activities have a major impact on the basin; identify opportunities and develop a capacity strengthening plan for capacity building.
CHAPTER 2. METHODOLOGICAL APPROACH

This Chapter discusses the methodology that was adopted in undertaking the capacity needs assessment. It describes the use of terms as used and understood in this document; it articulates the identification of characteristics and attributes that are indicative of a resilient institution and the framework for assessment. The Chapter also discusses the basis of the development of the questionnaire and guiding interview questions used during the consultation processes and the strengths and limitations of the capacity needs assessment exercise.

The methodology adopted to conduct the capacity needs assessment included the following:

- Analysis of literature related to capacities required for adaptive capacities and building of resiliency
- Analysis of the national instruments specific to the management of transboundary waters and climate change impact response
- Defining basic terms used during the development and application of the questionnaire such adaptive capacity, climate impacts, climate resilience and adaptation to provide for a contextualized use of terms for the purposes of the capacity assessment
- Design of questionnaire
- Application of the questionnaire
- Capture of the raw data/information/responses and interpretation of the data in the context of the assessment

In analyzing the data the following was taken into consideration:

- Existence of systemic framework instruments directly intended, or by implication or coincidence to incorporate for purposes of integrated water resources management nationally and at transboundary level
- Clarity of objectives of policy, legislation and supplementary instruments
- Feasibility of systemic instruments to implement, enforce and monitor
- Existence of organizational structures mandated to implement, enforce and monitor the systemic framework instruments within the water and climate sectors
- Organizational capacity to implement, enforce, monitor and evaluate the systemic framework instruments (finance, technological capacity, mechanisms for cooperation and collaboration with other competent and able entities at national, regional and international levels)
- Organizational capacity to collect, report and analyze data, including its qualitative and quantitative verification and provision of water resources, financial and technological information for decision-making
- Organizational capacity to conduct effective internal and public integrated water resources management education, awareness and training
- Organizational capacity for engaging in integrated water resources management discourses (participation at forums, coordination of representation, choice of representation, national dialogues prior and post to representation; use and value of engaging in regional and international water discourses)
3.1 Defining Working Terms

For the purposes of this capacity needs assessment report the following terms are used in the context and meaning described below:

*Climate impacts:* climate impacts refer to effects of current climate variability as well as projected future climate change effects. Climate impacts are the effects on natural and human systems of climate variability and climate change.

*Climate resilient development:* has been described as development that ensures that people, communities, businesses and other organizations are able to cope with current climate variability as well as adapt to future climate change, preserving development gains and minimizing damages. Climate – resilient development is about adding consideration of climate impacts and opportunities to development decision-making in order to improve development outcomes, rather than implementing development activities in a completely new way. Climate risks cannot be eliminated, but negative impacts on people and communities can be reduced or managed. Climate-resilient development helps minimize the costs and consequences of climate impacts so they do not hinder progress toward development goals.

*Climate Resilience:* climate resilience is the capacity of a system to anticipate, absorb, accommodate, or recover from the effects of hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration or improvement of its essential basic structures and functions.

*Climate stressors:* are climate factors that can affect the functioning of system.

*Climate variability:* is variations in climate, including normal highs and lows, wet and dry periods, hot and cool periods, and extreme values.

*Enabling conditions:* are components of the socio-political environment that affect development goals, such as legal regulatory regimes, governance systems, mechanisms and processes, market mechanisms and educational opportunities. Enabling conditions include institutional factors that affect adaptive capacity.

*Inputs:* inputs are factors that enable or support developments, these include financing, technology, training and information.

*Mainstreaming:* mainstreaming refers to the integration of climate stressors into existing planning and decision-making processes.

*Non-climate stressors:* these are development challenges such as environmental degradation, corruption, population growth and pollution that can harm the functioning of a system, thus hindering the achievement of development goals.

*Vulnerability:* vulnerability to climate change refers to the propensity or predisposition to be adversely affected by climate stressors.

*Adaptation:* is the process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit its opportunities. Adaptation actions seek to enhance resilience and reduce climate vulnerability in the near and long-term by increasing exposure or sensitivity, or by increasing adaptive capacity.
Adaptive Capacity: is the combination of the strengths, attributes, and resources available to an individual, community, society or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm or exploit beneficial opportunities. Adaptive capacity is fundamentally about the ability of an affected system to change in response to climate stressors.

### 3.2 Assessment Framework

The methodology used in the conduct of the capacity needs assessment is adapted from the UNDP Capacity Assessment Framework, 2008 which outlines the following five steps:

<table>
<thead>
<tr>
<th>Capacity Needs Assessment</th>
<th>Engage Stakeholders on capacity development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assess Capacity assets and needs</td>
</tr>
<tr>
<td></td>
<td>Formulate a capacity development response</td>
</tr>
<tr>
<td></td>
<td>Implement a capacity development response</td>
</tr>
<tr>
<td></td>
<td>Evaluate capacity development</td>
</tr>
</tbody>
</table>

Figure 3: Five steps of the UNDP Capacity Assessment Framework, 2008

Specific to this assessment, the following was undertaken:

(a) Mobilizing and designing – this entailed determination of the type of capacities are required and specific to which entities and the type of mandates for the entities in question. In this instance it was mainly the national entities responsible for management of transboundary water resources and LIMCOM. The information mobilized was on the types of capacities required at different levels to build resilience to climatic impacts. The said information was then used to design the questions and guides for discussions. The questions and responses were designed to identify the levels of capacity prevailing in the institutions. All countries were asked the same questions, however, some country specific questions were also applied. Given the constraints in regard to the time-frame and the logistical arrangements as well as the focus, the capacity assessment was not focused on the human resources or individual capacities or functional competencies but rather on systemic and organizational capacity to mainstream resilience building within the scope and mandate of the organisation and its role within the LRB and with primary relationships. A combination of a qualitative and quantitative approach for capacity assessment was taken and thus allowing a social science based approach to interpretation of the responses.
Due to the time constraints factor, the geographical scope and the fact that climate change resilience building is a cross cutting issue in the water sector across the LRB: the approach used was to collect the most relevant of inputs needed to answer the assessment questions to ensure focused analysis of the findings premised on the purpose of the assessment which was to primarily identify strengths and opportunities that can be built upon for resilience strengthening at institutional levels.

(b) Background research on climate change, the impacts of climate change, the adaptation actions and measures and the institutional requirements on capacities needed to create an enabling environment for resilient responsive development in particular in water institutions was undertaken. Furthermore, water resources governance instruments at transboundary and national levels were consulted with the aim of providing a foundation on the organizational capacities jurisprudence and discourse. Based on the jurisprudence and documented case studies key requisite actions, principles, characteristics and measures were identified with corresponding organizational capacities. The identified requisite capacities were then used in the design of the data collection for systemic and organizational capacities.

(c) Review of literature specific to the four riparian countries and that of LIMCOM was undertaken to gain an understanding of what capacities already exist. In respect to LIMCOM general information such as its mission, vision, organizational structure, activities, budget, human resources and operational procedures was reviewed. The literature review included identifying best practices and relevant examples such as OKACOM that were used as part of the basis for designing and implementing the capacity assessment, as well as knowledge of the functional and technical capacities to be assessed. Given the focus of the RESILIM Programme which includes, water, livelihoods and ecosystems the literature on cross–cutting issues of gender or the human rights-based approaches was also reviewed and used to inform the questionnaires accordingly.

(d) During the capacity assessment data and information are collected. Prior to the application of the questionnaire and discussions, organizations and individuals interviewed were provided with a brief on the purpose of the capacity assessment, what the questions were and what would be done with the responses. Agendas for the meeting was also provided to facilitate focused discussions. During the interviews in Mozambique, when required translation between English and Portuguese was provided to ensure that information was captured as accurate as possible. The means to obtain the necessary data and information included one-on-one interviews, questionnaires, and team group meeting discussions; in Botswana subsequent meetings were undertaken for follow up on clarification on recommended literature by the Department of Water Affairs. Additional questions were added on targeting specific roles in ensuring that the necessary foundation for facilitating climate resilient development is effective. The terms of reference for the capacity needs assessment was shared with the persons interviewed to provide a complete picture of what the whole assignment entails. The questions were designed to be simple and focused on those institutional capacities required to build or strengthen resilience.

(e) Upon conclusion of the discussions and responses and inputs captured, a summary of the findings was done per country and for LIMCOM. The brief was based on the interpretation of comparing the responses to the questions, and, the comparison of the actual existing capacities to the desired capacities. This helped to determine whether the level of existing capacity is sufficient or needs improvement and in turn identify where to focus the capacity development response.
3.3 Desired Institutional Resilience Capacities

Institutional climate resilient capacity strengthening/building is about ensuring that the transboundary institution and the national entities responsible for water and resilience within the Limpopo River Basin have the key principles, attributes and characteristics that ensure that resilience actions, interventions and actions that allow for resilience building. The existence of such characteristics and the use of the principles can assist organisations to have the capacity to undertake climate resilient development.

Table 1 below presents the desired capacities that a resilient institution should possess.
What are the desired institutional capacities for climate resilience?

These are principles, attributes and characteristics are considered essential for an institution to possess in order to respond adequately to the impact of climate change and to ensure resilience.

Note these desired capacities are used to measure the extent to which an institution is satisfactorily able to have resilience capacities: an institution does not need to have all of them to be considered resilient and having adaptive capacity. They form the basis on which an institution is measured against during the review.

<table>
<thead>
<tr>
<th>Desired Capacity</th>
<th>Explanation</th>
<th>Relevance for Limpopo</th>
</tr>
</thead>
<tbody>
<tr>
<td>External regime</td>
<td>Places the granting of authority and mandate to effectively enforce the programme of work within the overarching transboundary institution and externally with national institutions and other stakeholders as being a necessary pre-requisite. External regimes should allow the capacity to reconcile the interests of the traditionally powerful sectors with the interests of the more vulnerable water users. Clear statutory authority to undertake the coordination and facilitation of managing and responding to climate change impacts contributes towards effectively meeting climate resilience in the face of a changing climate.</td>
<td>▪ The Limpopo River Basin is governed under LIMCOM through a transboundary agreement entered into amongst four countries. To that end, the national frameworks should be able to allow for transboundary commitment to be honoured. ▪ The Agreement on the Establishment of the Limpopo Watercourse Commission provides: ▪ The institutional structure of LIMCOM provides for clear authority for the LIMCOM Secretariat to undertake coordination</td>
</tr>
</tbody>
</table>

▪ At national levels this requires that the various institutions that are responsible for decisions regarding water use such as in agriculture, tourism, mining and domestic supply take cognizance of the need to allow for their management systems and policies to factor in climate resilience actions stemming from the water sector. This includes integrated planning and budgeting for meeting climatic impacts and building of robust systems for collaboration, coordination, monitoring, leveraging of resources and sharing of information as well as usage of technology.
Flexible Resource Management Resources

Flexible resource management denotes the ability to flexibly manage the allocation of resources like water in the face of variability, uncertainty and extreme events. This requires the capacity to undertake resource mobilization. Resources required for river basin management include human resources, technological, financial and informational resources.

- This entails the ability to plan for and budget for unforeseen climatic impacts and the ability to re-allocate resources to manage unplanned response to climatic impacts.
- LIMCOM as the transboundary institution responsible for managing the transboundary affairs of the Limpopo Basin has to have the capacity to mobilise additional resources for basin wide responses. This requires that the LIMCOM Secretariat should have the requisite structural organizational framework, human resources, financial systems and mechanisms including financial operational rules and procedures in place.

- At national level this requires the capacity to raise financial resources, and, to monitor the availability of water and other basin resources as well as to track developmental activities that have a bearing on resources within the river basin. The information gathered from tracking developmental issues should be collated and interpreted as well as shared for the benefit of good decision-making by all water users as well as by the water sector itself. This means that the institutional set up at national level should have a repository for information, which information can also be shared or transmitted to the LIMCOM Secretariat and shared with other riparian states.

Legitimacy and Accountability –

Accountability to a range of key stakeholders enhances the legitimacy of an institution and encourage collective ownership of climate change challenges and associated responses. Studies indicate that ensuring that institutions are accountable to the full range of water stakeholders can improve their legitimacy within the scale of operation, allowing greater capacity to fulfill duties in “normal” periods as well as make difficult decisions in more extreme periods.

In transboundary river basin management and in addressing climate change resilience capacity building it is prudent to undertake mapping of stakeholders, actors, resource managers and users, partnerships and other actors that impact on or are impacted upon by activities and decisions on the basin. After the mapping of such stakeholders, it is useful to develop engagement plan(s) that facilitate the involvement of key stakeholders in the basin so that there is minimization of resistance to climate resilience measures, and thus ensuring that the said stakeholders engage with new ideas and come to own and help implement the necessary changes. The open and transparent engagement of stakeholders in a relevant and
meaningful manner coupled with the scientifically backed studies and projects on capacity resilience can help towards building or strengthening legitimacy and accountability.

- LIMCOM is legitimately established by the riparian countries and needs to have the capacity to conduct climate responsive actions that address the basin climate challenges such as having project activities designed to build resilience at transboundary levels
- LIMCOM is currently in the process of developing a stakeholder engagement plan and there are a number of projects taking place at basin level in the different riparian states that build towards stronger stakeholder engagement and understanding stakeholder needs. LIMCOM’s organizational structure requires enhanced systems and mechanisms to be visible and able to articulate the value of having a transboundary institution and the actual value of cooperation

At national level, policies, strategies, legislation and action plans are often under the purview of the climate change, meteorology and disaster management offices. The legitimacy and accountability in the national context can be understood to mean that the water sector departments should be visibly responsible for ensuring the mainstreaming of any actions for climate adaptation and building institutional capability and ability to address the climatic impacts or threats or to respond to unforeseen events pertaining to the water sector and specifically to the waters of the Limpopo River Basin. This would entail that water departments have the capacity to not only monitor the uses and availability of the basin waters but should also be able to effectively work in collaboration with and coordinate different water users whilst ensuring that resilient and adaptive capacity actions are designed, budgeted for and implemented by the said water users.

<table>
<thead>
<tr>
<th>Variety and diversity</th>
<th>Variety and diversity acknowledges that there is not a single best-fit ideological framework, optimal policy or set of mutually consistent solutions to a given problem or challenge or to seizing an opportunity.</th>
</tr>
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<tbody>
<tr>
<td>Lessons learnt from previous studies indicate that it is important to integrate scientific research on climate change impacts with on the ground projects. In supporting pilot projects, it is useful to identify priority projects. Having dynamic frameworks that plan for unforeseeable events,</td>
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such as allocation of resources or identification of resources for disaster management allows for the possibility of diversifying responses.

| Monitoring and Evaluation | Monitoring, assessment, evaluation and reporting are important tools for identifying when current policies or programs become ineffective or obsolete, or require change to fulfill mandates. Monitoring and evaluation are also crucial in tracking that resilient actions are being implemented and achieving the desired results. | Integrated transboundary water resources management requires diverse tools, of critical importance are tools for monitoring and evaluating the impacts of projects and other developmental activities. To that end the institution responsible for transboundary management, in this instance LIMCOM requires to have systems, mechanisms and resources for monitoring and evaluation. It is not feasible for an institution such as LIMCOM to have all the capacities needed to do the actual monitoring. To that end the use of monitoring networks is essential. Monitoring networks are said to provide valuable information (water quality, water quantity, species diversity etc) upon which both short and long-term management decisions should be made, while independent verification through external assessment and evaluation can provide vital accountability for plans and management strategies. National entities and project studies often provide technical information on ecological, social and economic status of the basin. Such information needs to be acquired and managed for dissemination and use. Technical information requires the establishment of protocols and standards for information gathering at national levels that is harmonised, as well as protocols and procedures for sharing such information and making it available to the coordinating body. The coordinating body may integrate scenarios based on the information in basin strategic framework for addressing climate impacts and capacity building resilience projects. |
| Identity | A clear purpose with visible boundaries provide a strong sense of institutional identity. A good starting point for identity is defining a vision for the transboundary basin and its institution to provide a sense of direction and inspiration from which different plans can be based upon | In reference to identity studies indicate that the capability to shift organizational purpose, vision, mandate and priorities over time, and to reevaluate strategies and approaches periodically, can allow an institution to readjust and respond to climate change. However, a clear purpose with visible boundaries provide a strong sense of institutional identity. In that regard, it has been observed that a fine balance between rigidity and flexibility needs to be struck. As a starting point, it is useful to have an overall vision for the basin with |
mini-visions as appropriate such as a vision related to climate change and response to its impacts. Such vision will provide an overall policy framework for the development of a climate change strategies that spells out the responses to be undertaken through concrete activities.

- A Vision provides a sense of direction and inspiration, as well as a framework for decision-making.
- Adaptive organizations have a clear sense of where they are going and why. More importantly they regularly re-examine their vision to make sure their vision is revised should encompassing changes occur.
- A strong visioning process provides a case for change which helps to marshal the organization and foster the development of adaptive attributes and initiatives.

- LIMCOM articulated its vision as: *Sustainable water security for improved livelihoods in the Limpopo River Basin*. Water security requires putting in place steps and measures to address the impact of climate change on the availability and accessibility of water for all users in the basin. An elaborated vision on management of climate change; responses to climate impact; adaptive climate actions and building of resilience will offer good guidance to LIMCOM management and responsiveness to climate change.

**Forward Thinking**

This entails the undertaking of scenario planning for future events and to put in place steps and resources to meet and better prepare for expected and unexpected events.

The forward thinking principle refers to incorporating uncertainty into planning such as scenario planning for multiple climate future that allows an institution to envisage and better prepare for future expected and unexpected climate impacts.

Within the Limpopo River Basin, there has developed a wealth of information that can provide an impetus for strategic scenario planning and to inter alia develop engineering guidance for any future infrastructure that is sustainable and robust. This can be done at both LIMCOM and national levels. This would require capacities relevant to scenario planning, finance projection and budgeting for climate impact response. It may also require the capacity to establish, manage and ensure the auditing of a dynamic and continuous climate funding mechanism.
Iterative Approaches

Iterative approaches to planning provides space for the use of monitoring and evaluation to inform future operations, thus allowing for absorption of new learning.

- The capacities required at both LIMCOM and national levels would be those capacities to develop monitoring and evaluation frameworks, approaches for measuring tools, development of indicators as well as the interpretation of information gathered from the indicators. Based on the outcomes of the evaluation of the indicators and other information the operations may be amended and lessons or best practices noted as well as documentation of any new knowledge and use thereof into existing plans and account for both social and institutional learning.
- For example, where there is a basin plan for climate change management, the basin plan needs to be subjected to revision periodically to assist in adaptive management including the need to revisit areas that were poorly understood or where compromises were made in the initial Plan. The Plan should have indicators for evaluation and developing targets.

Mainstreaming

Mainstreaming provides for infusing the management and response to climate change into the different sections and thus allowing for a holistic integration of resilience. Mainstreaming also implies the application of a systems approach to consider how climate change impacts the different aspects of an institution’s activities.

- Rather than setting up a separate resilience program, department or unit, an institution integrates adaptation into different sections to fashion a more holistic response to climate change. Mainstreaming also implies applying a systems approach to consider how climate change impacts the different aspects of an institution’s activities.
- A mainstreaming approach initiated, coordinated and facilitated at transboundary level by LIMCOM should be implemented at national level. This means that mainstreaming implementation should also be undertaken at national level, with the focal water institution ensuring that integration takes place within its own different departments sections or ministerial sections as well as those other sector government departments outside the ministries responsible for water whose mandate, activities and areas of operation impact on the basin resources and climatic conditions.
- At river basin level, there is need for a strategic development framework that has climate change mainstreamed, additionally, LIMCOM should have the capacity to lead mainstreaming within its own transboundary plans and to assist in advising on mainstreaming at national level. The capacities required for mainstreaming should at a minimum enable the carrying out of the following:
Defining the Scope – this entails the establishment of the context and focus for development. This requires the identification of priority development goals and key inputs for attaining the goals. In the case of the LRB, LIMCOM should undertake the identification of priority developments that can be impacted upon or that have the potential to increase the negative impacts of climate change. To that end, a scoping exercise is required for the LRB so that it develops a program of work.

Assessment – this enhances understanding about vulnerability and development of actionable information

Designing – identification, evaluation and selection of adaptation options

Coordination, Implementation and Management – ensuring that adaptation is effectively coordinated, facilitated, implemented and managed.

Monitoring, Evaluation and Adjustment – monitoring at all stages of coordination, facilitation, implementation and management of adaptation measures and actions. This also includes the overall monitoring of the impacts of adaptation actions in building resilience and in minimizing or reducing the negative impacts of climate change and recommends or informs adjustment accordingly. The capacity to develop baseline and indicators is also of paramount importance at river basin organisation level and also at national institutions responsible for water and management of the shared river basin.

Creativity and Learning

Creativity and learning refers to the designing of an explicit space for improvisational approaches in which change occurs through experimentation, learning and unplanned response to contingencies. Increased creativity can allow climate change to be treated less as an obstacle to continued success and more like an opportunity to It has been noted that encouraging a culture of social and institutional learning can allow institutions and actors within them to question embedded ideologies, frames, assumptions, claims, roles, rules and procedures.

In order for creativity and learning to take place, the basin entity has to be operational, in the case of LIMCOM it requires that human resources have to be in place, financial resources and initiating of projects or the
transform existing processes, structures and operations. Evaluation of those projects that have already been implemented prior to the LIMCOM Secretariat being operational. Furthermore, the operationalisation of the Secretariat will allow for it to practice its knowledge management functions which are at the foundation of learning and creativity with support from a robust monitoring and evaluation framework.

### Knowledge Management and Institutional Memory

Knowledge management facilitates the implementation of sound decision-making in response to climate impacts. Visionary forward looking socio-economic development can make use of knowledge management through inter-alia the creation, acquisition, packaging, availing, transmission and utilization of such knowledge to ensure climate change resilience capacity. Knowledge management provides opportunities for the increased role of knowledge management in sustainability and how the creation, packaging, dissemination and utilisation of knowledge is useful in embedding the continuous improvement of knowledge, learning and use of knowledge by the transboundary organisation, governmental entities, civil society and communities of practice.

As adaptation is a learning and iterative process, it is important to preserve, have access to, and incorporate knowledge and experience gained during the early stages to inform subsequent later iterations. Having a good institutional memory is part of good learning and management systems. Documentation, archival and information management systems, knowledge sharing and transfer systems and policies are critical to promoting and sustaining institutional memory. The lack of these can be detrimental to adaptation. It is essential that decisions, and the assumptions behind them, are clearly articulated in a transparent manner so that those coming fresh to the issue at a later date can understand, challenge and evaluate those decisions as necessary.

### Access to Research, Data/Information

An adapting institution needs to be able to conduct and extract needs value from research, expertise, data collection and monitoring activities (both from internal and external). This requires partnerships with institutions that conduct research and generate knowledge.

The scope and nature of these activities depend on the organisational needs and can include theoretical and applied research specific to the institutions’ core business, market research, data, systems/operations monitoring and sector and community data and information. These include research and monitoring, understanding associated impacts, vulnerabilities and risks in all relevant sectors within the basin. To that end, the institution needs to be able to:

- Be aware of its own needs and capabilities for research, data and expertise
Be aware of and be able to access as appropriate external research, collections of data, guidance, expertise and monitoring activities

Be able to identify relevant knowledge and data gaps, and to influence external research, monitoring activities and data collections

Be able to access research findings and data

Be able, where appropriate, to carry out its own research, monitoring and maintain collections of relevant data and other information

Be able to collect information on its own sensitivities to climate by recording weather and climate-related incidents, associated costs and impacts, and its own responses to these impacts

Be able to understand and interpret research results, data and other information in order to develop useable knowledge and translate that into guidance, policies, programmes and practices

Be able to identify climate stressors and utilizes appropriate climate information.

**Internal Agency and Authority**

Internal agency and authority allows an institution to be independent and swift in reacting to climate impacts. The authority and independence is fostered, promoted and granted by the external regime.

It has been observed that a measure of autonomy allows institutions to independently react more swiftly to unexpected climate-related events. Autonomy tends to be granted by the external regime, allowing the institution a measure of independence to pursue adaptive approaches and to enable its staff or departments some autonomy of their own. A clear framework on climate change and response to its impact can greatly assist the transboundary institution to know what its functions, mandate and parameters are in respect to resilience activities within the basin and in responding to emergencies.

Autonomy does not imply lack of checks and balances but rather allows for avoidance of stifling needed reactive adaptation to large scale events and shocks.

**Collaboration and Partnerships**

Well connected networks tend to enhance communication, favour collaboration, and build social capital as well as foster Partnerships allow for capitalization on inter-disciplinary expertise, avoid duplication and produce cutting edge products that a river basin entity and national departments may not have had own resources to produce.
innovation. Working with non-traditional stakeholders is an important part of climate adaptation efforts in the future. Networks and partnerships for information sharing and research also provide opportunities for exchange of experiences, mutual learning and the integration of knowledge into different levels of decision-making. Collaboration and partnerships provide space for a pool of expertise and experiences in not only identifying climate stressors but also an opportunity to explore measures and solutions that can be incorporated in the policy and decision-making processes.

Partnerships and collaboration with non-governmental organizations can increase preparedness for climate impacts especially at community levels due to the fact that non-governmental organisations often work on the ground with communities and have relationships that are built on trust and shared experiences.

At institutional level it is useful to map out the key partners, stakeholders, networks and potential partners within and outside the river basin system who can contribute towards the river basin management discourse. The creation of a database of partners, stakeholders and networks that provide or promote different capacities and opportunities including training on climate change and responses to its impacts. The institution should have inter alia some of these attributes in relation to partnerships and relationships:

- Processes that recognize and actively explore the different values, motivations, interests and roles of actors within adaptation decisions, policies and programmes
- Systems and processes that allow for the identification and engagement of those involved in decisions, policies and programmes
- Documentation that reflects and communicates the results of learning collaborations and stakeholder engagement (e.g. reflection of what went well and what could be done differently). Sustained resources allocated to building relationships and networks commensurate with the need
- Processes and settings that facilitate and encourage informal sharing of knowledge
- Staffing and skill development that includes participatory processes, design of inclusive events and facilitation

This principle is closely tied to the need for an effective communication strategy and communication tools that include a functional website. Additionally, policies, rules and procedures of engaging in the different relationships/strategic partners should be put in place.

| Leadership | Continuous leadership at all levels is required to champion the climate response programmes of work and vision. | Continuous effective leadership, even in the case of high turnover, is needed to ensure that both short and long term plans are made and goals are met. Innovative approaches often need to be pioneered by visionary |
leaders to be effectively mainstreamed by the institution and to drive transformational change toward more climate-adaptive solutions and management practices. Managing climate change adaptation in a river basin requires leaders that combine skills in science and humanities and bring excellent capacities to communicate, facilitate and collaborate with the many stakeholders to build a common vision that generates acceptance of necessary reforms. These requisites must be supplemented by highly skilled personnel, committee members, technical advisors etc. It has been observed that the fundamental importance of engaged leadership is key to unlocking resources for adaptation. Leadership is required at all levels as it provides the direction and motivation that supports change and adaptation. Leadership is not confined to those in the top level of the organizational chart: leadership can be found throughout an organization. Leadership is exhibited by all those who encourage others to accept, support and even embrace new behaviours.

<table>
<thead>
<tr>
<th>Flat Organizational Structure</th>
<th>Flat organization structures minimize the bureaucracy that is often an impediment in getting the job done especially where there are emergencies.</th>
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<td>Flat organizational structures minimize the bureaucracy that is often an impediment in multi-layered organisational structures. In successful flat organizations, all employees are empowered to get the job done. Reaction to changing environments is made on the front lines, resulting in faster organizational adaptation.</td>
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<tr>
<th>Transparency and Participation</th>
<th>Transparency and participation requires consultation and participation of key stakeholders including civil society. Transparency encourages ownership of the vision and actions related to resilience. Transparency and participation provides a forum to identify climate stressors for different developmental activities in various sectors.</th>
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<td></td>
<td>Consultation with and participation of civil society and external experts or stakeholders in the decision-making process ensure representation of a broad set of interests and allow for consensus to be built and conflicts resolved earlier rather than later. However, participatory processes can slow down adaptation efforts if not managed efficiently and effectively. Lessons learnt from documented case studies indicate that institutional strengthening in river basin planning has proved to be a key in more climate adaptive water management by enabling diverse stakeholders to participate in the discovery of options and joint action. These principles point to the importance of creating rather than minimizing choices of water institutions. Helping institutions to “bend rather than break” in the face of new challenges should expand its adaptive capacity. Many of these principles highlight a fine balance between the internal flexibility that allows institutions to adapt to change.</td>
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and the longer-term need for external mandates and regulated support. By managing resources flexibly, institutions may be able to not only cope with stresses, but also create opportunities for positive transformation out of those stresses.

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<th>Social Inclusion and Gender Equity</th>
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<tr>
<td>Climate change resilience requires the inclusion of all sectors of society including vulnerable men and women, youth, children and the marginalized who all in one way or the other are impacted upon by climate change. Organizational visions, plans, programmes and activities should be gender sensitive and ensure gender equity. To that end, gender equity must be integrated in organizational programmes and practices in order to achieve real equity and social inclusion.</td>
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Climate change resilience requires the participation of all actors and the success of adaptation requires the inclusion of all and should benefit diverse sectors of the socio-economic field. Organizations play a crucial role in design and delivery of gender-responsive and social inclusion sensitive programs and projects. Inclusiveness equality must be integrated into an organization's programming and organizational practices in order to bring about sustainable change toward achieving real equality. At transboundary level, it requires that the river basin organization mainstream gender in its systems of governance including in human resources policies. Most importantly in the context of climate change and its impact, gender must be integrated in all programs and projects from conception, design, implementation, management and delivery. Clear indicators for evaluation should be put in place. To that end, there must be political will that creates and makes organizational change feasible; technical capacity and skills for ensuring gender integration through the use of inter alia gender mainstreaming tools; accountability; and organizational culture that constitute the norms, customs, beliefs and codes of behaviour that support gender equality.

Integrating gender into an organization's activities and structures has dimensions that are both external and internal to the organization itself. Externally, gender integration fosters the inclusion of and benefits to women and men who participate in or who are affected by an organization's projects, services, or initiatives. Internally, gender integration promotes women's leadership and equality within the organization's policies and structures and provides benefits for both women
i. Identification of Target Institutions/Entities

The institutions interviewed were identified and agreed upon at the inception as included in the terms of reference for the capacity needs assessment. The institutions are those that are responsible for facilitating the sound management of the basin, have activities on the basin or whose activities impact on the basin and those responsible for various water users: namely, government entities, parastatal, private sector, international cooperating partners, NGOs and CSOs as well as research institutions conducting or involved in activities in the LRB. For the purposes of the capacity assessment a stakeholder was regarded as a person, organisation or system with an interest in the results of the capacity needs assessment study.

ii. Development of Questionnaire and Guiding Interview Questions

Background research on climate and the impacts of climate change; the adaptation actions; measures and the institutional requirements on capacities needed to create an enabling environment for resilient responsive development in particular in water institutions was undertaken. Furthermore, water resources governance instruments at transboundary level and national level were consulted with the aim of providing a foundation on the organizational capacities jurisprudence and discourse. Based on the available jurisprudence on institutional resilience and documented case studies the key requisite actions, principles, characteristics and measures and capacities for institutional resilience were discussed with the rationale provided for basis as an organizational or institutional resilient prerequisite. The identified required capacities were then used in the design of the data collection interview questions.

iii. Gathering of Baseline Information

Review of literature specific to the four riparian countries was undertaken to gain an understanding of what institutional capacities already exist and well as the literature review pertaining to the Limpopo River Basin and the Limpopo Watercourse Commission. In respect to LIMCOM general information such as its mission, vision, organizational structure, activities, budget, human resources and operational procedures was reviewed. The literature review included identifying best practices and relevant examples that were used as part of the basis for designing and implementing the capacity assessment, as well as knowledge of the functional and technical capacities to be assessed. Given the focus of the RESILIM Programme which includes, water, livelihoods and ecosystems the literature on cross-cutting issues of gender or the human rights-based approaches was also reviewed and used to inform the questionnaires accordingly.

iv. Strengths and Limitations

The capacity needs assessment was commissioned during the last quarter of the year, 2014; whereby most decision makers and sources are not available mainly due to the fact that they are busy with end of year project activities and the fact that in this sub-region (SADC) it is the period of time where people take official leave from their offices for the Christmas holidays or break and resume work usually the third week of January of the following year. This posed challenges indeed in securing timely appointments and securing sources. It is important to note that in most situations, findings stemming from capacity assessments will be of utility only if they and the process are locally owned through gathering information from mandated persons and parent or focal organisations responsible for water and climate change. It is therefore prudent to build in plenty of time for not just for the design of the capacity assessment method and tools but also for the actual time to undertake interviews.
In some instances, assessment fatigue was expressed, which appeared to have been caused by the initial lack of comprehension of the difference between a regular institutional and regulatory review on climate change impacts in contrast with a review on how to operationalize resilience within institutions to make the said institutions amenable to creating an environment that permits for managing, coordinating and facilitating adaptive capacity and resilience actions and response beyond having laws, policies and strategies in place. To that end, an attempt was made to strike a balance is between too much and too little process facilitation with the aim of ensuring that the process is driven from the inside and owned by relevant stakeholders.

4 CHAPTER 3. DATA AND INFORMATION ANALYSIS

Information gathered during the application of the questionnaire and during discussions using guiding interview questions was reviewed in the context of identifying opportunities for resilience capacity building. A summary on the key observation in relation to water, climate impacts and resilience is discussed below. Detailed findings are presented in Chapter 4 on Key Findings.

4.1 Climate Impact Response and Water Nexus

Figure 4: Climate change impact on water resources

Overall, there was a clear understanding of the relationship between climate change and water resources in terms of water availability, flooding, seasonal rainfall patterns and effects on biodiversity. There was an appreciation that responding to the changes especially negative impacts required robust institutions within the water sector and that such institutions needed to cooperate with other organisations dealing with climate change management. There was also a general understanding of the importance of the connectedness of the river basin and national entities and that response to climate impacts within the basin can stem from
national premises and also from transboundary level with strong linkages between LIMCOM, national and basin entities.

4.2 Understanding of Climate Impacts in the Water Sector

All the four riparian countries provided detailed information on the actual and projected impacts of climate change in their respective countries with specific focus on the Limpopo River Basin. Experiences arising out of the adverse climate impacts include floods, drought, displacement, loss of lives, loss of income or livelihoods, disturbance with learning for students, low agricultural yields, reduction in agricultural investment, regressing in socio-economic development indicators and lack of sufficient potable water.

At LIMCOM level, there was clear understanding of the impacts of climate change on the LRB its water resources as well as other basin resources. Reference was made to a number of key studies undertaken in the LRB that provided scientific and well researched evidence on the actual and potential impacts of climate change in the basin.

4.3 Understanding of Adaptive Institutions

All the riparian countries were of the view that institutions are at the core of ensuring that adaptation takes place and that for adaptation to be effective the institutions themselves need to have capacities to adapt and be resilient.

4.4 Understanding Resilience

The concept of resilience and its operationalisation through adaptive capacity was clearly understood however, the specific targeted capacities needed further clarification. The discussions from the riparian countries and LIMCOM were indicative of an understanding that there is urgent need to move away from the “business as usual” but rather to ensure that the programming of resilient actions should be tailored specifically to challenges posed by climate change taking into account the relationship of resilience to livelihoods, disaster risk management, food security and water security.

4.5 Rationale for Responsive Governance Institutions in the LRB

The complex nature of climate change and its impact and its unpredictability poses challenges to the concept of resilience: firstly resilience is difficult to define, measure and evaluate due to the complicated nature of climate change, secondly, building resilience towards impacts that may not happen is a challenge especially in countries where different pressing interests compete for developmental resources in particular financial resources. Building resilience requires that institutions put in place, policies, strategies, actions, plans and interventions that enable the institutions to change the way they do business, essentially to transform themselves. To a certain extent, transformation within the water sectors in the riparian countries began to take place when the regulatory instruments within the water sector expanded their mandates to undertake integrated water resources management. For example, the Mozambique’s Water Law of 1991 began the transformation process when it required that water resources governance be undertaken at river basin level within the participatory principles of resource governance. This requirement set to motion an institutional transformational processes which also resulted in establishment of other water governance structures. This particular example from Mozambique’s Water Law is important to note in the context of building resilience in that institutional transformational process is not new, nor is it static but is part of institutional or
organizational evolutionary process that is continuous and dynamic in response to an identified need and reason.

Climate change impacts have been identified as a key and substantive reason for institutions to transform themselves into organizational structures that are able to respond adequately to the negative impacts of climate change. Building resilience is the driver for transformation of the character of the institutions and the behavior of such institutions towards managing the climatic impacts and prevention of such impacts where feasible.

5 CHAPTER 4. KEY FINDINGS

This Chapter discusses the key findings on the institutional capacity needs assessment. The findings at national level indicate that there are dedicated water and climate institutions in place and that at transboundary level there is a mandated organization for the management of the Limpopo River Basin. Based on comparison with the desired capacities the following was noted:

(a) **External regime** – In all the riparian member states there exists clearly identified national institutions that are responsible for integrated water resources of the Limpopo River Basin and have the authority to ensure the effective management of water resources including addressing the issue of climate change.

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<thead>
<tr>
<th>Botswana</th>
<th>Zimbabwe</th>
<th>South Africa</th>
<th>Mozambique</th>
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<tr>
<td>• Department of Water Affairs</td>
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<td>• International Waters Unit</td>
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<td></td>
<td>• Ministry of Water Resources and Infrastructural Development</td>
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<td>• Department of Water Affairs</td>
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<td>• DWA Limpopo</td>
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<td>• National Directorate of Water</td>
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<td>• International Rivers Unit</td>
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<td>• Ara Sul</td>
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*Figure 5: Key National institutions responsible for LRB*

In respect to climate change and managing its impacts in all the countries, the core mandate to undertake the coordination and facilitation of managing and responding to climate change impacts rests with those departments responsible for climate change and disaster management respectively. To that end it is recommended that the water departments should have systems and mechanisms that enable the water departments to undertake responses to climate change in the water sector as part of their core business including requisite coordination and expectations on accountability. Strategies, guidelines and modalities for ensuring organizational and institutional linkages from national to provincial and local level governance structures have to designed and implemented to ensure that the external regime outside of the departments responsible for water provide the latitude and an enabling operational framework and environment that allows for the coordination, engagement, collecting and transmission of information and implementation of interventions as well as use of relevant skills.
At transboundary level, the riparian countries have set up LIMCOM which has a secretariat that needs to be made operational. Given that the Secretariat is a day-to-day operational arm of LIMCOM it is imperative that it should be supported by national regimes that allow for it to coordinate and facilitate adaptive capacity and building of resilience for management of the entire basin so as to ensure that all actors benefit from addressing the challenges of climate change impacts, and, in identifying opportunities arising due to climate change. At the same time, the agreements, systems, mechanisms and other modalities should be created within and be evident within LIMCOM. Cooperation through bilateral agreements between the riparian countries set a foundation for facilitating four country modalities for areas that are relevant to climate change resilience such as water allocation, water monitoring, information and data exchange and joint training.

(b) **Flexible Resource Management** – In all the four countries, the departments responsible for water receive allocation of funds from the national government for water development activities. In some instances, in particular where there are projects, funds may also cover climate activities within the water sector. These allocated funds are not generally subject to flexible management aimed at meeting unplanned and unforeseen responses to negative climatic impacts. In this situation it is advisable to engage the entities responsible for disaster management and assist them to budget for and allocate funds for unseen or unplanned impacts within the water sector. Additionally, the departments responsible for water can have in their budget allocation a financial window for water related disaster response actions. This approach requires that the ministries responsible for finance, water, development, climate, natural resources, disaster risk management and biodiversity be provided with knowledge, awareness, skills and guidelines on budgeting for climate. To support budgeting for climate there is need for the water sector to conduct, access and use evidence based research that will inform scenario planning on resilience actions. It is a fact that most government departments do not have adequate resources to conduct their own research regularly, it therefore becomes imperative that partnerships be built with other national, regional and international entities that are involved with climate, water and development.

At transboundary level the LIMCOM Secretariat currently does not have a budget allocated for climate change resilience actions as it is at the initial stages of operation. There are however, project activities in parts of the basin aimed at addressing climate change impacts, such as those in

![Figure 6: Resource availability comparison at the national level and transboundary level (LIMCOM)](image-url)
Mozambique, South Africa and Botswana. LIMCOM needs to have in place a resource mobilization strategy, budgeting and financial management systems that allow for some flexibility in resource management for supporting climate resilient response actions across the basin.

(c) **Resources** – Resources required for river basin management include human resources, technological and informational resources, and, financial resources. These resources should be effectively and efficiently deployed to react to an event, allocation or use of resources more flexibly or to better prepare for unpredictable hydrological situations.

Under the purview of resources is the ability to access adequate resources as well as the ability to mobilise resources.

A basin vision is necessary to set out the developmental path for the basin and its institutions. In addition a strategic framework on climate change resilience is necessary to allow for clarity on what climate change activities are planned for including planning for uncertainty and emergencies. The strategic framework can provide for mainstreaming climate change resilience goals with allocation of financial resources for projects designed to effectively adapt to climate change as well as investing in human resources, training, capacity building and technological resources in the coordinating institution and supportive national entities.

The human resources relevant for the water sector are present in all the countries. The challenge generally is the availability of human resources in terms of physical numbers and capacities in other areas that are supportive of managing climate change, building resilience and ensuring adaptive governance is in place within the water sector. In this case, national and local coordination as well as strengthening of institutional linkages and collaboration becomes key factors in accessing resources for climate resilience outside of those found in the water sector. Some of the countries have higher levels of technological and informational resources required in areas such as data management (for example Botswana is regarded as having higher water quality monitoring capacities and South Africa has good underground water monitoring systems), technology for monitoring and ease of transmission of information whilst other riparian countries have slightly lower technology. In transboundary management strengthened linkages of national entities and LIMCOM Secretariat will ensure leveraging of resources across the basin. At the same time the riparian member states can ensure that their institutions are accountable for their activities to LIMCOM to enable the Secretariat to identify any resources available or required to address climatic impacts within the basin.

(d) **Legitimacy and Accountability** – In transboundary river basin management and in addressing climate change resilience capacity building it is prudent to undertake mapping of stakeholders, actors, resource managers and users, partnerships and other actors that impact on or are impacted upon by activities and decisions on the basin. After the mapping of such stakeholders, it is useful to develop engagement plan(s) that facilitate the involvement of key stakeholders in the basin so that there is minimization of resistance to climate resilience measures, and thus ensuring that the said stakeholders engage with new ideas and come to own and help implement the necessary changes. The open and transparent engagement of stakeholders in a relevant and meaningful manner coupled with the scientifically backed studies and projects on capacity resilience can help towards building or strengthening legitimacy and accountability. LIMCOM as a transboundary institution needs to facilitate the building of trust through amongst other activities being an honest broker amongst the four riparian countries and the key stakeholders. LIMCOM should have as part of its core business, a LIMCOM strategic plan and projects that promote common interests of the basin states. LIMCOM needs to have adequate human resources, rules and procedures for
developing common transboundary interventions, modalities for communication with basin states and other interested and affected parties. In summary, LIMCOM needs to be visibly seen to be doing business in an earnest and mutually beneficial way in the context of broad basin management and in particular on building resilience.

The water departments and authorities in all the four riparian countries command respect in matters related to water resources management. Their role in climate adaptation and resilience building is generally not regarded as being core business due to the traditional arrangement of sectors operating in silos. However, the IWRM approaches that the riparian countries are taking in the water sector provide an opportunity to infuse targeted mainstreaming of climate change responses as a matter of course in water uses. Such mainstreaming interventions should be shared with relevant stakeholders on a case by case basis so that there is accountability to a range of key stakeholders that enhances the legitimacy of an institution and encourage collective ownership of climate change challenges and associated responses.

(e) **Variety and diversity** – variety and diversity acknowledges that there is not a single best-fit ideological framework, optimal policy or set of mutually consistent solutions to a given problem or challenge or to seizing an opportunity. The climate change impacts in the different countries have some commonalities and also differ. For example, the impacts of flooding in Mozambique are regarded as being destructive on the one hand but on the other hand may be regarded as useful for those who partake in flood cropping. In one environmental setting there may be a need for two or more parallel systems and mechanisms for responding to climate impacts and for implementing resilient actions. The national institutions and LIMCOM will have to recognize that resilience building actions have to be targeted in any given situation. There should therefore be space for negotiating and instituting on a case by case basis diverse resilience interventions and actions that serve the best interests of the basin and stakeholders. This requires a transparent institution that allows for participation and voices of different sectors to be heard. To that end, systems for engagement have to be clear and working and strategic planning and coordination be at the core of planning, designing, executing, monitoring and evaluating resilient climate responses.

(f) **Monitoring and Evaluation** – Existing studies and practice emphasise that monitoring, assessment, evaluation and reporting are important tools for identifying when current policies or programs become ineffective or obsolete, or require change to fulfill their mandates. In addition, monitoring networks are said to provide valuable information (water quality, water quantity, species diversity etc) upon which both short and long-term management decisions should be made, while independent verification through external assessment and evaluation can provide vital accountability for plans and management strategies.

National entities and project studies often provide technical information on ecological, social and economic status of the basin. Such information needs to be acquired and managed for dissemination and use at transboundary level. Such technical information requires the establishment of protocols and standards for information gathering at national levels that is harmonised, as well as protocols and procedures for sharing such information and making it available to the coordinating body. The coordinating body, LIMCOM may integrate scenarios based on the information in basin strategic framework for addressing climate impacts and capacity building resilience projects.
In the riparian countries, there is an indication that there is need to strengthen monitoring and evaluation systems within the water sector to be able to undertake or at least link effectively with other water user sectors. Traditionally within the water sector, monitoring and evaluation were tools and techniques used to monitor water specific areas, however, given the inter and intra linkages of water, climate, biodiversity, socio-economic development and land use there is now an urgent need for monitoring and evaluation in the water sector to broaden its mandate and perspectives. A number of approaches may be used taking due recognition that it is not feasible to have all the capacities needed for all those areas to be handled within the water institutions at national levels and by LiMCOM (which is a coordinating body). These approaches require a centred, collaborative and partnership approach to collecting, producing, accessing and utilisation of information that is required for monitoring. At country level, the departments responsible for water can have jointly developed indicators with different sectors that use water and have mechanisms in place for absorbing the information and using it as appropriate. This would allow for continued interrogation of any interventions designed for adaptive capacity and building resilience as well as an understanding of the climate impacts on water users, biodiversity and livelihoods. Monitoring, assessment, evaluation and reporting can then be important tools for identifying when current policies or programs become ineffective or obsolete, or require change to attain set resilience and adaptation goals.

(g) Identity – In reference to institutional identity, studies indicate that the capability to shift organizational purpose, vision, mandate and priorities over time, and to reevaluate strategies and approaches periodically, can allow an institution to readjust and respond to climate change. However, a clear purpose with visible boundaries provide a strong sense of institutional identity. In that regard, it has been observed that a fine balance between rigidity and flexibility needs to be struck. As a starting point in the context of LiMCOM, it is useful to have an overall vision for the basin with mini-visions as appropriate such as a vision related to climate change and response to its impacts. Such vision will provide an overall policy framework for the development of a climate change strategy that spells out the responses to be undertaken through concrete activities.

A Vision provides a sense of direction and inspiration, as well as a base for a framework for decision-making. Adaptive organizations have a clear sense of where they are going and why and afford opportunities for self-re-examination using inter alia monitoring and evaluation tools. Accordingly a strong visioning process provides a case for change which helps to marshal the organization and foster the development of adaptive attributes and initiatives.

LiMCOM has articulated its vision to be: “Sustainable water security for improved livelihoods in the Limpopo River Basin.” This Vision can be elaborated upon and have in place a strategic plan on how the vision will be achieved.
(h) **Forward Thinking** – The forward thinking principle speaks to incorporating uncertainty into planning such as scenario planning for multiple climate future that allows an institution to envisage and better prepare for future expected and unexpected climate impacts.

Within the Limpopo River Basin, there has developed a wealth of information that can provide an impetus for strategic scenario planning and to inter alia develop engineering guidance for any future infrastructure that is sustainable and robust.

The national development plans, and other strategic plans of the basin states provide an opportunity to integrate scenario planning for future events. A case in point is the South African *Limpopo Provincial Government’s Limpopo Green Economy Plan, 2013* which has already set future projections and scenarios for a climate resilient Limpopo.

There are a number of studies, mostly scattered in different institutions that have projected future trends regarding climatic impacts that can allow the undertaking of scenario planning for future events and to put in place steps and resources to meet and better prepare for expected and unexpected events. To large extent, this also requires the strengthening of capacities of disaster management entities and their involvement in water sector and climate change impact management and responses. Strengthening capacities to gather and package information in a useful manner so that different sectors can utilise it for planning and projecting scenarios forms an integral part of capacity building. To that end, information and knowledge management skills and tools are capacities that must prevail in climate, water, disaster and other key sectors. Scenario planning within LIMCOM can be conducted as part of the visioning process, which vision can be later translated into a strategic plan with clear activities and indicators.

(i) **Iterative Approaches** – iterative approaches to planning provides space for the use of monitoring and evaluation to inform future operations, thus allowing for absorption of new learning. In the case of LIMCOM, which has already in *a Limpopo River Basin IWRM Plan 2011-2015*, an iterative approach would require the Plan to be re-visited, assessed, reviewed and improved.

(j) **Mainstreaming** – mainstreaming provides for infusing the management and response to climate change into the different sectors/entities and water uses and thus allowing for a holistic integration of resilience. Mainstreaming also implies the application of a systems approach to consider how climate change impacts the different aspects of an institution’s activities. For effective climate impact response, the activities that are impacted upon are not those of the water sector only but those of other sectors and entities that use water.

Having in place sector specific engagement instruments and modalities for operating at national and transboundary levels will assist in ensuring that all relevant information required for sector specific mainstreaming is used. Resilience requires that mainstreaming be the “work and mandate” of all water users. There is need to target water users in terms of training and development of tools and guidelines for mainstreaming climate resilience responses. Some of the lessons learnt in effective institutional strengthening for resilience has been the need to consider communities as “institutions”. Evidence on the ground indicates that in just one portion of the basin in a given country and ecological zone it is possible to have different community interests that are premised on the different “felt” climate impacts. This then calls for communities where appropriate to be
regarded as “institutions” for purpose of identifying and mainstreaming climate resilience responses.

Rather than setting up a separate resilience program, department or unit, an institution should integrate adaptation into different sections to fashion a more holistic response to climate change. For example, the DNA could have a resilience strategy that is actioned through its different units or sections depending on the mandate of each unit.

At river basin level, there is need for a LIMCOM strategic development framework that has climate change actions integrated and the capacity to lead mainstreaming within its own transboundary plans and provide assistance at national level. The capacities required for mainstreaming should at a minimum enable the carrying out of the following:

- **Defining the Scope** – this entails the establishment of the context and focus for development. This requires the identification of priority development goals and key inputs for attaining the goals.
- **Assessment** – this enhances understanding about vulnerability and development of actionable information
- **Designing** – identification, evaluation and selecting adaptation options
- **Coordination, Implementation and Management** – ensuring that adaptation is effectively coordinated, facilitated, implemented and managed at transboundary river basin level and at national levels.
- **Monitoring, Evaluation and Adjustment** – monitoring at all stages of coordination, facilitation, implementation and management of adaptation measures and actions. This also includes the overall monitoring of the impacts of adaptation actions in building resilience and in minimizing or reducing the negative impacts of climate change and recommends or informs adjustment accordingly. The capacity to develop a baseline and indicators is also of paramount importance at river basin organisation level but also at national institutions responsible for water and management of the shared river basin.
- **In regard to LIMCOM**, each aspect of its mandate, vision and strategic plan requires that climate resilience interventions be identified and tools and techniques for mainstreaming be provided and used.

(k) **Creativity and Learning** – The riparian national climate change response instruments (Botswana and Zimbabwe are still in the process of development) of the riparian countries recognize that creativity and learning are required for appropriate climate change responses. In order for that to take place, existing processes, structures and operations of the key sectors have to be examined and areas for transformation identified, with strategies, plans, guidelines, tools and techniques for transformation put in place. The starting place will have to be the water sector departments who can then drive the transformational process. Since all the four riparian countries introduced IWRM approaches in the water sector that have resulted in institutional transformations taking place through establishment of new organisational structures and in some cases new mandates or extended responsibilities. The national water sector departments can work in partnership with climate change bodies, research institutes, disaster management entities and others to create
opportunities for inter-sectoral cooperation on climate resilient interventions on identified institutional processes, procedures and rules.

At transboundary level, LIMCOM stands at an opportune time to design processes, structures such as subject matter expert committees/task forces, community representations, and, operational rules and procedures that allow for organizational growth and transformation to take place. This approach is often easier to instill in newly established organisations or the private sector in contrast with older, conservative established bureaucracies. In order for creativity and learning to take place LIMCOM has to be operational.

(l) Knowledge Management and Institutional Memory – At national levels, there are different institutions and projects that work within the Limpopo River Basin and produce useful knowledge and information that needs to be identified, accessed, packaged, disseminated and utilized accordingly. The same situation exists at transboundary level. The challenge that seem to prevail is the ability of national entities and of LIMCOM to create, acquire, package, avail, transmit and utilize such knowledge to ensure climate change resilient capacity. Every stakeholder and active participant generates knowledge, practices, innovativeness, tools and techniques that are applicable to building climate resilience and ensuring continued adaptation. There should be in the context of the water sector modalities including agreements and protocols where necessary for acquiring useful knowledge on the practices, techniques and tools that can be shared across the basin.

(m) Access to Research, Data/Information – All the water departments in the four countries have partnerships with some knowledge generating institutions at national, regional and international levels. The challenge that seems to prevail is the ability to access the information in a manner that is easily transformed for use in decision-making or to inform the creation of tools, techniques and systems that can be utilized active resilience application. In all the four countries, the civil society does not generate data and researched information due to inter alia lack of financial resources, technologies and human resources.

(n) Internal Agency and Authority – In their recognition of the need to cooperate and partner on the management of the Limpopo River Basin, the countries set a collective granting of authority through the agreement to establish LIMCOM. It becomes imperative that all the four countries collectively continue to commit through political pronouncements, policies, finance, human resources, systems, procedures, processes, plans, strategies and actions that allow for the organic growth of LIMCOM. The actions of the four countries, individually and collectively should foster, promote and grant LIMCOM the authority to advice, coordinate or act in a manner that ensures swift reaction to climate impacts where required. For purposes of authority, it becomes necessary therefore for open discussion; and, to elaborate on LIMCOM roles, responsibilities, procedure, rules, accountability and other modalities to be done.
**(o) Collaboration and Partnerships** – At institutional level it is useful to map out the key partners, stakeholders, networks and potential partners within and outside the river basin system who can contribute towards the river basin management discourse. The creation of a database of partners, stakeholders and networks that provide or promote different capacities and opportunities including training on climate change and responses to its impacts would be useful. The institution should have inter alia some of these attributes in relation to partnerships and relationships:

- Processes that recognize and actively explore the different values, motivations, interests and roles of actors within adaptation decisions, policies and programmes
- Systems and processes that allow for the identification and engagement of those involved in decisions, policies and programmes
- Documentation that reflects and communicates the results of learning collaborations and stakeholder engagement (e.g. reflection of what went well and what could be done differently). Sustained resources allocated to building relationships and networks commensurate with the need
- Processes and settings that facilitate and encourage informal sharing of knowledge
- Staffing and skill development that includes participatory processes, design of inclusive events and facilitation

This principle is closely tied to the need for an effective communication strategy and communication tools that include a functional website. Additionally, policies, rules and procedures of engaging in the different relationships/strategic partnerships should be put in place.

**(p) Leadership** - Technical leadership in all the four countries exists as well as at LIMCOM level (and through the JPTC) and it provides the opportunities for upscaling the leadership to higher levels as well as ensuring that leadership at basin levels is identified and nurtured.

**(q) Flat Organizational Structure** - In this instance, strong, direct and functional linkages between LIMCOM and the departments responsible for water, climate and disaster management is required for LIMCOM’s ability to transmit timely information. A lesson from Mozambique is the decentralization of water resources governance that resulted in the creation of Ara Sul: a move towards attaining basin level management within location.

**(r) Transparency and Participation** - Consultation with and participation of civil society and external experts or stakeholders in the decision-making process ensure representation of a broad set of interests and allow for consensus to be built and conflicts resolved earlier rather than later.

**(s) Social Inclusion and Gender Equity** - Climate change resilience requires the participation of all actors and the success of adaptation requires the inclusion of all and should benefit diverse sectors of the socio-economic field. Organizations play a crucial role in design and delivery of gender-responsive and sensitive programs and projects. To that end, gender equality must be integrated into an organization’s programming and organizational practices in order to bring about sustainable change toward achieving real social inclusion. At transboundary level, it requires that the river basin organization mainstream gender in its systems of governance including in human resources policies. Most importantly in the context of climate change and its impact, gender must be integrated in all programs and projects from conception, design, implementation, management and delivery. Clear indicators for evaluation should be put in place. To that end, there must be political
will that creates and makes organizational change feasible; technical capacity and skills for ensuring gender integration through the use of inter alia gender mainstreaming tools; accountability; and organizational culture that constitute the norms, customs, beliefs and codes of behaviour that support gender equality.

In some of the basin countries, gender issues play a strong role in survival from flooding as cultural norms determine granting of rights to participate in evacuation, an example is in Mozambique. Institutions, including communities as “institutions” need tools and guidelines including guidelines on mainstreaming gender in climate response and resilience.

The specific institutional governance framework and capacity needs findings for each riparian member state as well as those of LIMCOM are discussed in more detail below.

5.1 Botswana

5.1.1 Summary of Climate Impacts

Evidence of climate impacts have been observed in Botswana and documented in a number of studies. Some of the impacts observed inter alia are:

Figure 7: Decline in maize production shown due to low or unreliable rainfall from 2003 to 2013. Taken from Statistics Botswana, Annual Agricultural Survey Report 2013.

(a) Low rainfall and changed rainfall patterns resulting in reduction in agricultural productivity as well as exerting undue pressure on disaster risk management and mitigation practices as more resources are required for coping strategies.

(b) Increased incidence of veld fires destroying large areas that support the community’s social and economic activities especially for livestock grazing and harvesting of wood for rural energy needs.

(c) Increased frequency of droughts resulting in higher wild animals and livestock mortalities and consequent economic challenges.

(d) Flooding and high temperatures negatively affect infrastructure developments rendering local communities vulnerable due to their low adaptive capabilities.
There is no large body of studies detailing the costs of climate impacts on the Limpopo River Basin specifically to the Botswana socio-economic situation. However a number of national studies and research indicate the following actual and potential costs:

(a) Spread of vector-borne diseases and macro-parasites accompanied by the emergence and circulation of new diseases which would in turn cause the increase of costs in livestock agriculture as the costs of acquiring and using medicines to combat new diseases increase. It has been noted that frequent outbreaks of foot and mouth (FMD) disease in Botswana in recent years could be attributable to climate change. The beef industry is the third highest income earner for the Botswana economy.

(b) Reduced household and national income for small holder and commercial livestock farmers due to changes in feed resources associated with the carrying capacity of rangelands, the buffering abilities of ecosystems, intensified desertification processes, increased scarcity of water resources and decreased grain production. As in other parts of the world livestock farming in Botswana is an important source of income at individual, household and national levels.

(c) Costs of basic commodities including meat and meat products may go up as farm inputs rise.

(d) Reduction in liquid asset and inputs to crop production due to the fact in mostly in small holder farmers and rural families, cattle are a sources of commercial and social liquid assets and source of energy in arable agriculture.

(e) Climate change is expected to impact on dairy farmers resulting in decline in milk yields.

(f) Climate impacts are expected to result in a drier environment that will accelerate the rate of retrogression on rangelands and shift composition to less desirable plants with low nutritional values.

(g) Decline of livestock productivity that may result in loss of employment and the multiplier effects on households and livelihoods including poverty

(h) Availability of water for meeting the demands of growing urban and rural populations including for industrial use has already become a challenge. The cost of consumptive water is also increased, making water access a significant national concern. Botswana’s major dams are along the Limpopo river system, these dams provide domestic and commercial water supply major urban centres and villages.
5.1.2 Water Institutional Framework

The Department of Water Affairs in Botswana is vested with the overall mandate for the management of water resources in Botswana. In respect to the transboundary management of water resources, the Department of Water Affairs works with the International Waters Unit which facilitates the management of the Limpopo River Basin as well as other river basins.

In the management of water resources the DWA is guided by the *Integrated Water Resources Management and Water Efficiency Plan (IWRM-WE Plan)* which seeks to ensure sustainable management of water resources. The key institutional features of the Plan include:

(i) Greater inclusiveness and participation of stakeholders and thus meeting the principles of participatory water governance

(ii) A holistic approach with close linkages to development and land use planning. This ensures that water is at the centre of development planning and is considered in the decisions regarding the use of land.

(iii) Decentralized catchment area institutions linked to national institutions. The approach towards basin level water resources management is also used in Mozambique whereby the Ara Sul is at catchment level and is directly linked to the DNA; South Africa where the Department of Water Affairs is at Limpopo with direct accountability to DWAF and the Umzingwane Catchment in Zimbabwe being accountable to ZINWA. Any mainstreaming and capacity building measures on climate change are therefore manageable at basin level.

(iv) Separation of water sector management tasks;

(v) Full integration of transboundary water management; the integration of water management recognises the fact that water is both a developmental issue and also a resource management concern that needs to be fully integrated.

(vi) Realistic capacity building efforts that take the current institutional set up into account.

The Plan introduces water sector and accompanying institutional reforms for effective integrated water resources management in the country. The institutional reforms do not seek to create new institutions but rather increase capacity and effectiveness of existing ones. According to the IWRM-WE Plan, the institutional framework is as follows:

- **Department of Water Affairs** is responsible for assessing, planning, developing and maintaining water resources for domestic, agricultural, commercial, industrial and other uses in the whole country. The DWA also has the responsibility to *assist and advise in the formulation of water resources development and management policies and legislation* and also be the secretariat of the Water Resources Board (WRB).

- **Water Resources Board** (not yet established) has the duty to oversee and allocate Botswana’s scarce water resources. It will also be responsible for monitoring and development of water related policies. All major sectors and stakeholders are be represented in the WRB. According to the IWRM-WA Plan the WRB needs to develop institutional capacity in each water catchment (catchment area councils). Catchment Area Councils will advise on and engage in water resource management in their respective catchments. The WRB provides a good forum for strategic mainstreaming of climate resilience actions that include all sectors or representation concerned with water uses.
Water Utilities Corporation (WUC) is responsible for the delivery of potable water to the entire country, and, delivery and management of wastewater treatment services.

Catchment Management Committees (CMC, not yet established, however the process has commenced). These are to be based on the existing Community Based Organisations (CBOs) for Natural Resources. The IWRM – WE Plan states that where CBOs are established, CMC are to be established as subcommittees of Village Development Committees (VDCs). The CMC are to be responsible for local level planning, the control and monitoring of the use of water and catchment ecosystem resources. The IWRM-WE Plan notes that the role of stakeholders outside government has been limited in the past, and needs to increase.

IWRM Unit – The Plan proposes that an IWRM Unit be established within DWA to drive and monitor implementation of the plans. The Unit will be responsible for the establishment of a stakeholder participation committee or forum comprised of stakeholders from government, civil society, private sector, local communities, researchers and academic institutions. The IWRM Unit is expected to coordinate capacity building initiatives for relevant stakeholders. The Unit will, in association with relevant stakeholders, develop IWRM outreach and awareness material to enhance capacity on IWRM. It is expected that local government entities will facilitate coordination and implementation at district level and will be linked to local communities, private sector and national levels as well. Under the Plan it is anticipated that the local government departments and authorities will also provide guidance to local communities, assist in capacity building of communities and provide for interactions between locals and private sector. This Unit, by virtue of its ties with local government departments will provide important institutional links with land use planning and development works practices that need to take the water uses into their developmental actions.

At transboundary level, the DWA through its International Waters Unit has the responsibility of ensuring that transboundary initiatives are supported by enabling rules, processes and mechanisms for climate adaptation and resilience at national level.

- Greater inclusiveness and participation of stakeholders
- A holistic approach with close linkages to development and land use planning
- Decentralized catchment area institutions linked to national institutions
- Separation of water sector management tasks
- Full integration of transboundary water management based on current institutional capabilities, and realistic capacity building efforts
- Integration of fresh and wastewater planning and management.

The portfolio for climate change is under the purview of the Department of Meteorological services (DMS), which is in the process of developing a national climate change policy, strategy and a climate change action plan. In this regard, one of the most important external influential regime for the DWA is the climate change instruments being developed by DMS and DMS itself is an influential external regime entity. This scenario requires close and open partnership between DMS to enable the sharing of information, use of expertise, joint strategic planning in climate resiliency and other areas of collaboration that can ensure good design of climate resilient responsive systems. In addition to DMS, the DWA has the onus of developing negotiated partnerships with other sectors that use water such as agriculture, tourism and mining to ensure that those external regimes are responsive to its responsibility on building resilience in the water sector.
5.1.3 Climate Impact Response Institutional Framework

The National Climate Response under development proposes the following institutional arrangements for implementation of the climate change response policy:

(i) *National Climate Change Unit* – The main responsibilities of the Unit will be to implement, monitor and ensure compliance. The National Climate Change Unit shall develop guidelines and methods of engagement for facilitation of NCCC’s work.

(ii) *National Climate Change Committee* - The National Climate Change Committee is to be an advisory body to government comprised of members with technical expertise on climate change that could facilitate credible advice to inform government decisions.

(iii) *Parliamentary Portfolio Committee on Natural Resources and Environment* - Parliament provides an oversight role for realization of the policy response measures. A Parliamentary Portfolio Committee on Natural Resources Management and Environment already exists and is expected to take the lead in promoting establishment of enabling environment that would facilitate the implementation of the policy.

(iv) *Focal Points*: For effecting the coordination, implementation and monitoring of the national response to climate impacts the government requires dedicated focal points. To that end all the major sectors of the economy, government and private sector, will be required to appoint focal persons that would monitor and report on the implementation of the sustainability response measures especially adaptation and mitigation plans as well as carbon budgets. The focal points will take the lead and provide guidance to their sectors on socio-economic and environmental reforms required for efficient adaptation and mitigation of climate change impacts.

(v) *District Climate Change Committees* - The District Climate Change Committees will be established to support the implementation of sustainable climate change response measures at village and district levels. The committee will be responsible for integrating climate change into district development plans and assist in building climate resilient development planning at local levels. The committee will be accountable to district councils and indirectly linked and supported by National Climate Change Unit on resource mobilization, capacity building and education and awareness.

The capacity assessment indicates a dedicated commitment by the Government of Botswana in addressing climate change is in the process of being put in place. These findings acknowledge that the National Climate Response is still at the draft stages and has not yet been adopted by the Government of Botswana, however the discussion to date and the factors outlined are instructive in indicating the Government of Botswana’s commitment to responding to climatic impacts through adaptation and mitigation measures. The following mechanisms provide potential entry points for capacity building for institutional resilience:

(i) National Climate Change Unit
(ii) Focal point in the water sector
(iii) District Climate Change Committees
(iv) Parliamentary Portfolio Committee on Natural Resources and Environment
(v) Building resilience
(vi) Use of precautionary principle
(vii) Public participation
(viii) National, regional and international cooperation
(ix) Transboundary water management and management of transboundary impacts
In addressing climate change impacts it is expected that the following principles and factors will be taken into consideration.

(i) **Sustainable Development**: to be achieved through development activities including adaptation and mitigation response measures as well as building national resilience that balances social, economic and environmental objectives so as to meet the needs of current and future generations.

(ii) **Precautionary Principle**: adoption of a risk averse and cautionary approach in decision-making and in implementation of actions required to address climate change resilience and sustainability in recognition of the risks posed by climate change, the scientific uncertainties in the available climate information as well as in the effects of adaptation and mitigation response measures.

(iii) **Public participation**: broad participation of all interested parties in climate change actions shall be promoted across all levels and sectors in order to ensure that adaptation and mitigation decisions and response measures are owned by all and mutually beneficial.

(iv) **Vulnerability**: Resources for mitigating and adapting to climate change and sustainability shall be fairly distributed across all sectors and population groups taking into consideration their vulnerabilities, responsibilities and associated costs and benefits.

(v) **Polluter Pays Principle**: apportioning the costs required for undertaking remedial adaptation and mitigation actions.

(vi) **Common but differentiated responsibilities and respective capabilities**: this takes into cognizance the ability of Botswana’s ecological circumstances, stage of development and capabilities to reduce GHG emissions and in line with the country’s sustainable development goals with priority being accorded to adaptation actions.

(vii) **Comprehensiveness**: The need for adaption and mitigation of climate change impacts is to reduce Botswana’s vulnerability and provide an enabling environment for socio-economic growth and development.

It is envisaged that the climate change response shall accelerate the protection of the environment against further degradation and minimize the adverse effects on habitats, protection and management of biodiversity and forest covers and other landscapes such as rivers, lakes and land, as well as address trans-boundary environmental considerations.

Botswana is of the view that mainstreaming climate change into development planning at local, district and national levels and cross-sectoral policies be prioritized and anchored on building national resilience and sustainability through budgetary provisions. It is understood that sector or activity specific climate response mechanisms and activities will be coordinated at all levels in an all-inclusive manner and cooperation and integration being at the centre of coordination. Cooperation is articulated at being at national, regional and international levels.

The Government of Botswana acknowledges that cooperation and participation in regional programs aimed at minimizing the impacts of climate change needs to be promoted. Botswana recognizes the use of integrated development plans and trans-boundary biodiversity conservation as instrumental to mitigation of trans-boundary impacts and maintaining the integrity of Botswana’s ecosystems. In that regard the government aims to cooperate with the region through bilateral and regional blocks to ensure that climate change is regionally integrated into development planning processes and where possible, harmonization of regulatory instruments is achieved in a regionally coordinated manner.
The government recognizes the benefits and need to engage in a robust approach to building capacity that would enhance the country’s competency to implement international treaties and decisions that are foundational to domestic climate change actions.

Specific to adaptation to climate change, Botswana states that actions will involve dedicated measures as well as their integration into existing development processes and activities. This integration will be achieved through formulation of strategies, programs and regulatory frameworks that will create an enabling environment for wide-stakeholder participation in implementation in response to observed and anticipated climate change and impacts.

National priorities identified under the national climate response policy under development are:

(i) **Agriculture and food security** – amongst the many measures mentioned is the need to promote access to existing and new information and use of early warning system for agricultural planning and management purposes.

(ii) **Water** - The country’s development and growth potential depends on the availability of water for domestic and economic purposes. The varied and low rainfalls have largely affected most sectors of the economy especially major economic drivers such as agriculture, mining and wildlife. There is therefore a need to reduce the vulnerability of the economy and communities to water related climate change impacts and enhance the country’s resilience to such impacts through water efficiency. Some of the key areas in relation to water include:

- utilization of shared water courses for the benefit of Batswana
- Integrating climate change response measures in the water planning processes across all economic sectors.
- Consideration of defining potential water aquifers and adopting appropriate measures of protection for water security and sustainability.
- Promotion of rain water harvesting, water re-use and recycling for domestic, agriculture, industrial and commercial purposes.
- Promotion of integrated watering systems for livestock particularly in rural areas.
- Employing accounting and valuation tools to support water management decision systems.

(iii) **Human Health** - There is recognition that climate change is likely to negatively affect human health directly through increased temperatures, drought and floods and indirectly through its effect on the spread of water borne, water related and vector borne diseases, malnutrition among others. Consequently there is need in order to increase the country’s resilience to such impacts.

(iv) **Human settlements** – Activities related to human settlements will need to incorporate water conservation planning as part of development approval process and also promote the harmonization of relevant human settlement related policies to enhance resilience and sustainability.

(v) **Forest Management** - The government recognizes the value of forests and its dual role for adaptation and mitigation to adverse impacts of climate change. Land rehabilitation and forest management are instrumental in maintaining the integrity of forests as providers of ecosystem services and carbon sinks.
(vi) *Land Use and Allocation* - it is stated that land use and allocation will be based on *inter alia* ecosystem land use planning; and, development of guidelines for the mainstreaming and implementation of climate change development measures in rural development, wildlife and land use planning policies made to achieve an integrated approach to land allocation and land use management. This will be supported by the establishment of climate decision making systems that balance the interest between food production, climate smart agriculture and development needs and ensure appropriate allocation of land within the balanced environment.

(vii) *Disaster Risk Reduction*: Botswana observes that climate change impacts are likely to increase vulnerability to disaster risk factors such as heatwaves, veldt fires, floods and droughts caused by extreme weather events, and will also increase pressure on resource allocation towards disaster risk management. This increase therefore calls for comprehensive approaches to disaster risk reduction programs and plans in order to enhance societal adaptive capacity and capability. This will need:

- Continued research and promotion of use of information on climate change, early warning systems for extreme weather and climate to inform disaster risk reduction plans and allocation of resources.
- Strengthening collaboration with the regional and international forecasting centers to share early warning systems for national application and benefit.
- Strengthening and *monitoring* the implementation of disaster reduction plans through guidelines on climate change induced disasters.
- Continued interaction with communities, NGO’s and other institutions committed to raising awareness on adaptation, technology transfer and capacity building so as to enhance the communities adaptation capacity and reduce vulnerability to natural disasters.
- Building the country’s resilience and coping mechanisms to disasters, through interventions of key actors.

(viii) *Biodiversity and Ecosystems* - The government realizes the importance of promoting conservation and sustainable use of biodiversity and effective management of ecosystems, as well as promotion of equitable sharing of benefits from natural resources. This is will call for:

- The need to accelerate the prioritization of climate change related research on species richness changes, migration, pests and diseases.
- Supporting the coordinated implementation and integration of climate change into existing biodiversity and ecosystem related policies and community based programs.
- Promote use of ecosystem based adaptation approaches in order to take into consideration the full range of possible climate outcomes.
- Adopt climate change guidelines for designing and monitoring of development activities within and adjacent to sensitive ecosystems in order to enhance their resilience under changing climates.
- Where possible avoid human settlements adjacent to sensitive ecosystems that may interfere with the natural rehabilitation cycles of such ecosystems especially large water bodies.
- Promote the implementation of natural capital accounting measures.
(ix) **Infrastructure Development** – this will entail integration of climate change considerations into infrastructure planning, designing and development processes.

(x) **Gender** - The government in recognizing the need to mainstream gender into development planning intends to ensure that climate change response measures are gender sensitive particularly the recognition of women’s vulnerability to climate change impacts. This shall be achieved through amongst others the adoption of strategies that are targeted at increasing resilience of most vulnerable groups such as women, children and disabled people to climate change impacts through provision of means of implementation such as technologies, finance and capacity building. Including gender and climate change into academic curriculum at all levels is also one of the measures that is considered as useful for social transformation in gender and climate change.

(xi) **Stakeholder Involvement** – Participation of all sectors of the economy and all actors is to be encouraged as well as the allocation of roles and responsibilities.

(xii) **Resources** - The government is committed to mobilizing resources that are necessary for realization of climate change response measures. This mobilization includes financial resources, technical cooperation and technology transfer at local, national, bilateral, regional and international levels.

(xiii) **Technology Development and Transfer** - The government recognizes that efficient emission reduction and effective adaptation should be supported by appropriate technology.

(xiv) **Education, Research and Development** – it is stated that climate change decisions shall be informed by research and as a cross sectoral discipline, its understanding is imperative to effectively adapt to the varied circumstances and mitigate potential impacts. Botswana is therefore committed to allocating resources for climate change research and further collaborates with institutions of learning at national, regional and international levels to promote adaptation and mitigation related research. Priority shall be given to the establishment of climate change related programs, impact identification; risk analysis and management and information dissemination in existing and new institutes subject to available resources and needs.

### 5.1.4 Existing Opportunities for Botswana

Table 1 below spells out the opportunities for addressing capacity needs in water governance for strengthening adaptive capacity and ensuring resilience building.
<table>
<thead>
<tr>
<th>Resilience/Adaptive Capacity</th>
<th>Opportunity</th>
<th>Activity</th>
</tr>
</thead>
</table>
| External Regime             | **Opportunity 1:** The IWRM-WE Plan provides opportunities for institutional linkages cascading from the national central government levels to local governance structures and communities. The institutional regimes for management of water provide good bases for the development of climate change impact management options that can be implemented and monitored by different relevant institutions. The envisaged Focal Point for Climate Change within the water sector will have direct linkage with the National Climate Change Unit. The work of the LRB will be ensured of visibility at highest levels. | ▪ Mapping of national and regional stakeholders and development of climate change impact management options. The expected output would be a database of stakeholders                 ▪ Identification of climate stressors and vulnerabilities  
▪ Development of a climate change and adaptation vision in the water sector that is inclusive of all sectors and communities that utilize water as a resource, which function and are active within the Limpopo river basin system. A common vision will most likely be owned by all and provide an impetus for integrating climate change in the different sectors and interests.  
▪ Identification and development of climate change impact adaptation options  
▪ Identification of gaps in sector specific regulatory instruments that may compromise the effectiveness of climate change resilient measures and recommendations on how to address the gaps                                                                                                                                                                                                 |
|                             | **Opportunity 2:** The DWA can develop a robust institutional engagement and strategy plan on how it can coordinate the implementation and monitoring of climate resilient framework and measures as it is both a secretary to the Water Resources Board and is also responsible for the development of policies, plans, strategies and provision of advisory services. | ▪ Specific terms of reference for the DWA and associated entities on climate change impact adaptation and resilient framework  
▪ Development of a framework for managing climate change impacts, ensuring adaptation and resilience. This framework will have to be aligned and connected to frameworks that may be developed for the Limpopo at transboundary levels. At national level, it should spell out the roles and responsibilities of each sector, and, unit within the institutional structure as described in the Botswana IWRM-WE Plan.  
▪ Training and guidance on budgeting for the mainstreaming or integration of climate impact                                                                                                                                                                                                 |
| Opportunity 3: A climate change impact adaptation plan, with guidelines, tools and requisite training can be initiated by the DWA, with allocated responsibilities for each concerned actor/stakeholder. This would require the full and active participation of all stakeholders. | ▪ Development of a dynamic adaptation plan
▪ Development of tools for coordinating, implementing and monitoring climate change adaptation actions
▪ Training on mainstreaming climate change adaptation actions and use of tools |
| Leadership Opportunity 1 | ▪ Setting of baseline and protocols for collection and interpretation of data
▪ Development of indicators and monitoring and evaluation framework and plan
▪ Development of a monitoring and evaluation system for DWA/WRB
▪ Appropriate training |
| The Department of Water Affairs and its International Rivers Unit have dedicated visionary leadership that can benefit from well packaged focused, targeted and stratified sensitization, awareness and educational materials that can be used to deliver transformational messages to water users. The leadership can also benefit from guidelines and other knowledge products that are useful in ensuring the mainstreaming actions that build adaptive capacity and build resilience in other institutions that use or manage water. | ▪ Conduct at least one workshop for parliamentarians (Environment, agriculture, mining, tourism, finance, education parliamentary committees) and senior policy makers on mainstream climate resilient actions into the water sector with added focus on transboundary integrated water resources management. The workshop should highlight on mainstreaming climate resilience in sector policies and budgets
▪ Conduct one workshop on transformation of systems, processes, procedures etc for strengthening climate resilience in institutions. |
<p>| Flexible resource management | Opportunity 1: Build and attain capacity for climate resilient budgeting for funds that are allocated from the national budget. DWA can be trained as trainer of trainers in the integration of climate resilience actions and measures including on budgeting for those climate resilient interventions. DWA can then deploy this skill to other sectors that use water and are subject to climate impacts. | ▪ Conduct a workshop on scenario planning and water use in tourism, mining and agriculture in the Limpopo Basin ▪ Training on climate responsive budgeting |
| Resources – | Opportunity 1: identification of sources of resources essential to immediate responses | ▪ Identification of climate impacts and development of options for managing and adapting to those impacts ▪ Identification of partners and existing programs and projects on the ground for leveraging of resources ▪ Development of viable project proposals ▪ Development of an external resources mobilization strategy ▪ Explore through LIMCOM, opportunities with other LRB countries for joint planning and use of resources for mutually identified specific areas |
| Legitimacy and Accountability – | Opportunity 1: Botswana national level: Stakeholder engagement plan and national dialogue meetings on the | ▪ Collaboration with disaster risk management office and other relevant offices for responses in regard to unexpected hydrological situations ▪ Development of a water sector stakeholder engagement plan with added focus on the Limpopo River Basin |</p>
<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and Evaluation –</td>
<td>The Research Unit at the Department of Water Affairs conducts research on water quality and other areas. The Research Unit can team up in terms of sharing information with other departments such as the research unit at the Department of Environmental Affairs. Baseline information is available and can be packaged in a manner that makes it of use monitoring and evaluation.</td>
</tr>
<tr>
<td>Identity</td>
<td>The Department of Water Affairs is already in a transformational process in which one of its responsibilities is to ensure sound management of water resources. Sound management of water resources includes management in the context of climate resilience in the water sector. Department of Water Affairs can be the leading coordinating agency for strengthening climate resilience in the water sector.</td>
</tr>
<tr>
<td>Forward Thinking –</td>
<td>The IWRM-WE Plan anticipates innovations to be used in addressing the management of water resources. Forward thinking involves scenario planning based on inter alia evidence based research and lesson learnt in prior practices and experiences.</td>
</tr>
<tr>
<td>Iterative Approaches –</td>
<td>The IWRM-WE Plan anticipates innovations to be used in addressing the management of water resources. Forward thinking involves scenario planning based on inter alia evidence based research and lesson learnt in prior practices and experiences.</td>
</tr>
</tbody>
</table>

- Development of targeted messages for different key stakeholders within the Limpopo Basin
- Training on designing and utilisation of tools for monitoring and evaluation of policies and programmes
- Strengthening the monitoring and evaluation system and linkages with other existing systems and databases
- Development and elaboration of key elements or vision for the water sector’s response to climate change impacts and branding the water sector as a driving coordinating body for leading climate resilience building among the various water users
- Development of key messages and communication materials for the Department of Water Affairs in climate resilience with added focus on the Limpopo River Basin
- Packaging of key messages from current studies and other evidence of possible climate scenarios and the type of climate resilient actions required for different water users and the type of resources and inputs that may be require
- Strengthening of forums and modalities for communicating the messages to the identified water users
- Appropriate training as may be required
- Development of training materials for auditing climate resilient actions and effectiveness of adaptive capacities of various water users and organizations
- Training on auditing the effectiveness of climate resilience interventions (these will include policies, strategies, and plans. Projects, programmes and guidelines)
Mainstreaming –

Opportunity
The draft climate response policy and the IWRM-WE Plan calls for the recognition and acknowledges the cross cutting nature of climate change. Mainstreaming climate responses including climate resilience actions is one of the ways of managing actual and anticipated or potential impacts.

At river basin level, there is need for a strategic development framework that has climate change mainstreamed, additionally, the river basin organisations should have the capacity to lead mainstreaming within its own transboundary plans and to assist mainstreaming at national level. The capacities required for mainstreaming should be an integral part of doing business.

Creative and Learning –

The DWA ‘s research unit in collaboration with other departments and key organisations can spearhead the strengthening of knowledge and institutional memory

- Defining the Scope – this entails the establishment of the context and focus for development. This requires the identification of priority development goals and key inputs for attaining the goals. For the DWA it may involve examining the actions contained in the national development plan and the IWRM-WE Plan.
- Development of skills for Assessment – this enhances understanding about vulnerability and development of actionable information
- Designing – identification, evaluation and selection adaptation options and resilience building actions
- Systems, mechanisms and tools for Coordination, Implementation and Management – ensuring that adaptation is effectively coordinated, facilitated, implemented and managed at transboundary and national levels
- Training on Monitoring, Evaluation and Adjustment skills – monitoring at all stages of coordination, facilitation, implementation and management of adaptation measures and actions. This also includes the overall monitoring of the impacts of adaptation actions in building resilience and in minimizing or reducing the negative impacts of climate change and recommends or informs adjustment accordingly.
- Training on skills required to develop a baseline and indicators
- Development of indicators
- Training on use of indicators and reporting the results therefrom

- Identification of skills, techniques and capacities needed within DWA for adaptation and building resilience
and also in assessing skills required for continued resilient actions and interventions

<table>
<thead>
<tr>
<th>Knowledge Management and Institutional Memory – Opportunity</th>
<th>Training and skills development plan</th>
</tr>
</thead>
</table>
| The International Waters Unit and the other units within the Department of Water Units, notably the Research Department are in a position to coordination of the collation of relevant information on water resources and to develop or strengthen the knowledge management systems. | Development of a knowledge management plan and systems  
Implementation of the plan including relevant training |

| Access to Research, Data/Information – Opportunity | Identification of relevant data  
Archival of information  
Packaging of information  
Identification of sources of knowledge, information and data from different communities in the basin and other research done on the basin |
<table>
<thead>
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<tbody>
<tr>
<td>The DWA has multiple water users in different sectors and communities of practice. There are communication systems in place and these may be strengthened accordingly. Additionally, the DWA works with various institutions at national, regional and international levels on management of water resources in different basins including the Limpopo. All the information that is generated needs to be packaged into useful and useable information for amongst others, decision-making, programme design, evaluation etc</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Comparison against desired capacities
In addition to the principles, characteristics and attributes discussed above, the responses to the questions revealed additional institutional capacity needs for Botswana. They are summarized below in Table 2:
<table>
<thead>
<tr>
<th>Constraint</th>
<th>Recommended Intervention</th>
<th>Period</th>
</tr>
</thead>
</table>
| Lack of shared aspirations in managing climate impacts within the Department of Water Affairs and its Ministry, as well as with other relevant sectors | ▪ Adoption of an inclusive method or approach to redefining or re-articulating the aspirations of the water sector in regard to climate impacts and transboundary aspirations  
▪ Development of a Vision that is translated into bold set of goals regarding the coordination and implementation of climate change adaptation specified by concrete and well defined frames to achieve the goals | Medium term – development of a climate change adaptation and resilience vision for the water sector and transboundary shared resources |
| ▪ Low level joint strategic planning and consistently shifting strategy goals in practice  
▪ No integrated strategy for implementation of climate impact concerns within the water sector and with other water users and actors within the Limpopo River Basin and other shared basins | ▪ Adopt a style where all Departments and relevant statutory bodies undertake joint strategic planning and cost sharing initiatives in the implementation of climate change adaptation and general overall water governance and ensure that all programmes and services are well defined and fully aligned with the common mission, vision and goals and synergies fully captured.  
▪ Continual assessment of gaps in implementation of the Botswana IWRM – WE Plan and joint planning for re-direction of priorities. | Short term – roundtable discussion to unpack the Botswana IWRM-WE Plan to sensitize stakeholders on their roles in managing the impacts of climate change and identify roles and responsibilities  
▪ Short term – workshop on inter-functional coordination within the DWA and its units and with other organs of the Ministry in relation to roles, responsibilities, capacities and budgeting for climate change adaptation and resilience building  
▪ Medium term – support to DWA to facilitate the development of sectoral water plans in the context of climate change adaptation and resilience within the LRB; sectors include the water catchment committees |
| Uptake of change management is slow due to amongst others lack of sensitization on the actual and potential challenges of the impacts of climate change – moving from Business as Usual (BAU) mode | ▪ Encourage high levels of executive commitment to climate change adaptation by supporting the strengthening of the institutional framework established under the IWRM-WE Plan  
▪ Actual use of existing human resources capacity due to greater integration, enhanced coordination and the change of doing business  
▪ Inter-ministerial training or exchanges about linking water and climate governance to key areas of sustainable development being carried out by other Ministries especially | Short term – priority identification meeting for strengthening water resources governance of the institutions established under the IWRM-WE Plan and their role in climate change adaptation and building resilience  
▪ Medium/Long term – identify, develop and encourage champions and working groups for key areas of resilience such as information and knowledge management, data collection and strengthen capacity to make changes in a planned, managed or systematic fashion to place financial and personnel resources to complement the requirements |
| Learning opportunities are not maximized in the context of strengthening climate impacts | Capacities for DWA to be a continually learning organization in relation to the implementation of climate change in the water sector, especially the latest methodologies, tools and systems needed to inform policy and budgetary considerations of the entire ministry. This will enhance the appreciation of the support needed by coordinating and implementing departments of the Ministry and other established institutions under the IWRM–WE Plan  
- Enhanced understanding of basics on the objectives, obligations, responsibilities and benefits of planning for and managing climate impacts  
- Enhanced understanding of policy requirements and resources needed  
- Enhanced capacity to plan and inform the Ministry’s overall training plan, skills development, retention of staff modalities and deployment  
- Structures and systems that nurture innovation | of integrated management of climate impact coordination and implementation  
- **Short term** – develop knowledge products including policy notes and briefs on climate change and resilience building  
- **Short term** – breakfast seminars for inter-ministerial/departmental executive on inter alia importance of budgeting for climate change adaptation and management of impacts as well as the importance of mainstreaming climate change responses.  
- **Short term** - Inter-ministerial training and exchanges  
- **Medium/Long term** – strengthen the DWA ‘s capacity to acquire, synthesize and package knowledge – the DWA can be a knowledge centre for water resources and climate impact responsive governance that has direct linkages with LIMCOM  
- **Medium/long term** – develop an interactive information management system and a website for managing climate change impacts in the water sector and for water governance in shared river basins  
- **Medium/long term** – develop a training plan specific to needs of the water sector in ensuring management of climate impacts and building of resilience  
- **Short term** – identify training institutions and other entities that provide opportunities for capacity enhancement in climate change responsive governance; these include practical on the job training and exchange training opportunities with other riparian states  
- **Long term** – strengthen the DWA ‘s laboratory  
- **Short term** - Capacity of DWA to appreciate the synergies with other sectors for cost effective budgeting, programme/project design, policy |
<table>
<thead>
<tr>
<th>Shortage of human resources (both in terms of technical expertise and numbers, especially in the International Waters Unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Capacity to develop and implement procedures for effective human resources planning in and across the departments to enable efficient delivery of climate impact responses</td>
</tr>
<tr>
<td>▪ Capacity for effective and relevant deployment to maximize internal existing capacity (avoid internal brain drain)</td>
</tr>
<tr>
<td>▪ Capacity for developing positive eco/green-incentives</td>
</tr>
<tr>
<td>▪ Capacity to motivate staff to perform at optimal levels</td>
</tr>
</tbody>
</table>

| ▪ Established interactive and accessible information systems |
| ▪ Formulation, legislation development and public outreach |
| ▪ **Short term** - Develop a continually updated needs based training programme for existing and strategic planning, policy analysis and other areas of climate change impacts, adaptation, resilience and advisory capacities |
| ▪ **Short/medium term** - Develop handbooks, manuals and other such instruments to guide staff executing duties related to mainstreaming climate change responses and monitoring implementation |
| ▪ **Medium/Long term** - Capacity to develop water resources, climate change impacts and environmental analysis tools and standards for informing policy and programme development or execution. During planning and programming efforts, analysis of interactions between water, climate change and other development initiatives, tools and principles have to be used to ensure integration of environmental considerations (context-sensitive solutions, scenario planning, impact analysis are examples of tools and principles that can assist in mainstreaming climate change in the water sector and cost-effectiveness) |

| ▪ **Medium term** – DWA Staffing Plan that articulate the levels that match the workload and required expertise/skills for climate impact responsive governance. Staffing that match experience, knowledge, exposure, motivation, interest, passion and qualifications/training |
| ▪ **Medium/Long term** - Established annual staffing/work-force planning in all departments in line with strategic and budget planning timetables/schedules relevant to responding to and managing climate impacts |
| ▪ **Long term** - Human resources management systems that encourage retention of skilled and
- Develop procedures for induction of new employees
- Capacity for effective planning and performance goal setting for climate impact responsiveness. In an effective organization, work is planned out in advance, this is especially important for climate change due to its uncertainty and unplanned effects. Planning means setting performance expectations and goals for groups and individuals to channel their efforts toward achieving organizational objectives for climate resilience. Getting employees involved in the planning process will help them understand the goals of the organization, what needs to be done, why it needs to be done, and how well it should be done. Through critical elements, employees are held accountable as individuals for work assignments or responsibilities. Employee performance plans should be flexible so that they can be adjusted for changing program objectives and work requirements. When used effectively, these plans can be beneficial working documents that are discussed often to keep abreast of changes in climate and requisite responses.

<table>
<thead>
<tr>
<th>Low levels of capacity for knowledge management that is essential for science- and knowledge based climate impact interventions and building of resilience</th>
<th>Strengthen DWA’s capacity to establish knowledge learning and knowledge sharing networks, data bases and e-discussion. This is necessary for sharing best practice is supporting policy development, legislation and budgeting for climate change impact responses and resilient governance as it provides access to best practices, information and expertise relevant to the technical staff as well as use or other resources residing in external departments such as those in the Department of Meteorological Services (responsible for climate change at national level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Medium/Long term - Measurable performance elements and standards that understandable, verifiable, equitable, and achievable geared towards climate resilience and impact management/responsiveness</td>
<td></td>
</tr>
<tr>
<td>- Long term – establishment of knowledge management systems</td>
<td></td>
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<tr>
<td>- Short term – provide analytical policy briefs, guidelines and concept papers to inform and generate ideas on areas of knowledge management</td>
<td></td>
</tr>
<tr>
<td>- Short term – seminars on importance, practice and lessons on knowledge management for resilient responsive governance</td>
<td></td>
</tr>
</tbody>
</table>
| Coordination capacity needs to be strengthened | Under the IWRM-WE Plan, DWA is mandated to take full responsibility for national coordination of all areas of water governance. To that end it has the following duties in so far as water governance and climate change is concerned:
- Coordinate the implementation of climate change adaptation, resilience and mainstreaming among the users of water resources
- Demand accountability for mainstreaming implementation
- Drive policy process for water and climate change adaptation and resilience implementation
- Duty to establish rules and procedures for accountability mechanisms and M&E |
| Medium/Long term – development of Formal coordination and collaborative decision-making mechanisms |
| Medium term - Standing and non-standing committees for coordinated water and climate change impact governance/management |
| Medium term - Formal Scopes of Work for the committees, reference groups, working groups, steering committees, advisory committees etc; with clear defined rules on their roles, methodology of work and internal decision-making |
| Medium/Long term - development of a functional monitoring and evaluation framework and system |
| Short/Medium term – rules and procedures for reporting on set targets for climate change mainstreaming |
| Programme and Project Design, Management, Monitoring and Evaluation | Mainstreaming climate change in water sector and water uses programs and projects
| Monitoring and evaluation |
| Medium/Long term – Provide training on the basics on use programming tools to translate policy, strategies, action plans etc into programmes or projects whilst mainstreaming climate change responsiveness |
| Short/Medium term – Basic training on planning for results based programming and management |
| Short/Medium term – training on capacity to manage, monitor and evaluate programmes and projects |
| Gender Mainstreaming | Need for gender considerations to be integrated in water governance and climate change |
| Short term – capacity for identification of gender issues and needs in the water and climate change sectors |
Table 2: Summary of additional Institutional Capacity needs for Botswana

<p>| Short term | development of gender policy statement and gender mainstreaming plan |
| Medium term | Training in gender mainstreaming tools and gender auditing |
| Medium term | application of gender mainstreaming |</p>
<table>
<thead>
<tr>
<th>Identified gap/Opportunity</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demarcation of catchment areas into management areas so that people are reached</td>
<td>DWA needs technical and financial assistance on this.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Medium Term</strong> – support to develop a catchment management areas plan</td>
</tr>
<tr>
<td>Involvement of communities is minimal</td>
<td>Activities for community cohesiveness and giving communities “voices”. A community initiative to get them on board is necessary including strengthening of existing structures. This concern can be addressed through the development of stakeholder engagement plan and through the strengthening of catchment management committees. During the development of the Vision at national level, communities and other stakeholders should fully participate. The other three riparian countries can also undertake the development of a national LRB climate change and water governance vision. All the four visions may then be used to develop a basin wide vision.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Short/Medium term</strong> – Vision development. This should be undertaken in the context of the stakeholder mapping and engagement plan. This was flagged as being urgent. This activity can also be done in the other three countries with the ultimate aim of establishing or strengthening communities and their active participation.</td>
</tr>
<tr>
<td>Focus is shifting from water supply to water monitoring – lack of comprehensive data on the Limpopo hinders monitoring</td>
<td>Capacity for bio-monitoring</td>
</tr>
<tr>
<td></td>
<td>- <strong>Medium/Long term</strong> – facilitation of discussions and agreements on basin-wide</td>
</tr>
<tr>
<td>Botswana is conducting a risk assessment on the dams</td>
<td>Opportunity for engagement on other use of dams and building resilience</td>
</tr>
<tr>
<td></td>
<td>- <strong>Immediate</strong> – facilitate cooperation on conducting risk assessment of dams and infrastructure development across the basin</td>
</tr>
<tr>
<td>Ad hoc activities like water hyacinth which are more reactive than proactive</td>
<td>We therefore need to go back to the IWRM Plan and prioritize and act immediately on transboundary concerns</td>
</tr>
<tr>
<td></td>
<td>- <strong>Immediate/Short and Medium term</strong> – Facilitate a national forum for unpacking the IWRM WE Plan and prioritise resilience activities with the LRB</td>
</tr>
<tr>
<td>Lack of shared information from other countries for effective monitoring</td>
<td>Data and information sharing strategy and associated protocols</td>
</tr>
<tr>
<td></td>
<td>- <strong>Short/Medium</strong> – facilitate discussions and provide technical support for development of data and information sharing strategy and associated protocols</td>
</tr>
<tr>
<td>DWA – needs policy and guidelines on climate change and resilience (note, CC Policy is being done by DMS)</td>
<td>CC policy and guidelines specific to all river basins is necessary. Limpopo would be a good start. External capacity is needed to implement some of the recommendation in previous studies to ensure climate resilience in the LRB.</td>
</tr>
<tr>
<td></td>
<td>This is covered under the mainstreaming aspect of climate change.</td>
</tr>
</tbody>
</table>
| Gender and climate change integration – gender has no resources as it is funded by donors | Capacity is required – human and financial. Department of Gender Affairs would like to engage with DWA and the LRB programmes.  
**Short term** – Facilitate gender integration workshop, training and development of gender mainstreaming instruments |
| Development of bilateral agreement on water sharing between Botswana and South Africa | RESILIM could assist here as a matter of priority as Botswana’s dams are in the Limpopo catchment area. |
| Information and data collection | Need for common collective database that is web based  
Need for development of common standards for data collection  
Need to address the gap in information sharing (tie with disaster management): LIMCOM could host the website but no capacity.  
**This is a priority area for intervention.** |

Table 3: Summary of Identified Capacity Needs for LIMCOM by Botswana
The discussions on the capacity needs of LIMCOM with the Department of Water Affairs and other stakeholders indicated that there are a number of opportunities for strengthening the capacities of LIMCOM to undertake its duties as a fully functional river basin organisation. A number of capacities at systemic, organizational and human resources levels were identified as needing support in building/enhancing capacities. The areas referred to amongst others, the mandate, functions and duties of LIMCOM in coordination, provision of secretariat services, provision of policy and technical advice, information management and knowledge management and as a facilitator for the development of the Limpopo River Basin.

The institutional capacity gaps and recommendations for addressing the gaps are reflected in Table 4 below:
<table>
<thead>
<tr>
<th>Identified gap/Opportunity/Concern</th>
<th>Potential Area of Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for a basin wide water quality survey (so far only Bots and SA are doing it)</td>
<td><strong>Medium/Long term</strong> – technical capacity for water quality survey using common standards across the entire basin</td>
</tr>
<tr>
<td>Need for a Limpopo Communications Strategy</td>
<td>Provision of interim-communications for LIMCOM so as to expedite other activities since LIMCOM currently has no communications officer. If RESILIM or other partners could facilitate coordination or sponsor a coordinator then this person can also do communication duties</td>
</tr>
</tbody>
</table>
| Mobilization collective political will and commitment                                             | Forum to get Ministers together with technocrats to have “conversations”  
  - **Immediate** - this will feed into the development of a common basin climate change adaptation and resilience vision |
| Training in common standards, methods etc in maintenance of gauging stations across the basin (19 of them) | RESILIM or other partners could facilitate and fund the training – **Immediate/short and Medium term** |
| Operationalisation of LIMCOM (all the activities related to this were considered to be urgent)   | - Recruit ES  
  - Assist ES in developing a three year operationalisation workplan and a one year workplan  
  - Development of Task Forces and other required specialist bodies  
  - Interim coordination support by RESILIM or other partners through the provision of a coordinator or funding one. RESILIM or other partners could also draft the terms of reference for such Coordinator. The Coordinator will look at inter alia:  
    - Hydrology  
    - Climate change  
    - Basin wide issues  
    - Water allocation  
    - IWRM agreements  
    - Communication (see above)  
  - Finances – need for seed money cause lack of finances tend to derail very good initiatives. There is need to assist the ES to develop a financial strategy – expertise is needed -  
  - Lack of support from SADC on LIMCOM therefore RESILIM or other partners should offer to assist the operationalisation of the LIMCOM Secretariat  
    - HR Policies, financial governance instruments etc  
    - RESILIM or other partners should review the existing terms of reference for skeletal staff  
  - Assist with the development of financial regulations: procedures for preparation and approval of budget, audit rules and appointment of auditors etc |
- Assist the (Interim-)Secretariat to prepare a three year operationalisation plan for the LIMCOM Secretariat with financial implications and associated financial plan
- Assist the host country to engage more and develop accountability measures
- Once RESILIM effectively supports the operationalisation of LIMCOM key areas on data can be supported as per the Joint Limpopo Scoping Study and the IWRM Plan. Parallel, RESILIM or other partners can also develop a process for facilitating data and information sharing negotiations and protocols, development of common standards and training. Weak institutional structures cannot achieve resilience.

Table 4: Capacity Needs for Operationalizing LIMCOM Secretariat as identified by Botswana
4.1.3. Recommendations based on the Botswana Findings

The capacity needs assessment exercise revealed the gaps and areas of institutional strengthening at national level (Botswana) and at transboundary level (LIMCOM) and highlighted the importance of having robust institutions at national level that can coordinate the basin-wide strategies and activities. However, effective transboundary river basin management requires a functional entity that can coordinate activities designed for the benefit of the entire basin. Currently, LIMCOM does not have the capacity to undertake that and thus has not fully utilized the opportunities presented by RESILIM and other partners.

Strategies, technical and other studies have been undertaken for the sound management of the Limpopo River Basin, however there has been very little uptake of the recommendations and advice at collective basin level due to the weak institutional capacity of LIMCOM. A number of factors render LIMCOM weak, the key factor being that LIMCOM is a relatively new entity.

Based on the analysis, the following recommendations are made:

- Organize a workshop for validating the findings of the capacity needs assessment
- Institute a forum for soliciting buy in and political support on measures for the strengthening of LIMCOM and closer cooperation on the management and development of the LRB. This could be done at highest levels by having a Ministers Dialogue Forum where they will be sensitized on cooperative and collaboration issues.
- Have a technical meeting prior to the Ministers Dialogue Forum to identify priority issues and consolidate elements for the development of a common vision by all the four countries. The identified priority issues will be presented to the Ministers.
- Organize a stakeholder’s meeting to sensitize and also develop elements for a common basin vision on water and climate change impact responsive governance.
- Produce policy analysis briefs, concept notes and other knowledge products to stimulate continued discussions in identified areas of strengthening
- Based on the identified institutional capacity needs, develop and agree on a plan with the countries and other cooperating partners on activities to be undertaken including identification of resources.
- Embark on the immediate need to support the operationalisation of LIMCOM
- Assist Botswana to implement the capacity actions and interventions based on the findings and opportunities.

NB The findings on Botswana are applicable to the other riparian countries as appropriate, especially those in reference to LIMCOM
5.2 Mozambique

Mozambique is one of the most vulnerable countries when it comes to climate change impacts and also suffers from high levels of poverty. Consequently addressing the impacts of climate change is one of the most influential factors in poverty alleviation, economic development and sound resource management and balanced sustainable development.

5.2.1 Summary of Climate Impacts

Table 2: Summary of Catastrophic floods and droughts, impact and frequency of events in Mozambique can be observed in the Table. Table from World Meteorological Association

<table>
<thead>
<tr>
<th>Year</th>
<th>Type of Disaster</th>
<th>Influenced By Cyclone</th>
<th>Affected Areas and Some More Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Flood</td>
<td>Jokwe</td>
<td>Zambezi, Pungue, Buzi and Save rivers in Mozambique flooded. Zambezi River flooded for more than two weeks with 256,000 people affected and more than 100,000 displaced in Mozambique.</td>
</tr>
<tr>
<td>2007</td>
<td>Floo</td>
<td>Foio</td>
<td>Zambezi River flooded - more than 120,000 displaced and 250,000 people affected in Mozambique (<a href="http://www.care.org/newsroom/articles/2007/02/20070223_mozambique_cyclone.asp">http://www.care.org/newsroom/articles/2007/02/20070223_mozambique_cyclone.asp</a>)</td>
</tr>
<tr>
<td>2003</td>
<td>Flood</td>
<td>Delfina</td>
<td>Zambezi River flooded. Seven people died and more than 30,000 people displaced in Malawi and more than 400 homes washed away in Mozambique (<a href="http://www.ndec.moz.gov/id/99/hazard/2003jan">http://www.ndec.moz.gov/id/99/hazard/2003jan</a>)</td>
</tr>
<tr>
<td>2002 - 2003</td>
<td>Drought</td>
<td></td>
<td>Drought period for most of rivers on the southern east coast of Africa with some parts of Limpopo Basin affected. More than 43 districts affected in Mozambique, including those in Limpopo River Basin.</td>
</tr>
<tr>
<td>2001</td>
<td>Flood</td>
<td>Dera</td>
<td>Zambezi River flooded, with 115 deaths reported and more than 500,000 affected in Mozambique and 340,000 people affected in Malawi. (<a href="http://www.fhnews.org/report.aspx?reportid=18976">http://www.fhnews.org/report.aspx?reportid=18976</a>)</td>
</tr>
<tr>
<td>1999</td>
<td>Flood</td>
<td>Elole, Olane and Rufue</td>
<td>Limpopo, Maputo, Uemo, Buzi, Inhaimbi, Buzi and Save rivers severely flooded. Some 640 deaths recorded and more than 2 million people affected. ENI main road in Mozambique closed for several weeks.</td>
</tr>
<tr>
<td>1997</td>
<td>Flood</td>
<td>Lisette</td>
<td>Floods in Buzi, Pungue and Zambezi river; no road traffic to Zimbabwe for weeks; 78 deaths; 300,000 people affected in Mozambique alone.</td>
</tr>
<tr>
<td>1995</td>
<td>Flood</td>
<td>Beira</td>
<td>Floods on all southern rivers of the country; (including Limpopo River) - 200,000 people affected in Mozambique alone.</td>
</tr>
<tr>
<td>1994 - 1995</td>
<td>Drought</td>
<td></td>
<td>Southern east of Africa river basins, including Limpopo, with more than 1.5 million in Mozambique alone. Major crop failure and outbreak of cholera epidemic.</td>
</tr>
<tr>
<td>1997</td>
<td>Drought</td>
<td></td>
<td>800,000 affected in Inhaimbi province.</td>
</tr>
<tr>
<td>1995</td>
<td>Flood</td>
<td></td>
<td>Floods in southern provinces of Mozambique including Limpopo River, and recorded worst flooding in 50 years.6.5 million affected.</td>
</tr>
<tr>
<td>1993 - 1994</td>
<td>Drought</td>
<td></td>
<td>Most of the Mozambique affected. Cholera outbreak and many deaths from drought, which further worsened the suffering of the people from civil war war.</td>
</tr>
<tr>
<td>1991</td>
<td>Drought</td>
<td></td>
<td>2.16 million people affected in south and central parts of Mozambique.</td>
</tr>
<tr>
<td>1991</td>
<td>Flood</td>
<td></td>
<td>Floods on Limpopo river; 0.5 million people affected.</td>
</tr>
<tr>
<td>1990</td>
<td>Drought</td>
<td></td>
<td>Southern and central parts of Mozambique affected.</td>
</tr>
</tbody>
</table>
Climate change impacts have been felt in Mozambique and in the Limpopo Basin specifically. Some of the impacts that have been documented and noted are:

(i) Extreme weather events such as floods and droughts that result in loss of life, livelihoods and damage to ecosystems thus impacting on availability of ecosystem services and goods. The records of extreme events for the period between 1956 and 2007 indicate that the occurrences that led to the highest number of deaths and affected people were the droughts that lasted more than one year.

(ii) Flooding also causes destruction of infrastructure such as bridges, roads, schools, hospitals, power grids, residences, crops and animals.

(iii) Propensity of riverine and coastal areas to floods and cyclones often resulting in removal of vegetation.

(iv) Increase in environmental degradation and loss of biodiversity, erosion and saltwater intrusion. Moreover, environmental degradation and the loss of biodiversity and ecosystems may affect tourism, mining, forestry, fisheries and agriculture, among other important socioeconomic sectors. According to Ara Sul the frequency and rainfall pattern has changed within the basin, with rainfall season starting in January instead of October. The changes in the rainfall patterns impact on agriculture and negatively affects small holder farmers and their means of livelihoods. Other visible impacts are the sea level rises bringing salinity challenges in the Limpopo especially Xai Xai and Chokwe.

(v) Reduction in the availability of water with the necessary quality for various uses including energy production.

(vi) change in the distribution and abundance of fish stocks and marine biodiversity due to the warming and acidification of water and, ultimately, the bleaching and death of corals;

According to the Strategy possible future impacts include:

- Changes in precipitation patterns with erratic rainfall in terms of start and end time, load (intense precipitation events in a short time) and extension of the rainy season, drought, and distorted understandings of the ‘official’ and ‘real’ start of the agricultural season, which in some regions may result in a drop in potential revenue of up to 25%; and further reductions in potential agricultural income of up to 20% for the main crops that form the basis of food security and are essential for improving per capita yield of Mozambican households.

- greater risk of loss of life, crops, forests and natural heritage, soil erosion and damage to infrastructure associated with floods and inundation by rising seas, storm surge water and extreme precipitation events such as floods.
• reduction in the availability of water with the necessary quality for various uses – including human and animal consumption, forestry, agriculture, energy production and industry – due to reduced rainfall, decreased recharge of aquifers, increased evapotranspiration, saltwater intrusion and an increased risk of wildfires due to lower atmospheric relative humidity;
• increased mortality and morbidity by human-borne diseases associated with climatic variables and higher malnutrition, with greater effects on vulnerable groups.

In addition to climatic impacts, there are some concerns related to water pollution. Water pollution comes from a variety of sources including:

• Urban wastewater
• Industrial wastewater
• Rural settlements and pit latrine usage
• Large scale agriculture
• Subsistence agriculture
• Commercial mining
• Gold panning
• Soil erosion

5.2.2 Water Institutional Framework

The 1991 Water Law of Mozambique lays the foundation for the regulatory and institutional framework for water governance in Mozambique including transboundary water resources management. Additionally, the 1995 National Water Policy, the 20017 Revised Water Policy and the 2007 National Water Resources Management Strategy buttressed the principles of IWRM and the decentralization of water resources from national to local levels within the regulatory framework.

Most of Mozambique’s water is sourced from shared river systems and Mozambique itself is a downstream country. In recognition of that fact, the law requires that water development should be planned and managed at the river basin as the basic unit.

The Water Law, states the need for the following:

• institutional coordination
• involvement of stakeholders
• compatibility with regional plans and due regard for environmental needs
• regular updates of the water resources availability
• compulsory registration of all water users
• the development of a national plan to guarantee in the future an adequate balance between water demand and water availability
• water quality
• pollution prevention measures and the adoption of polluter pays principle
• effluent discharges
• declaration of protection zones for restricting activities that can be developed in areas so declared
• defines water uses and fees
In addition to the Water Law, there is the Water Policy that was approved by the government in 2007. In respect to issues and opportunities related to resilience the Water Policy covers the following:

- Water supply and sanitation
- Socio-economic development – the Policy stresses water as an important aspect of socio-economic development in particular for irrigation, hydropower, industry and livestock.
- Environment – the Policy emphasizes environmental protection and protection zones
- Floods and droughts management – through inter alia measures to be considered in reducing the vulnerability to extreme weather events.
- Basin Management – particular attention is given to river basin plans, joint studies, negotiations and agreements for shared river basins and the need to accelerate the construction of hydraulic infrastructures, mainly storage dams and flood protection dykes.
- Water resources management – focus is on water use, water efficiency and environmental flows
- Economic and financial aspects – the Policy recognises the need to factor in the economic value of water, the need for financial sustainability of the water management institutions as well as of the service providers
- Private sector participation – the Policy calls for greater participation of the private sector and states some areas where this participation is particularly needed
- Legal and institutional framework - On the institutional side, there is an emphasis on continuing with the decentralizing process in water management and for a greater involvement of stakeholders in water management at the river basin level
- Capacity building – capacity building is regarded as being crucial to the success of water resources management and implementation of the Water Policy.
5.2.3 Institutional Water Governance Framework

The Water Act defines the basic institutional set-up of water management in Mozambique. The Ministry responsible for the water sector is the Ministry of Public Works and Housing (MOPH), through the National Directorate of Water (DNA). Diverse institutions are involved with water management in Mozambique. These institutions include those working in the following ways:

- those dealing with water resources management; for example DNA and Aras and other ministries that use water such as Ministries of Agriculture, Energy, Industry, Fisheries, Tourism and Mineral Resources. These ministries regulate economic activities that take place in the Limpopo Basin. The Ministry of Environmental Coordination is also of relevance as environmental flows, nature conservation, biodiversity and impact assessments fall under its institutional mandate.
- Those that represent water users, water supply and sanitation.
- those that are indirectly involved, particularly universities, research institutions and NGOs

MOPH is the ultimate responsible authority for water management in the country, including relations with other basin countries in shared river basins. MOPH delegates responsibilities to DNA. The DNA is supported by a consultative Technical Council. The DNA’s main functions are:

- Defining of policies for water resources management, water supply and sanitation
- Inventory and assessment of water resources at national, regional and river basin, sustained by an information system
- Elaboration and implementation of plans and studies
- Investments in infrastructures for water management, water supply and sanitation
- Drafting of water legislation and supervision of its enforcement

The DNA is comprised of the following departments/organs:

- Department of Administration
- Department of Planning
- Department of water resources management
- Department of rural water supply
- Department of urban water supply
- Department of sanitation
- International rivers office
- Hydraulic infrastructures office
Of particular importance to transboundary river basins and resilience building is the Department of Water Resources Management (DGRH) with the following responsibilities:

- Define policies and regulations for water resources management;
- Prepare river basin plans and monitor its implementation;
- Promote studies on water resources;
- Guarantee an adequate participation of Mozambique in the planning and management of shared river basins;
- Define the methodology for hydrologic data collection, processing, storage and dissemination of information;
- Promote the adoption of adequate standards of water quality and supervise its application;
- Promote environmental conservation, groundwater protection zones and safety of hydraulic infrastructures;
- Organize and update the register of hydraulic infrastructures in the country;
- Prepare flood warning systems and coordinate with other institutions involved in civil protection;
- Supervise the activities of the ARAs;
- Support the International Rivers Office in the preparation, implementation and supervision of compliance of agreements in shared river basins.

At river basin level, the DNA is represented by the Regional Water Administration (Aras) whose main functions as defined in their statutory instruments are to undertake the following actions:

- Participate in the plan of development of the hydrological network and implement it
- Issue licenses and concessions, including for effluent discharges
- Authorize construction of hydraulic infrastructures
- Collect hydrological data, maintain database updated
- Reconcile conflicts between water users
- Recognize and register common uses

Each ARA is guided by a management council that includes representatives of ministries, provincial governments, water users and members of staff. The 5 Aras are:

- ARA Sul, that covers the south border of the country to the basin of the Limpopo River and covers the Umbeluzi, Maputo, Incomati and Save basins.
- ARA Centro, that covers the Pungwe and Buzi
- ARA Zambeze that covers the basin of the Zambezi river;
- ARA Centro Norte - that covers the region from the basin of the Zambezi river to Lurio river inclusive
- ARA Norte - that covers the Rovuma

There are river basin committees that promote efficiency of water use and representation of users’ interests in water management.
The water governance institutional structure is well articulated in the relevant governance instruments and also confirmed during the discussions. The scope and coverage of the different organs and functions regarding transboundary water management, disaster risk reduction and response, and, opportunities for building capacity in climate resilience measures is clear. The human resources capacities, systems, tools, technology, infrastructure and finances are requires for achieving resilience to climate change impacts and ensuring adaptation takes place.
5.2.4 Climate Impact Response Institutional Framework

The operationalisation of climate change management actions in Mozambique is guided by the Mozambique Climate Change Strategy of 2012. The Strategy is for the period 2013 to 2025. It also provides guidelines for implementation, and an action plan for the period 2013-2014 which is the first phase of implementing the Strategy.

Overall the Strategy seeks to reduce climate change vulnerability and improve the wellbeing of Mozambicans through the implementation of concrete measures for adaptation and climate risk reduction, mitigation and low-carbon development, aiming at sustainable development, with the active participation of all stakeholders in the social, environmental and economic sectors. The Strategy highlights three key strategic objectives:

i. that Mozambique becomes resilient to the impacts of climate change, reducing to a minimum the climate risks to people and property, restoring and ensuring the rational use and the protection of the natural and physical capitals;

ii. Identify and make use of the opportunities to reduce GHG emissions that simultaneously contribute to the sustainable use of the natural and the access to financial and technological resources at affordable prices. Additionally to ensure the reduction of the pollution and the environmental degradation promoting a low-carbon development;

iii. Build the institutional and human capacity as well as explore opportunities to access to technological and financial resources to implement the NCCAMS.

The Strategy in terms of resilience covers the following areas:

- strengthening early warning systems
- increasing capacity to prepare responses to climate risks
- increasing capacity to manage water resources
- increasing access and capacity to capture, store, treat and distribute water
- increasing the resilience of agriculture and livestock
- increasing the resilience of fisheries
- guaranteeing adequate levels of food security and nutrition
- increasing the adaptive capacity of vulnerable people
- reducing people’s vulnerability to climate change-related vector-borne diseases
- promoting mechanisms for the planting of trees, and establish forests for local use
- developing resilience mechanisms for urban areas and other settlements
- planning of the development of tourist zones and coastal zones to reduce the impacts of climate change
In implementing the Strategy the following principles amongst others provide guidance:

(i) Proactive/Preventive nature – demonstrate leadership and a pioneering spirit rather than a reactive attitude; this speaks to leadership and scenario planning.

(ii) Social equity – recognize and respect human rights and the fact that all citizens, regardless of their social status, should lead specific actions for mitigation and adaptation to climate change, noting the cultural diversity that characterizes the Mozambican society;

(iii) Equality – respecting the rights of men and women in all spheres of political, social, economic and cultural life, irrespective of colour, race, ethnic origin or place of birth, religion, level of education, socioeconomic status, occupation, political belief and party affiliation;

(iv) Gender parity – respect the principle of equality between men and women, to ensure the representation of women in climate change decision-making bodies and management;

(v) Sustainability – design climate change interventions that are economically, financially, environmentally, socially and culturally sustainable;

(vi) Transparency and participation – provide information exchange, accountability and adequate responses among different actors related to climate change, to implement the Strategy through a broad, inclusive and participatory process.

Based on the regulatory and institutional framework for water resources management and for climate change responses it is apparent that Mozambique has set in place a framework for developing and supporting climate resilience capacity building actions at national and basin levels. The framework provides a good basis for identifying opportunities for resilience capacity building actions.
5.2.5 Existing Opportunities in Mozambique

A number of challenges and opportunities within the Limpopo Basin and nationally were identified as being relevant to building adaptive capacity and resilience.

i. Reducing Climate Risk through use of Early Warning System

Mozambique is one of the most vulnerable countries in the world and suffers from extreme climatic conditions. Specific to the Limpopo Basin, being a downstream country brings in additional climatic pressure. The lack of an effective national early warning system has contributed to the negative impact of climate change, particularly in remote rural communities where there is a lack of climate information and infrastructure for sharing information about extreme events (e.g., weather stations and community radio). It is recognized that strengthening institutional preparedness for imminent extreme climatic events and capacity to conduct relief operations during and after shocks are particularly important. Thus, proposed actions include:

- providing adequate and timely weather information tailored to each user – including the development of a wildfires warning system, and identifying the most effective ways to reach multiple audiences with the most appropriate tools and instruments in relevant languages;
- increasing the scale of the warning system, and reaching the district level, through contributions from sectoral institutions to improve early warning systems, particularly for agriculture, water and health;
- Timely distribution of information to key users and local communities. Timely distribution of information is an important factor that in managing emergencies such as evacuation of people during flooding.

From an institutional perspective the resilience building in regard to early warning systems should be supported by strong institutional linkages that filter from regional through to national, provincial and local levels. The strengthening of local basin entities and committees is necessary, in particular in communications systems and mechanisms including the usage of different mediums using innovative approaches.

ii. Minimal capacity to prepare and respond to climate risks

The capacity to prepare for and respond to climate risks can be strengthened through the following actions:

- improving the preparation for imminent climate disasters, including the relocation and protection of people and property, and the supply of resources and equipment;
- strengthening the roles related to coordinating operations, evacuation, relief, reconstruction and support for victims of climate disasters;
- strengthening the coordination capacities to reduce vulnerability to drought in arid and semi-arid zones;
- strengthening the role of the Multiple Uses Resource Centres (CERUM) in supporting local communities efforts to make more efficient use of natural resources and map vulnerable areas;
- ensuring the establishment and training of Local Committees for Disaster Risk Management.

iii. Capacity to manage water resources
Mozambique recognises that to ensure the availability of water in the necessary quantity and quality, there will be a need to construct and/or rehabilitate water management infrastructure such as dykes, dams, canals, small hydropower plants, community dams, rainwater harvest systems and drainage and water transfer systems. Discussions with Ara Sul during the capacity needs assessment suggest that the construction of small dams and dykes are considered as a priority in building resilience. To that end, studies on small dams or dykes will be required as a pre-requisite for informing decision making.

In addition to constructing and/or rehabilitating water management infrastructure other areas of capacity that need to be attended to include the capacity to harvest and distribute rainwater; strengthening capacity to manage shared water resources, and, improved knowledge about the quality and quantity of groundwater resources. According to Ara Sul, there already is in place cooperation with the Department of Water Affairs in Limpopo, South AFRICA on sharing or accessing information on ground water. The existing cooperation provides an opportunity to formalize the data capturing and data management arrangements amongst the four riparian countries.

iv. Increased Resilience in key sectors such as agriculture, tourism, forestry

As previously mentioned, agriculture is one of the sectors that is impacted upon by two weather extremes in the Limpopo, namely, drought or floods. It is in that regard that Mozambique calls for agricultural interventions to be tailored for each agro-climatic zone and their predicted vulnerabilities. For example, in the Limpopo basin where more erratic precipitation is expected, the emphasis should be on water resource management and use of relevant technologies. In this regard, climate resilient interventions within the agricultural sector in the Limpopo should be responsive to local climatic impacts.

v. Infrastructure development for urban areas and other settlements

The urban areas of the Limpopo River Basin are subjected to extreme weather events that disturb amongst other socio-economic developments and investments. To that end the Mozambican Strategy seeks to develop resilience mechanisms for urban areas and other settlements through:

- developing climatically robust instruments for land-use planning and strengthening their implementation;
- mapping vulnerable and at-risk infrastructure, depending on expected climatic phenomena
- updating building codes for transport, telecommunications, energy distribution, and water infrastructure and buildings, in order to make them climate resilient;
- ensuring that investments, particularly public, in risky areas are climate change-proof;
- promoting the design and implementation of insurance mechanisms for climate risks to existing infrastructure

vi. Factor climatic impacts and appropriate responses in the development of tourist and coastal zones
The protection of vulnerable infrastructure in tourist and coastal zones is recognized by the Mozambican Government as requiring the following actions to be undertaken to respond to climate impacts:

- Assessment of main climatic impacts within the tourism areas. Tourism is one of the emerging and growing industries in the Limpopo Basin in areas such as Xai Xai, at the same time those are areas that are prone to flooding and droughts.
- Promotion of best practice among operators and tourists, making use of public-private partnerships to build the resilience of the sector and the conservation of ecosystems;
- promoting climate insurance for tourist activities and infrastructure

vii. Biodiversity Conservation

Mozambique’s Conservation Policy has the overall objective of “developing and consolidating a national system of conservation of biological resources and their aquatic and terrestrial biodiversity contributing to the sustenance of life, economic growth and poverty eradication.

The following priority actions have been identified as being essential to contributing towards achieving biodiversity conservation:

- developing programmes and actions for climate change-adaptive conservation;
- identifying and implementing adaptation actions to ensure the protection of threatened species;
- establishment of trans-boundary conservation areas to maintain ecosystem functions and allow wildlife migration. This is relevant for the national parks within the Limpopo as well as sustainable freshwater biodiversity conservation and use
- applying management practices that increase the adaptive capacity of ecosystems, and maximize the utilization of habitats and biodiversity conservation. This is an important aspect of climate resilience building
- reclassifying and resizing conservation areas, and identifying risk areas of biodiversity loss

viii. Social Protection/Inclusion and Gender Equity

It is expected that the adverse climate change effects will have more severe consequences for vulnerable people, including women and children, and elderly, disabled, chronically ill and displaced people. According to the Ministry of Woman and Social Action (MMAS) climate change contributes to the impoverishment and an increased vulnerability of the population in general, particularly for those already most vulnerable, and results in greater population displacement, migration and orphaned children.

Access to land and water and the control of resources is normally more restricted for women than men despite historically women being principal providers for the family in most parts of rural Mozambique. Women produce food, fetch water and manage the sanitation needs of the family, although they are at a disadvantage with respect to access to water. In rural areas in particular, it is common knowledge that most human labour for agriculture is by women.

It is therefore recognized that social protection and inclusion can play a key role in increasing the resilience of the most vulnerable to the adverse impacts of climate change. To address these concerns the following actions should be undertaken:

- developing and implementing innovative community-based adaptation approaches;
strengthening the existing climate change-related social protection systems to contribute to the resilience of vulnerable people;
- strengthening the capacity, orientation and emphasis of basic social protection programmes to increase the resilience of vulnerable people;
- strengthening linkages between social protection systems and those related to natural disasters, including early warning systems

xi. Climatic interventions

The Climate Change Strategy sets out short and long term interventions in response to climate change impacts and these include:

- increasing local resilience, fighting poverty and identifying opportunities for adaptation and low-carbon development at community level, to be included in district planning
- increasing regional resilience, reduce poverty and identify opportunities to adapt and encourage low-carbon development at the provincial level, to be included in planning at the provincial level
- increase national resilience, reduce poverty and identify opportunities to adapt and encourage low-carbon development at the national level, to be included in planning at national level

These interventions provide useful institutional linkages and specific responsibilities to ensure climate resilience at different levels of institutional governance.

5.2.6 Institutional organizational structure for climate change

According to the NCCAMS, its implementation will be carried out by a number of actors, including those from the private and public sectors, civil society and CBOs, and cooperation partners.

The institutional and organizational structure for climate change in Mozambique is as follows:

(i) MICOA: MICOA is responsible for climate change coordination.
(ii) CONDES: deals with the political coordination of sustainable development
(iii) CT CONDES: is responsible for provision of technical advice to CONDES
(iv) FUNAB and DNA: Within MICOA, there is a set of supporting entities with mandates related to CC, in particular FUNAB and DNA are responsible for CDM projects.
(v) CCU: the CCU is established within the CONDES’s Secretariat. The CCU is responsible for coordinating and facilitating inter-institutional connections on climate change, preparing annual programmes and work plans, monitoring the implementation of NCCAMS, and giving technical advice on projects and programmes financed by climate change funds and the MEA. The CCU is an important part of the process of ensuring institutional linkages between the climate issues and the water sector as well as linkages to other sectors that use water

A number of cross sectorial issues are identified in the Strategy, these are issues related to the alignment of the legal and institutional framework with the Strategy; development of research on climate change; strengthening of institutions ‘s systematic data collection on inputs to GHG inventories and National Communications on climate change; development of the level of knowledge and capacity to act on climate change, and, promoting the transfer and adoption of clean and climate change resilient technologies.

To facilitate the implementation of cross-sectorial issues including the participation of actors from the community to the national level, it was decided that:
the implementation of the actions in this Strategy will be performed in an integrated and coordinated way by actors from the public and private sectors, civil society and community-based organizations (CBOs), according to the plan of action.

- the coordination of finance will be undertaken by the National Environment Fund (FUNAB), and the necessary funds will arise from the state budget (OE) and Multilateral Environmental Agreements (MEA), bilateral accords and other resources mobilized by the private sector and civil society, while the possibility of creating a climate change-related common fund and gathering funds through social corporations and individuals will be evaluated. This aspect of funding has the potential for funding for specific prioritized climate resilience interventions and actions within the transboundary water sphere.

- Climate change knowledge will be managed by the Centre for the Management of the Climate Change Knowledge (CGCMC), to be created in the Academy of Sciences of Mozambique, within the Ministry of Science and Technology (MCT), having as its basis the existing institutions, with thematic groups managed by their corresponding public entities, which constitute a Climate Change Network. The CGCMC will be a repository for studies, and will have a role in coordinating and disseminating research, and providing training to meet needs identified by all relevant stakeholders – particularly by the GIIMC in partnership with the CCU – and will function through a Climate Change Network composed of thematic groups that will identify existing knowledge, and coordinate research-based knowledge generation. The thematic areas that constitute the Network will be coordinated by the sectoral ministries, which are mandated to deal with such issues through their respective research institutions. The Network will coordinate a network of research institutions, higher-education organizations, other entities that systematically collect climate and sectoral-activity data, and other organizations identified as holding or producing relevant data or information. Besides this function, the CGCMC shall elaborate communication plans aiming to spread the acquired knowledge and information in order to promote an informed Mozambican society able to make decisions about the challenges, risks and opportunities posed by climate change.

Based on the analysis of the climate and water governance institutional framework and corresponding mandates the following opportunities were identified as reflected in the Table 5 below:
<table>
<thead>
<tr>
<th>Resilience/Adaptive Capacity Characteristic</th>
<th>Opportunity</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Regime</strong></td>
<td>The NCCAMS provides a platform for mainstreaming climate change actions and addresses specifically the issue of addressing transboundary resources management in the context of climate change: There is already in place a system. The NCCAMS provides direct institutional mainstreaming of climate change into the water sector.</td>
<td>▪ Developing a water sector climate change adaptation and resilient plan with tools and guidelines for implementation</td>
</tr>
<tr>
<td><strong>Flexible Resources Management</strong></td>
<td>This is a challenge for most governments and Mozambique is no exception. It should be noted that the findings indicate that currently a number of donor-funded projects are taking place in Mozambique and Limpopo Basin specifically to address climate change impacts and build resilience.</td>
<td>▪ Build capacity in negotiating and designing programme/projects in a manner that allows for budget flexibility as appropriate</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>The DNA, International Rivers Unit and Ara Sul as well as the Climate Change Unit receive funding from the national/central government and often the funding is not sufficient to cover some of the areas related to climate change mainstreaming and resilience building.</td>
<td>▪ Fundraising capacities and the ability to leverage resources in different climate resilience building activities within the water sector and amongst other sectors is essential. This requires joint integrated planning and open communications.</td>
</tr>
<tr>
<td><strong>Legitimacy and Accountability</strong></td>
<td>The DNA, International Rivers Unit and Ara Sul have been constituted through a statute and are endowed with the requisite mandates to address the management of climate impacts in the Limpopo basin. This statutory legitimacy can be assisted with the capacity to engage</td>
<td>▪ Develop sensitization materials for different water users. This can assist the DNA and Ara Sul to gain more visibility and further entrench the existing statutory legitimacy.</td>
</tr>
<tr>
<td><strong>Variety and Diversity</strong></td>
<td>The Climate Change Strategy recognizes the different effects stemming from climate change in different sectors including water user sectors such as agriculture, tourism, land use and settlements. Based on that Responses to climatic impacts are expected to be sector specific, to that end, a specific institutional capacity</td>
<td>▪ Strengthen capacities for integrated planning and budgeting within water user institutions and those with oversight responsibilities</td>
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</tbody>
</table>
suitable for making a response for agriculture maybe be different to that of tourism.

| Monitoring and evaluation | Monitoring and evaluation is mentioned in the Water Policy and the Climate Change Strategy as being an important tool for responding to climate change. However, discussions indicate that the capacities of for example the DNA and Ara Sul to undertake monitoring are lacking. At basin level some of the challenges are that financial resources are limited for monitoring. Field visits for inter alia water quality monitoring used to take place four times per three months but now due to limited budget field visits have been reduced. Budget is now being limited to covering essentials. | • Collation of baseline information  
• Strengthen modalities for data collection  
• Facilitate the negotiation and development of protocols and standards with other riparian countries  
• Creation of monitoring systems  
• Development of tools for monitoring and evaluation  
• Training on development and use of tools  
• Facilitate and undertake joint monitoring exchange visits  
• Installation or rehabilitation of monitoring stations |

| Identity | The DNA and Ara Sul have solid statutory foundations that directs their identities as water management institutions charged with ensuring effective management of water resources including ensuring the management of climate impacts on water availability, quality, quantity and uses. Climate resilience requires innovative ways of handling impacts of climate change including emphasis on the cross cutting nature of climate change and the need to ensure visibility and leadership each entity has in addressing climate impacts. Capacity to develop informational materials specific to the role of DNA and Ara Sul in transboundary water resources management and climate adaptation and resilience actions | |

| Forward thinking | The water and climate response instruments in Mozambique have clear plans on handling climate change impacts and the National Climate Change Policy in particular recognizes and plans for building resilience to climate change and furthermore identifies areas in tourism and agriculture as well as social inclusion as key | • Collation and interpretation of information based on research and studies conducted on the basin  
• Packaging of information for ease of use in decision-making |
areas to undertake resilience building within. In order to effectively plan in a forward thinking manner, there is need to have information that can be used to inform forward thinking plans and interventions. Challenges related to information were identified and include:

- Usage of relevant information is not maximized in the management of the basin as access to data and research is difficult
- There is limited space for women and children in decision-making at basin level especially in the face of emergencies such as evacuation during flooding. The voices of women are not heard.
- The impact of floods on the formal education for most students has been immense as students have missed school terms due to flooding and the national education system does not factor the occurrence and impacts of floods

**Iterative approaches**

The use of and tools for monitoring and evaluation is minimal within the DNA for the reason that the capacity is low. It is also worth noting that monitoring and evaluation is often associated with monitoring project outcomes and not with the actual continuous monitoring of climate change impacts and the required interventions to manage the impacts.

**Mainstreaming**

The National Climate Change Strategy states that climate interventions have to be mainstreamed in different sectors of the economy and society. The water sector and transboundary water resources management is specifically mentioned.

**Creativity and learning**

The climate, water and natural resources instruments provide for options in mainstreaming climate change interventions.

<table>
<thead>
<tr>
<th>Challenge areas</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build capacity for scenario planning and budgeting for predicted and unforeseen impacts</td>
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<tr>
<td>Facilitate integrated planning and budgeting engaging key non-water sectors such as the disaster risk management office</td>
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<tr>
<td>Conduct of studies on the costs related to missed schooling during the time of floods and plan for scenarios and actions that assist in minimizing your preventing educational disruption due to climatic impacts</td>
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<tr>
<td>In line with the actions/interventions suggested under the monitoring and evaluation capacities, it is necessary to build capacity to monitor, evaluate and single out lesson learnt and identify new areas of learning</td>
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<tr>
<td>Mainstreaming new areas of learning in climate response</td>
<td></td>
</tr>
<tr>
<td>Targeted identification of climate resilience interventions for mainstreaming in the water users active or impacting on the LRB</td>
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<tr>
<td>Based on the results of monitoring and evaluation identify options for changing existing processes as appropriate to ensure that the DNA, Ara Sul and other relevant</td>
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<table>
<thead>
<tr>
<th>Iterative approaches</th>
<th>Mainstreaming</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>Based on the results of monitoring and evaluation identify options for changing existing processes as appropriate to ensure that the DNA, Ara Sul and other relevant</td>
<td></td>
</tr>
<tr>
<td>Knowledge management and Institutional memory</td>
<td>According to the findings on capacity needs assessment there are a number of projects and research studies that take place within the LRB on building climate resilience. These studies and products from projects generate knowledge that may be useful for use in transboundary water resources management and climate resilience building.</td>
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<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
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<tr>
<td>- Identification of sources of information relevant for climate adaptation and climate resilient building actions</td>
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<tr>
<td>- Establishment of a knowledge management and information systems</td>
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<tr>
<td>- Training in the following in regard to knowledge management:</td>
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<tr>
<td>- Creation of knowledge targeting specific areas</td>
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<tr>
<td>- Acquisition of knowledge</td>
<td></td>
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<tr>
<td>- Development of knowledge products</td>
<td></td>
</tr>
<tr>
<td>- Tools, systems and modalities for dissemination of information</td>
<td></td>
</tr>
<tr>
<td>- Development of knowledge management systems</td>
<td></td>
</tr>
<tr>
<td>Access to research, Data and Information</td>
<td>Different entities are involved in undertaking research in the LRB, however there is a challenge in relation to accessing research products, data and information due to a variety of reasons including the lack of knowledge on which institutions and entities are undertaking research. At government to government level, there is an exchange of data especially on ground water whereas exchange of data and information on the impact of climate change and activities taking place is at low levels.</td>
</tr>
<tr>
<td>Internal Agency and Authority</td>
<td>Given that the DNA and Ara Sul are mandated through their respective statutory instruments to respond to climate change whilst at the same time the disaster management office is charged with responsiveness towards responding swiftly to climate impacts.</td>
</tr>
</tbody>
</table>
Climate Change Coordination Unit also has a key role to play. It is therefore prudent to ensure that the efforts and actions of the different entities are carefully and effectively coordinated for collaborative and joint responses as appropriate.

| Collaboration and Partnerships | Although there are a number of projects on resilience building taking place in the LRB, there are challenges on the part of the DNA and Ara Sul to effectively coordinate and absorb the different projects and associated donors or international cooperating partners. There is a potential for DNA and Ara Sul to extend and strengthen collaboration and put in place partnerships that build networks for information sharing, learning and integration of knowledge into different levels of decision making. For example, IWEGA, has conducted a significant amount of published research within the LRB, entities such as IWEGA therefore are essential for collaboration and partnership as they can provide information which DNA and Ara Sul may not be able to generate on their own given the governmental budget limitations. | • Identification of entities for collaboration and partnerships |
| Leadership | The leadership at the DNA and at Ara Sul indicates the understanding that due to its nature and the great impact climate change has on availability and quality of water there is need to ensure that leadership on managing climate impacts needs to be maintained at national and basin level at all levels. | • Articulate clarity in roles and responsibilities in the application of climate adaptation actions and resilience interventions within the institutions charged with implementation |
| Transparency and Participation | The DNA and Ara Sul recognize the value of transparency and participation in the development and implementation of climate resilience activities and that the leadership and roles in regard to responding to climatic impacts can be placed at different levels within entities and individuals. For stakeholders to participate there must be amongst other sensitization of communities and entities using communication | • Development of water sector climate response vision • Development of key messages to articulate the vision and how the vision will be implemented amongst the different stakeholders. |
messages on climate change that are relevant. To that end it may be useful to evaluate the current communication mechanisms to assess their adequacy in the context of the shared transboundary basin and the socio-economic and cultural dynamics.

Social Inclusion and Gender Equity

Gender inequity issues are pronounced in Gaza Province where the LRB is found. For DNA and Ara Sul to effectively integrate and implement gender equity within the transboundary water sector.

- Develop a plan for integration of gender equity and social inclusiveness
- Social inclusion and gender awareness communications, tools and messages
- Conduct trainer of trainers on local and basin level social inclusion and gender equity tools and measures

Table 5: Capacity Needs and Opportunities Identified in comparison with desired capacities for Mozambique
<table>
<thead>
<tr>
<th>Identified gap/Opportunity</th>
<th>Intervention</th>
</tr>
</thead>
</table>
| Flooding                                                                                 | • **Medium Term** - Feasibility studies for building of small dams in the tributaries, dykes and lakes  
• **Long Term** – Building of small dams in the tributaries as may be recommended  
• **Continuous** – sensitization of communities on impacts of climate change using messages and mediums of communications that reach all and are effective.  
• **Medium** – analytical study on the dyke system to protect Chokwe and Xai Xai  
• **Medium to Long Term** - Master and make use of models using satellite images need for advance warning |
| Limited financial resources for water monitoring within Ara Sul. A significant percentage of the limited budget for Ara Sul is reserved for meeting operational costs | Ara Sul is already cooperating at transboundary level with South Africa on exchange of information which is used in informing decision making. Formalizing the exchange of information amongst the four riparian countries is essential for cost effectiveness and cooperation. Furthermore, Ara Sul has to have a monitoring budget of its own to undertake regular maintenance  
• **Medium Term** – Facilitate development of cooperative agreements on joint monitoring building on what already exists between the different riparian countries  
• **Medium Term**- assist Ara Sul to develop resource mobilization options for monitoring activities |
| Maintenance of dams is a huge and difficult task                                           | Mozambique considers dams as necessary for flood management and essentially are integral part of resilience. There is need to resource mobilize and budget accordingly to ensure availability of funds for maintenance of infrastructure that contributes towards building resilience to climate change impacts.  
**Immediate** – facilitate cooperation on conducting risk assessment of dams and infrastructure development across the basin |
| • Monitoring of quality of water  
• Monitoring is done at DNA level within the International Cooperation Unit, and, some indicators are in place although there is need for indicators for water resources | **Medium to Long Term** – Facilitate joint exchange visits amongst the riparian countries and setting of common standards  
**Medium Term** – Conduct studies on the water sources of the river and how these sources are managed including local sources and tributaries  
**Medium to Long Term** – Elaboration and further development of indicators for water monitoring |
<table>
<thead>
<tr>
<th>Water salinity</th>
<th><strong>Medium Term</strong> - Undertake studies and plans that address the management of salinity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium Term</strong> – identify relevant sources of critical information and establish suitable</td>
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<tr>
<td><strong>Long Term</strong> – install monitoring stations in some of the tributaries that do not have monitoring</td>
<td></td>
</tr>
<tr>
<td><strong>Medium to Long Term</strong> – establish/strengthen data collection, interpretation, dissemination</td>
<td></td>
</tr>
<tr>
<td>and management systems</td>
<td></td>
</tr>
<tr>
<td><strong>Medium to Long Term</strong> – training on data collection, storage, dissemination and management system</td>
<td></td>
</tr>
<tr>
<td><strong>Medium to Long Term</strong> – strengthen early warning systems. This can be done through the initial</td>
<td></td>
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<tr>
<td>assessment or evaluation of the current communication mechanisms to assess their adequacy in the</td>
<td></td>
</tr>
<tr>
<td>context of shared transboundary basin and the socio-economic and cultural dynamics</td>
<td></td>
</tr>
<tr>
<td><strong>Medium to Long Term</strong> - Communication is a challenge because of the different institutions involved such as meteorology, disaster risk management and water institutions</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General institutional water governance capacities</th>
<th><strong>Medium Term</strong> - Develop or strengthen participatory decision-making governance systems that are not based on top-down approach to governance, but that allow for transparency for climate change management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Participatory water governance</td>
<td><strong>Medium to Long Term</strong> – Design targeted institutional capacity building actions for strengthening the resilience of basin level structures including capacity for effective participation of the basin level consultative committees.</td>
</tr>
<tr>
<td>• Institutional cohesiveness including capacitating existing local governance institutions for resilience and ability to speedily respond to climate impacts</td>
<td><strong>Short to Medium Term</strong> – strengthen capacities for designing, and implementing community responsive projects for resilience building. There is need in the context of resilience building to consider communities as “institutions” so that their roles, participation and voices are heard and clearly defined as well as the role communities play in institutional memory, legacy and foundation. The consideration of communities as “institutions” provides an opportunity to identify the concrete roles and responsibilities of communities and leadership acts at different levels. It should be noted that institutional dynamics have a bearing on the success of resilience interventions designed to meet the climatic impacts</td>
</tr>
<tr>
<td>• Project and programme design</td>
<td><strong>Immediate to Long Term</strong> – design transboundary and national projects that seek to address and enhance Mozambique’s capacities to address resilience building whilst contributing to transboundary climate responses</td>
</tr>
<tr>
<td>• Mozambique is the least developed of the countries and needs capacity in different areas such as human resources in terms of numbers and personnel; vehicles; technology; equipment etc</td>
<td></td>
</tr>
<tr>
<td>• Communication</td>
<td></td>
</tr>
</tbody>
</table>
- Gender considerations – there is no space for women and children in decision-making at basin level especially in the face of emergencies such as evacuation during flooding. For Mozambique, the absence of the gender mainstreaming into climate response and resilience poses a threat to livelihoods due to some cultural norms and practices that are entrenched in specific gender roles that may not be practical for adaptation and resilience building.

- There is an imbalance in representation especially in the Gaza Province where its male dominated.

- The impact of floods on the formal education for most students has been immense as students have missed school terms due to flooding and the national education system does not factor the occurrence and impacts of floods.

- Economic impact on men – loss of jobs, income, housing, health and the impact on the male Shangaan ego

- Displacement of the vulnerable such as the elderly, disabled and young headed households as well as the perpetuation of poverty as assets, small livestock and crops are lost during the flooding.

**Medium Term** – modalities for the resettlement of people – this should be part of the integrated plan for the Limpopo on the Mozambican side.

**Medium Term** - there is need for a family strategic plan for flood emergencies that can include communicating on flood evacuation preparedness for people, livestock and domestic animals such as dogs.

**Medium to Long Term** - An overall social inclusion/protection gender strategy for the Limpopo Basin is desirable in addition to tools and guidelines for implementing the strategy. The strategy should include a family plan for flood emergencies that can include communicating on flood evacuation preparedness for people, livestock and domestic animals.

**Short term** – Facilitate gender integration workshop, training and development of gender mainstreaming instruments

**Short Term** – undertake study on the socio-cultural and economic dimensions of development in the basin – management interventions there is need to deal with heritage and modernization in the water basin management. An example by the DNA in Maputo of people preferring dirty water in contrast with water derived from the use of a hand held pump is indicative of persistence in using some cultural norms that may be detrimental to human health.
- Information on water and climate is not well organized, as well as not well communicated.
- There is no institutional memory – it is important to organize institutional memory on climate change.
- There is limited knowledge on existing sources of water, however mechanisms for ensuring that there is effective knowledge management at national level for ensuring that there is information and knowledge for decision making are in place.

<table>
<thead>
<tr>
<th>Limited understanding on the role of lakes in reducing the impact of floods</th>
<th>Medium to Long Term - Undertake studies on the role of lakes and other modes of feasible flood management</th>
</tr>
</thead>
<tbody>
<tr>
<td>The systems and mechanisms of communication need to be improved</td>
<td>Medium Term - Design and implement a climate change communication strategy within the water sector and specifically the Limpopo integrated water resources management context</td>
</tr>
</tbody>
</table>
| There are no common standards for water monitoring amongst the three riparian countries | Need for common collective database that is web based  
Need for development of common standards for data collection  
Need to address the gap in information sharing (tie with disaster management): LIMCOM could host the website but no capacity. **This is a priority area for intervention.** This was also identified by Botswana and South Africa as an area that will be mutually beneficial to the entire transboundary management of the LRB |

Table 6: Opportunities and Capacity Needs as identified by Mozambique
LIMCOM Capacity Needs – Mozambique Perspective

The discussions on the capacity needs of LIMCOM with the DNA, Ara Sul and other stakeholders revealed similar areas of concern in regard to strengthening LIMCOM. The areas referred to amongst others, the mandate, functions and duties of LIMCOM in coordination, provision of secretariat services, provision of policy and technical advice, information management and knowledge management and as a facilitator for the development of the Limpopo River Basin. There was also the concern that LIMCOM’s role is not adequately visible in the LRB and what the benefits for Mozambique are given the extreme events of flooding and drought.

The observations, concerns and recommendations made by Mozambique were similar to those identified by Botswana and South Africa in regard to LIMCOM’s role and operationalization.

The institutional capacity gaps as identified and recommendations for addressing the gaps are reflected in Table 7 below:
<table>
<thead>
<tr>
<th>Identified gap/Opportunity/Concern</th>
<th>Potential Area of Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>The visibility of LIMCOM nationally and as regional linkage is not yet strong in the country and therefore there is minimal appreciation of its role</td>
<td><strong>Medium/Long term</strong> – develop and elaborate on the LIMCOM long term vision and how the vision will be institutionalized. Identify specific resilience building messages and actions that need to be incorporated at national levels.</td>
</tr>
</tbody>
</table>
| Operationalisation of LIMCOM (all the activities related to this were considered to be urgent)    | **Immediate** – Mozambique identified the same needs for the operationalisation of LIMCOM as Botswana and South Africa. Additionally the following were emphasized by Mozambique:  
  - Identify areas in which there is room for secondment of technicians to the LIMCOM Secretariat to facilitate key immediate actions that can contribute towards  
  - Employ a coordinator whose responsibilities will include ensuring transboundary cooperation in resilience building  
  - Facilitates dialogues on core resilience projects and interventions as well as on the operationalisation of LIMCOM. The dialogues should aim inter alia to build trust amongst the riparian countries  
  - Explore different financial models for sustaining LIMCOM Secretariat and financing of actions designed to build resilience |

Table 7: Opportunities and needs for LIMCOM as identified by Mozambique.
4.1.4. Summary of Recommendations Specific to Mozambique Findings

The impacts of climate change in Mozambique are immense and are currently being witnessed, for instance, the extreme floods and drought being experienced in the Limpopo River Basin and associated challenges of salinity, erosion, displacement of communities, loss of livelihoods, disruption of formal education, reduction in business investments, destruction of infrastructure and actual loss of lives. Mozambique is recorded as one of the most vulnerable countries in the world and thus ensuring adaptive capacity and building resilience to climate change impacts is of critical importance. Based on the challenges identified the following recommendations for building climate adaptive and climate resilience capacities are made:

(i) Assist Ara Sul on how to implement the plan for the Limpopo River Basin in particular to identify those elements that have potential for transboundary cooperation and can be included in projects and fundraising at transboundary level.
(ii) Develop further the indicators that are already in place at the DNA to strengthen the capacity to monitor all areas pertinent to water resources management and addressing climate change impacts.
(iii) Conduct studies and put in place plans to address salinity as well as studies to acquire better knowledge on the water source of the rivers and how those sources are managed including local river sources and their tributaries.
(iv) Conduct studies on the use of infrastructure for purposes of building climate resilience to floods through use of small dams, dykes and lakes.
(v) Improve data and warning systems with clearly articulated institutional linkages for communications and transmission of information.
(vi) Build an economic case on the impacts of climate change to facilitate deepened intervention at high levels.
(vii) Monitoring and evaluation of the impacts of different donor interventions.
(viii) Resettlement strategy for people currently living in national parks.
(ix) Developing training guidelines on adaptive capacity.
(x) Enhance the central database in Maputo and develop one for the province.
(xi) Gender and social inclusion challenges and considerations especially during flood times must be addressed.
(xii) There is need for common standards on water monitoring and exchange visits (measuring environmental flows).
(xiii) Facilitate compliance with Agreements on ecological flows.
(xiv) Impact of floods on the education system and means for adaptation.
(xv) Implement the resilience capacity interventions as identified by Mozambique.


5.3 South Africa

5.3.1 Summary of Climate Impacts

Evidence of climate impacts have been observed in South Africa and documented in a number of studies and policy documents such as the National Climate Change Response. The following actual and potential impacts have been noted:

(a) Emergence of new disease and increased potency of existing diseases such as malaria and the costs to human health
(b) Extremes of weather situations and the impacts on agriculture
(c) Scarcity of water and the negative impacts on water-intensive economic sectors such as the mining and electricity-generation sectors
(d) Increased environmental degradation
(e) Increased occurrence and severity of veld and forest fires; extreme weather events; and floods and droughts will also have significant impacts on people directly dependent on the ecosystem services and goods
(f) Sea-level rise will negatively impact the coast and coastal infrastructure.
(g) Mass extinctions of endemic plant and animal species will greatly reduce biodiversity with consequent impacts on eco-system services.

Figure 10: Direct and indirect health effects of climate change, taken from NE Climate change handbook
The South African National Climate Change Response states that South Africa is extremely vulnerable and exposed to the impacts of climate change due to the prevailing socio-economic and environmental context. In the same way as evidenced in the other riparian countries and other developing countries climate variability and its negative impacts, disproportionately affect the poor. The effect on the poor can be felt through the lack of access to ecosystem services, loss of jobs as economic sectors scale down investments in response the detrimental impacts of climate change on the economy. Furthermore, South Africa has been noted as being an already water-stressed country and faces future drying trends and weather variability with cycles of droughts and sudden excessive rains leading predominantly to the poor being displaced, prone to health challenges and difficulties in accessing clean water. Consequently the National Climate Change Response recognised the need to:

- Urgently strengthen the resilience of its society and economy in response to climate change impacts
- Develop and implement policies, measures, mechanisms and infrastructure that protect the most vulnerable.
- Cooperate with other countries with due recognition that climate change impacts do not respect political boundaries and that its impacts cannot be managed by one country alone.

5.3.2 Overview Socio-Economic Costs of Climate Impacts in South Africa

There is no large body of studies on the costs of climate impacts on the Limpopo River Basin specifically to the South Africa socio-economic situation. However the National Climate Response discusses key areas that are affected by climate impacts and identifies employment as being of key concern and a critical vulnerability that could be severely worsened by climate change. It is recognized that severe income distortions further limit many people’s ability to build resilience to climate change impacts. South Africa does note that the climate change responses that improve resilience could positively impact employment in South Africa for example through creation of new jobs as a result of adaptation interventions that may create new jobs to which workers can migrate from sectors affected by mitigation strategies. Consequently the climate change response will attempt to reduce the impact of job losses and promote job creation during the shift towards the new green economy.

In addressing the impact of climate change on employment, the National Employment Vulnerability Assessment (NEVA) and Sector Jobs Resilience Plans (SJRP) are to be used to move employment from a carbon intensive economy to a lower carbon economy. It means that these two instruments will be used to inform policy decisions regarding the economic activities within the Limpopo River Basin. The NEVA will be reviewed on a regular basis that gives sufficient time for interventions to be effective but is sufficiently often to make proactive changes as and when necessary.

The NEVA and SJRP are instruments that inherently provide an opportunity and premise for infusing climate resilient building interventions in the socio-economic activities within the Limpopo River Basin in South Africa. In this instance, South Africa offers an opportunity for lessons learnt in approaching resilience building through the employment sector. However, the results of this policy approach are yet to be seen as the implementation of the NEVA and SJRP has not commenced. Suffice to note that South Africa does take the impact of climate change on the economy seriously and have sought policy measures to respond accordingly. It is worth noting that the high percentage of water users in the South African side of the LRB are commercial industries.
5.3.3 Water Institutional Framework

The Department of Water Affairs in South Africa is responsible for management of water resources at national level and has a provincial office in Polokwane in the Limpopo which manages the day to day affairs of the Limpopo river basin. The DWA in Polokwane works directly with ARA Sul in Mozambique, DWA in Botswana and ZINWA in Zimbabwe on the ground issues of the LRB including sharing data and information on ground water. Below is a discussion of the key pertinent instruments for water governance in South Africa that are relevant to the basis for resilience capacity building in the LRB.

![Diagram: Water governance institutional structure](image)

Figure 11: Water governance institutional structure - Courtesy: Limpopo Awareness kit, National Water Resource Strategy (NWRS), 2013

The National Water Resources Strategy is an instrument for operationalizing the National Water Act of 1998. It is legally binding on all authorities implementing the National Water Act. The NWRS responds to the priorities as set by the South African Government within the National Development Plan (NDP) and the National Water Act imperatives that are seen to be in support of sustainable development. The overall purpose of the NWRS is to ensure that water resources are protected, used, developed, conserved, managed and controlled in an efficient and sustainable manner for the benefit of South Africa.
In regard to transboundary water resources management the NWRS outlines the following:

(a) The recognition that South Africa should comply with the principles of IWRM
(b) The need to make use of strategic partnerships to harness opportunities for capacity building and exchange of expertise and information in addressing challenges faced by the water sector such as acid mine drainage, the impact of climate change on water resources and water quality
(c) Consistent identification of international opportunities for job creation, research partnerships, provision of services in strategic partner countries and institutions and business opportunities for the benefit of South African entities and citizens.
(d) Enhanced interaction with civil society, NGOs, strategic stakeholders on international water issues and the implementation of strategic engagements with the aim of creating dynamic partnerships for development and cooperation
(e) Facilitation of access to resources, sources of funding, expertise and in kind resources for national and regional development initiatives related to water.
(f) Provision of guidance of the water sector in developing, servicing and application of international agreements
(g) Promotion of lesson sharing and benchmarking through tapping into available expertise

The NWRS discusses climate change and water resources in the water sector and observes the following:

(a) Water is the primary medium to which climate change impacts will be felt in the country
(b) Climate change impacts will be evident in changing rainfall patterns, the intensity of storms, extremes of droughts and floods, increasing evaporation, changes in soil moisture and runoff resulting in challenges to water availability, and, increase in climate variability
(c) Recognition of the need to build economic sustainability and resilience
(d) The country’s water infrastructure and management capacity assists in adapting and responding to variability however it is expected that climate change variability will exacerbate with significant hydrological, ecological, social and economic consequences.
(e) Capacity building of institutions in the water sector to function in the context of high uncertainty
(f) There is need to strengthen the water sector’s climate response capability and commitment to timeous action to ensure appropriate responses in the context of high uncertainty
(g) The importance of improving collaboration between all agencies to address climate change, in particular those that are likely to have overlapping or similar objectives
(h) The is need to adjust the water resources planning management processes in the country to build the required resilience and adaptive capacity in society and ecosystems
(i) The strengthening of the rainfall, environmental, hydrological, and hydro-geological monitoring systems to support effective climate change detection and effective adaptation should be done as a matter of urgency
(j) The available human capacity relating to climate change impact assessments and adaptation within the water sector is very limited and needs to be strengthened
(k) Research gaps must be addressed in water sector climate change programmes and water and climate change knowledge

The NWRS outlines a number of strategic actions for responding to the challenges of climate change within the water sector. In regard to water governance, the NWRS encourages an adaptive approach where inter alia, response to climate change is to be addressed through existing programmes, and investments are to be made in skills development and resource allocation for dealing with the long term effects of climate change.
Furthermore, the NWRS states that the DWA will work to ensure that the institutions responsible for water management and governance are able to adapt timeously and effectively to changing climatic conditions. This requires that management institutions such as municipalities, water boards, CMAs, international bodies and the DWA are designed and operate as adaptive, learning institutions.

The National Water Resources Strategy discusses the monitoring and information management aspects of IWRM and notes that the collection and interpretation of data is regarded as crucial in water management actions. To that end, the following is outlined:

- Improvement and enhancement of the quality of data and information in all aspects of water
- Development of a high quality integrated information management system for the water sector
- Generation of beneficial integrated water information products
- Improvement of access to and dissemination of water data and information
- Ensure adequate skills for activities related to data collection, interpretation, packaging, dissemination, management and use are in place
- Develop and implement a viable and adequate funding model for monitoring
- Develop and implement an integrated national information management plan
- Prioritization of the protocols for data collation from different sources, ensuring data integrity, data sharing platforms and the standardization of data parameters.
- Put in place data and information sharing agreements

The DWA has the primary responsibility to ensure the successful implementation of the NWRS and in the context of water and climate change has the following significant institutional responsibilities to:

(a) Manage, coordinate and facilitate inter-governmental relations and collaboration
(b) Undertake awareness and communication activities
(c) Build resilience and reduce vulnerability through management systems and through appropriate infrastructure choices as well as building upon existing coping/resilience structures and practices
(d) Encourage research and development in areas such as land use, sedimentation, water quality, dam safety, flooding, infrastructure sustainability, evaporation, the socio-economic costs etc. The Water Research Commission is identified as playing a key role in this context.
(e) Work with National Planning Commission in developing shared water solutions as part of the SADC economic integration process
(f) Ensure that climate change resilience for water infrastructure is factored into the National Water Investment Framework

At the Limpopo Provincial level, DWA is supported by the National Water Resource Infrastructure Institutional Model; Regional Water Utility; Catchment Management Areas, Water Users Associations, Water Services Authority, Water Services Providers and sector line departments.

(i) Department of Water Affairs Strategic Plan 2013/14 to 2017/18

The Strategic Plan aims to meet the South African Government’s priorities within the water sector as expounded in the NWRS-2. Of key interest to the capacity needs assessment process is that the Strategic Plan emphasizes the centrality of water in economic development. Water is recognised as an enabler and a bedrock for all future planning and development in various sectors of socio-economic development: mining, energy, agriculture and social development. All these activities take place in the Limpopo and are depended upon the water resources of the Limpopo River Basin.
At international level, the Strategic Plan addresses the interest of South Africa in international water cooperation through bilateral or multilateral fora. This includes the implementation of joint water programmes in which LIMCOM is included.

5.3.4 Climate Impact Response Institutional Framework

The policy outlined in the National Climate Change Response embodies South Africa’s commitment to a fair contribution to stabilizing global GHG concentrations in the atmosphere and to protecting the country and its people from the impacts of inevitable climate change. It presents the vision for an effective climate change response and the long-term transition to a climate-resilient, equitable and internationally competitive lower-carbon economy and society – a vision premised on Government’s commitment to sustainable development and a better life for all. In response to the impacts of climate change, South Africa seeks to inter alia undertake the following:

(a) Sustainably manage, conserve and enhance GHG sinks and reservoirs, including terrestrial, coastal and marine ecosystems, biomass, forests and oceans;
(b) Develop climate change response plans to address integrated coastal zone, water resources, agriculture, and land protection and rehabilitation;
(c) Mainstream climate change considerations into social, economic and environmental policy;
(d) Promote and cooperate in the development, application, diffusion and transfer of GHG emission mitigation technologies, practices and processes;
(e) Further develop and support research and systematic observation organisations, networks and programmes as well as efforts to strengthen systematic observation, research and technical capacities, including promoting research and systematic observation in areas beyond national jurisdiction;
(f) Develop and implement education, training and public awareness programmes on climate change and its effects to promote and facilitate scientific, technical and managerial skills as well as public access to information, public awareness of and participation in addressing climate change.
(g) Ensure that the necessary climate change-related investments contribute to building South Africa’s future economic competitiveness and economic growth and contribute to its over-riding national priorities for sustainable development, job creation, improving public and environmental health and poverty eradication;

In achieving the above aims the following principles are expected to provide guidance:

- **Common but differentiated responsibilities and respective capabilities** – aligning domestic measures to reduce the country’s GHG emissions and adapt to the adverse effects of climate change within the context of the country’s unique national circumstances, stage of development and capacity to act.
- **Equity** – this entails ensuring the fair allocation of effort, cost and benefits in the context of the need to address disproportionate vulnerabilities, responsibilities, capabilities, disparities and inequalities.
- **Special needs and circumstances** – considering the special needs and circumstances of localities and people that are particularly vulnerable to the adverse effects of climate change, including vulnerable groups such as women, and especially poor and/or rural women; children, especially infants and child headed families; the aged; the sick; and the physically challenged.
• Uplifting the poor and vulnerable – climate change policies and measures should address the needs of the poor and vulnerable and ensure human dignity, whilst endeavouring to attain environmental, social and economic sustainability.

• Intra- and Inter-generational sustainability managing our ecological, social and economic resources and capital responsibly for current and future generations.

• The Precautionary Principle – applying a risk-averse and cautious approach, which takes into account the limits of current knowledge about the consequences of decisions and actions.

• The Polluter Pays Principle – those responsible for harming the environment paying the costs of remediating pollution and environmental degradation and supporting any consequent adaptive response that may be required.

• Informed participation – enhancing public awareness and understanding of climate change causes and impacts to promote participation and action at all levels.

• Economic, social and ecological pillars of sustainable development – recognizing that a robust and sustainable economy and a healthy society depends on the services that well-functioning ecosystems provide, and that enhancing the sustainability of the economic, social and ecological services is an integral component of an effective and efficient climate change response.

South Africa states that its response to climate change impacts is guided by a win-win approach that employs a needs-driven and customized perspective that involve employing a wide range of different types of adaptation and mitigation approaches, policies, measures, programmes, interventions and actions consistent with the principles outlined above, but in particular, that meet the special needs and circumstances of those most vulnerable as well as being specifically tailored to the potential, best available solutions and other relevant conditions related to the specific actor, organisation, sector or sub-sector concerned.

Specific to the water sector, the Strategy Response indicates that in the short term, the development of a climate change response for the water sector through the National Water Resource Strategy plays a key role in government’s integrated water resource planning process and will inform the ongoing maintenance of the water balance reconciliation strategies for water management areas that have recently been developed for water supply systems for up to 75% of the country’s population, and the areas which together generate well over 80% of the national GDP. It is anticipated that in the medium to long term, the Water for Growth and Development Framework, which has a 2030 planning horizon, aims to balance the critical role of water in terms of both poverty alleviation and economic development (be it for domestic, industry, mining, agricultural or forestry use).

Water vulnerability and response is required to be adequately factored into the Water for Growth and Development Framework document. It is envisaged that a two-pronged approach will be followed in which climate change is used as the catalyst for addressing urgent short comings in the water sector and implementing effective, efficient and sustainable water resources and services management measures. Additionally a long-term strategic focus on planning, adaptation and the smart implementation of new concepts and proactive approaches to managing water resources is to be done. To this end, the key elements of the National Climate Change Response Policy for the water sector include:

• Integrating climate change considerations in the short-, medium- and long-term water planning processes across relevant sectors such as agriculture, industry, economic development, health, science and technology.
Sustaining state-of-the-art, water-related research and capacity development in all aspects of climate change in order to ensure the availability of relevant high quality, complete and current data, and tools with which to analyse the data.

Ensuring that water adaptation measures are managed from a regional perspective given the trans-boundary nature of our major rivers.

Implementing best catchment and water management practices to ensure the greatest degree of water security and resource protection under changing climatic conditions and, in particular, investment in water conservation and water demand management.

Exploring new and unused resources, particularly groundwater, re-use of effluent, and desalination.

Reducing the vulnerability and enhancement of the resilience to water-related impacts of climate change in communities and sectors at greatest risk.

Providing human, legal, regulatory, institutional, governance and financial resources and capacity to deal with the long-term effects of climate change.

Undertaking focused monitoring and research in order to ensure the efficacy of water adaptation approaches over the long-term.

The Response Strategy also discusses key sectors that are big water users such as agriculture and commercial forestry and notes the following:

Climate resilience addresses issues of strategic national importance: food security, water, health, and land reform. Agriculture is the largest consumer of water (through irrigation) and is vulnerable to changes in water availability, increased water pollution (particularly from toxic algal or bacterial blooms) and soil erosion from more intense rainfall events and increased evapotranspiration.

Under-resourced, small-scale and subsistence farmers are particularly vulnerable to the impacts of climate change.

Conventional, commercial input-intensive agriculture has a range of negative environmental, social and economic externalities, which increasingly render it an unsustainable model. However, commercial agriculture remains a significant contributor to GDP and employment. Its full contribution, with multipliers, comprises up to 12% of GDP and 30% of national employment. Crop failures can therefore have a significant economic impact.

A climate resilient agricultural response depends on the recognition that agriculture should provide not only food, but also a range of other environmental and socio-economic benefits.

Commercial forestry in the form of alien plantations reduces streamflow and so impacts scarce water resources. It also reduces biodiversity. However, plantations function as carbon sinks that reduce the amount of GHGs in the atmosphere.

To build resilience to climate change, the priorities for agriculture and commercial forestry are to:

- Integrate agriculture and forestry into climate resilient rural development planning to address job creation, food security and livelihoods with a particular emphasis on building climate resilience through leveraging synergies between adaptation and mitigation.
- Using the results of available risk and vulnerability studies, develop and update short-, medium- and long-term adaptation scenarios to identify climate resilient land-uses.
- Support through research “climate-smart agriculture” that lowers agricultural emissions, is more resilient to climate changes, and boosts agricultural yields.

Use early warning systems to give timely warnings of adverse weather and possibly related pests and disease occurrence. This will also provide up-to-date information and decision support tools to assess the vulnerability of farmers and inform farm management decisions.
- Invest in education and awareness programmes in rural areas and link these to agricultural extension activities to enable both subsistence and commercial producers to understand, respond and adapt to the challenges of climate change.
- Promotion of ecosystem-based adaptation to adequately respond to changes in rainfall patterns and temperatures
- Promote urban climate change adaptation to counter urban climate change challenges. Water demand in urban centres is growing rapidly and placing undue stress on water supply systems.
- Rural communities with the highest dependence on natural water sources are in KwaZulu-Natal, the Eastern Cape and Limpopo. The former two will probably experience more flooding and water contamination. In addition to these, Limpopo will probably experience more droughts. These are areas with some of the poorest communities and under resourced municipalities with limited capacity and skills to adapt to changing conditions. Disaster risk reduction and management are short-term adaptations to climate change because both address vulnerability to climate change-related impacts. Resilience to climate change-related extreme events, such as heat waves, floods, droughts, wildfires and storm surges, will be the basis for South Africa’s future approach to disaster management. Extreme weather events often cross country borders and impact the region as a whole. As such a region-wide approach to disaster management is often needed.
  - South Africa’s Disaster Management Act sets out a comprehensive approach to disaster management and it identifies the roles and responsibilities of key institutions and disaster management agencies. In addition, the Act establishes a National Disaster Management Centre whose role is to address disaster prevention, coordinate disaster management agencies and capacity across government and to ensure that critical information is disseminated speedily.
  - Climate change will require more effective disaster management to deal with the increased number of extreme weather events. The increase in extreme events will strain public resources due to the need to declare and support disaster areas in an immediate crisis as well as during long-term recovery. In response to these challenges, South Africa will:
    - Continue to develop and improve its early warning systems for weather and climate (especially severe weather events) and pest infestation events and to ensure that these warnings reach potentially affected populations timeously.
    - Investigate and implement plans to use the mass media and appropriate information and communication technologies to alert vulnerable populations.
    - Seek to collaborate with neighbouring states to share early warning systems with regional applications and benefits.
    - Continue to promote the development of Risk and Vulnerability Service Centres at universities, which will, in turn, support resource-constrained municipalities.
    - Facilitate increased use of seasonal climate forecasts among key stakeholders such as those in the water and agricultural sectors.
    - Collaborate with social networks such as community organisations, non-governmental organisations (NGOs), women and farmers’ organisations, and the Adaptation Network to help raise awareness and to transfer technology and build capacity.
    - Develop mechanisms for the poor to recover after disasters, including micro-insurance.
According to the Strategy Response a set of Near-term Priority Flagship Programmes will be implemented as an integral part of this policy informed by several important factors including the urgency of acting on mitigation and adaptation responses as soon as possible as well as the fact that many sectors have already researched and have experience in implementing policies and measures to address the challenges of climate change.

Specific to the water sector is the Water Conservation and Demand Management Flagship Programme includes the accelerated implementation of the National Water Conservation and Water Demand Management Strategy in the industry, mining, power generation, and agriculture and water services sectors.

The Adaptation Research Flagship Programme is also relevant to the water sector resilience building. The Adaptation Research Flagship Programme is led by the South African National Biodiversity Institute, the design and roll-out of a national and regional research programme to scope sectoral adaptation requirements and costs and identify adaptation strategies with cross-sectoral linkages and benefits, including an assessment of climate change vulnerabilities in the sub-region, with a detailed scenario planning process to define potential sub-regional response strategies.

According to the Strategy Response the consistent implementation of the National Climate Change Response Policy requires a long-term framework for institutional coordination to:

- Coordinate research and development and promote innovation.
- Coordinate adaptation and mitigation actions.
- Measure, report and verify climate change responses.
- Facilitate and promote the use of carbon trading and off-set schemes.

(a) National Government – takes lead in inter alia:
   - formulating the climate response policy;
   - amending and promulgating legislation to deal with climate change;
   - Participating in international negotiations on climate change.

(b) Line function National Departments will integrate climate change into their policies and programmes, and will manage Near-term Priority Flagship Programmes to build climate resilience.

(c) Parliament will oversee the development and implementation of the National Climate Change Response Policy through the Portfolio Committees, and in particular the Committees on Water and Environmental Affairs; Energy; Agriculture, Forestry and Fisheries; Trade and Industry; Mining; Science and Technology; and Transport.

(d) The Inter-Ministerial Committee on Climate Change (IMCCC) - The strategic, multi-faceted and cross-cutting nature of climate-resilient development requires a coordination committee at executive (Cabinet) level that will coordinate and align climate change response actions with national policies and legislation.

(e) Forum of South African Directors- General clusters The national climate change response actions shall be guided by strategic leadership of the relevant Forum of South African Directors-General clusters based on their different mandates: the Economic Sectors and Employment Cluster on issues that have a strong bearing of economic growth and employment creation; the Infrastructure cluster on all infrastructure-related aspects of this policy; and the International Cooperation Cluster on international engagements.
(f) **Intergovernmental Committee on Climate Change (IGCCC)** The IGCCC has been established to operationalize cooperative governance in the area of climate change. Accordingly the IGCCC brings together the relevant national and provincial departments and organised local government. The IGCCC therefore has a key role to play in the review of the National Climate Change Response Policy as well as its implementation.

(g) **National Disaster Management Council** - The National Disaster Management Council will be responsible for ensuring that the National Framework for Disaster Risk Management provides clear guidance across all spheres and sectors of government for managing climate change-related risk and for ensuring that an effective communications strategy is in place for early warnings to vulnerable communities with respect to extreme weather events such as flooding and droughts.

(h) **Provincial and local government** - The environment is a concurrent function between provincial and national government, and provinces will coordinate provincial adaptation and mitigation responses across their own line departments, as well as between municipalities within the province. Each province will develop a climate response strategy, which evaluates provincial climate risks and impacts and seeks to give effect to the National Climate Change Response Policy at provincial level. Local government plays a crucial role in building climate resilience through planning human settlements and urban development; the provision of municipal infrastructure and services; water and energy demand management; and local disaster response, amongst others. Climate change considerations and constraints will be integrated into municipal development planning tools such as Integrated Development Plans, and municipal service delivery programmes. Note that in the Limpopo there is the Limpopo Green Economy Plan.

(i) National Treasury will lead a process to re-examine the current fiscal measures and the appropriate incentives for adaptation and mitigation measures by local government. Programmes to build capacity for local and provincial governments’ climate response strategies will be prioritised, and a climate change toolkit will be prepared for provincial and local government practitioners.

(j) DEA and Department of Cooperative Governance and Traditional Affairs will lead in coordinating best-practice knowledge-sharing across provinces and municipalities to take advantage of innovative models in climate change adaptation and mitigation.

(k) The South African Local Government Association, as a body mandated to support, represent and advise local government action, will continue to actively participate in the inter-governmental system, and ensure the integration of climate adaptation and mitigation actions into local government plans and programmes, and lobby for the necessary regulatory measures and resources to support local government in this regard.

(l) **Academia and scientists** - The climate change science and academic community must work together to improve projections of climate change, its impacts, key vulnerabilities in affected sectors and communities. They need to explore appropriate mitigation and adaptation responses; continue to build capacity in climate change science; and inform government and the public of climate change-related socio-economic challenges and opportunities.

(m) **Financial institutions** - South Africa recognises that financial institutions are important intermediaries to allocate and transfer capital between different economic activities. Government acknowledges and supports initiatives by the South African banks to integrate environmental considerations into their decision-making frameworks. The different distribution channels in the financial system, such as public finance, banks (including development finance and microfinance institutions), investors and insurers, are important development partners for Government in the following ways:
Public finance can support climate change through the procurement of sustainable technologies by Government as well as developing catalytic projects and programmes.

The development finance system in South Africa is critical to integrating development with climate change. Development finance institutions can incubate climate-resilient development. This is particularly true for climate proofing of infrastructure and industrial processes;

- designing and testing new financing instruments;
- localizing and rolling out of sustainable technologies;
- provision of grants for research
- unlocking new economic opportunities through
  - enterprise development and job creation
  - Building technical capacity and knowledge platforms to mobilise action at regional, provincial and local level.

It is envisaged that the following mechanisms will be used to coordinate climate change activities and consult on climate change policies with stakeholders.

(a) **National Committee on Climate Change (NCCC)** - The NCCC has been set up to consult with stakeholders from key sectors that impact on or are impacted by climate change.

(b) **National Economic Development and Labour Council (NEDLAC)** - NEDLAC serves as the forum where government comes together with organised business, labour and community groupings on a national level, and this platform will ensure that climate change policy implementation is balanced and meets the needs of all sectors of the economy. NEDLAC has indicated that climate change should be a key component of its agenda.

Monitoring of climate change is an important aspect of the South African response to climate impacts. It is therefore recognized that decisions must be based on accurate, current and complete information in order to reduce risk and ensure that interventions are effective. Consequently, South Africa will aim to undertake the following:

(a) Ensure that nation-wide climate change and atmosphere monitoring systems are maintained and enhanced where necessary, including through monitoring networks at appropriate spatial density and frequency that monitor, among others, rainfall, ambient air temperature, humidity, soil moisture, wind and solar radiation, lightning, extreme weather event characteristics and their impacts, selected atmospheric GHGs, gas fluxes from selected vegetation, soil and marine carbon pools, sea levels, sea surface temperature, ocean current behaviour and acidity. Data analysis, synthesis, archiving, interpretation and dissemination will be a key component of this effort.

(b) Ensure that climate change impacts are monitored at appropriate spatial density and frequency, where feasible, of changes in spatial distribution and incidence of climate-sensitive diseases; ecosystems and the goods and services they supply; key species responses (including invasive alien species); wildfire hydrology and water resources; and agricultural and forestry production.

(c) Establish a monitoring system for gathering information (with bottom-up inputs where possible) and reporting progress on the implementation of adaptation actions.

(d) Identify the key role-players involved in monitoring and measuring these indicators. Describe how these role-players will share and report information on observed climate change.
(e) In line with internationally agreed reporting requirements, include a summary of climate change impacts and adaptation actions in the National Communication, which highlights new areas of concern and areas in which observations do not align with modelled projections.

(f) Medium- and long-term modelling - Adaptation requires proactive interventions that minimize projected climate change impacts. To achieve this, medium and long-term climate projections that represent the full range of possible climate outcomes must be available. They include the risk and scale of projected impacts, the costs and benefits of possible responses, and the risks of their failure. Because local authorities will plan and implement many of the climate change responses, predictions need to be at a level that they can use.

(g) Monitoring responses - To monitor the success of responses to climate change and to replicate the ones that have worked well, there is need to measure their cost, outcome and impact.
5.3.5 Limpopo Green Economy Plan, Including Provincial Climate Change Response, 2013

The Limpopo Province has pronounced its responses to climate impacts in its Limpopo Green Economy Plan, Including Provincial Climate Change Response, 2013. Specific to the water, biodiversity and livelihoods sectors are the following pronouncements:

(a) Goals: the goals of the Limpopo Green Economy plan are:
   i. Short Term: Generate Jobs Improve Environmental Quality
   ii. Medium Term: Create Enabling Conditions for Green Growth Change Behavioral and Production Patterns
   iii. Long-Term: Build a New Economic/Environmental Paradigm for Limpopo

It is envisaged that the goals will be implemented through specified initiatives in the key focus areas of:

- Sustainable Production and Consumption
- Water Management
- Sustainable Waste Management Practices
- Clean Energy and Energy Efficiency
- Resource Conservation and Management
- Agriculture, Food Production and Forestry
- Green buildings and the built environments
- Sustainable Transport and Infrastructure
- Green Municipalities
- Cross-cutting issues

Water efficiency, amongst others is considered to be of priority and urgent commencement, including local sustainable consumption and production.

The Plan emphasizes water management as a key challenge and opportunity for green economy and building resilience as well as observing that although there are some inherent benefits in relation to transboundary management of water resources, the accompanying challenges to realize the full potential of benefit-sharing at transboundary level cannot be ignored. The following are among the crucial ones synonymous within the Limpopo context.

- Disproportionate distribution of water resources;
- The agricultural sector consumes 62% of the total water resource. It is concerning to note that this sector is not yielding benefits in proportion with consumption patterns;
- In the domestic arena (27%) the urban area far outweighs the proportion which the rural areas consume the resource with 23% and 4% respectively.
- Inter-basin water transfers are expensive - cost recovery of water services serve as a barrier to access to safe water by poor people;
- Ageing water infrastructure and limited access – costly to maintain infrastructure;
- Some economic activities are impacting negatively on water quality and the environment (acid mine drainage) – due to resource constraints and lack of capacity, it is often difficult to monitor and assess the quality of water with more emphasis placed on water quantity instead;
- Unlawful use of water – in certain areas people make illegal connections while others, use water intended for domestic use for agricultural purposes;
Demand outweighs supply – demand of water usage has over the years increased in all sectors, making it difficult to provide good quality water to consumers;

Human settlements – with increased urbanization and movement of people to areas close to work opportunities, a number of settlements have surfaced as result. Often these settlements have no adequate reticulation systems or are sometimes of poor quality making it easy for groundwater to be polluted resulting in, groundwater not being a viable option;

Abundance of ocean water – some areas are experiencing drought despite an abundance of ocean water;

Insufficient data, data limitations and poor information about the cultural, social, and political norms of the existing population often hinder development of an effective planning strategy;

Disparities in intellectual capital and technological innovation which are essential for sustainable management.

The physical nature of a river basin can confound efforts to manage the basin's resources; because basins are irregular and receive water flows from multiple sources, difficulties are often encountered when attempting to divide a basin into discrete, manageable subunits;

Further, the stochastic nature of rainfall forecasting makes prediction and control of the water problematic;

Limited potential for further resource development in most areas. The following are potential areas where action could be taken:

Use national development goals or water-related challenges as a starting point;

Secure commitment at the highest level, but ensure a broad base of support which reaches down to the grassroots;

Involve high-level officials in water-related sectors from the outset and assign the task of developing a strategy to a multi-sectoral steering group;

Stakeholders awareness of the scarcity of water can lead to meaningful involvement in the different process;

Create adequate knowledge base to make informed decisions;

Acknowledgement that water is an integrator of all sectors when it comes to sustainable development;

Ensure a realistic plan of implementation that includes a clear definition of roles and responsibilities, a sound financing strategy, provision for capacity-building and systems to monitor progress and make adjustments as needed;

Optimizing the contribution of water for growth and development requires the consideration of complex links between activities that influence and are influenced by how water is developed and managed and how a more efficient use of the water as a limited resource can be secured;

Identified priority needs for the Limpopo include:

- Mainstreaming water- water should be at the core of planning and used as a basis for planning;
- Strengthening of sectoral co-operation;
- Strengthen institutional and regulatory capacity
- Improve water management;
- Addressing service backlogs- assess persistent backlogs and devise strategy for service delivery
- Changing water use behaviour - effect change in behaviour by regulation, self-regulate, use of market-based instruments and awareness and education
In relation to natural resources and biodiversity management the Plan identifies the following challenges and opportunities for action:

- The current scenario on the preservation of the ecosystem comes with perverse incentives that are more harmful than what they are intended to achieve. There is an absence of standards to determine what “conservation” is friendly.
- The waste production in the mining industry in South Africa poses both a challenge and an opportunity for viable economic ventures
- Target setting remains a challenge, there are no clear targets outlined and need for generation of baseline by scientist and economists;
- Future economic gains from conservation need to be articulated clearly. The value of biodiversity and ecosystem services is not adequately captured by current economic instruments, ecosystem service assessment need to be reviewed.
- A connected landscape where different elements are clustered together lead to rapid urbanization which puts pressure on basic facilities. As a result the resilience of landscape is decreased and this poses risks for floods, sand transport, storms, etc. The opportunity here is in mainstreaming and enhancing biodiversity friendly production landscapes that are well planned.
- The invasion of alien species poses a big threat to the ecosystem.
- Climate change implications are not accounted for in figures and the projected future could be more. More emphasis needs to be placed on prevention work. There needs to be comprehensive funding mechanism to cater for entire ecosystem functioning.

The following are biodiversity priorities in the Limpopo:

- Interdisciplinary knowledge generation on embedded systems;
- Knowledge transfer into planning instruments that ensure landscape sustainability and maintenance;
- A more engaged civil society;
- The government should provide an empowering framework for conservation of the ecosystem and biodiversity;
- Expedite the National Land Degradation Fund as a vehicle for enabling civil society support for green economy restoration and conservation initiatives;
- Expand funding partnerships between conservation and development funds for implementation demonstrations;
- Limpopo Biodiversity Conservation Plan
- Valuation of natural resources
- Up-scale “working for-programmes (eradication of alien plants, maintenance of veld, production of final products)
- Beneficiation of natural resources (alien plants, medicinal plants, animals, protected areas)
- Provision of raw material for crafting and domestic cooking
- Tree planting at specific areas and specific species
- Char-coal production from alien plants

In addition to the resilience and priority actions identified in the national and Limpopo instruments, South Africa made the following observations during capacity needs assessment exercise:

- Identification of opportunities to use water as a catalyst for employment
- There is need for training on integrating climate impacts budgeting within the provincial and national budgets to address specific areas of institutional adaptive capacity (budgeting for climate response). Assistance is sought on how to incorporate climate change in the water cycle.
- Water Users and Irrigation Boards in some instances have not proved to be viable due to their small sizes, low income and financial constraints in some catchment areas. There is need to analyze on how catchment management can be viably implemented as part of capacity resilience efforts as members play a key role in the LRB activities. Local level institutional capacity has to be enhanced.
- South Africa is desirous of establishing a Catchment Management Agency that looks into water and management. To that end, there is need to have support and skills for planning and budgeting for climate resilience and broad adaptive capacity.
- RESILIM was requested to provide knowledge products on climate change that are tailored to specific institutions, entities, communities and individuals. The knowledge products could include factual briefs, operational guidelines, policy briefs, step by step guides etc. The knowledge and sensitization products must be packaged attractively and easy to make use of by the different institutions. The need for knowledge and sensitization products is in response to the understanding that local institutions operating in the Limpopo do not generally have high knowledge on how they can make their institutions respond to climate impacts.
- The increased role for RESILIM is desired, especially at facilitating transboundary LRB development and cooperation. RESILIM must assist in articulating the “fruit and benefits” of better management of the transboundary management of the Limpopo.
- South Africa needs a national Limpopo Vision – capacity and facilitation of the visioning exercise and process. All countries should be encouraged to have Limpopo visions that can inform the LIMCOM LRB vision.
5.3.6 Existing Opportunities for Capacity Building

The Table 8 below reflects the existing opportunities for strengthening resilience in South Africa in comparison with desired capacities for resilience.
<table>
<thead>
<tr>
<th>Resilience/Adaptive Capacity Characteristic</th>
<th>Opportunity</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Regime</td>
<td>The national instruments on water resources and climate change responses provide a supportive framework for enhancing the capacities of all entities in building capacities to adapt to climate change and implement climate resilience actions and interventions. Specific to the Department of Water Affairs the national external regime is supportive of its role as having the primary responsibility to mainstream climate change management within the water sector. The external regime, as witnessed in other riparian countries the principles of IWRM, the value of transboundary cooperation and the need to manage the impacts of climate change through inter alia building resilience to climate change impacts through robust institutions provides a basis for capacity building in climate resilience.</td>
<td>Development of a resilience capacity building for the LRB with clear roles and responsibilities for all involved. The Limpopo Green Economy and Climate Response offers guidance in this regard. The external regime in South Africa provides support for national climate change resilience interventions which can support LRB climate resilience actions to be effective.</td>
</tr>
<tr>
<td>Flexible Resources Management</td>
<td>The Department of Water Affairs in the Limpopo has limited budget therefore the capacity to have flexibility in shifting allocated and dedicated funds is limited.</td>
<td>Identify ways of sourcing funds for emergencies based on scientific evidence scenario planning premise and build capacity for budgeting for unforeseeable impacts.</td>
</tr>
<tr>
<td>Resources</td>
<td>The Department of Water Affairs has a fairly adequate supply of human resources with relevant skills for water resources management. The human resources available may work with other sister-entities towards enhancing information, coordination, monitoring and informing decision making in regard to managing water resources and building resilience to climate change. In regard to financial resources it appears that in addition to the funding availed at national level for managing climate change impacts there are a number of projects on the ground seeking different interventions for resilience building through</td>
<td>It is necessary to conduct a cursory skills and resources audit amongst those entities that contribute towards climate change response at decision making level, technologically, knowledge generation (research and development), coordination and communication: to consequently source and use those resources as applicable.</td>
</tr>
<tr>
<td>Different Entry Points</td>
<td>Legitimacy and Accountability</td>
<td>Variety and Diversity</td>
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<tr>
<td>different entry points such as biodiversity that can be used as sources for leveraging resources for resilience building within the water sector</td>
<td>The statutory instruments that establish and mandate the institutions for water and climate change have by the virtue of the subject matter accountable to a range of different stakeholders and water users and those whose activities impact on water. The different activities that impact on water such as agriculture, mining and land use are clearly articulated in the respective instruments.</td>
<td>The National Climate Change Response Strategy acknowledges that there is need for different targeted interventions to adequately respond to climate change impacts. However the articulation of specific frameworks in terms of the shape and form they take is not done.</td>
</tr>
<tr>
<td>The Department of Water Affairs is not traditionally known for being responsible for climate change. Therefore, in the same manner as the other riparian countries it will be useful to enhance its visibility in climate change management and resilience building through strengthening its capacities that are necessary for resilience building and adaptive capacity.</td>
<td>Identify the challenges to institutional resilience building specific to each primary entity that uses or impacts on water and assist the institution to draw guidelines and standards as well as other measures and mechanisms to adapt to climate change impacts as well as to transform processes within to better adapt and minimize the negative impacts of climate change.</td>
<td>The linking of national institutions that can provide information and data is necessary as well as those non-national institutions that work on information essential for monitoring and evaluation of the LRB. Additionally the Department in cooperation with other riparian countries develop monitoring and evaluation systems with tools, standards and guidelines. The national system can periodically provide information to LIMCOM based on specific requirements agreed by the riparian states.</td>
</tr>
<tr>
<td>Identity</td>
<td>The Department of Water Affairs has a clear purpose for its role within the LRB and has further defined its role the Limpopo Green Economy Plan Based on its identity, vision and mandate develop a number of plans to meet different resilient capacities required for the sound management and response to climate impacts within the LRB.</td>
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<tr>
<td>Forward thinking</td>
<td>The water and climate change response instruments provide targets that are forward looking and also articulate the steps to meet the scenarios. However at Departmental level there are no capacities for reducing the projected scenarios to implementable actions with allocated resources. Strengthen capacities for scenario planning and budgeting</td>
<td></td>
</tr>
<tr>
<td>Iterative approaches</td>
<td>Monitoring and evaluation is one of the capacities essential for successful adaptive capacity and resilience building as M&amp;E can inform future operations and supports the use of iterative approaches to planning. Strengthening capacities for monitoring and evaluation for use in re-planning to achieve desired results or for re-designing projects; and, the acquisition of knowledge through documenting lesson learnt and best practice</td>
<td></td>
</tr>
<tr>
<td>Mainstreaming</td>
<td>The National Climate Change Response recognises that the achievement of a holistic response to climate change can be done inter alia through different departments, entities, projects and programmes mainstreaming climate change response actions. Given that traditionally the Department of Water Affairs has not been undertaking climate resilience actions as its core business, there is need to build the capacity of the Department to mainstreaming climate resilience and most importantly to facilitate and/or coordinate the mainstreaming of climate resilient actions within the water user institutions amongst the different sectors Training on the use of mainstreaming tools and systems approach</td>
<td></td>
</tr>
<tr>
<td>Creativity and learning</td>
<td>The opportunity for undertaking projects that can bring forth lessons learnt is available within the IWRM mandate of DWA at both national and provincial levels to undertake a number of projects and activities on resilience building Capacity enhancement on project design, implementation and extraction of lessons learnt which can inform the iterative approaches to building institutional resilience to climate change</td>
<td></td>
</tr>
<tr>
<td>Knowledge management and Institutional memory</td>
<td>There is recognition on the importance of robust knowledge management systems.</td>
<td>Develop an integrated knowledge management system and provide training and enhancement of associated skills</td>
</tr>
<tr>
<td>Access to research, Data and Information</td>
<td>The Department does conduct its own research, however as in most governmental departments funding for research, development, acquisition, generating and production of knowledge is limited. It is therefore essential to find alternative ways of enhancing opportunities for acquisition of relevant and applicable knowledge through partnerships and use of strong institutional linkages. There is in place a coordination body for climate change which provides opportunities for arrangements for information and data sharing linkages.</td>
<td>Linkages and building of partnerships with sources of critical research, data and information and making arrangements for the availing and use of that information for use at basin and national levels</td>
</tr>
<tr>
<td>Internal Agency and Authority</td>
<td>The National Climate Change Response give direct role of the Department to respond to the climatic impacts within the water sector. This role can be and should be supported by other institutions based on the impact to which swift response is required</td>
<td>An internal climate resilience plan that clearly project the conditions for swift responses from the water sector is desirable</td>
</tr>
<tr>
<td>Collaboration and Partnerships</td>
<td>Collaboration and partnerships form an active part of the functioning of the Department of Water Affairs. Arrangements, in particular for resilience interventions need to be informed in response to building a capacity essential to adaptation of the institution towards climate change impact in the LRB</td>
<td>In order to strengthen knowledge management systems and the acquisition of research, data and information as well as having evidence based policy, interventions and actions in place to ensure resilience capacities institutions in the water sector and in particular the Department of Water Affairs needs to have collaborative partnerships. The LRB supports an array of stakeholders on the South African side, it will be therefore practical that the networks of partnerships are all inclusive to include non-traditional partners to actual and potential different sources of expertise that can enhance the sharing and exchange of information relevant to effective responses to climate change.</td>
</tr>
<tr>
<td>Leadership</td>
<td>As observed in the other riparian countries, leadership for climate change concerns is available and needs to be supplemented or enhanced with</td>
<td>Continuous sensitization on the need to champion climate resilient actions and the benefits to be derived therefrom. This could include dialogues</td>
</tr>
</tbody>
</table>
political leadership at high levels, especially in relation to the IWRM of the LRB at transboundary level targeted for different levels of leadership and not just the political leadership. It is worth noting that political leadership is important especially in championing for financing and transboundary cooperation

| Transparency and Participation | The prevailing democratic norms provide opportunities for participatory governance of the LRB. In the context of institutional resilience building, it is essential that the water sector has effective systems, mechanisms and tools that ensure effective and meaningful participation takes place in a manner that creates and encourages ownership of the climate change resilience actions and responses as well as voices of all actors on the various climate stressors of concern to them | Strengthening of different forums for participation is necessary. The establishment of a Catchment Management Agency can provide a base for establishment of rules, processes, mechanisms and systems for ensuring transparency and participation in climate adaptation and resilience building actions.

| Social Inclusion and Gender Equity | The National Climate Change Response, the Water Strategic Plan and the Limpopo Green Economy Plan address social inclusion and gender equity as being central to socio-economic development | Develop a social inclusiveness and gender equity action plan, tools and measures. Implement the plan. |

Table 8 opportunities for strengthening resilience in South Africa in comparison with desired capacities
<table>
<thead>
<tr>
<th>Identified Gap/Opportunity</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>The water sector has not clearly identified its role in climate change impact response</td>
<td>▪ <strong>Short Term:</strong> Institutional arrangements for coordinating climate change impact responses has to be investigated and capacity for managing knowledge and sharing information at national and provincial levels has to be enhanced through improving systems. There is need to identify and capacitate key core players who can coordinate and manage knowledge required.</td>
</tr>
<tr>
<td>There is minimal clarity on the economic, social, political and ecological benefits for South Africa in terms of higher levels of policy investment in the transboundary management of the LRB</td>
<td>▪ <strong>Short Term</strong> - Develop a business case for South Africa to have an enhanced appreciation of the concept of one whole basin management especially in the context of climate change. This can be done through the production of a policy brief that indicates the economic, social, political and ecological benefits for South Africa to be part of one whole basin vision.</td>
</tr>
<tr>
<td>There is no collated comprehensive information that frames the value added by RESILIM to the LRB</td>
<td>▪ <strong>Short Term:</strong> There is need to frame the value added by RESILIM to the Limpopo River Basin in being of service to LIMCOM and transboundary cooperation. A number of studies and pilot projects have been conducted by RESILIM</td>
</tr>
</tbody>
</table>
| Limited capacity in coordination of the dissemination and transmission of information to areas related to agriculture and forestry in the LRB e.g. timely warnings about extreme weather | ▪ **Short to Medium Term:** Identify relevant institutions and actors that provide information as well as those that need information and develop a database that is continuous update as well as developing a coordinating plan and ensure its implementation  
 ▪ **Short to Medium Term:** Identify find synergies between farmers and municipalities that can enhance institutional linkages for cooperative work in terms of building resilience |
| Enhanced cooperation on water quality issues and opportunities for onsite exchange training visits among the four riparian countries | ▪ **Short to Medium Term:** Develop concept note and training proposal for the onsite exchange visits for building capacity, linking the institutions in the four countries and engendering the spirit of cooperation and eventually leading to development and agreement of common standards.  
 ▪ **Medium/Continuous:** Conduct exchange visits |
| ▪ Botswana and South Africa have bilateral agreements on cooperation in regard to water quality and monitoring and other issues such as management of kwela birds. South Africa and Zimbabwe have the same bilateral agreements. According to South Africa, those agreements could form a good basis to scale | ▪ **Short to Medium Term** Identify crucial common areas of cooperation and facilitate discussions  
 ▪ **Long Term:** Facilitate the development of localized and transboundary water sharing agreements |
specific sector or subject matter multilateral agreements for the management of the LRB.

- There is need for two types of water sharing agreements: (i) is the transboundary one amongst the four countries and (ii) is localized water sharing agreements. Capacity support to facilitate the reaching of such agreements is required.

- LIMCOM and LRB need an integrated information and knowledge management system and mechanisms.

- Water Users and Irrigation Boards in some instances have not proved to be viable due to their small sizes, low income and financial constraints in some catchment areas. There is need to think through on how catchment management can be viably implemented as part of capacity resilience efforts as members play a key role in the LRB activities. Local level institutional capacity has to be enhanced.

- Considerations and opportunities to use water as a catalyst for employment

- Low capacity for incorporating climate change in the water cycle and for budgeting for climate response at institutional level

| Short Term: | Facilitate discussions on the development of an integrated information and knowledge management system and mechanisms for the LRB |
| Medium Term: | Develop an integrated knowledge management system for the Limpopo |
| Medium Term: | Train on the use of the integrated knowledge management system |

| Short Term: | Develop a concept note on the role of and the capacitation of local level and basin level institutions in resilience capacity building |
| Medium Term: | Conduct study on the opportunities for the use of the waters of the LRB as a catalyst for employment |

| Medium Term: | Design a training plan on integrating climate impacts budgeting within the provincial and national budgets to address specific areas of institutional adaptive capacity (budgeting for climate response). |
| Long Term: | Develop a training plan building capacity for scenario planning |
| Long Term: | Build capacity for project design, implementation and evaluation |
| Long Term: | Design a capacity building plan for monitoring and evaluation for the provincial and national level water departments and the soon to be established Catchment Management Agency |
The mining sector and other industries need to be engaged in the LRB and their corporate social responsibility plans should indicate their interest, efforts and activities for managing the impacts of climate especially those that stem from their activities. Botswana, South Africa and Zimbabwe are mining coal, there is need to have a facilitated forum to discuss their roles in climate resilience. (issues of acid drainage, shortage of water and pollution are important)

Local institutions operating in the Limpopo do not generally have high knowledge on how they can make their institutions respond to climate impacts as they in the first place do not really have sufficient knowledge of climate change and how their activities in fact contribute to or even minimize climate impacts

|                                           | **Long Term**: Design and produce targeted, stratified and tailored knowledge products on climate change for institutions, entities, communities and individuals. on climate change. These could include factual briefs, operational guidelines, policy briefs, step by step guides etc. |
|                                           | **Medium Term**: Provide capacity and facilitation of the visioning exercise and process. |
| Low level of hydrometric gauging stations through the basin | **Long Term**: Assist in resource mobilization in securing hydrometric gauging stations beyond Chokwe in Mozambique |

Table 9: Additional institutional opportunities and capacity needs for South Africa
4.3.1. South Africa’s Perspectives on LIMCOM

South Africa recognises the importance of transboundary cooperation in the management of the Limpopo River Basin. A number of challenges and opportunities identified for formulation or strengthening of actions to enhance transboundary cooperation are similar to those identified by Botswana and Mozambique. Specific are:

- RESILIM and others can assist LIMCOM with the following:
  - Facilitate the recruitment of the ES urgently
  - Provide human and institutional oriented support to the current interim secretariat so that LIMCOM Secretariat services are actually realised. (coordinating of communications, scheduling of meetings, production of minutes, facilitating discussions/conversations/negotiations etc)
  - Engagement of Ministers is required – the Ministers have not met on specific transboundary LRB agenda that can help inter alia political buy in, transboundary “ownership” of RESILIM activities and the operationalisation of LIMCOM (Ministers Dialogue).
  - Develop LIMCOM Vision
  - Review required LIMCOM personnel in the context of climate resilience and produce terms of reference accordingly

4.3.2. Recommendations based on the South African Findings

Based on the analysis, the following recommendations specific to South Africa are made:

- Develop specific plan for the South African part of the Limpopo River Basin outlining the resilient interventions inclusive of roles and responsibilities and how they contribute towards the entire basin resiliency and sound management of the LRB at transboundary level.
- Provide assistance in information awareness on the issues related to climate change management, responses and required institutional behavioral changes.
- Strengthen the operationalisation of LIMCOM as recommended by other riparian countries so as to enable the coordination of amongst other, resilient capacity building interventions.
- Implement the capacity needs interventions identified by South Africa

5.4 Zimbabwe

5.4.1 Summary of Climate Impacts

The effects of climate change in Zimbabwe have been noted in a number of studies. Zimbabwe is a semi-arid country that experiences mainly two seasons: the dry season and the wet season. There is evidence that the rainfall pattern has been affected by climatic impacts and some of these impacts are on the most vulnerable socio-economic sectors which include: agriculture, rangeland, water, biodiversity, health and human settlement. It has been observed and documented that plant biodiversity is sensitive to rainfall and temperature regimes. Zimbabwe experiences a tropical dry climate. Zimbabwe is prone to moisture and water deficiency as a result increasing frequency of droughts or short rain seasons and also occurrence of extreme events such as floods experienced like that in year
2000. Studies conducted in the country have shown direct strong correlation between increase in temperature and decrease in precipitation that impact negatively on plant biodiversity.

Given the erratic and inadequate rain/precipitation, Zimbabwe is already feeling the impact of this in the form of inadequate run-off into water reservoirs/dams as well as water table reduced re-charge or disappearance. This is already being experienced in the Save and Umzingwane and Shashe catchment areas. The Umzingwane and Shashe catchment areas are part of the LRB.

![Figure 13: Rainfall Variability and economic growth in Zimbabwe](image)

**5.4.2 Water Institutional Framework**

Water governance in Zimbabwe falls under the Ministry of Rural Resources and Water Development.
### 5.4.3 Climate Impact Response Institutional Framework

#### Table 3: Vulnerability of women to climate change

<table>
<thead>
<tr>
<th>Climate Impact</th>
<th>Underlying socio-economic risk factors</th>
<th>Vulnerability of women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop failure</td>
<td>- 70% of women in Zimbabwe are smallholder farmers</td>
<td>- Strain on food provision</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Increased agricultural workload</td>
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<tr>
<td>Shortage of safe, clean drinking water</td>
<td>- Gendered division of household labour</td>
<td>- Additional time required to travel greater distances to collect water from alternative sources, which may not be clean/ safe</td>
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<td></td>
<td></td>
<td>- Exposure to violence / sexual abuse when travelling to and from water sources</td>
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<tr>
<td>Disease</td>
<td>- Gender division of reproductive labour / care giving</td>
<td>- Additional time required to care for young, sick and elderly</td>
</tr>
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<td></td>
<td>- Cultural restrictions on mobility</td>
<td>- Woman of all ages lack access to health care services</td>
</tr>
<tr>
<td>Migration</td>
<td>- Males may contribute little to household income (e.g. remittances)</td>
<td>- Increased domestic / agricultural workload</td>
</tr>
<tr>
<td></td>
<td>- Women who become de facto household heads may face difficulties in retaining control over land and other productive assets due to unequal property and land rights</td>
<td>- Decreased coping capacity and insecure tenure</td>
</tr>
<tr>
<td>Disaster</td>
<td>- Women and children often lack skills, knowledge and resources</td>
<td>- Women and children are more likely to die than men during disaster events</td>
</tr>
<tr>
<td>Displacement</td>
<td>- Particular problems in temporary housing / relocation rates</td>
<td>- Woman and young girls face higher rates of sexual abuse and violence</td>
</tr>
<tr>
<td>Resource scarcity</td>
<td>- 70% of the world’s poor are women</td>
<td>- Limited time and resources to invest in more resilient land and shelter</td>
</tr>
<tr>
<td></td>
<td>- Women have lower levels of educational attainment</td>
<td>- Limited resources to invest in alternative livelihoods</td>
</tr>
<tr>
<td></td>
<td>- Women are over-represented in the informal sector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Women earn lower wages and have limited access to markets</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Drawn from Bini et al., 2009; Bini and Bodman (2011); WWDO (2008)*
5.4.4  Existing Opportunities and Gaps

Figure 14: Zimbabwe Water Organogram

5.4.5  Recommendations

•  To be inserted later
6   CHAPTER 5. LIMCOM – CAPACITY NEEDS FOR BUILDING INSTITUTIONAL RESILIENCE

This Chapter discusses the role and responsibilities of LIMCOM and the capacities that are desired for LIMCOM to be an effective transboundary organization that effectively ensures that adaptive capacity takes place within the institutions and entities active in the LRB and consequent resilience building. The Chapter draws from lessons learnt in the operationalization of the Permanent Okavango Watercourse Commission (OKACOM) responsible for the transboundary management of the Okavango/Cubango River Basin.

6.1 OKACOM

A brief discussion on OKACOM is provided below for the main purpose of deriving institutional lessons relevant for carrying out transboundary actions or interventions designed to ensure the integrated water resources management of a shared basin. The institutional lessons from OKACOM are not focused on building capacities for resilience but rather on the form of an organizational structure and how the institutional linkages provide for facilitating and coordinating the implementation of transboundary interventions with impact at both basin wide and national levels.

6.1.1 Brief History on the Evolution of OKACOM

The Permanent Okavango River Basin Water Commission (OKACOM) was established on the 15th of September 1994 by the Governments of Angola, Botswana and Namibia to act as the technical advisor to the riparian countries on matters relating to the conservation, development and utilisation of water resources of common interest in the Okavango River basin. This entails promoting coordinated and sustainable water resources management of the basin, while addressing the legitimate social and economic needs of riparian States. The shared vision of the three States envisaged anticipating and reducing unintended, unacceptable and often unnecessary impacts on the resources of the Okavango basin system supported by operational principles of:

- Equitable allocation;
- Sustainable utilisation;
- Sound environmental management, and
- Sharing of benefits.

Figure 15: Landscape in the upper catchment, Angola, courtesy of OKACOM
The Commission’s mandate requires it to investigate the pre-requisites and set up conditions to:

- Determine the long term safe yield of water available from the river;
- Estimate reasonable demand scenarios from consumers;
- Prepare criteria for conservation,
- Ensure equitable allocation and sustainable utilisation of water;
- Undertake investigations related to water infrastructure;
- Formulate recommended pollution prevention measures;
- Develop measures for the alleviation of short-term difficulties, such as temporary droughts and floods and,
- Generate visible impacts on poverty alleviation for the riparian communities, emanating from applied basin resources management options.

**OKACOM Institutional Significant Timelines**

- **1990**: Botswana and Namibia conclude bilateral talks on the cooperation in regard to the Okavango/Kavango water resources
- **1990**: These bilateral talks led to the establishment of the Joint Permanent Water Commission (JPWC) for Botswana and Namibia on the Okavango with focus on the joint management of the Okavango River. This included the Zambezi ground water and other water related issues such as the environmental protection of the Kwando-Linyanti-Chobe river system.
- **1992**: Botswana and Namibia were joined by Angola in further discussions and negotiations
- **1994**: Agreement that established the Permanent Okavango Water Commission concluded.
- **Between 1994-2002**, work of the Commission was challenged by the Angola civil war that restricted activities in the Cubango-Okavango Basin. Nevertheless, the Commission’s members never wavered in their determination to work together to plan for joint use of the Basin’s resources, and continued to meet, rotating responsibility for organizing meetings among the three countries and supported administratively by the countries’ respective water ministries
- **2004**: The Commission recognized the need to establish a secretariat
- **2005-2007**: Negotiations on the type of entity required to provide secretariat services
- **2005-2008**: Provision of interim secretariat service under a USAID funded IRBM Project (Integrated River Basin Management Project
- **2007**: OKACOM reviews its organizational structure to bring it in line with the Revised SADC Protocol on Shared Watercourses and gave the OBSC formal status, recognizing it as a permanent and forma internal body of OKACOM with defined functions, roles, responsibilities as well as operational procedures.
- **2007**: Formal establishment of the OKACOM Secretariat – headed by an Executive Secretary and initial funds provided by Sida to operationalize the Secretariat under its 3 year Workplan
- **2007**: Host Country Agreement signed between the Government of Botswana and OKACOM
- **2012**: Amendment of the 2007 Organizational structure of OKACOM Agreement to give the OKACOM Secretariat more powers and functions in response to the emergent roles and activities of the OKACOM Strategic Action Plan and riparian member states National Action Plans. The OKACOM Secretariat was given additional powers and functions to undertake programme management and afford as well as facilitate technical advice.
To ensure effective fulfilment of its functions, OKACOM is driven by an internal organisational structure that presently consists of:

i. **The Commission** – the principal organ of OKACOM, responsible for defining and guiding the development policy and general supervision of the activities of OKACOM.

ii. **The Okavango Basin Steering Committee (OBSC)** – is the technical advisory body to the Commission. It provides technical leadership to permanent or temporary subsidiary committees and/or task forces that are established according to the nature and specificity of the matter. The OBSC also provides quality assurance functions.

iii. **The Secretariat** – responsible for providing administrative, financial, technical, coordination, programme management, knowledge management, policy development and general secretariat services to OKACOM.

iv. **Seconded Staff** – To augment expertise and skill whilst maintaining a “slim” structure, OKACOM makes use of seconded staff from its national government departments and other eligible institutions such as academia. OKACOM also utilises seconded staff from international cooperating partners. The modalities for effecting the use of seconded staff are elaborated in OKACOM’s human resources policies.

In addition to the OBSC, OKACOM uses committees that are set up to meet specific functions requiring subject matter experts for non-permanent periods of time. The Committees were originally referred to as Task Forces prior to the conduct of the Institutional Functional Analysis of 2012. The main technical committees and their functions are:

- **Institutional Development Technical Committee**: to provide support in strengthening the institutional and operational capacity of OKACOM as a whole and OKASEC in particular and to provide guidance on further development and implementation of OKASEC’s service delivery.

- **Socio-Economic Technical Committee**: to provide support, advice and guidance on socio-economic factors that arises out river basin management.

- **Water Resource Technical Committee**: to provide advice and technical guidance on strategic, continuous and adaptive approach to the basin level management of water and assisting with the development of responses to consultations by government and other bodies on integrated water resources management.

- **Land Management Technical Committee**: to provide advice and guidance to OKACOM, and in particular OKASEC on sustainable land use, management of human settlements, infrastructure development, conservation of resources supported by cross-sectoral strategies, programmes and plans for land use in the Basin

- **Biodiversity and Environment Technical Committee**: to advise OKACOM, in particular OKASEC, on matters relating to the identification, conservation and recovery of species at risk within the Basin, including on general biodiversity and environmental risks to the Basin and in the development of workable conservation, recovery and sustainable use programmes and activities.
The figure above depicts OKACOM after the establishment of its Secretariat. The direct OKASEC staff consisting of the Executive Secretary, the Communications Specialist and the Finance Officer were the initial personnel put in place to ensure the operationalisation of the Secretariat.

The Figure below shows the further elaboration of OKACOM after the OKACOM Transboundary Diagnostic Analysis (TDA), National Action Plans (NAPs) and the Strategic Action Plan (SAP) were conducted and produced. The implementation of the said governance instruments required robust institutional structures and organizational linkages for effectiveness.
Figure 17: OKACOM Organizational Structure after the Institutional Functional Analysis - 2012. The core 2007 structure was not changed but rather additional capacities were provided.
Figure 18: OKACOM Functional Organizational Set up 2012 in response to added functions and roles: Courtesy OKACOM

- Management, supervision of the implementation, coordination, and monitoring the decisions of the Commission
- Facilitators for Tech Committees
- Analysis and advice to OBSC
- Professional Guidance to Programme Impl.
- Overall coord. & man/ relations to OKACOM Organs
- Logistics, arrange meetings, procurement and financial management
- Information and Communication systems, Website, Monitoring Dbases, DSS, Basin Models etc
- Analysis and advise to OKACOM
- guidance to programme impl.
- Facilitators for Tech Committees
- Coordination with NAP Impl. Units and Regional Projects
- Implementation of specific regional SAP interventions
- Monitoring of SAP implementation
- Preparing bankable project proposals

- Management
- Administration
- Knowledge Support Services
- Policy Analyst Unit
  - Institutional Dev Spec
  - National Seconded Staff
  - Socio-economic Spec
  - Water Resources Spec
  - Land Management Spec
  - Env & Biodiversity Spec
- Programme Coordination Unit

- OKACOM Ministers Forum
  - OKACOM accountability to Ministers
  - Sharing/ exchanging ideas at high level
- OKACOM Commission
  - defining and guiding the development of policy
  - general supervision of the activities of OKACOM
- OKASEC
  - Administrative and technical support
  - Resource Mobilisation
  - Policy analysis
  - Overall coord. & man/ relations to OKACOM Organs
  - Logistics, arrange meetings, procurement and financial management
  - Information and Communication systems, Website, Monitoring Dbases, DSS, Basin Models etc
  - Analysis and advise to OKACOM
  - guidance to programme impl.
  - Facilitators for Tech Committees
  - Coordination with NAP Impl. Units and Regional Projects
  - Implementation of specific regional SAP interventions
  - Monitoring of SAP implementation
  - Preparing bankable project proposals

- Institutional TC
- Socio Economic TC
- Water Resources TC
- Land Management TC
- Environment & Biodiversity TC

- OKAVANGO BASIN STEERING COMMITTEE (OBSC)
  - management, supervision of the implementation, coordination, and monitoring the decisions of the Commission
  - Analysis and advice to OBSC
  - Professional Guidance to Programme Impl.

- OKACOM MINISTERS FORUM
  - OKACOM accountability to Ministers
  - Sharing/ exchanging ideas at high level

- OKACOM COMMISSION
  - defining and guiding the development of policy
  - general supervision of the activities of OKACOM

- OKASEC
  - Administrative and technical support
  - Resource Mobilisation
  - Policy analysis

- OKACOM MINISTERS FORUM
  - OKACOM accountability to Ministers
  - Sharing/ exchanging ideas at high level

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  - defining and guiding the development of policy
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  - Resource Mobilisation
  - Policy analysis

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  - OKACOM accountability to Ministers
  - Sharing/ exchanging ideas at high level

- OKACOM COMMISSION
  - defining and guiding the development of policy
  - general supervision of the activities of OKACOM

- OKASEC
  - Administrative and technical support
  - Resource Mobilisation
  - Policy analysis
Specific institutional building lessons from OKACOM:

(a) **Political Will** – political will should be maintained at all times as new emerging and sometimes challenging issues and needs arise. Continued communication founded on socio-political equity, sustainable development, common vision and science based evidence is essential. The Forum provided by the Ministers meetings provides an opportunity for continued political engagement and dialogues that often prevail in transboundary water resources management and also facilitates the understanding of the value for national governments to commit financial and other resources on regular basis. The reality of climate change impacts requires the presence and effecting of political will due to the fact that climate impacts affect all sectors of socio-economic development and that managing and building resilience to climate impacts requires substantial financial and other resource investments. A Ministerial-level decision-making forum can be a useful means for raising awareness for joint river basin management, increasing the visibility of the RBO and strengthening high-level political commitment that is useful during the national budget making process. It also ensures accountability at highest level on the use of public funds, grants, loans and taxes used for responding to climate change impacts.

(b) **Dynamic, responsive and flexible institutional legal framework** – Initially the OKACOM started off as a Joint Water Permanent Commission but evolved to be a hybrid of other institutions in responding to emerging and growing issues within the basin. To that end it is important to have a robust solid legal foundation that can set the parameters for change without deviating from the intended purposes and outcomes. The ability to be responsive to identified needs is a desirable attribute in dealing with climate change impact response especially in ensuring adaptive capacity and mainstreaming or integration of resilience interventions. The basin institutional architecture has to be framed in a way that facilitates the success in delivery of interventions whilst being cost effective. The evolution of OKACOM signifies the importance of the institution to be responsive to the desired functions and the subject matter for coordination and management. OKACOM at its initial stage was centred on water resources management but evolved to encompass other resources within the basin. Its current structural formation articulates its larger role beyond water resources management. It would appear that modern or contemporary river basin management has become forward looking given the issues of inter alia climate change, livelihoods, biodiversity, monitoring, information and data management, drought and disaster management and thus the status is not solely water focused.

(c) **Direct linkages with national dedicated implementation units** – this brings a sense of ownership of the basin at national levels and focus is placed on basin strategic plans and activities that ought to be implemented at national level. The use of the personnel in national entities is a resource contribution in kind and adds up to cost reduction. All transboundary activities have to be implemented at national level, national level boundaries form components of one entire basin. This attributes speaks to the need for supportive external regime for adapting and resilient entities. Supportive national entities drive the realization of a common basin vision and any governance instruments and plans in place. National entities are often work closely with basin level institutions and communities, therefore they are best placed to guide the implementation of transboundary climate change response interventions. At the same time, direct linkages of national entities and the transboundary institution provides *inter alia* space, mechanisms and modalities for monitoring, evaluation, accountability, knowledge sharing, information transmission and participation required in regard to transboundary integrated river basin governance.
(d) **Institutional and programme review/evaluation**: Although OKACOM was a JWPC initially it later evolved to a Commission. The Commission operated for a while without a secretariat. However, in pursuit of implementing the 1994 Agreement the Commission realised the need for a dedicated secretariat that could coordinate and facilitate the implementation of its 1994 Agreement on a day to day basis. In 2007 such secretariat was established with the limited mandate of administration and provision of secretariat services. Between 2009 and 2011, the OKACOM Secretariat played a meaningful role in technical issues and project management during the TDA for the Okavango and the subsequent development of the Basin Strategic Plan and the national action plans. This called for the conduct of an institutional functional analysis for OKACOM as a whole. The results and recommendations of that analysis led to the amendment of the 2007 Organizational Structure Agreement to give the OKACOM Secretariat technical and programme/project management roles and functions. A key lesson is the use of iterative approaches based on monitoring and evaluation of institutional aims and results and adjusting accordingly.

(e) **Financial management plans**: The existence of financial management plans provides actual and potential cooperating partners a perspective on opportunities for financial resource support whilst provides OKACOM with an opportunity to account on its financial expenditures. OKACOM Secretariat, since its establishment, put in place a financial management system, financial policy and manual, produces externally audited financial reports and published financial statements and accounts for its financial expenditures. OKACOM’s reports can be accessed from its website: www.okacom.org

Operationization of a secretariat enables its commission to carry out important core functions required in transboundary management and importantly financial planning and management essential to building resilience towards climatic impacts whilst strengthening adaptive capacity. Where financial management is practiced, the institution is able prioritise in its budgeting and expenditures in response to needs.

(f) **Clear human resources policies, rules and procedures** – the OKACOM Secretariat human resources policies provide a good basis for planning on staff requirements and skills and to prioritise recruitment of staff in a staggered phases subject to short or long term needs as well as availability of resources. For example the only position that has been filled to date since the Institutional Functional Analysis of 2012 is that of a Programmes Coordinator due to the fact that programme coordination at basin level and linking with national level activities is of immediate importance to OKACOM in the context of financial constraints. An important lesson to note in this regard is that the actual act of recruitment of desired and appropriate personnel is a contributing factor to building institutional strength and resilience. For example, in discussions with LIMCOM member countries, the need to urgently recruit a coordinator who would facilitate and coordinate interventions on amongst others, climate change responses and capacity building was highlighted. For LIMCOM to recruit, it has to in addition with existing job descriptions reconsider personnel priorities in light of its role in climate resilience building and in implementing it key identified priorities.

(g) **Exploration of diverse forms of resources for running the organisation including in kind contribution**: OKACOM is run on resources that come from diverse sources and these include country contributions that are used for recurrent operational costs and paying of staff; in kind contribution including provision of interns; project support, partnerships with research institutions and collaboration with SADC and other institutions. At the onset of the establishment of OKACOM Secretariat was provided with funding by Sida under a three year operationalisation plan for the OKACOM Secretariat. Under the said three year plan, OKACOM Secretariat was to
fulfil some duties including production of minutes, setting of agendas, ensuring timely communication amongst the three riparian countries, organisation of meetings, provision of logistical arrangements, archiving, communications with different stakeholders, knowledge management and information dissemination. A review of the three year plan under the support of Sida indicated that OKACOM Secretariat did perform the required activities and additionally provided some technical support in the development of its TDA and its Strategic Action Plan. Lesson from this aspect of operationalisation highlights the benefit of having a staffed Secretariat that can ensure that plans are actually implemented. OKACOM reports on its activities including the production of governance instruments can be viewed from the OKACOM website. Whilst the success and value of establishing RBOs and supporting the operationalisation of secretariats is subjective, the functionality of the OKACOM Secretariat is evident in the strides that have been made by OKACOM, including the reorganization of OKACOM to meet the demands of its SAP and newly added functionalities. Communication, knowledge management and coordination amongst others are essential in responding to climatic impacts.

(h) **Country contributions and ownership:** The country contributions are used to run the Secretariat. To that end, the member states have ownership of their institution and are to a large extent able to push basin development agenda that contributes to their own vision and objectives. The assured availability of operational funds enables the secretariat to concentrate on delivering on its mandate and to also explore opportunities for partnerships, projects and programmes on climate change responses and resilience building in IWRM within a basin.

(i) Basin wide strategic plans that also reflect national needs and areas of national implementation require a responsive river basin organisation: The Okavango/Kavango river basin attracts different country development priorities however, OKACOM sees the need to be responsive to basin and national level concerns and monitor accordingly. The needs may change and this requires a river basin organisation that is founded on robustness with the ability to be responsive. The basin wide strategic plans must be informed by national concerns and negotiated at basin level with a view to have basin level interests covered. The elements of negotiation and compromising in the interests of the basin are essential in basin strategic planning. Climate change is impacted upon by different economic and livelihoods activities in rural and urban settings, at the same time, climatic impacts are felt deeply within the different socio-economic activities in countries with varying levels of development and infrastructure. It is prudent to negotiate basin wide climate resilient strategic plans that take into consideration all aspects of the felt and potential impacts of climate change in the basin.

(j) **“One whole basin” approach** – despite the competing national needs, the institutional set up of OKACOM is designed to facilitate planning at basin level and not at individual portions of the basin. This approach provides an attractive basis for sustainable development of the basin and conflict/dispute resolution. Climatic impacts do not adhere to political boundaries; and, activities carried in one part of the basin can have catastrophic impacts in another part of the basin intra and inter riparian country. For example, flood management in the Limpopo should be treated as a basin wide problem and not just for downstream country, namely Mozambique. Essentially, building climate resilience within basin institutions should be framed from a perspective of “building a resilient Limpopo River Basin.”
(k) **Phased institutional development:** OKACOM was established as a Commission in 1994, without a secretariat. In response to the demands on the ground, it later on legally established the OKACOM Secretariat which initially was meant to provide administrative and secretariat services and was to operate as a “slim structure”. However, the OKACOM Secretariat has evolved to making use of subject matter expert committees and Secondment of officers to attain its evolved mandate. The evolution of the OKACOM Secretariat has required OKACOM to access resources from national governments as well as building partnerships. LIMCOM may need to draw up a human resource policy and plan to meet the climate resilient and adaptive capacity vision and interventions of the Limpopo River Basin.

In summary, OKACOM is instructive on the importance of having in place a functional transboundary river basin organization in place, with identified subject matter areas for implementation and associated structures as well as governance instruments for ensuring that mandates are fulfilled. Additionally a phased approach to institutional development in response to emerging issues adds to the value the concept of coordination and facilitation; monitoring and evaluation, use of iterative approaches, knowledge management, communications, tapping into diverse sources of resources, political will, accountability and transparency. OKACOM publishes its reports and governance instruments of which some are available on its website.

### 6.2 Mandate and Institutional Framework

The mandate of LIMCOM is as outlined in the Limpopo Watercourse Commission Agreement, which sets up LIMCOM. The mandate of LIMCOM is to provide advice to the riparian countries and to make recommendations on the uses of the water, its tributaries for the purposes of protection, preservation and management. In order to deliver on its mandate an institutional structure is in place and consists of the following organs:

1. **The Council** – the Council is to advise on the following:
   a. Measures and arrangement for determining the long term safe yields of the water available from the LRB
   b. Equitable and reasonable utilization in support to sustainable development and harmonization of related policies in each riparian state
   c. Participatory governance in the management of the LRB
   d. Social and cultural heritage impacts
   e. Effective collection, processing and dissemination of data and information
   f. Contingency plans and measures for prevention and responding to harmful conditions and extreme weather events
   g. Investigations and studies separately or jointly by riparian countries in regard to the development of the LRB
   h. Dispute resolution measures

2. **The Secretariat**

3. **Task Forces** such as Flood Task Team; Legal Task Team and Committees

LIMCOM’s Vision is to ensure sustainable water security for improved livelihoods in the Limpopo River Basin. In realizing the Vision, LIMCOM through its “Mission”, seeks to advise the riparian states on the governance, management and development of water resources in the Limpopo River Basin through
integrated water resources management in order to improve social equity, promote economic efficiency and ensure sustainable development.

The Vision also seeks to address key identified challenges which are:

- Droughts and floods
- Disaster management
- Pollution of the aquatic ecosystems
- Water allocation
- Water efficiency

5.1. Identified Capacity Needs

The functioning of LIMCOM is guided by the LIMCOM IWRM Plan of 2011-2015. The Table below indicates the key areas covered by the 2011-2015 IWRM Plan.
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<thead>
<tr>
<th>Area</th>
<th>Planned Intervention</th>
<th>Status</th>
<th>Suggested Intervention</th>
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</thead>
</table>
| Water Governance          | Coordination Mechanisms for participatory IWRM governance Communication procedures are in place for timely and adequate informing of stakeholders | ▪ The Interim Secretariat is in place but does not have adequate staff to carry out the coordination functions. All the riparian States were of the view that the operationalisation of the Secretariat including the recruitment of a coordinator is of paramount importance  
▪ The LIMCOM member countries noted that a number of studies have been conducted in the LRB and that the recommendations from these studies should be implemented. The transboundary actions can be implemented effectively where there is a functioning Secretariat with human resources, systems, rules, procedures, mechanisms and a supportive external regime. In this instance a supportive external regime can be derived from the riparian countries creating an enabling environment for the Secretariat to implement actions.  
▪ A stakeholder engagement plan is currently being developed through the assistance of RESILIM. However, the success in using the engagement plan to ensure successful participatory water governance requires that the Secretariat have requisite staff to undertake the application of the stakeholder engagement plan. | ▪ Recruit the Secretariat personnel  
▪ Develop a resources mobilization strategy to fund activities related to coordination and participatory IWRM  
▪ Strengthen local/provincial and basin institutions  
▪ Develop a communications plan with implementable actions  
▪ Strengthen the LIMCOM website and ensure that it is continually updated  
▪ Create a database of entities and stakeholders that can be given targeted relevant information on the LRB |
| Water Management (through defined water policies and regulations) | ▪ planning  
▪ assessment  
▪ monitoring | There are bilateral agreements between Botswana and South Africa; Mozambique and South Africa; and, South Africa and Zimbabwe | Development of a holistic water management system for planning, assessment and monitoring including common standards as applicable |
| Water resources development (financing, implementation and operating structures for irrigation, drainage, water supply and sanitation, hydro-power generation and flood management) | ▪ Project preparation  
▪ Resource mobilization  
▪ Pilot projects | There are some pilot projects on the ground in the different countries. These pilot projects can be assessed for their impacts, lessons learnt and possible replication across the basin | The human resources recruitment for the Secretariat will assist in ensuring that the capacity to mobilise resources, prepare project proposals and monitor the impacts of those projects |

Table 10 – LIMCOM IWRM Plan 2011-2015
The LIMCOM IWRM Plan for 2011-2015 has a number of operational objectives and some of those are pertinent to climate resilience capacities. The Table below discusses the operational objectives and provides for suggested interventions that also result in climate resilience building. It should be noted as per the Table above that the actions were not either started or fully completed for the period 2011-2015.
The Table 11 below provides for the opportunities for capacities for resilience building for LIMCOM,

<table>
<thead>
<tr>
<th>Operational Objective: Priority Intervention as per LIMCOM IWRM</th>
<th>Key Action as per LIMCOM IWRM Plan</th>
<th>Relationship with Adaptive Capacity and Resilience Building</th>
<th>Opportunity</th>
<th>Intervention</th>
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</table>
| Disaster Preparedness Plan for the LRB                       | ▪ Assess risks,                      | Disaster risk reduction and climate change adaptation share a goal: both approaches seek to strengthen people’s and societies’ capacity for resilience. Disaster risk reduction and climate change adaptation are stated to have similar aims and mutual benefits, hence the close linkages. Both focus on reducing people’s vulnerability to hazards by improving their ability to anticipate, cope with and recover from the impact; and, because climate change increases the frequency and intensity of climate-related hazards, the use of a disaster risk reduction approach is crucial in supporting communities to adapt to climate change. | There is existing cooperation amongst the countries on disaster risk reduction. All countries and LIMCOM identified disasters such as droughts and floods as important issues to be managed as they affect economic investments and livelihoods in the Limpopo. Furthermore, the attributes for building resilience within the disaster risk reduction are the same as resilience factors in climate change. The consequences of disaster are the same or similar to the ones from climate change. This then calls for integrated approach in responding to disaster risks, be they stemming strictly from disasters or climate change impacts. | **Long Term** – LIMCOM develop a disaster risk reduction and management implementation plan based on risk analysis of factors that influence resilience in the LRB. The analysis should examine the following factors and provide responses on targeted resilience building:  
  ➢ Institutional (Resources Planning Responsiveness Accountability Rule of law)  
  ➢ Political (Leadership Participation Representation)  
  ➢ Cultural (Knowledge transfer Belief systems Customs)  
  ➢ Social (Communications Support networks Organisation Inclusion Conflict resolution)  
  ➢ Environmental (Land use Access to natural resources Sustainability) |
<table>
<thead>
<tr>
<th>Human (Food security Health Education)</th>
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<tr>
<td>Economic (Income security Access to markets and employment Livelihoods diversity and flexibility Financial services Land tenure)</td>
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<tr>
<td>Physical (Structures Water supply Sanitation)</td>
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<tr>
<td><strong>Short to Long Term:</strong> Establish a LIMCOM Working Group on Disaster Management</td>
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<tr>
<td><strong>Long Term:</strong> Develop a Preparedness Plan with resources required, roles and responsibilities</td>
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<td>Operational Objective: Priority Intervention as per LIMCOM IWRM Plan</td>
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| Information and data sharing protocol between member states on disaster management | ▪ Facilitate a process between member states to develop an information and data sharing agreement  
▪ Establish a LIMCOM Working Group on Disaster Management | The use of data and information is essential in responding to climate impacts and disasters. | The riparian countries are at different levels in terms of capacities, technologies and research on tools, mechanisms, skills, standards, indicators, interpretation etc on different areas that need monitoring in all aspects of river basin resources such as water, biodiversity, fisheries, weather patterns, use of modelling and others. The different stages of development in information and data provides an opportunity to develop common standards and draw on the riparian countries’ different strengths to develop an agreement for data and information sharing that best fit the needs of managing the | Short Term – Develop a concept note and/or brief on the benefits of information sharing and outlining a process for developing an information and data sharing agreement. **Short Term:** Develop a facilitation process plan, indicating the timelines, the human resources required, the relevant participants, the activities and financial resources for the facilitation process. |
<p>| Stakeholder participation/public awareness campaigns on disaster risk management | ▪ Undertake participatory assessment of indigenous knowledge related to disaster preparedness and response | Participatory governance is an integral part of building resilience. When different stakeholders and communities participate in development | There is a process in which stakeholder analysis is taking place, and different communities in the riparian countries are involved in pilot | This activity in particular the stakeholder participation can be taken as part of the process for developing the implementation plan for disaster risk management. |</p>
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<tr>
<td>Climate change adaptation and mitigation strategies for the LRB</td>
<td>• Development of Climate Change Adaptation Strategy for the Limpopo • Development of Climate Change Mitigation Strategy for the Limpopo</td>
<td>Resilience building achieves the ability to adapt to climate change. In essence the act of adapting to climate change requires that resilience actions be put in place and be implemented.</td>
<td>The Capacity Needs Assessment for Resilience building in the Limpopo has highlighted the areas that need strengthening. These in conjunction with the Resilience Capacity Strengthening Plan can be used to develop the Climate Change Adaptation Strategy for the LRB</td>
<td>Short to Medium Term: undertake a LIMOCM Visioning Exercise with clear objectives regarding climate change adaptation and building climate resilience Long Term: Develop the Climate Change Adaptation Strategy</td>
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| Water related hazard monitoring system | Establishment of water related hazard monitoring system  
Establish an inventory of existing early warning system equipment and make recommendation for securing appropriate equipment and infrastructure | Resilience building in regard to water related hazards can be achieved through: (i) enhanced risk assessment, better forecasting, and, strengthened early warning communications; (ii) institution building at transboundary, national, provincial, river basin, and community levels; and (iii) selecting and/or revamping appropriate technologies for developing information systems for forecasting and early warning, and, technologies for improving the safety of the infrastructure to make them climate resilient | The SADC Early warning systems provides lessons on the development of the LRB early warning system |
| Communication and dissemination system for early warning information | Protocols, formats and procedures for provision of basin relevant information established  
Strengthen capacities for communication and dissemination of disaster information and data | Sharing of data and information is necessary for disaster preparedness as well as for climate change impact responsive planning and decision making | The riparian countries are already in the practice of sharing data and information in regard to warnings about floods or other extreme weather in the LRB. There is an opportunity to build upon the bilateral practices and agreements in place. |
<p>| Short Term: | development of training plan and materials and conduct of training on systematic collection of data and undertaking risk assessments at all levels as appropriate in the LRB | Medium: Establish an inventory of existing early warning system equipment and make recommendation for securing appropriate equipment and infrastructure |
| Medium to Long Term: Establishment of water related hazard monitoring system | Short to Medium Term: develop protocols, formats and procedures for provision of basin relevant information through different media and for different institutions | Continuous: Training on dissemination of information through communicating risk information and reliable warnings to potentially affected locations through traditional and new media and use of different media. |</p>
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<tr>
<td>Reduction of impacts of floods and droughts through water infrastructure development</td>
<td>▪ Draw up infrastructure inventory using a common template with linkages to for example Google Earth</td>
<td>Infrastructure is a direct physical way of managing floods that result from disasters and climate change</td>
<td>Infrastructure development such as construction of small dams, use of dyke systems and lakes is recognized in the capacity needs assessment for resilience building as one of the ways of building resilience and adapting to the impacts of floods</td>
<td>Short Term: Draw up infrastructure inventory using a common template with linkages to for example Google Earth</td>
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<td></td>
<td>▪ Assessment of operating rules and flooding study</td>
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<td>Short Term: Assessment of operating rules and flooding study</td>
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<td></td>
<td>▪ Financial and social assessment of recommended interventions</td>
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<td>Short Term: Financial and social assessment of recommended interventions</td>
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<tr>
<td></td>
<td>▪ Identification of strategic water infrastructure</td>
<td></td>
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<td>Short Term: Identification of strategic water infrastructure</td>
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</table>
| | ▪ Climate proofing of water infrastructure  
  ➢ Initiate two climate proofing pilot activities  
  ➢ Development of climate proofing guidelines in infrastructure | | | Medium to Long Term: Climate proofing of water infrastructure  
  ➢ Initiate two climate proofing pilot activities |
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| Promotion of adoption of common standards of water quality in order to reduce transboundary water pollution | • Harmonisation of water quality standards in the member states  
  ➢ Baseline study on water quality monitoring  
  ➢ Harmonisation of standards, methods and practices on water quality monitoring across the riparian states  
  • Develop Protocol on monitoring procedures as well as information and data-sharing procedures relating to water quality  
  • Develop Water Quality Monitoring Plan  
  • Awareness raising on Water Quality issues | From the supply side, climate change affects the water cycle directly and, through it, the quantity and quality of water resources available to meet the needs of societies and ecosystems. Bilateral cooperation is already taking place between some of the riparian states. At the same time riparian states individually do conduct their own water quality monitoring and have waste and pollution control laws guiding discharges in water sources. | Short Term: conduct a baseline study on water quality monitoring  
  Short term: design water quality monitoring plan development process with specific outputs, targets, timelines, quality assurance structures and resources required  
  Medium to Long Term: Implement the water quality monitoring plan development process, including the facilitation of development of a Protocol on Water Monitoring  
  Medium Term: develop awareness raising action plan, materials and implement it  
  Short Term: Support a political dialogue on water quality issues | Development of climate proofing guidelines in infrastructure  
  Medium-term: Assessment of micro hydro-power in the Limpopo River Basin |
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<tr>
<td>Facilitation of implementation of pilot projects for reducing transboundary water pollution</td>
<td>▪ Development of guidelines on formulating and implementing pilot projects</td>
<td>Flexibility, learning and innovativeness are essential to resilience building.</td>
<td>There are pilot projects taking place within the LRB and lesson learnt can be derived and used to inform replication elsewhere</td>
<td>Short term: Facilitate the development of guidelines on formulating and implementing pilot projects</td>
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<td>Promotion of the equitable and reasonable utilisation of water resources in the Limpopo River Basin</td>
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<tr>
<td>▪ Development of a concept note/position paper outlining examples of joint basin wide opportunities and benefit sharing arrangements</td>
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<td>It has been noted that the benefits of regional cooperation in managing transboundary water resources lie in both consumptive and non-consumptive uses, which are linked to the ‘specific use value’ and the ‘system value’. The specific use value arises from a single, specific use of water, for example, the use of water for irrigation or hydroelectricity. The system value is the aggregate value that a unit of water generates as it moves through the river system before it is consumed or lost. For example, a cubic metre of water flowing through the LRB from upstream South Africa reaching downstream Mozambique can generate hydropower at different sites and provide irrigation and drinking water. The system value is the sum of benefits accrued to all the countries involved through all uses of water – hydropower, irrigation, navigation, fisheries, tourism and so forth – within a river basin. Regional cooperation using a river basin approach is essential to achieve the cooperation on the waters of the Limpopo have been ongoing, between and amongst the riparian member states. All states acknowledge the need to strengthen trust in regard to the management of the LRB and the use of its resources. Sharing of information and data is one of the ways of facilitating the building of trust. Joint monitoring activities and joint studies also contribute towards the building of trust as countries agree and share data, research and information pertinent to the management of the LRB. The different countries benefit from the LRB, to that end, facilitating discussions on equity and benefits holistically will assist in basin wide practices of socio-economic uses of water that factor in resilience building interventions.</td>
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<td>Short Term: Development of a concept note/position paper outlining examples of joint basin wide opportunities and benefit sharing arrangements</td>
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<td>Continuous: Development of pilot projects on basin wide benefit sharing</td>
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<td>Short to Medium Term: Coordinate the development of the Limpopo Information System</td>
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<tr>
<td>Continuous: Hosting of the Information Sharing Hub by the LIMCOM Secretariat</td>
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<tr>
<td>▪ Development of pilot projects on basin wide benefit sharing</td>
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July 15

Institutional Resilience Capacity Needs Assessment Report

140
| Monitoring - Facilitation of the dissemination of information on water resources and water usage in the LRB | ▪ Coordinate the development of the Limpopo Information System  
▪ Hosting of the Information Sharing Hub by the LIMCOM Secretariat | maximum system value of transboundary water resources |  |
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<tbody>
<tr>
<td>▪ Assessment of ground and surface water resources</td>
<td>See Interventions on: Promotion of adoption of common standards of water quality in order to reduce transboundary water pollution</td>
<td>See Interventions on: Promotion of adoption of common standards of water quality in order to reduce transboundary water pollution</td>
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<tr>
<td>▪ Establishment of the “Water Balance for the Limpopo River Basin up to 2030”</td>
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<td>▪ Development of Economic Accounts for Water (EAW)</td>
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</table>
| Promotion of methods for increasing water availability and efficiency | ▪ Conduct feasibility studies on potential interventions based on the Limpopo River Basin Monograph Study  
▪ Conduct cost benefit analysis of recommended interventions | Water efficiency and availability can be achieved through ensuring that resilient actions are integrated in different areas of socio-economic development across all sectors. |  |
| ▪ The Limpopo Monograph Study provides a good basis for conduct of interventions on water efficiency and water availability |  |  | Medium Term: Conduct feasibility studies on potential interventions based on the Limpopo River Basin Monograph Study  
Medium Term: Conduct cost benefit analysis of recommended interventions
6.3 Recommendations for Capacity Strengthening

The recommendations for capacity strengthening for LIMCOM are as follows:

(a) Provide support for the operationalisation of the LIMCOM Secretariat. This support should include guiding scope of work and the rules of procedure for different organs of the Commission, task forces and committees; development of scope of work for positions; job descriptions; advertorial materials for recruitment; recruitment grading forms; human resources policies and manuals; operational procedures, financial policies and manuals; gender policy, and, remuneration policy and grading system. Other governance instruments that should form part of the support include policies on how the LIMCOM Secretariat will engage with external partners and stakeholders in different areas for different purposes. The rationale for supporting the operationalisation of the LIMCOM Secretariat is based on the acknowledgement of the role functional institutions play in coordinating and facilitating the transboundary interventions including those on climate adaptation and resilience building.

(b) Facilitate the review of the LIMCOM IWRM Plan of 2011-2015 and develop priority actions for implementation and identify sources of resources

(c) Identify different interventions that are taking place in the Limpopo River Basin on building climate resilience and categorize those interventions that can be used to either leverage resources of be source of addressing identified priority actions.

(d) Support LIMCOM to elaborate on a long term visioning process

(e) Assist LIMCOM to develop a resource mobilization strategy

(f) Provide LIMCOM with support to document good practices on climate resilience building taking place at different levels

(g) Develop a knowledge management system plan for LIMCOM

(h) Elaborate on a communications plan for LIMCOM and develop further a LIMCOM website

(i) Assist LIMCOM in conducting dialogues on transboundary institutional resilience capacity building
CONCLUSIONS
The Institutional Capacity Needs Assessment provides guidance on actions and interventions that can be developed and used to ensure resilience building within the Limpopo River Basin. These interventions will seek to address the challenges posed by the changes in climate and associated impacts. The proposed interventions will contribute towards increasing resilience and adaptive capacity to address the risks posed by climate change to the LRB’s water sector based on IWRM principles and approaches. The focus will be to build resilience at transboundary level and ensuring complimentary resilience interventions at national level through harnessing existing opportunities. The observations and interventions identified under the Institutional Capacity Assessment Needs Report are articulated in a capacity strengthening plan which will indicate desired actions and outputs. The overall purpose of the strengthening plan is to set a solid foundation for increasing the capacity of key stakeholder to integrate climate change concerns into the policy frameworks, management and also mainstreaming climate change responses into the regulatory frameworks and decision-making processes that are relevant for integrated water resource management, changes to strategies, policies, and measures, as well as sectorial budgeting and monitoring systems, will be reflected.