

# STRATEGIC PLAN FOR THE **Zambezi Watercourse** 2018-2040



ZAMBEZI WATERCOURSE COMMISSION



win-win cooperation / cooperacao, ganhas tu, ganho eu

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Citation: ZAMCOM. 2019. Strategic Plan for the Zambezi Watercourse,  
Zambezi Watercourse Commission (ZAMCOM), Harare.

The preparation of the Strategic Plan for the Zambezi Watercourse  
was financed by the World Bank through CIWA, and Danida.

April 2019

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Front cover designed by Len Abrams

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Photographs; front cover: Cahora Bassa Dam, Mozambique; Midlands,  
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Livingstone, Zambia, Len Abrams

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### **ZAMCOM definition of the “Zambezi Watercourse”**

To align the terminology in the Strategic Plan with the 2004 ZAMCOM Agreement, the term “Zambezi Watercourse” is defined as: the system of surface and ground waters of the Zambezi constituting by virtue of their physical relationship a unitary whole flowing normally into a common terminus, the Indian Ocean. The “Zambezi Watercourse” is perceived broadly to also include the topography of the landscape and associated lands of the Zambezi River.

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## Abbreviations

CIWA	Cooperation in International Waters in Africa
CRIDF	Climate Resilient Infrastructure Development Facility
Danida	Danish International Development Assistance
DFID	UK Department for International Development
ECRAI	Enhancing the Climate Resilience of Africa's Infrastructure
GDP	Gross domestic product
GIZ	German Gesellschaft für Internationale Zusammenarbeit
GNI	Gross National Income
IIEA	Independent Integrated Economic Analysis
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
JPSC	Joint Project Steering Committee
M&E	Monitoring and Evaluation
MSIOA	The Zambezi River Basin: A Multi- Sector Investment Opportunity Analysis
NASC	National Stakeholders' Coordination Committee
OECD	Organisation for Economic Co-operation and Development
SADC	Southern African Development Community
SARDC	Southern African Research and Documentation Centre
SAPP	Southern African Power Pool
Sida	Swedish International Development Cooperation Agency
UNEP	United Nations Environment Programme
WHAT-IF	Water, Hydropower, Agriculture Tool for Investment and Financing
ZACPRO	Zambezi Action Plan Project
ZAMCOM	Zambezi Watercourse Commission
ZAMSEC	ZAMCOM Secretariat
ZAMSTRAT	Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin
ZAMTEC	ZAMCOM Technical Committee
ZAMWIS	Zambezi Water Resources Information System
ZEO	Zambezi Environment Outlook
ZRA	Zambezi River Authority
ZSP	Strategic Plan for the Zambezi Watercourse



# Foreword



On behalf of the Council of Ministers of the Zambezi Watercourse Commission (ZAMCOM), I wish to commend the Strategic Plan for the Zambezi Watercourse to the peoples of the Zambezi Watercourse. We all are

aware that the Zambezi Watercourse is one of Africa's largest and possesses the most valuable natural water assets. Being endowed with such assets, places upon us a responsibility to protect and develop them for the benefit of all our citizens including future generations.

The ZAMCOM Agreement, negotiated under the umbrella of the Revised Southern African Development Community (SADC) Protocol on Shared Watercourses of 2000, was signed in 2004 and came into force in 2011. The Agreement makes provision, in Article 8.1.(j), for the preparation of a Strategic Development Plan for the sustainable development and efficient management of the Zambezi Watercourse. I and my colleagues in the ZAMCOM Council of Ministers are proud to present this Plan in the spirit of the Agreement.

The Strategic Plan for the Zambezi Watercourse builds upon a significant body of previous studies and analysis undertaken in recent years to guide the equitable development and protection of the resources of the Zambezi Watercourse. These include the Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin (2008); The Zambezi River Basin: A Multi-Sector Investment Opportunity Analysis, undertaken by the World Bank in 2010; the Dam Synchronization and Flood Release in the Zambezi River Basin Study (2011); the Zambezi River Basin Atlas of the Changing Environment (2012); and the Zambezi Environment Outlook (2015).

The Strategic Plan has been developed over the past two years using a stakeholder consultative process with regular input from the National Stakeholder Coordination Committees from each of the Member States; guidance from a Steering Committee with representation from each of the Member States called the Joint Project Steering Committee.

Input was also sought from the Basin-wide Stakeholders' Coordination Committee and the Zambezi Basin Stakeholders' Forum.

Consultations were also made with the ZAMCOM Technical Committee, the technical arm of the organisation whose functions include implementation of ZAMCOM Council decisions through the ZAMCOM Secretariat.

Input has also been sought from the ZAMCOM Council of Ministers during their annual sessions.

The Strategic Plan provides guidance and vision for the years to come and has four main components:

- The investment in and development of infrastructure to enhance water, food and energy security;
- The support of livelihoods in the Watercourse to reduce rural poverty and poverty driven degradation of land and water resources;
- The management and protection of the environment, particularly given the threat of climate variability and change; and
- The integrated management and protection of water resources

It is imperative now that the Strategic Plan is implemented through the engagement and co-operation of all parties at national and regional levels. We invite our international development partners to join us in building a prosperous and secure future for the Zambezi Watercourse.

This Strategic Plan for the Zambezi Watercourse will now provide guidance, under the leadership of the ZAMCOM Council of Ministers, for the development of the water and related resources of the Zambezi Watercourse. As provided for in Article 14.9 of the Agreement, which states that: *"Member States shall conduct their management and development plans, projects and programmes relating to the resources of the Zambezi Watercourse in accordance with the Strategic Plan"*.

ZAMCOM Council Chair  
Hon. Dr. Dennis M. Wanchinga, MP  
**Minister of Water Development, Sanitation and Environmental Protection**

April 2019

## Preface



The Zambezi Watercourse is an expansive ecosystem whose potential for co-operation among the eight countries; Angola; Botswana; Malawi; Mozambique; Namibia; Tanzania; Zambia; and Zimbabwe

is primarily anchored in the prospective communal socio-economic development and environmental management.

It is in light of the afore mentioned potential that the 2004 Zambezi Watercourse Commission (ZAMCOM) Agreement, which came into force on 19 June 2011, provides for the preparation of the Strategic Plan for the Zambezi Watercourse (ZSP). In essence, the Agreement defines the ZSP as “a master development plan comprising a general planning tool and process for the identification, categorization and prioritization of projects and programmes for the efficient management and sustainable development of the Zambezi Watercourse”.

The ZSP acknowledges the limitations to development impinged by significantly limited and underdeveloped infrastructure in the Watercourse, notwithstanding the main strategic challenge of achieving balance between socio-economic growth that ensures environmental sustainability while minimising risks posed by climate extremes predominantly related to floods and droughts. The ZSP further admits the concern that the risks are further exacerbated by climate variability and change that pose the threat of poverty induced watercourse degradation.

Through the ZSP approach, it is imperative, that the Zambezi Watercourse Member States engaged a development pathway based that would enable maximization of economic benefits of water development in the Zambezi Watercourse whilst ensuring consistent maintenance of moderate environmental flows and providing for flood and low flows safeguard.

More importantly, the ZSP provides a platform for promoting a realization of benefits to Watercourse communities through investments at the national level on interventions that are of transboundary nature. Such investments have high potential to enhance regional dialogue on various issues that foster transboundary cooperation and integration among the Member States.

The preparation of the ZSP, through an elaborate consultative process, demonstrates the value of cooperation not only among the Member States but also with supportive international cooperating partners, particularly Danida and the World Bank.

The ZAMCOM Council of Ministers at its annual meeting on the 28 February, 2019 in Dar-es-Salaam, Tanzania impressed on ZAMCOM to promote delivery of benefits to the Watercourse communities. Above all, effective cooperation among the Member States and with various partnerships remains the mainstay of ZAMCOM's intent to facilitate the delivery of the much-anticipated benefits to Watercourse communities, through active implementation of the ZSP.

A handwritten signature in black ink, appearing to read 'Mutale'.

Michael Mutale  
Executive Secretary  
Zambezi Watercourse Commission (ZAMCOM)  
April, 2019

# Acknowledgements

The completion of the development of the Strategic Plan for the Zambezi Watercourse (ZSP) is a significant milestone for the Zambezi Watercourse Commission (ZAMCOM). The approval of the ZSP, by the ZAMCOM Council of Ministers at their meeting on 28 February 2019, henceforth provides guidance, at the highest level, towards development and management of water resources of the Zambezi Watercourse. The ZSP is geared to also promote all-inclusive cooperation not only among the Member States, per se, but largely in the whole lot of the Southern African Development Community (SADC). In essence, the ZSP will significantly contribute towards the realisation of the ZAMCOM objective of *“promoting the equitable and reasonable utilisation of the water resources of the Zambezi Watercourse as well as the efficient management and sustainable development thereof”*.

The development of the ZSP would not have been possible without the involvement of a cross-section of stakeholders that included: National Stakeholders' Coordination Committees (NASCs) at national levels; ZAMCOM Technical Committee (ZAMTEC); International Cooperating Partners; and the ZAMCOM Council of Ministers. An elaborate consultative process was engaged in the development of the ZSP.

ZAMCOM, therefore, wishes to acknowledge and thank all stakeholders that actively took part in shaping the ZSP. Without the input from the Member States through NASCs, the ZSP would have lacked ownership and buy-in from the potential implementers of the Plan. NASCs are specially commended for the unwavering support and guidance during country consultations. The Member States prioritised the needs of the consultation process and allowed NASC dialogue meetings to take place despite other pressing national priorities.

Another group of stakeholders to whom ZAMCOM is grateful for their valuable input into the ZSP development process are members of the Basin-wide Stakeholders' Coordination Committee which included representatives from partner organisations and NASC focal persons.

ZAMCOM is also indebted to the Joint Project Steering Committee (JPSC) for the cardinal role it played in

the review of the various ZSP outputs ranging from the Inception, the Situation Analysis and Strategic Directions, Basin Development and Infrastructure Inventory, Basin Development Scenarios, Basin Investment Scenarios, Draft Strategic Plan, Final Strategic Plan reports and the Online Monitoring and Implementation Tool. Furthermore, the JPSC facilitated multi-stakeholder consultation and information-sharing within the ZAMCOM Member States on the progress and implementation of the ZSP consultancy.

The ZAMTEC was instrumental in the approval process of the various outputs. The critical review and input of ZAMTEC contributed to the timely completion of the development of the ZSP. ZAMTEC reviewed and recommended the document for approval by ZAMCOM Council of Ministers – the final ZSP.

ZAMCOM wishes to thank the International Cooperating Partners especially Danida and World Bank (through Cooperation in International Waters for Africa (CIWA)) – for the generous financial contribution to the development of the ZSP, over the two years, besides other operational costs. ZAMCOM wishes to assure the International Cooperating Partners that the ZSP will remain a living document that will further revolutionise the development and management of water resources in the Watercourse.

ZAMCOM Council of Ministers is highly commended for their support of the ZSP and its development process which led to them authenticating it.

ZAMCOM hopes that the implementation of the ZSP will cherish the same support rendered during its development. Our trust is that the Member States will take the lead in the implementation of the Plan and as Secretariat we will provide the requisite support, accordingly.



Eng. Kenneth Nyundu  
ZAMTEC Chair  
April, 2019





# EXECUTIVE SUMMARY

## INTRODUCTION

Zambezi near Livingstone, Zambia / Len Abrams

The Zambezi Watercourse Commission (ZAMCOM) Agreement, which came into force on 19 June 2011, provides for the preparation of a strategic development plan, including a general planning tool for the identification, categorisation and prioritisation of projects and programmes for the sustainable development and efficient management of the Zambezi Watercourse.

ZAMCOM has accordingly prepared the Strategic Plan for the Zambezi Watercourse under which all activities of ZAMCOM and the ZAMCOM Secretariat (ZAMSEC) fall and which incorporates all other programmes and activities of the Commission.

The preparation of the Strategic Plan has been undertaken by ZAMCOM with the technical support of international expertise and the financial support of the World Bank and the Danish International Development Assistance (Danida), through a process including national consultations within the Member States of the Zambezi Watercourse. The preparation of the Strategic Plan has been built upon and incorporates work previously undertaken by ZAMCOM and takes into account the national and sectoral plans of the Member States.

### THE ZAMBEZI WATERCOURSE

The Zambezi Watercourse is shared by eight Member States – Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe. The total population of the eight Member States is estimated at just over 173 million, of which an estimated 28% (47 million) live within the Zambezi Watercourse. The economies of the Member States are growing and are varied, depending primarily on rain-fed agriculture and extractive industries.

### THE STATE OF THE ZAMBEZI WATERCOURSE

The Zambezi Watercourse is largely undeveloped with limited major infrastructure, the most recent of which was built 40 years ago. Currently total water withdrawals amount to 15% of the total average flow.

The main strategic issue faced in the Watercourse is achieving the balance between economic growth (inclusive of ensuring environmental sustainability) and the risk of droughts and floods posed by a historically highly variable climate, a risk which is predicted to be further exacerbated by climate change.

Poverty and poverty-induced degradation of the Watercourse are jointly the largest threats to the people, the ecosystems and future development of the Watercourse. This degradation is likely to intensify unless a concerted effort is made to improve the livelihoods of the poorest sectors of the population, who make up more than two thirds of the people living in the Watercourse and are mostly engaged in smallholder rain-fed agriculture, accounting for 96% of agricultural activity.

Poverty-induced degradation has resulted in 51% of land in the Zambezi Watercourse becoming moderately degraded and 14% highly degraded, with growing negative impacts on the population and on water resources.

### FUTURE DEVELOPMENT

There are sufficient water resources in the Zambezi to support the implementation of the current investment plans of the Member States, **assuming future climate conditions remain consistent with historical mean climate conditions observed in the Watercourse.**



This is an important finding from previous phases of the preparation of the Strategic Plan, which included extensive hydro-economic modelling. This modelling explored the existing and future planned development of the Watercourse under different scenarios of environmental protection and disaster management in the context of both historic climate conditions and potential future climate change conditions. Given the current relatively under-utilized water resources of the Watercourse, the planned level of development will increase the total withdrawals to 31% of the historical mean flow, which is generally regarded as still falling below the threshold of water scarcity. **However, there are indications that under dry future climate scenarios, there will be water scarcity in some reaches of the Watercourse.**

Based on these results, a future preferred development pathway was decided on, upon which the Strategic Plan has been based:-

**Maximise the economic benefits of water development in the Zambezi Watercourse, subject to the constraints of ensuring the maintenance of moderate environmental flows and provision of flood protection.**

The impact of environmental protection is a function of watercourse-wide management. The environmental protection objective will be achieved with minimal impact on irrigation and power production only if there is operational coordination and co-operation between Member States and specific infrastructure assets (dam synchronisation etc.). If there is no co-operation, achieving these desired environmental and flood protection objectives may result in significant negative impacts on energy and food production objectives.

Climate change is a major threat to investment performance assuming full development in the Watercourse. However ZAMCOM-led collaboration and synchronization of operational activities across the Watercourse have the potential to reduce climate change impacts. Long-term development planning will need to be adapted as actual changes to the climate become apparent.

### THE DEVELOPMENT OBJECTIVES OF THE STRATEGIC PLAN

The Development Objectives of the Strategic Plan for the Zambezi Watercourse are:

*To promote and facilitate:*

- |          |   |
|----------|---|
| <b>A</b> | Regional co-operation and good neighbourliness;   |
| <b>B</b> | Development and utilisation of the resources of the Zambezi Watercourse for equitable economic growth and prosperity;     |
| <b>C</b> | Sustainable and ecologically sound development and utilisation of the resources of the Zambezi Watercourse;               |
| <b>D</b> | Climate resilient infrastructure and development, and to manage and reduce risk to investments and to society at large;   |
| <b>E</b> | Public access to sufficient and safe water supplies, and related essential services, for basic needs and livelihoods; and |
| <b>F</b> | Capital mobilisation and investment finance.  |

## CORE COMPONENTS OF THE STRATEGIC PLAN

The Strategic Plan has four Core Components through which these different Development Objectives will be achieved. The Core Components are described in Box 1.

## BOX 1: CORE COMPONENTS OF THE STRATEGIC PLAN

1	Infrastructure Investment 	<p>Investment in water related infrastructure is required throughout the Watercourse in order to underpin economic and social development and contribute towards achieving the national development goals and aspirations of the Member States. Investment plans included in the Strategic Plan are based on the priorities and national plans determined by Member States within the parameters of the agreed investment scenario. The investment plan is distributed over two planning horizons: Short term – 2018-2027 and Medium term – 2028-2040.</p> <p>In line with the increasingly widely used Nexus Approach to development, the Infrastructure Investment Component has 4 Programmes:</p> <ul style="list-style-type: none"> <li>• Hydropower;</li> <li>• Agricultural Water;</li> <li>• Water Supply Services; and</li> <li>• Catchment &amp; Natural Asset Management.</li> </ul>
2	Livelihoods Support 	<p>Poverty and its impact on the Zambezi Watercourse are the most pervasive problems facing the inhabitants of the Watercourse. Increasing the availability of water for smallholder farmers and improving rain-fed agriculture practices, together with catchment management and conservation investments, will both improve rural livelihoods and reduce environmental degradation. Livelihood support will be conducted in such a way as to support wider gender mainstreaming efforts in marginalized communities. Livelihood support will enhance the resilience of the region as a whole, whilst reducing the negative impacts of degradation of the Watercourse (e.g. high sediment loads, rapid siltation of reservoirs etc.).</p>
3	Environmental Resources Protection and Utilization 	<p>In keeping with the stated Development Objectives and the ZAMCOM Agreement, development and management of the Watercourse will ensure the sustainable protection and conservation of natural riverine and aquatic ecosystems and resources. Instream flow targets will to be set and monitored, together with the monitoring of specific systems such as wetlands and the delta.</p>
4	Water Resources Management 	<p>The Zambezi Watercourse is large and complex, with its water resources requiring collaborative management across the relevant Member States. Many of the required systems and networks needed to undertake these tasks have already been established by ZAMCOM, such as the Zambezi Water Resources Information System (ZAMWIS) and the Decision Support System.</p>
Institutional Foundation 		<p>This includes governance and management, harmonisation of policy and legislation in the Member States, together with the activities required to strengthen co-operation, communications, capacity development and gender mainstreaming.</p>





### THE ROLE OF ZAMCOM

The role of ZAMCOM is to promote and support the sustainable development and efficient management of the Zambezi Watercourse for the equitable benefit of all the inhabitants, in terms of the ZAMCOM

Agreement. This includes the promotion of regional integration and co-operation between Member States. The principal instrument of ZAMCOM by which it will perform this role, in terms of the Agreement, is through the Strategic Plan.

The role of ZAMCOM will be as follows:

- To ensure that the principles of developing trans-boundary waters, as enshrined in the ZAMCOM Agreement, are observed, that is:
  - The principle of equitable and reasonable utilisation of shared water resources;
  - The duty to prevent significant transboundary harm; and
  - The general duty to cooperate.
- To provide an agreed platform and process for notification and resolution of notification-related issues and disputes, if these should arise;
- To promote transboundary integration and dialogue on infrastructure-related issues, together with regional bodies such as the Southern Africa Power Pool, Southern African Development Community (SADC), etc;
- To support Member States in transboundary water economics analysis, project preparation, project financing, and transaction management etc.;
- To promote investments in the Watercourse on the international stage and to attract investors, working in close collaboration with Member States and development partners; and
- To ensure that the design and implementation of investments meet the environmental and disaster risk management criteria agreed to in this Strategic Plan and subsequent amendments, including making provision for their ongoing monitoring;

- To monitor changes in climate over time and advise Member States on the implications of changes in climate, including adaptations needed to plans and project design;
- To promote and oversee the joint and cooperative operation of infrastructure on the Watercourse, including such activities as dam synchronisation; and
- To provide watercourse-wide oversight of the long-term planning of infrastructure development using the Decision Support System tools developed by ZAMCOM for this purpose.

### FUNCTIONS AND ACTIVITIES OF ZAMCOM

ZAMCOM is not an infrastructure implementing agency – infrastructure development projects will be implemented either individually at the national level or, in the case of joint projects, together with two or more Member States. In order to support the implementation of the Strategic Plan, the ZAMSEC will be strengthened to provide a range of specialised support to Member States for national, joint and watercourse-wide projects, especially in the infrastructure development and livelihoods components of the Plan.

The support functions and activities which will need to be undertaken by ZAMCOM are indicated in Box 2.

## BOX 2: ZAMCOM SUPPORT FUNCTIONS AND ACTIVITIES

1	Infrastructure Investment 	<ul style="list-style-type: none"> <li>● <b>Infrastructure development support unit</b> <ul style="list-style-type: none"> <li>• Economics of transboundary water</li> <li>• Support project design and preparation</li> <li>• Support project financing and packaging</li> <li>• Transaction management support</li> </ul> </li> </ul>
2	Livelihoods Support 	<ul style="list-style-type: none"> <li>● <b>Livelihood programme support unit</b> <ul style="list-style-type: none"> <li>• Poverty 'hot-spot' identification</li> <li>• Livelihood research and analysis</li> <li>• Livelihood project support</li> </ul> </li> </ul>
3	Environmental Resources Protection and Utilization 	<ul style="list-style-type: none"> <li>● <b>Environmental health monitoring</b> <ul style="list-style-type: none"> <li>• Watercourse-wide monitoring</li> <li>• Sensitive areas (wetlands, delta, head-waters etc.)</li> <li>• Degradation hot-spots</li> </ul> </li> <li>● <b>Managing environmental impacts of investments</b> <ul style="list-style-type: none"> <li>• Establishing environmental impact guidelines</li> <li>• Engagement in project design and implementation</li> <li>• Monitoring of in-stream flow requirements</li> <li>• Support to operational co-operation and communication</li> </ul> </li> </ul>
4	Water Resources Management 	<ul style="list-style-type: none"> <li>● <b>Water resources management</b> <ul style="list-style-type: none"> <li>• Water data capture, and management including ZAMWIS</li> <li>• Decision Support Systems</li> <li>• Knowledge management</li> </ul> </li> <li>● <b>Notification coordination and support</b></li> <li>● <b>System operational oversight to promote coordinated energy production</b></li> <li>● <b>Policy and legislation support &amp; harmonisation</b></li> <li>● <b>Disaster risk management</b></li> <li>● <b>Climate change monitoring, including –</b> <ul style="list-style-type: none"> <li>• 'Climate Watch' function</li> <li>• Climate change knowledge function</li> </ul> </li> </ul>
	Institutional Foundation 	<ul style="list-style-type: none"> <li>● <b>Governance, co-operation and regional integration</b></li> <li>● <b>Communications</b></li> <li>● <b>Gender mainstreaming</b></li> <li>● <b>Capacity development</b></li> </ul>

### FINANCING

There are three principal areas of financing required for the implementation of the Strategic Plan for the Zambezi Watercourse. These are:-

- The financing of infrastructure projects included in Component 1: Infrastructure Investment and Component 2: Livelihoods Support portions of the Plan. Infrastructure projects will be financed and implemented at Member State level with the support of ZAMCOM through the proposed Infrastructure Development Support Unit;
- Financing of non-infrastructure activities and functions under Component 3: Environmental Resources Protection and Utilization and Component 4: Water Resources Management portions of the Plan. Finance will be sought jointly by Member States and by ZAMCOM; and
- Funding functions and activities of ZAMCOM and its organs.

ZAMCOM will provide support to Member States to prepare projects to international standards, framed in such a way as to be attractive to foreign investment, and to identify and package finance and investment resources from all possible sources, both private and public.

ZAMCOM will work in close collaboration with a variety of other organisations and institutions to achieve the Development Objectives of the ZAMCOM Agreement through the Strategic Plan. Such institutions include multi-lateral development agencies such as the World Bank and the African Development Bank; bi-lateral agencies such as Danida, the UK Department for International Development (DFID), the Swedish International Development Cooperation Agency (Sida), the German Gesellschaft für Internationale Zusammenarbeit (GIZ) etc; regional development programmes such as Climate Resilient Infrastructure Development Facility (CRIDF) and the SADC Water Fund, and such initiatives as the African Water Facility, and Cooperation in International Waters in Africa (CIWA) (World Bank), etc.

Some basins in the region are faced with similar issues to those experienced by the Zambezi Watercourse. ZAMCOM will therefore seek close working relationships with river basin organisations such as OKACOM (the Permanent Okavango River Basin Water Commission), ORASECOM (the Orange-Senqu River Commission) and LIMCOM (Limpopo Watercourse Commission) with the possibility of developing shared capacity between the key basin organisations of the Southern African region.

### STRUCTURE OF THE STRATEGIC PLAN

The Strategic Plan is comprised of two parts:

- Executive Summary
- Strategic Plan for the Zambezi Watercourse (this document)

Accompanying this Strategic Plan are the following background reports and tools:

- Situation Analysis and Strategic Directions Report;
- Basin Development Scenarios Report;
- Basin Investment Scenarios Report; and
- Online Monitoring and Implementation Tool.



# 1 INTRODUCTION

## 1.1 STATUS OF THE STRATEGIC PLAN FOR THE ZAMBEZI WATERCOURSE

The Zambezi Watercourse Commission (ZAMCOM) Agreement was signed in Kasane, Botswana on 13 July, 2004. The Agreement came into force on June 19, 2011 after six of the eight Member States had deposited their ratification instruments with the Southern African Development Community (SADC) Secretariat.

The ZAMCOM Agreement makes provision, in Article 8.1.(j), for the preparation of a strategic development plan, which includes a general planning tool for the identification, categorisation and prioritisation of projects and programmes for the sustainable development and efficient management of the Zambezi Watercourse.

The ZAMCOM Agreement provides the legal mandate for the preparation and implementation, in close collaboration with the Member States, of the Strategic Plan for the Zambezi Watercourse. Article 14.9 states that *“Member States shall conduct their management and development plans, projects and programmes relating to the resources of the Zambezi Watercourse in accordance with the Strategic Plan”*.

The Strategic Plan for the Zambezi Watercourse is the primary plan in terms of the ZAMCOM Agreement, under which all activities of ZAMCOM and the ZAMCOM Secretariat (ZAMSEC) fall and which incorporates all other programmes and activities of the Commission.

## 1.2 PURPOSE OF THE STRATEGIC PLAN

Based on the ZAMCOM Agreement, it is necessary for the shared future of all the people of the Zambezi Watercourse, and for the preservation of the wealth of the natural resources of the Watercourse, to ensure that development is undertaken in a planned and mutually agreed fashion. For this to be achieved, a flexible plan is required which equitably reflects the needs and aspirations of all the Member States and to which all parties consent. The objective in preparing the Strategic Plan for the Zambezi Watercourse is therefore to prepare an evidence-based, scientifically and technically sound Plan based on extensive hydro-economic modelling and drawing on an existing body of previous studies, which has been widely consulted upon with stakeholders throughout the Watercourse.

## 1.3 STRUCTURE OF THE STRATEGIC PLAN

The Strategic Plan is comprised of two parts:

- Executive Summary
- Strategic Plan for the Zambezi Watercourse (this document)

Accompanying this Strategic Plan are the following background reports and tools:

- Situation Analysis and Strategic Directions Report;
- Basin Development Scenarios Report;
- Basin Investment Scenarios Report; and
- Online Monitoring and Implementation Tool.

## 1.4 PROCESS OF DEVELOPMENT OF THE STRATEGIC PLAN

The Strategic Plan for the Zambezi Watercourse was developed by ZAMCOM, managed by ZAMSEC, in consultation with the Member States and development partners. The development of the Plan was financed by the World Bank through CIWA (Cooperation in International Waters in Africa) as a recipient executed activity. The technical activities required to prepare the Strategic Plan were undertaken by a consortium of consulting firms procured under international tender.

The project was overseen by the Joint Project Steering Committee (JPSC), comprising of senior officials from each of the Member States. Meetings of the National

Stakeholders' Coordination Committee (NASC) in each of the Member States were held at key points in the process of developing the Strategic Plan – see Figure 1.

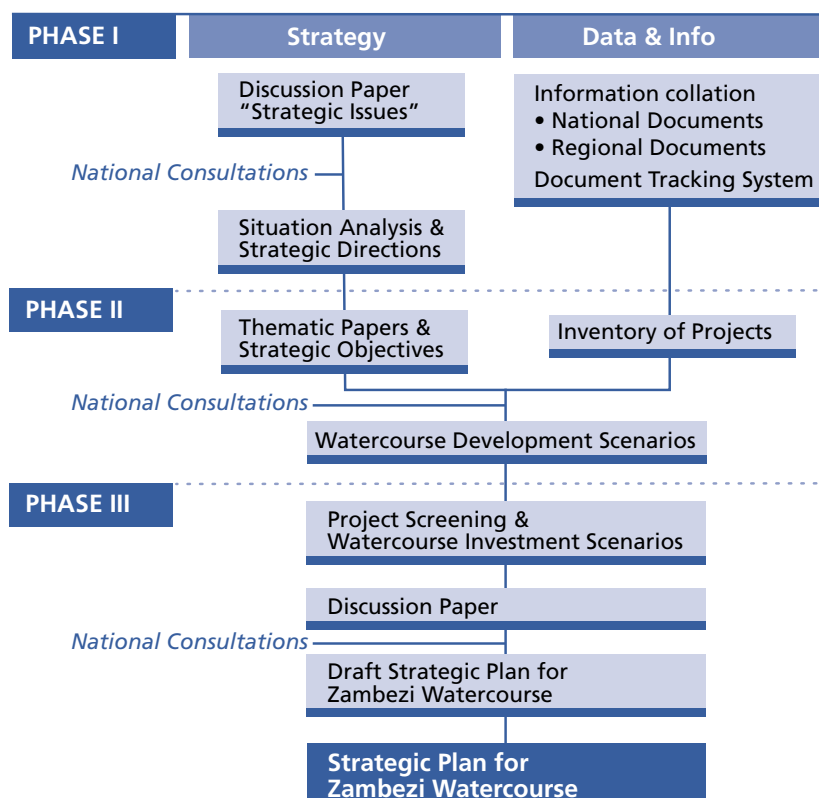
The process of developing the Strategic Plan included three phases:

**Phase 1:** Analysis of the current situation in the Zambezi Watercourse;

**Phase 2:** Determination of future development options; and

**Phase 3:** Preparation of the Strategic Plan.

FIGURE 1: STRATEGIC PLAN PREPARATION PROCESS







Chobe River, Kasane, Botswana / Peter Qwist-Hoffmann

## 2 THE INSTITUTIONAL CONTEXT

The following section provides a summary of the legal and institutional context in which the Strategic Plan for the Zambezi Watercourse will be implemented.

### 2.1 GOVERNANCE OF ZAMCOM

#### 2.1.1 Council of Ministers

In terms of the ZAMCOM Agreement, the primary governance structure of the Commission is the Council of Ministers, made up of the Ministers responsible for water resources management and development from each of the Member States. The Council is responsible for overseeing the implementation of the plans, programmes and projects of the Commission – Article 8.1.(b).

#### 2.1.2 Technical Committee – ZAMTEC

The Council is advised by the ZAMCOM Technical Committee (ZAMTEC), made up of up to three representatives from each Member State. In terms of Article 10.1.(b), the Technical Committee is responsible for developing and recommending the Strategic Plan for the Zambezi Watercourse to the Council and for assigning tasks to, and supervising the work of the Secretariat (Article 10.2.(g)).

#### 2.1.3 The ZAMCOM Secretariat – ZAMSEC

The key functions of the ZAMCOM Secretariat, in terms of the Agreement, are to provide technical and administrative services to the Council under the Technical Committee's supervision; and to facilitate the implementation of the Strategic Plan, annual work programmes, plans, studies, assessments and other activities required for the implementation of the Agreement – Article 11.6.(a) & (b).

An interim Secretariat was established in 2011. The permanent Secretariat was established in 2014 and is currently situated in Harare, Zimbabwe, with a staff of eight people including the Executive Secretary.

Looking to the future, ZAMSEC will continue to be suitably structured and staffed to be able to fulfil its mandate, a major element of which is to successfully implement the Strategic Plan. As the main thrust of the Strategic Plan is the development of infrastructure to underpin the economies of the Member States, additional areas of expertise will be needed within the Secretariat, including planning, economics and transaction management. This is discussed further in Section 7.3 below.

### 2.2 INTERNATIONAL WATERCOURSE CONTEXT

The ZAMCOM Agreement adopts internationally accepted procedures and frameworks for transboundary water management and development, underpinned by the SADC Revised Protocol on Shared Watercourses (2000), as well as international water law principles. These determine the scope of water-related activities at watercourse and national levels – the ZAMCOM Agreement distinguishes between an activity which is purely the concern of an individual Member State, and an activity which impacts other Member States and is therefore a matter of concern under the ZAMCOM Agreement. In general terms, water-related activities become the concern of ZAMCOM if they potentially impact more than one Member State within the Watercourse.

## 2 THE INSTITUTIONAL CONTEXT

This could include:-

- A project or portfolio of projects which is jointly implemented by two or more Member States;
- A national project which is implemented on – or abstracts water from – a shared river or water resource (this could include the cumulative impact of a number of small projects, each of which individually would not have an appreciable impact);
- A project which is implemented at national level by a Member State, but which has significant regional benefits or which requires an offtake agreement;
- Water-related projects which address an issue or problem which is common to multiple Member States; and /or
- A project which results in a transfer of water out of the Watercourse.

In planning water-related development projects which might have transboundary implications, Member States are required to take all reasonable steps to ensure that each State is adhering to the three key rules or principles of international law, as enshrined in the ZAMCOM Agreement:

- The principle of equitable and reasonable utilisation;
- The duty to prevent significant transboundary harm; and
- The general duty to cooperate.

The ZAMCOM Agreement therefore provides the legal context for the development and implementation of the Strategic Plan for the Zambezi Watercourse, and the functioning of the ZAMSEC in supporting the implementation of the Strategic Plan.

### 2.3 PREVIOUS ZAMCOM PROCESSES

An initial strategy for the operationalisation of the ZAMCOM Agreement was prepared under the SADC supported ZACPRO project (ZACPRO 6.2). This culminated in the preparation of an Integrated Water Resources Management (IWRM) Strategy and Implementation Plan for the Zambezi River Basin (ZAMSTRAT), which was completed in 2008 and republished in 2016 entitled “ZAMSTRAT at a Glance”. The strategy was constructed around four “Challenges” as follows:

- A** Integrated and Coordinated Water Resources Development and Management;
- B** Environmental Management and Sustainable Development;
- C** Adaptation to Climate Variability and Climate Change; and
- D** Basin-wide Co-operation and Integration.

In addition to the development of ZAMSTRAT, there have been a number of other programmes and activities, all of which have contributed towards the development of the Strategic Plan for the Zambezi Watercourse. These are listed in Table 1.



**TABLE 1: KEY ACTIVITIES UNDERTAKEN IN THE ZAMBEZI WATERCOURSE IN RECENT YEARS**

Activity	Objective	Conclusions & Achievements
<b>2010:</b> The Zambezi River Basin: A Multi-Sector Investment Opportunities Analysis (MSIOA) – World Bank	To illustrate the benefits of co-operation among the Member States in the Zambezi Watercourse through a multi-sectoral economic evaluation of water resources development, management options and scenarios — from both national and watercourse-wide perspectives.	<ul style="list-style-type: none"> <li>Coordinated operation of the Southern African Power Pool system of hydropower facilities could provide an additional 23% generation over uncoordinated (unilateral) operation.</li> <li>Assuming full co-operation of Member States, a reasonable balance between hydropower and irrigation investment could be achieved while providing a level of flood protection and part restoration of natural floods in the Lower Zambezi.</li> </ul>
<b>2011:</b> ZAMCOM Interim Secretariat established	To provide an interim arrangement before ratification.	The arrangement permitted the continuation of ZAMCOM activities and an operational base for setting up the permanent Secretariat.
<b>2011:</b> Dam Synchronization and Flood Release in the Zambezi River Basin – SADC	To determine how dams and water management measures in the Zambezi Watercourse can contribute to safeguarding lives, livelihoods and nature while enabling further sustainable development at reasonable costs.	Implementing recommendations could lead to: <ul style="list-style-type: none"> <li>Good governance, communication and enhancement of dam operations;</li> <li>Improved, regulated releases from main reservoirs which would improve livelihoods and environmental flows; and</li> <li>Watercourse-wide flow forecasting and information exchange resulting in improved management of the water resources and floods for the benefit of power production, dam safety, disaster management, the environment and livelihoods.</li> </ul>
<b>2012:</b> The Zambezi River Basin Atlas of the Changing Environment – SADC, SARDC, ZAMCOM, GRID-Arendal and UNEP	To provide scientific evidence of changes in natural resources and the environment for use by policy makers and other stakeholders, to generate climate resilient action through adaptation and mitigation of the impacts of climate change.	The first of its kind in Southern Africa, the Atlas concludes with 31 key findings and 10 recommendations.
<b>2014:</b> Permanent ZAMCOM Secretariat established	To provide a permanent institutional base through which the objectives of the ZAMCOM Agreement can be achieved.	The establishment of the Permanent ZAMCOM Secretariat marks a milestone in decades of work undertaken by the Member States, SADC and many partners. The Secretariat must now operationalise and implement the objectives of the ZAMCOM Agreement.
<b>2014:</b> Hydropower Policy Brief – Energy Research Centre, University of Cape Town et al.	To address the major uncertainties facing hydropower development in the Zambezi Watercourse, and to deepen understanding among stakeholders of the risks to hydropower from changes in climate and increased upstream water demand.	Climate change will have a major future impact on hydropower potential, as will increased irrigation and other demands. Different future climate scenarios will affect the key installations (Kariba, Cahora Bassa, Batoka Gorge and Mphanda Nkuwa) differently, resulting in different degrees of vulnerability and reduction in energy production.
<b>2015:</b> Zambezi Environment Outlook – ZAMCOM, SADC and SARDC	To provide an integrated analysis of the shared natural resources of the Zambezi Watercourse, taking into account ecological, social and economic issues, in order to achieve a balance between human demand on natural resources and the natural environment's ability to meet those demands.	By 2040, the vision is to have a regionally integrated and sustainable Watercourse ecosystem that supports various human socio-economic activities but with a sound infrastructure and stable biodiversity. Continuing on the current trajectory is not a good option and major policy interventions are needed to bend the curve towards the outlined sustainability goals and targets.

TABLE 1: KEY ACTIVITIES UNDERTAKEN IN THE ZAMBEZI WATERCOURSE IN RECENT YEARS continued

Activity	Objective	Conclusions & Achievements
<b>2016:</b> ZAMSTRAT at a glance – ZAMCOM	The objective of the Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi Basin is to ensure equitable sustainable utilization of water for social and environmental justice, regional integration and economic benefit for present and future generations.	“ZAMSTRAT at a Glance” captures the salient aspects of the Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin and is a quick and easy-to-use reference resource for general use.
<b>2016:</b> Rules and Procedures for the Sharing of Data and Information – ZAMCOM	To ensure that relevant and quality assured data and information are shared in a timely fashion between the Member States in order to facilitate that the Member States – through ZAMCOM – will be able to take informed decisions in relation to the planning and management of the shared water resources in the Zambezi Watercourse.	The adoption of the Rules and Procedures marks an important milestone in co-operation in the Zambezi Watercourse and opens the way to improved management and development of the shared water resources to the benefit of all.
<b>2016:</b> Southern Africa Energy-Water Nexus Background Paper – World Bank	To provide high-level background information on the interdependency between the supply of electricity and water in Southern Africa.	The paper specifically does not seek to make any recommendations on policy alternatives to tackle challenges facing the region on water-energy-food nexus issues.
<b>Ongoing</b> ZAMWIS – Zambezi Water Resources Information System	To provide the Member States with an efficient and timely means of sharing data and information on water resources in the Watercourse, and to support water resources strategic planning in the Watercourse for mutual benefit of all Member States in the Watercourse.	ZAMWIS is an important tool which will provide on-going benefits to ZAMCOM and the Zambezi Member States. It requires continuous management and updating to remain current and to make best use of advancing technology.

## 2.4 NATIONAL PLANS OF MEMBER STATES

Each of the Member States have a range of national and sectoral plans and strategies which they are pursuing. These are multi-year plans which reflect the vision and ambitions of each Member State. The relevant national plans are identified in Table 2.

TABLE 2: NATIONAL DEVELOPMENT PLANS (Multiple sources)

Nation	National Development Plan	Period covered	Date issued
Angola	<ul style="list-style-type: none"> <li>National Development Plan</li> <li>Republic of Angola: National Indicative Programme – European Union</li> <li>Partnership Framework between the Government of Angola and the United Nations System</li> </ul>	2013-2017 2014-2020 2015-2019	2000 – revised 2005 & 2010
Botswana	<ul style="list-style-type: none"> <li>National Development Plan 11</li> </ul>	2017-2023	September 2016
Malawi	<ul style="list-style-type: none"> <li>Malawi Growth and Development Strategy III</li> <li>Vision 2020: The National Long-term Development Perspective</li> </ul>	2017-2022 → 2020	November 2017
Mozambique	<ul style="list-style-type: none"> <li>Republic of Mozambique: National Indicative Programme – European Union</li> <li>Republic of Mozambique: Country Strategy Paper</li> </ul>	2014-2020 2011-2015	November 2015 August 2011
Namibia	<ul style="list-style-type: none"> <li>Namibia's 4th National Development Plan</li> <li>Namibia Vision 2030: Policy Framework for Long-term National Development</li> </ul>	2012-2017 → 2030	2012 2004
Tanzania	<ul style="list-style-type: none"> <li>National Five-year Development Plan</li> <li>The Tanzania Development Vision 2025</li> </ul>	2016-2021 → 2025	June 2016
Zambia	<ul style="list-style-type: none"> <li>Seventh National Development Plan</li> <li>Republic of Zambia: Vision 2030</li> </ul>	2017-2021 → 2030	June 2017 December 2006
Zimbabwe	<ul style="list-style-type: none"> <li>Zimbabwe Agenda for Sustainable Socio-Economic Transformation (Zim-Asset)</li> </ul>	2013-2018	October 2013



Mulanje, Malawi / Len Abrams

## 3 THE CURRENT SITUATION IN THE ZAMBEZI WATERCOURSE

The following section provides a summary of the current situation in the Zambezi Watercourse.

### 3.1 GEO-POLITICAL DESCRIPTION OF THE ZAMBEZI WATERCOURSE

All the Member States in the Zambezi Watercourse are members of the SADC. Membership of SADC includes assent to and adoption of a number of related treaties, agreements and development strategies.

The Objectives of SADC are to achieve economic development, peace and security, growth, poverty reduction, enhance the standard and quality of life of the peoples of Southern Africa, and support the socially disadvantaged through Regional Integration. These objectives are to be achieved through increased Regional Integration, built on democratic principles, and equitable and sustainable development.<sup>1</sup>

The ZAMCOM Agreement was facilitated by SADC and is based on the SADC Revised Protocol on Shared Watercourses (2000). The timeframe of the Strategic Plan is timed to coincide with the SADC Regional Infrastructure Development timeframes.

The Zambezi Watercourse is shared by the eight Member States of Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe, as shown in Table 3. The total population of the eight Member States is estimated at just over 173 million (World Bank, 2017). It is estimated that 28% of the population of the Member States live within the Zambezi Watercourse area,<sup>2</sup> representing over 47 million people.

The majority of the people, about 85%, live in three of the Member States: Malawi, Zimbabwe, and Zambia (World Bank, 2010). Operation and control of the Zambezi Watercourse and its resources are shared among the eight Member States.

The Watercourse and the location of the eight Member States is illustrated on the map provided as Figure 2.

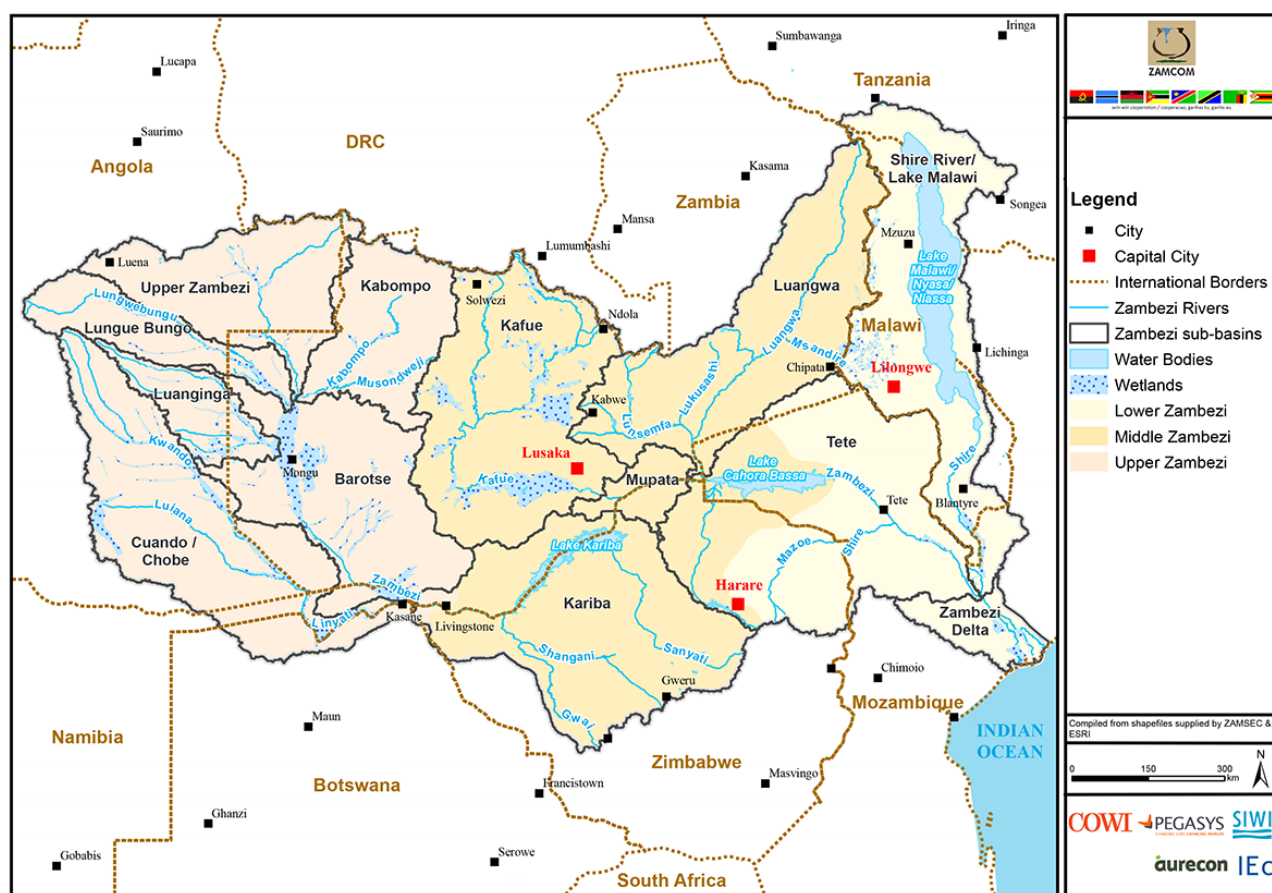
1. SADC web site: [www.sadc.int](http://www.sadc.int) – December 2018.

2. This estimate is based on the population statistics of 1998, used as a baseline by ZAMCOM, SADC and SARDC (2015).

**TABLE 3: PERCENTAGE OF ZAMBEZI WATERCOURSE AREA OCCUPIED BY EACH MEMBER STATE**  
(ZAMCOM, SADC AND SARDC, 2015)

Country	Country area within Watercourse	Area of Watercourse occupied by country	Total country population (million)	Population in Watercourse (million)	Rural population (country)	
					2007	2017
Angola	20.5%	18.5%	30	0.9	62%	54%
Botswana	3.3%	1.4%	2.3	0.02	44%	42%
Malawi	93.4%	8.0%	19	16.6	85%	83%
Mozambique	20.5%	11.8%	30	6.5	70%	67%
Namibia	2.1%	1.2%	2.5	0.08	61%	51%
Tanzania	2.9%	2.0%	57	2.1	74%	67%
Zambia	76.8%	41.6%	17	10.6	63%	58%
Zimbabwe	55.2%	15.6%	17	10.5	66%	68%
TOTALS			174	47.3	69.9%	65.3%

FIGURE 2: ZAMBEZI WATERCOURSE MAP (ZAMCOM, 2017)





## 3 THE CURRENT SITUATION IN THE ZAMBEZI WATERCOURSE

### 3.2 HYDROLOGY

The climate of the Watercourse varies throughout, with the Kalahari Desert to the south and tropical rainforests in the north. Rainfall also varies, from arid conditions (less than 500mm/year) to sub-tropical (over 1500 mm/year). Rainfall is also subject to large variations between seasons and from year to year, resulting in extremes of drought and flooding. Evaporation rates are high, especially in the west of the Watercourse, such that only about 10% of the runoff reaches the Indian Ocean due to evaporative losses from wetlands and lakes (ZAMCOM, SADC and SARDC, 2015).

The Zambezi Watercourse can be categorised into three distinct stretches (upper, middle, and lower Zambezi), which are divided into 13 sub-watercourses representing the major tributaries. The Watercourse's main stem originates in the Kalene Hills in northwest Zambia and, after about 2,600 km, reaches the Indian Ocean at the Zambezi Delta in Mozambique. The mean annual runoff, into the Indian Ocean is about 130 km<sup>3</sup>/year (World Bank, 2010).

### 3.3 THE ECONOMY OF THE WATERCOURSE

Agriculture contributes the highest percentage to gross domestic product (GDP) in Tanzania (31%), Malawi (30%) and Mozambique (25%) compared to the other Member States. In Botswana and Namibia, arid conditions make arable land a scarce resource.

In Angola, the economy is largely dependent on the extractive sector. Most of the Member States, particularly Botswana, Zambia, and more recently Tanzania and Mozambique, have significant ventures in extractive industries, chiefly in coal, gold and copper.

Most GDP revenue is concentrated in the service sector for the majority of the Member States. Table 4 provides a summary of key economic data for the individual Member States.

An estimated 65-70% of the population living in the Watercourse are engaged in small scale, rain-fed agriculture, which, in terms of the numbers of people involved, is the principal economic activity within the Watercourse. However, because of the low level of investment and the informal nature of the majority of the rural economy, this is generally not factored into the formal GDP of the Member States. The principal formal economic activities in the Watercourse, (in addition to the economic activities in the cities and towns) are hydropower generation, commercial agriculture (both irrigated and rain-fed), tourism and small scale agricultural activity (mainly rain-fed).

### 3.4 POVERTY

Poverty is at critical levels amongst the rural populations of the Zambezi Watercourse, as indicated in Table 4. 44% of the population of the Member States as a whole (76 million people) live below the poverty line. These are aggregated national figures – the proportion under the poverty line amongst the mainly rural population living within the Watercourse is likely to be higher. The World Food Programme declared their highest level of emergency affecting 16.3 million people in Malawi, Tanzania, Zambia & Zimbabwe in 2016.

### 3.5 THE ENVIRONMENT

The Zambezi Watercourse is endowed with a rich variety of natural resources which include the catchment areas, the river and its tributaries, lakes, wetlands and the delta. Most of the Watercourse is covered by forests and bushland, with considerable areas of cropped land and grassland. A portion of the Watercourse is covered by large water bodies, including Lake Malawi/Nyasa/Niassa, Lake Kariba, and Lake Cahora Bassa.

Approximately 39% of the territory of the Member States is classified as forest area. However, the forested area is decreasing due to encroaching subsistence agriculture (accounts for 42% of deforestation) and large-scale commercial agriculture (32%).

**TABLE 4: INCOME AND POVERTY INDICATORS** (World Bank, 2015)

Indicators	Angola	Botswana		Mozambique	Namibia	Tanzania	Zambia	Zimbabwe
<b>Poverty indicators</b>								
Latest data available	2008	2009	2010	2008	2009	2011	2010	Different years
Poverty headcount ratio at national poverty lines (%)	36.6	19.3	50.7	54.7	28.7	28.2	60.5	72.3 <sup>3</sup>
Income share held by lowest 20% <sup>4</sup>	5.4	2.8	5.5	5.2	3.3	7.4	3.8	5.8 <sup>5</sup>
<b>Gross National Income (GNI) indicators</b>								
GNI per capita (US\$)	4,180	6,460	340	590	5,190	920	1,490	860

**TABLE 5: OVERVIEW OF CURRENT WATER USES**

Water use	Annual Volume (billion cubic meters)	% of consumptive use	Source
Available runoff	105.0		World Bank, 2010
Urban, rural, industrial, mining	0.34	2.71%	SADC and ZRA, 2008
Irrigated agriculture and livestock	1.59	12.69%	SADC and ZRA, 2008
Net reservoir evaporation	10.6	84.60%	Calculated: Total-rainfall=net
Total Consumptive use	12.5	100%	Calculated

Other deforestation drivers include mining, infrastructure development and urban expansion.

Besides the trend in land use change, the region also faces land degradation issues, caused by over-cultivation, deforestation, charcoaling, forest fires, inefficient irrigation practices, overgrazing, overexploitation of resources, and climate change and variability. 51% of land in the Zambezi Watercourse is moderately degraded and 14% is highly degraded with growing negative impacts on the population and on water resources. Only 35% of the land area is therefore not degraded.

### 3.6 EXISTING WATER USE

Water use in the Watercourse is summarised in Table 5. The largest non-natural 'user' of water (84.6%) is the loss to evaporation from the Kariba and Cahora Bassa reservoirs which are both single-purpose hydropower facilities. The other users are irrigation (12.69%), human consumption, urban and industrial (total 2.71%). Current total water withdrawals amount to approximately 12% of the total average flow, indicating that the Watercourse is largely undeveloped.

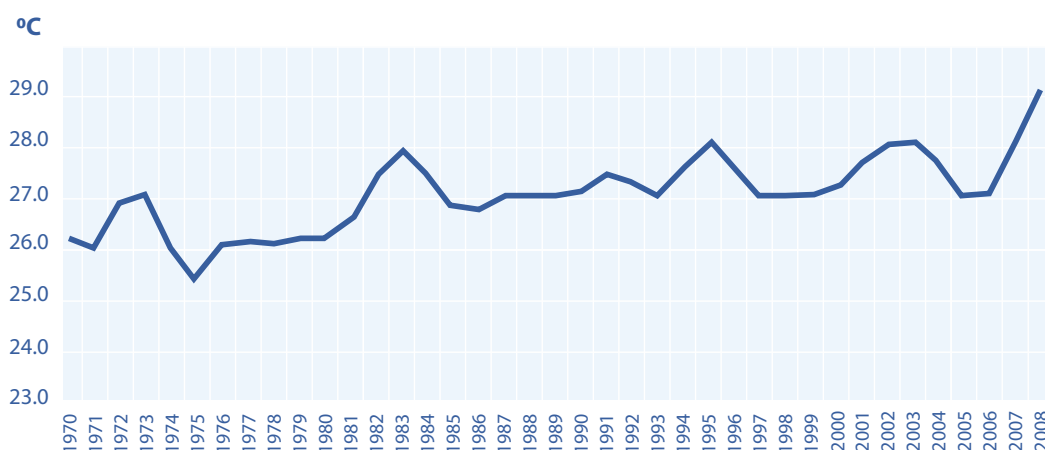
3. Latest data available is from 2011.

4. The percentage of income share is the share that accrues to sub-groups of population indicated by the quintiles (20% of the population).

5. Latest data available is from 2010.

### 3 THE CURRENT SITUATION IN THE ZAMBEZI WATERCOURSE

FIGURE 3: ANNUAL MEAN TEMPERATURE AT KARIBA (ZAMCOM, SADC AND SARDC, 2015)



#### 3.7 CLIMATE CHANGE AND VARIABILITY

Climate variability is a long-established characteristic of the region. There is increasing evidence that the extremes of variability across the entire Zambezi Watercourse will be exacerbated by climate change. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) (2014) asserts that further change in climate is inevitable in the coming decades and will pose greater challenges to growth and development. Temperatures are predicted to increase and indications are that this has already begun to occur – see Figure 3.

The key risks predicted for the Zambezi Watercourse related to climate change over the coming century are (ZAMCOM, SADC and SARDC, 2015):

- The Zambezi Watercourse can expect a significant warming trend of 0.3-0.6°C;
- Temperature increases across the Watercourse will increase open-water evaporation;
- Multiple studies cited by the IPCC estimate that rainfall across the Watercourse will decrease by 10-15%;
- Significant changes in the seasonal pattern of rainfall across the Watercourse are predicted, including delayed onsets, with shorter and more intense rain fall events;

- All Member States will experience a significant reduction in average annual stream flow;
- Multiple studies estimate that the Zambezi's runoff will decrease by 26-40% by 2050;
- Increasing water stress is a serious concern in the semi-arid parts of the Zambezi Watercourse; and
- The frequency and severity of extreme weather events (floods and droughts) will increase.

A consequence of historical climate variability has been frequent recurrent episodes of floods and droughts which have impacted the Southern African region and the Zambezi Watercourse. Some of these most notable extreme events are summarised in Table 6.



**TABLE 6: NOTABLE FLOOD AND DROUGHT EVENTS (ZAMCOM, SADC and SARDC, 2015)**

Period	Condition
<b>2017</b>	During January and February many parts of Southern Africa including parts of the Zambezi Watercourse experienced very severe seasonal rains and, in February, Tropical Cyclone Dineo made landfall near Inhambane, Southern Mozambique. These caused loss of life and property in Mozambique, Malawi, Zimbabwe, Botswana and Namibia.
<b>2015-2016</b>	Drought linked to the El Nino Southern Oscillation climate phenomenon reported to be the worst in the past 35 years, affecting 39 million people, about 13% of SADC.
<b>2014-2015</b>	Tens of thousands of people in Malawi, Mozambique and Zimbabwe were severely affected by floods caused by Tropical Storm Chedza, which started in December and continued through February 2015. Malawi was hard hit by the floods. More than 200 people died and 500,000 were displaced. In Mozambique 150,000 people were affected and about 6,000 in Zimbabwe.
<b>2012-2013</b>	Following poor performance in November, good rains were received in the first 10 days of December but dry conditions resumed late January through to May in the southern parts of the Zambezi Watercourse.
<b>2008-2009</b>	The Watercourse experienced flooding, which displaced thousands of people in Angola, Botswana, Malawi, Namibia and Zambia.
<b>2007</b>	Floods induced by Cyclone Favio impacted on Mozambique and parts of Zimbabwe.
<b>2005-2006</b>	Parts of southern Africa received very heavy rains resulting in flooding that caused considerable infrastructural damage, destroying schools, crops, roads and telecommunications.
<b>2004-2005</b>	Many parts of the Zambezi Watercourse received below-normal rainfall during the agricultural season. Several Member States declared national disasters.
<b>2001-2003</b>	Severe drought in the SADC region.
<b>1999-2000</b>	Cyclone Eline hit the region and widespread floods devastated large parts of the Limpopo basin (southern and central Mozambique, southern-eastern Mozambique, parts of South Africa, Botswana and Zimbabwe). In Mozambique alone this affected 2 million people with 650,000 forced to abandon their homes.
<b>1994-1995</b>	Many countries in the SADC region were hit by a severe drought, surpassing the impact of the 1991-1992 droughts.
<b>1991-1992</b>	Worst drought in living memory experienced in southern Africa, excluding Namibia.
<b>1986-1987</b>	Drought conditions returned to the region.
<b>1983</b>	This year saw a particularly severe drought for the entire African continent.
<b>1982</b>	Most of sub-tropical Africa experienced drought.
<b>1981-1982</b>	Severe drought occurred in most parts of southern Africa.
<b>1967-1973</b>	This six-year period was dry across the entire region. Some records show a severe drought.

## 3 THE CURRENT SITUATION IN THE ZAMBEZI WATERCOURSE

### 3.8 INFRASTRUCTURE DEVELOPMENT & NATIONAL PLANS

The present investment situation in the Watercourse is one characterized by a long-term infrastructure deficit. Of the total estimated 5.2 million hectares of arable land in the Watercourse, 183,000 or 3.6% is equipped for irrigation; of the total estimated potential hydropower capacity of 13,000 MW in the Watercourse, 5,000 MW or 38% has been developed. There has been no new major infrastructure built on the Zambezi Watercourse since 1979, 39 years ago (see Table 7).

During the course of the preparation of the Plan an inventory of current and future projects was prepared which contains details on 251 existing infrastructure developments, including:

- 12 hydropower projects;
- 50 urban, rural and multipurpose water supply projects;
- 186 agriculture projects; and
- Mining and other projects.

In addition, the inventory contains details of 282 planned projects with a total estimated cost of 28 billion USD, including:

- 26 hydropower projects;
- 116 urban, rural and multipurpose water supply projects;
- 120 agriculture projects; and
- 20 mining and other projects.

Each Member State has their own national development plans and sectoral plans and policies. The common feature of these plans is that they all prioritise the need for economic growth and to address the high levels of poverty through inclusive growth which supports the livelihoods of the poorest sector of the economy, whilst ensuring environmental sustainability.

### 3.9 SUMMARY OF CURRENT STATUS

ZAMCOM is concerned that, although the Zambezi Watercourse is endowed with enormous wealth in terms of both natural resources and human capital, the Watercourse remains largely under-developed and is plagued by widespread poverty. The national plans and visions of the Member States of the Watercourse all seek to ensure inclusive economic growth and development. In order for the shared resources of the Zambezi Watercourse to properly contribute to the achievement of these goals, it is necessary to identify the main current strategic issues which need to be addressed by the Strategic Plan. These issues are identified below and are then addressed in the formulation of the Strategic Plan for the Zambezi Watercourse which ZAMCOM presents in this document:

**Persistent poverty – the need for equitable and resilient development.** 64.8% of the Watercourse's population is rural, depending largely on rain-fed subsistence agriculture and is extremely vulnerable due

TABLE 7: MAJOR INFRASTRUCTURE IN THE ZAMBEZI WATERCOURSE

Infrastructure	Country	Date	Age in 2018
Kariba Dam	Zambia / Zambezi	1958	60 years
Kamuzu Barrage (Liwonde)	Malawi	1965	53 years
Cahora Bassa Dam	Mozambique	1974	44 years
Itezhi Tezhi Dam	Zambia	1976	42 years
Kafue Gorge Upper	Zambia	1979	39 years

### 3 THE CURRENT SITUATION IN THE ZAMBEZI WATERCOURSE

to little or no investment in local water infrastructure – 96.5% of agricultural activity (by area) in the Watercourse is rain-fed and the majority of this is smallholder farming.

**Competing uses – the need for balanced development.** The two main water using sectors in the Watercourse are agriculture and hydropower. Water for urban, industrial and mining uses is critical for the economies of all Member States but requires much smaller quantities of water. Balanced investments require an equitable sharing of the benefits of development between Member States and carefully determined trade-offs between different inter-related water uses, particularly energy and food production.

**Infrastructure deficit – the need for infrastructure development.** There is a substantial infrastructure deficit across the whole of the Zambezi Watercourse (e.g. of the total estimated 5.2 million hectares of arable land in the Watercourse, 183,000 or 3.6% is equipped for irrigation; of the total estimated potential hydropower capacity of 13,000 MW in the Watercourse, 5,000 MW or 38% has been developed.) Without infrastructure, specifically large, medium and small scale water storage facilities, the different growth sectors of the economy and the economy as a whole will remain vulnerable to regional rainfall variability and will lack resilience to climate change.

**Environmental degradation – the need for sustainable development.** A number of recent studies highlight the wealth of the natural resources of the Zambezi Watercourse, of which water is a key part. Currently the Watercourse environment faces serious challenges caused by the growing impacts of poverty and unplanned development, exacerbated by climate change and variability (e.g. 51% of land in the Zambezi Watercourse is moderately degraded and 14% is highly degraded with growing negative impacts on the population and on water resources.)

**Disaster risk – the need for climate resilient development.** There is extensive documentation on the economic and human impacts of floods and droughts in the Zambezi Watercourse. There is evidence that climate change will exacerbate the current situation and accentuate the extremes of floods and droughts. Increasing poverty throughout the Watercourse and its accompanying impacts on land use and catchment degradation will also exacerbate the impacts of extreme weather events. Measures will have to be undertaken to manage as effectively as possible the risk of water related disasters.



Victoria Falls, Zambia and Zimbabwe / Peter Qwist-Hoffmann

## 4 IDENTIFICATION OF FUTURE OPTIONS

Given the size and diversity of the Watercourse, the sovereign ambitions of each of the Member States to implement their national development plans, and the current situation of the Zambezi Watercourse as described in Chapter 3 above, there is a wide range of different future development options, each of which will impact the Watercourse in different ways.

In the spirit of the ZAMCOM Agreement, the Member States of the Zambezi Watercourse are intent on ensuring that the basis for future development will be collaboration and co-operation, rather than each Member State pursuing their own plans unilaterally with no reference to the other States with which they share the Watercourse. Different degrees of collaboration and co-operation will be required, depending on the type of investments and developments which are being considered.

### 4.1 CRITICAL CHALLENGES FOR FUTURE DEVELOPMENT

The analysis of the current situation in Chapter 3.9 summarises the issues facing the people of the Watercourse. In order to determine the pathways for future development of the Watercourse, hydro-economic modelling techniques were used (See Box 3). The current situation in the Watercourse presents a number of challenges to future development which need to be addressed in the development strategy for the future:

**1 Water utilisation:** Given the current under-development of the Watercourse and the under-utilisation of available water resources, is it possible to meet all the future water demands of Member States as contained in their existing plans?

**2 Sector competition:** Will the development of water for different purposes require trade-offs between different water uses, particularly energy and food production?

**3 Sub-watercourse competition:** Further, although there may not be conflicts between different demands at the watercourse scale, will there be conflicts in some sub-watercourses?

**4 Reducing the infrastructure deficit:** Is it possible to address the infrastructure deficit in the Watercourse, including large, medium and small scale water storage, so as to equitably meet development needs across the Watercourse?

**5 Safeguarding environmental needs:** Is it possible to undertake the future development envisaged in national plans, together with operating the existing infrastructure in the Watercourse, while continuing to meet the environmental water requirements of riverine/ lake ecosystems, wetlands and the river delta?

**6 Protecting against floods and droughts:** Is it possible to protect vulnerable sections of the Watercourse against floods and droughts through the cooperative management of existing and proposed new infrastructure?

## 4 IDENTIFICATION OF FUTURE OPTIONS

### BOX 3: HYDRO-ECONOMIC MODELLING FOR DEVELOPING PREFERRED WATERCOURSE DEVELOPMENT SCENARIOS

The objective of the hydro-economic modelling to analyse future development options in the Zambezi Watercourse was to develop a set of 3 to 5 preferred Watercourse Development Scenarios from the tens of thousands of possible infrastructure development options. To achieve this objective, two hydro-economic modelling tools were employed. A screening tool, CLI-OPT, allows for selection of the Watercourse Development Scenarios that maximize the achievement of a set of strategic objectives across all the potential Development Scenarios.

The CLI-OPT model simulates the water balance (supply and demand) in the Zambezi Watercourse, including the impact of existing and proposed water system infrastructure.

Once the set of preferred Watercourse Development Scenarios was determined, a detailed socio-economic analysis was carried out using the core modelling tool WHAT-IF (Water, Hydropower, Agriculture Tool for Investment and Financing) – an economic assessment tool that values the use of water for food, energy, and other purposes.

WHAT-IF estimates the costs and economic welfare gains across diverse sectors, Member States and stakeholders by modelling the water resources, agricultural and energy systems as an integrated system, providing a rich set of both biophysical and economic indicators. The models were run for both historic and potential future climates, looking at Watercourse population and economic development in 2050 with no budget constraints and a range of environmental and disaster risk policies.

**7 Climate change:** Is it possible to predict the impacts of climate change and to ensure that investments are both resilient to the effects of different possible climate change outcomes, and adaptable to accommodate uncertainties?

**8 Combined impacts:** What are the consequences of combining multiple development options such as developing the national plans, safeguarding the environment, protecting against drought and floods, and accommodating climate change uncertainty?

**9 Catchment management and water for rural livelihoods:** What would the positive impacts be of incorporating a rural livelihoods support programme

coupled with a catchment management programme in the Strategic Plan? Would there be any negative impacts? What are the long-term impacts and costs of the 'do nothing' alternative which will see poverty increase together with the resulting high levels of sedimentation and decreasing fertility of the Watercourse?

**10 Unilateral versus collaborative development:** Can greater benefits be derived for individual Member States and for the Watercourse as a whole through collaborative management of infrastructure? Would development in the Watercourse be constrained if Member States continued to function unilaterally without cooperating together?

## 4.2 DIFFERENT POSSIBLE DEVELOPMENT SCENARIOS

During the development of the Strategic Plan some 500 different combinations of projects, development priorities and constraints were investigated. Out of the many different scenarios, seven main possible Watercourse Development Scenarios were identified as follows:

**1 Energy Security** – maximize the marketable firm energy from hydropower and hence prioritise energy production above other potential uses of water in the Watercourse.

**2 Food Security** – maximize calorie production to achieve the highest potential for food security, primarily through expansion of irrigated agriculture, and hence prioritise food production over other potential water uses in the Watercourse.

**3 Maximize Economic Benefits** – maximize the net present value of the combined revenues from firm hydropower and irrigation expansion.

**4 High Environmental Flows** – maximize economic benefits (option 3) whilst providing for the full maintenance of in-stream flows for ecosystems, and the maintenance of healthy wetlands, but with low allocations to flood and delta protection.

**5 High Delta and Flood Protection** – maximize economic benefits (option 3) whilst allowing for high levels of delta and flood protection, but low allocations to instream and wetland ecosystem preservation.

**6 Moderate Environment and Delta/Flood** – maximize economic benefits (option 3) with balanced but moderate allocations to instream ecosystems, wetlands, flood, and delta protection.

**7 Ambitious Environment and Delta/Flood** – maximize economic benefits (option 3) whilst providing ambitious allocations to instream ecosystems, wetlands, flood, and delta protection – a combination of options 4 & 5.

These seven possible Watercourse Development Scenarios are summarized in Table 8.

**TABLE 8: SEVEN MAIN POSSIBLE WATERCOURSE DEVELOPMENT SCENARIOS**

Possible Scenario	Objective	Constraint			
		Environmental Flows (volume – percentile of naturalized flow)	Wetlands (volume – percentile of naturalized flow)	Delta (minimum flow in m <sup>3</sup> /sec during February)	Floods (maximum flow in m <sup>3</sup> /sec)
<b>1</b> Energy Security	Maximize energy security	No provision	No provision	No provision	No provision
<b>2</b> Food Security	Maximize food security	No provision	No provision	No provision	No provision
<b>3</b> Maximize Economic Benefits	Maximize economic benefits	No provision	No provision	No provision	No provision
<b>4</b> High Environmental Flows	Maximize economic benefits	High (20th percentile)	High (95th percentile)	Low (6,000)	Low (11,000)
<b>5</b> High Delta and Flood Protection	Maximize economic benefits	Low (5th percentile)	Low (50th percentile)	High (8,000)	High (15,000)
<b>6</b> Moderate Env and Delta/ Flood Protection	Maximize economic benefits	Medium (10th percentile)	Medium (75th percentile)	Medium (7,000)	Medium (13,000)
<b>7</b> Ambitious Env and Delta/ Flood Protection	Maximize economic benefits	High (20th percentile)	High (95th percentile)	High (8,000)	High (15,000)



## 4 IDENTIFICATION OF FUTURE OPTIONS

### 4.3 THE PREFERRED FUTURE

Based on the outcomes of the Watercourse Development Scenario modelling which was endorsed through a broad process of consultations with national stakeholders across the Watercourse, Option 6 was chosen, as detailed in Table 8.

**Preferred Future:** Maximise the economic benefits of water development in the Zambezi Watercourse, subject to the constraints of ensuring the maintenance of moderate environmental flows and flood protection:

- Environmental flows should not fall lower than the 10th percentile;
- Wetland flows should not fall lower than the 75th percentile;
- Minimum flow to the delta should not fall below 7,000 cubic meters per second; and
- Floods should not exceed 13,000 cubic meters per second.

### 4.4 CLIMATE CHANGE

The Zambezi Watercourse is highly susceptible to climate variability as is clear from historical flow records and recent experience. Numerous studies also indicate that the Watercourse will be significantly impacted by anticipated changes to the climate in coming decades. The Zambezi was a case study in the 2015 joint World Bank/United Nations Economic Commission for Africa – Africa Climate Policy Centre study on Enhancing the Climate Resilience of Africa's Infrastructure (ECRAI), in which ZAMCOM was a partner. The study included adaptation to climate change at the watercourse scale linked to the Southern African Power Pool (SAPP) and a project adaptation analysis of the Batoka Dam (Cervigni et al., 2015).

The ECRAI Study highlights key issues to be addressed in the Strategic Plan (Kaseke, 2015):

- the need to incorporate climate change scenarios into strategic plan development processes; and
- the need to prioritise investments that increase climate resilience.

The results of the hydro-economic modelling described in Box 3 assume a future climate that is similar to the historic climate of the last 60 years. However, many assessments of potential impacts of greenhouse gas emissions on the climate of Southern Africa suggest a high probability of significant reductions in precipitation, alongside increased temperatures and associated increases in potential evapotranspiration. The ECRAI study examined over 100 projections of future climate for the Zambezi Watercourse and found that over 85% these projections suggest a reduction in runoff and increase in evaporation from reservoirs, in addition to increased crop water requirements for rain fed and irrigated crops.

To assess the possible impacts of climate change on the future development of the Zambezi Watercourse, four climate scenarios were tested using hydro-economic modelling – these were: Dry, Semi-dry, Semi-Wet and a Wet scenario. Table 9 and Figure 4 indicate a number of key insights:



**TABLE 9: CLIMATE CHANGE IMPACT ON OUTPUTS, WITH AND WITHOUT CO-OPERATION**

Scenario	Hydropower Generation (TWH/year)		Firm Power 90th (TWH/year)	
	Historical	Dry	Historical	Dry
<b>Unilateral (minimum co-operation)</b>				
Baseline (No Constraints)	39.87	11.81	22.0	8.7
High Environment and Delta/ Flood protection	33.17	13.91	20.8	9.6
<b>Cooperative</b>				
Baseline (No Constraints)	46.8	33.0	46.9	33.0
High Environment and Delta/ Flood protection	46.2	14.0	46.4	12.0

- The potential impact of climate change on future development is dramatic for planned hydropower projects (see Figure 7, Section 7.4) and (less so) for irrigation projects (see Figure 4), which in turn has major economic implications for the economies of the Member States;
- Watercourse-wide collaboration and synchronization has the potential to increase economic growth under the current climate and help to mitigate impacts under potential dry climate futures (see Table 9); and
- A drying climate significantly increases the cost of providing moderate to strong flood and environmental protection.

#### 4.5 DIRECTIONS FOR FUTURE DEVELOPMENT

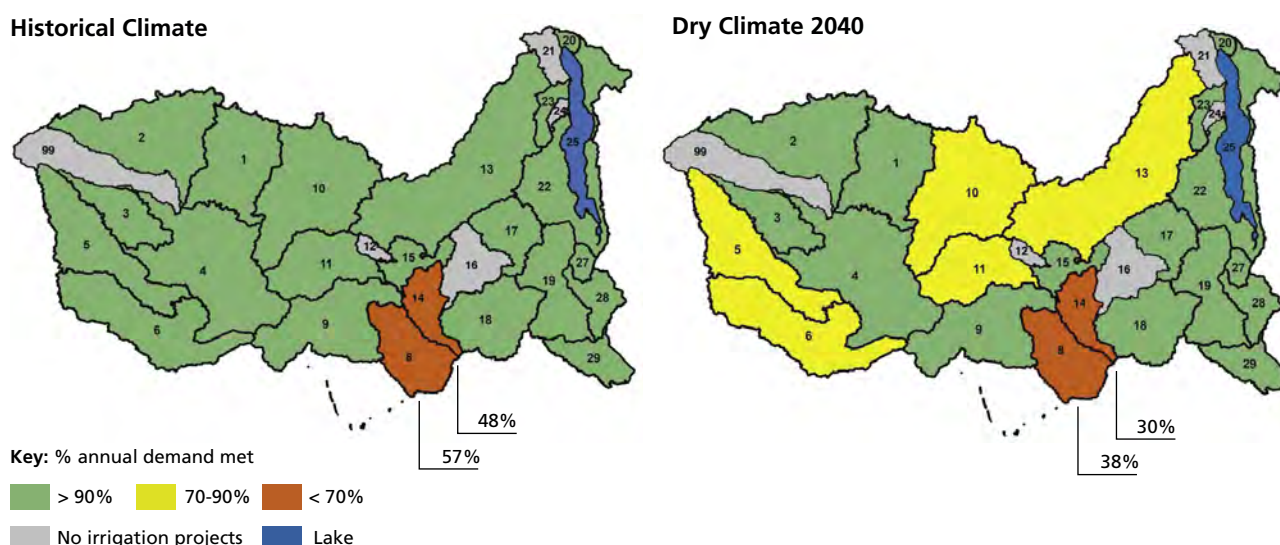
Having chosen development option 6 from Table 8 above, the hydro-economic modelling provides directions for future possible development in the Watercourse. Some key insights derived are as follows:

- In the Zambezi Watercourse the main issue is the balance between economic growth (inclusive of ensuring environmental sustainability) and disaster risk reduction in the presence of the threat of climate change. It is not a competition for water use between sectors (except in some tributaries under climate change induced dry conditions as described in Section 4.4).
- Poverty and its progressive degrading impacts on the Watercourse is the largest single threat to the people, the Watercourse and to future development. It is

likely to intensify unless a concerted effort is made to improve the livelihoods of the poorest sectors of the population who make up more than two thirds of the people living in the Watercourse and are mostly engaged in smallholder rain-fed agriculture, accounting for 96% of agricultural activity in the Watercourse. For this reason special efforts will be made to improve smallholder rain-fed agriculture water use and catchment management programmes.

- The modelling supports the conclusion that, given the current relatively under-utilized water resources of the Watercourse, there are sufficient resources to support the implementation of the current investment plans of the Member States **under the current historical mean climate conditions** – see Table 10. However, there are indications that under dry future climate scenarios, there will be water scarcity in some parts of the Watercourse – see Figure 4.
- The impact of environmental protection is a function of watercourse-wide management. If the current infrastructure plan is fully implemented, the environmental protection objective can be achieved with minimal impact on irrigation and power production only if there is operational coordination and co-operation between Member States and specific infrastructure assets (dam synchronisation etc.). Such operational coordination and co-operation will be undertaken by the Member States concerned and coordinated through ZAMCOM.
- If there is no co-operation, achieving agreed environmental and flood protection objectives may

**FIGURE 4: PROJECTED IRRIGATION RELIABILITY UNDER DIFFERENT FUTURE CLIMATE CONDITIONS FOR FULL DEVELOPMENT OF IRRIGATION PLANS – 2040**



result in significant negative impacts on energy and food production objectives.

- Watercourse-wide co-operation and hydro-climatic forecasting can greatly mitigate the impacts of environmental protection objectives.

- Climate change is a major threat to Zambezi Watercourse investment performance at full development. However ZAMCOM-led collaboration and synchronization has the potential to reduce climate change impacts. Long-term development planning will need to be adapted as actual changes to the climate become apparent.

**TABLE 10: OVERVIEW OF CURRENT AND FUTURE WATER USES, INCLUDING CURRENT NATIONAL PLANS**

Water use	Annual Volume Used (Billion Cubic Meters)		Source
	Current	Future	
Available runoff	105.0	105.0	World Bank, 2010
Urban, rural, industrial, mining	0.34	1.21	SADC and ZRA, 2008
Irrigated agriculture and livestock	1.59	4.80	SADC and ZRA, 2008
Net reservoir evaporation	10.6	15.3	Calculated: Total-rainfall=net
Total Consumptive use	12.5	21.3	Calculated
Total Withdrawals	15.5	31.0	Calculated
Environmental/flood releases	1.20	6.45	SADC and ZRA, 2008
Water Security Index (Withdrawals / availability)	0.15	0.31	Below 0.3 indicates little or no water scarcity



# 5 PLATFORM OF THE STRATEGIC PLAN

## 5.1 POLITICAL ENDORSEMENT

This Strategic Plan for the Zambezi Watercourse, prepared in terms of Article 8.1.(j) of the ZAMCOM Agreement, was endorsed and approved by the Council of Ministers of the ZAMCOM on 28 February 2019. The Council of Ministers will provide ongoing guidance and oversight of the proper execution of the Strategic Plan in order to ensure the success of the plan.

It is particularly important for the success of the Plan that there is ongoing collaborative management of the Watercourse in order to ensure that aspects such as dam operation and synchronisation are implemented and maintained. The full benefits of the development plans will not be optimally achieved (full development of the country infrastructure plans together with provision for the environment, flood control and delta protection) without day-to-day operational co-operation, which will be overseen by ZAMCOM through ZAMSEC.

ZAMCOM, as the body representing the governments of the Member States of the Zambezi Watercourse in terms of the ZAMCOM Agreement, depends on the full and active support, engagement and co-operation of member governments to effectively fulfil its mandate on behalf of the Member States. This requires engagement specifically with Ministries and Departments of Member States responsible for water management and development, and with related ministries and departments such as agriculture, energy, finance, regional integration and others. As much of the development of the Watercourse currently and in the future is multi-purpose and inter-related, collaboration and co-operation between sectoral ministries and departments is also important.

## 5.2 DEVELOPMENT OBJECTIVES

The Development Objectives of the Strategic Plan for the Zambezi Watercourse indicate the spirit and intention of the peoples of the Zambezi Watercourse and their governments, and express their collective values and vision for a shared future. The Development Objectives provide a guide against which all the activities and outcomes of the Strategic Plan for the Zambezi Watercourse will be tested, and are derived from and representative of the many years of deliberation of the governments and stakeholders of the Member States, as contained in various national and regional policy and strategy instruments.

The strategic objectives have been formulated based on a thorough study of the national development plans of the Member States and the input received during workshops with the NASCs in each Member State during the preparation of the Strategic Plan. They have been formulated to conform with the articles of the ZAMCOM Agreement and the tenets of international water law.

- A Development Objective A:** To promote and facilitate regional co-operation and good neighbourliness.
- B Development Objective B:** To promote and facilitate equitable, safe and optimal development and utilisation of the resources of the Zambezi Watercourse for equitable economic growth and prosperity.
- C Development Objective C:** To promote and facilitate sustainable and ecologically sound

## 5 PLATFORM OF THE STRATEGIC PLAN

development and utilisation of the resources of the Zambezi Watercourse.

- 
- D Development Objective D:** To promote and facilitate climate resilient infrastructure and development, and to manage and reduce risk to investments and to society at large.
- 
- E Development Objective E:** To promote and facilitate public access to sufficient and safe water supplies, and related essential services, for basic needs and livelihoods.
- 
- F Development Objective F:** To promote and facilitate capital mobilisation and investment finance.
- 

### 5.3 TIMEFRAME

The planning horizon for the Strategic Plan for the Zambezi Watercourse is divided into two periods selected to coincide with the SADC Regional Infrastructure Development timeframes:

- Short Term – 2018-2027; and
- Medium Term – 2028-2040.

### 5.4 EXISTING ZAMCOM PROGRAMMES AND ACTIVITIES

The Strategic Plan for the Zambezi Watercourse, as mandated in the ZAMCOM Agreement, is the primary instrument through which the Council of Ministers will achieve the objectives of the Commission. The Strategic Plan therefore incorporates the existing plans and activities of ZAMCOM including ZAMSTRAT (2008).

An implementation plan for operationalising the Strategic Plan will be prepared during 2019.

The integration of these components and activities in the Strategic Plan for the Zambezi Watercourse is indicated in Chapter 6.





## 6 STRATEGIC PLAN COMPONENTS

### 6.1 INTRODUCTION

The Strategic Plan for the Zambezi Watercourse is a comprehensive plan (summarized in Box 4) aimed at achieving the agreed Development Objectives (described in Section 5.2). These objectives reflect the goals of the SADC Regional Indicative Strategic Development Plan for 2015 to 2020 and the Member States' National Development Plans. The emphasis of these plans, in addition to poverty eradication and economic growth, include inclusive growth as well as providing support to livelihoods. In addition to the physical infrastructure investment programme, the Strategic Plan therefore includes both investments prioritised in the national plans and other non-infrastructure functions and activities needed to ensure broad inclusive development and co-operation. Additionally, these functions and activities are underpinned by principles from other broader frameworks such as the Sustainable Development Goals and IWRM. Together all of these activities and functions make up the Strategic Plan of the Zambezi Watercourse.

The Strategic Plan as a whole comprises four core components which, together with the institutional foundation of ZAMCOM, cover the full scope of activities and functions required to fulfil the mandate of the ZAMCOM Agreement.

The Sections below describe these four Core Components of the Strategic Plan in more detail. **It must be noted that the components are all inter-related and that there will be overlaps between the components and different related activities and projects.**

## 6 STRATEGIC PLAN COMPONENTS

### BOX 4: COMPONENTS OF THE STRATEGIC PLAN

1	Infrastructure Investment 	Investment in water related infrastructure is required throughout the Watercourse in order to underpin economic and social development and contribute towards achieving the national and sectoral goals and aspirations of the Member States. The technical analysis and hydro-economic development scenario modelling will provide the ongoing decision tool for this component.
2	Livelihoods Support 	Poverty and its impact on the Zambezi is the most pervasive problem facing the people of the Watercourse. Increasing the availability of water for smallholder farmers and improving rain-fed agriculture practices, together with catchment management and conservation investments, will improve both rural livelihoods and the resilience of the Watercourse as a whole, whilst reducing the negative impacts of catchment degradation (high sediment loads, rapid siltation of reservoirs etc.) throughout the Watercourse.
3	Environmental Resources Protection and Utilization 	In keeping with the stated Development Objectives and the ZAMCOM Agreement, development and management of the Watercourse will ensure the sustainable protection and conservation of natural riverine and aquatic ecosystems and resources. Instream flow targets need to be set, monitored and met, together with the monitoring of specific systems such as wetlands and the delta.
4	Water Resources Management 	The Zambezi Watercourse is large and complex, requiring collaborative, watercourse-wide management. Many of the required systems and networks needed to undertake these tasks have already been established by ZAMCOM such as ZAMWIS and the Decision Support System.
	Institutional Foundation 	This includes governance and management, harmonisation of policy and legislation in the Member States, together with the activities required to strengthen co-operation, communications, capacity development and gender mainstreaming.



### 6.2 COMPONENT 1: INFRASTRUCTURE INVESTMENT

#### 6.2.1 Introduction

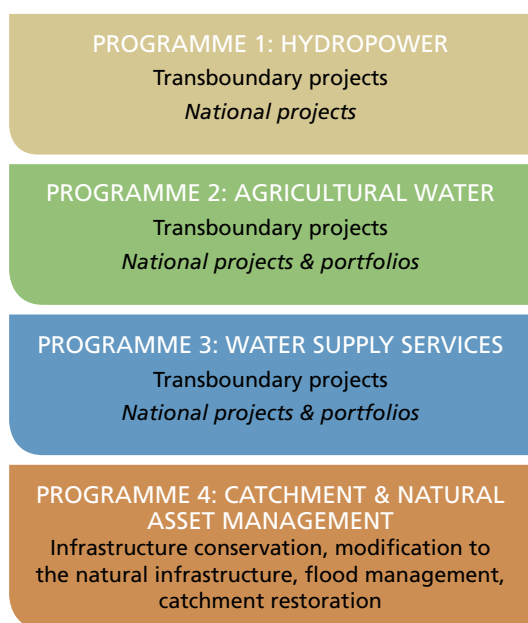
This component includes the preparation and implementation of transboundary related water infrastructure projects as contained in the *Project Inventory* of national project plans, developed during an earlier phase of preparing the Strategic Plan.

During the preparation of the Strategic Plan, after having determined the preferred future development scenario [Maximise economic benefits, subject to ensuring the maintenance of moderate environmental flows and

flood protection], a Watercourse Investment Framework was developed to determine the opportunity and risk of financing and implementing the identified projects on the Zambezi, at both a transboundary and national scale. The Investment Framework was developed based on an assessment of all the joint and national projects included in the Project Inventory using the criteria of the adopted preferred future development scenario. See Box 5 for a description of the modelling tools used.



**FIGURE 5: INVESTMENT PLAN PROGRAMMATIC STRUCTURE**



### 6.2.2 Programmatic Structure of Infrastructure Investment Component

Figure 5 and Table 11 provide summarised information on the programmatic structure of the Investment Framework. The four programmes align well with the Nexus Approach to resource development, which jointly considers not just water, but energy, agriculture and the environment, acknowledging the interconnected nature of these different areas. The estimated costs of the investments are based on the information contained in the Project Inventory and will need to be verified during the successive phases of planning for each project.

#### 6.2.2.1 Grouping of Projects into Portfolios

Due to the large number of projects in the Project Inventory, projects were grouped into “portfolios” of projects. Portfolios represent a number of projects that either fall under the same programme within a Member State (such as a national rural water supply programme) or are located in the same catchment or development area (as would be in a multipurpose catchment development plan). On a watercourse scale, this enables the simplification and clustering of the total project list into coherent investment opportunities, which may be financed or implemented together. Grouping projects into portfolios simplifies the Inventory and offers a clearer overview of investment opportunities. For each of the four programmes, a detailed list of the projects

#### BOX 5: HYDRO-ECONOMIC MODELLING FOR ASSESSMENT OF INVESTMENT PLANS

The hydro-economic modelling for the assessment of the multi-staged investment plans was based on the preferred Watercourse Development Scenario – Maximise the economic benefits of water development in the Zambezi Watercourse, subject to the constraints of ensuring the maintenance of moderate environmental flows and flood protection.

Two investment scenarios were developed: one for implementation in 2027 and one for implementation in 2040. Given the potential hydrologic and economic interaction of water infrastructure projects, there was a need to assess these investment plans using the same social economic indicators employed in the Watercourse Development Scenario analysis (Box 3). The hydro-economic modelling tools, CLI-OPT and WHAT-IF, were run using the set of water infrastructure projects in

the two investment plans. These assessments used a single set of environmental and risk policies based on the preferred development scenario, refined through discussions with stakeholders. The two staged investment plans were each analysed separately and run for both historic and potential future climates looking at Watercourse population and economic development for the decades 2027-2036 and 2040-2049, respectively.

**TABLE 11: SUMMARY OF INVESTMENT PLAN PROJECTS AND PORTFOLIOS, WITH ESTIMATED COSTS**

Programme	Summary	Estimated costs
Hydropower	9 transboundary projects, 18 national projects	USD 19,384 million USD 7,158 million
Agricultural Water	10 transboundary projects 46 national projects or portfolios	USD 55 million USD 549 million
Water Supply Services	4 transboundary projects and portfolios 10 national projects and portfolios	USD 1,068 million USD 60 million
Catchment & Natural Asset Management	4 national projects	No estimate available at present
Estimated total costs		USD 28,274 million

and portfolios has been compiled at a national and transboundary level.

#### 6.2.2.2 Transboundary and National Project Types

In terms of international law, transboundary projects are those projects which have a potential impact on another Member State within the Watercourse, whether this requires joint implementation between two or more Member States, or is implemented nationally but requires notification of other Member States.

However, following common terminology, each project and portfolio within the Zambezi Watercourse listed in the Project Inventory was classified as either national or transboundary, indicating the potential degree of sovereign autonomy or necessary joint collaboration, respectively. Transboundary joint projects have been classified based on any of the following justifications:

- the project or portfolio of projects is jointly implemented by two or more Member States;
- the project is implemented on – or abstracts water from – a shared boundary river or resource;
- the project is implemented at the national level by a Member State, but has significant regional benefits and requires offtake agreement; and/or
- the project is a water transfer out of the Watercourse.

National projects are implemented by a single Member State, on – or abstracting from – a national river or any water body within the Zambezi Watercourse, and benefit a single nation. However, it is also important to consider the role that national projects play in supporting the overall development of the Watercourse. Multiple national projects can have profound cumulative consequences on the Watercourse, and as such require notification.

Moreover, national projects can be financed and/or enabled by the participation of multiple Member States. Multi-lateral co-operation for the development of national and transboundary projects across the Watercourse is often crucial to enable resilient interventions in transboundary watercourses. Coordinated action is needed at both regional and national levels to effectively overcome challenges due to fragmentation of water resources and to build resilience. While acting exclusively at the national level can lead to maladaptive and non-resilient outcomes, focusing solely on transboundary projects is insufficient. Regional and national coordination is needed. Cooperative action can outweigh transaction costs and bring about efficiency gains. As cited by the World Bank (2017), co-operation also helps countries adopt more “future-oriented” behaviour, which can lead to greater water and economic security in the longer term.

#### 6.2.2.3 Meeting Member State Development Objectives

All the projects included in the Watercourse Investment Framework have been drawn from the Project Inventory developed during an earlier phase of the Strategic Plan. This inventory was compiled after extensive consultation with the Member States which included a number of requests for information, as well as the compilation of projects explicitly named in their national development plans. Member States were invited to identify priority projects on their lists.

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### 6.2.2.4 Project Characterisation

Projects were characterised by a number of criteria including the stage of preparation of projects – project maturity – and whether projects are single or multi-purpose.

Project lifecycles typically follow a given trajectory: Concept – pre-feasibility – feasibility / design – financing – detailed design – transacting – implementation – commissioning. For the purpose of the Investment Framework, projects and portfolios have been categorised according to their completion horizon, 2018-2027 or 2028-2040. This assessment of the maturity, as it corresponds to the project development lifecycle of each project or portfolio, was based on information provided in the Project Inventory and stakeholder research. Where no information on completion was provided in the Inventory, the projects or portfolios were examined and classified as follows:

Projects and portfolios were grouped into the 2027 horizon if:

- The project was at feasibility stage when captured in the Infrastructure Inventory; and/or
- There was sufficient information on capacity and cost to imply the project is either:
  - advanced enough in the project preparation process; and/or
  - of small enough scale, to be implemented in the next nine years; or
- The project is a top national priority and is therefore likely to be implemented in the first phase.

Projects and portfolios with a 2040 horizon were deemed to be in the second phase of implementation on the basis that they are larger projects that are at early-stage project development. This does not imply that these projects would not start now, but rather that they would need further development as they are in an early concept stage.

### 6.2.3 The role of ZAMCOM in the Infrastructure Investment Programme

Infrastructure projects will be prepared, financed and implemented in and by the Member States, either acting alone in the case of national projects, or together with two or more Member States in the case of joint projects. ZAMCOM will not implement infrastructure projects.

The role of ZAMCOM will be as follows:

- To ensure that the principles of developing transboundary waters, as enshrined in the ZAMCOM Agreement, are observed, that is:
  - The principle of equitable and reasonable utilisation of shared water resources;
  - The duty to prevent significant transboundary harm; and
  - The general duty to cooperate.
- To provide an agreed platform and process for Notification and resolution of notification related issues and disputes if these should arise;
- To promote transboundary integration and dialogue on infrastructure related issues together with regional bodies such as SAPP, SADC, etc;
- To support Member States in transboundary water economics analysis, project preparation, project financing, and transaction management etc. – see Section 7.3 below;
- To promote investments in the Watercourse on the international stage and to attract investors, working in close collaboration with Member States and development partners;

**TABLE 12: HYDROPOWER PRODUCTION IN THE ZAMBEZI, by country** (Africa Energy Commission, 2015)

Country	Angola	Botswana	Malawi	Mozambique	Namibia	Tanzania	Zambia	Zimbabwe
Hydropower % of total energy	73.2%	0%	98.4%	93.9%	98.9%	27.2%	93.3%	66.2%

- To ensure that the design and implementation of investments meet the environmental and disaster risk management criteria agreed to in this Strategic Plan and subsequent amendments, including making provision for their ongoing monitoring;
- To monitor changes in climate over time and advise Member States on the implications of changes in climate including adaptations needed to plans and project design;
- To promote and oversee the joint and cooperative operation of infrastructure in the Watercourse, including such activities as dam synchronisation;
- To provide watercourse-wide oversight of the long-term planning of infrastructure development using the Decision Support System tools developed by ZAMCOM for this purpose.

#### 6.2.4 Programme 1: Hydropower

Hydropower is a key catalyst to stimulate socio-economic development, as it supports the development of industry and the electrification of households. Most Member States recognise the potential of hydropower in stimulating growth in their national plans. The SAPP also acknowledges this potential. The SAPP is an institution coordinating the collaboration of Southern African states in energy production to guarantee regional energy security.

The SAPP comprises a diversified energy mix, including hydropower and thermal plants, both of which rely on water resources. As shown in Table 12, most Member States are heavily dependent on hydropower to meet the needs of their population, cities, and industries. With industrial productivity steadily increasing in the region, the World Bank anticipates that the demand for electricity in the SADC region will increase by 40% over the next 10 years (World Bank, 2011).

The Watercourse has enormous potential for hydropower development; according to the World Bank, “with co-operation and coordinated operation of the existing hydropower facilities found in the Watercourse, firm energy generation can potentially increase by seven %, adding a value of \$585 million over 30 years with essentially no major infrastructure investment.”

#### 6.2.5 Programme 2: Agricultural Water

Most people in the Watercourse rely on agriculture to sustain their livelihoods. Roughly 5.2 million hectares of land are cultivated throughout the Watercourse; 85% of that surface is located in Zimbabwe, Zambia and Malawi. Agriculture practices are central to guarantee food security and achieve the sustainable development goal of Zero Hunger (WWF and ABInBev, 2017). Agriculture is also critical to enable sustainable economic growth.

Irrigated agriculture increases the resilience of crops to long periods of aridity and droughts and thereby increases food security. Irrigated agriculture also allows for crop diversification, and for the production of high value crops such as sugarcane. Sugarcane covers most irrigated fields in the Watercourse, followed by perennial crops and cereals. Irrigation helps increase crops productivity, and irrigated fields are usually more profitable to farmers than rain-fed fields.

**TABLE 13: INDUSTRIES IN THE ZAMBEZI WATERCOURSE (CIA, 2017)**

Country	Angola	Botswana	Malawi	Mozambique	Namibia	Tanzania	Zambia	Zimbabwe
GDP for industry (billion USD) (2017)	124	39.55	22.47	37.39	27.02	162.8	68.9	33.87
% of total GDP (2017)	61.4%	29.5%	15.6%	23%	25.8%	28.6%	35.6%	26.9%
Industrial production growth rate	1.9%	3%	1.2%	10.5%	2.2%	8.8%	5.1%	2.1%

**TABLE 14: URBANISATION IN THE ZAMBEZI WATERCOURSE (CIA, 2017)**

Country	Angola	Botswana	Malawi	Mozambique	Namibia	Tanzania	Zambia	Zimbabwe
Urbanisation rate	4.6%	1.38%	4.02%	3.36%	3.63%	5%	4.35%	2.44%

### 6.2.6 Programme 3: Water Supply Services

The national development plans of Member States all address rural poverty, and the need to improve living conditions and service delivery in order to trigger inclusive growth. Better access to water supply in urban and rural settings is key to meeting these objectives.

Water supply projects use water for industrial use, domestic supply and sanitation, or transfers out of the Watercourse, amongst other uses.<sup>6</sup> Water supply projects are important to support socio-economic development, as they provide access to clean water to the population, but also support industrial development. Industries account for an important share of the GDP of Member States, a number that is growing. Table 13 demonstrates this.

Water supply is also crucial to the development of cities, which are in turn vital to economic development. The Member States' urban growth rate currently ranges between 1.4 and 5% (2017 numbers). According to projected rates of urbanisation, as shown in Table 14, the urban population will exceed the rural population of Sub-Saharan Africa by about 2040. Cities will, thus, be the drivers of economic growth, trade and diversification.

### 6.2.7 Programme 4: Catchment and Natural Asset Management

Catchment management aims to manage naturally occurring water within a catchment area by managing or accounting for all aspects of the hydrological cycle. Managing catchments can be a cost-effective way to reduce water treatment and purification costs in the production of potable water. Other benefits of catchment management practices include the protection of biodiversity and the management of floods. Protecting biodiversity leads to a better provision of ecosystem goods and services, which are often crucial to local communities for food provision and to support livelihood activities. Catchment management can also help improving a catchment's carbon storage capacities.

This category of projects includes investments in catchment and water resources management activities and equipment including hydrometric stations, reservoirs for structural flood protection and sediment management, navigation projects, as well as knowledge enhancement and information system projects. Information gathering and management systems (including hydrometric stations) and flood protection systems are crucial to protect environment, livelihoods and economic activities. Floods in the

6. Under the water supply category, we have also classified dam projects with no hectareage.



Zambezi destroy natural and man-made infrastructure and disrupt economic activities.<sup>7</sup> Sediment management projects also help prevent deterioration of infrastructure functionality downstream, such as water supply schemes or hydropower stations.

Projects in this programme need to be linked to other infrastructure, and they need to be cross-cutting. These projects have a more explicit livelihood focus and have, therefore, been merged with the representative project section. Some representative projects are:

- Flood management, through:
  - Early warning flood systems that can be managed, interpreted and communicated by local communities; and
  - Dyke construction and related flood protection infrastructure, as appropriate.
- Aquatic ecosystem management/enhancement, promoting fisheries and related aquaculture activities (including harvesting reeds and herbs for medicinal purposes).
- Woodland management and forestry restoration, in particular community managed forestry, promotes sustainable use of woodland resources and forests through the provision of alternative energy sources.
- Catchment restoration and management, through interventions such as agroforestry, erosion control, terracing and buffer strips.
- Green infrastructure, such as wetland health restoration, increased green and blue space in urban areas, riparian buffers, etc.

### 6.3 COMPONENT 2: LIVELIHOODS SUPPORT

#### 6.3.1 Introduction

About 96.5% of agricultural activity (by area) in the Watercourse is rain-fed and the majority of this is smallholder farming in which two thirds of the population is engaged. Rain-fed agriculture is consequently a far higher cumulative ‘user’ of water than irrigated agriculture in the Watercourse although this water, being rain-fed, is not included in the runoff-based hydrological balance of the Watercourse. Improving rainwater capture and storage, and improving soil moisture capture and retention through improved rain-fed agriculture techniques and management provides the greatest promise for poverty reduction, food production and resilience for the highest number of people in the Watercourse. There are, however, very few investment projects aimed at supporting rain-fed agriculture, particularly at smallholder level, in the Project Inventory of national plans. A future update to the Strategic Plan could ask Member States to more explicitly focus on identifying projects of this kind.

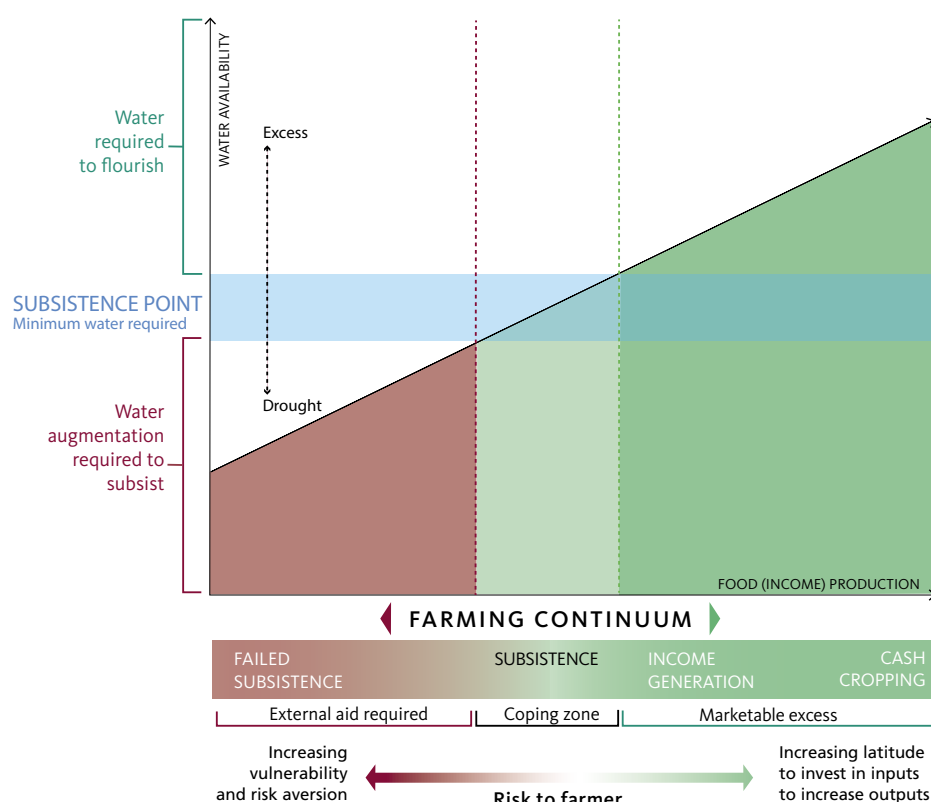
Rain-fed agriculture has its associated challenges, as it is vulnerable to climate variability and climate change. Rainfall variability within the Watercourse is fundamentally linked to agricultural productivity and the primary cause of poverty related vulnerability. Throughout the Watercourse, climate change is expected to increase variability, and modify the frequency and intensity of rainfall, droughts and floods. As described more fully in Section 3.7, it is estimated that rainfall across the Watercourse will decrease by 10–15% by 2100, with delayed onset to the rainy season, and shorter, more intense rainfall events. All Member States will experience a significant reduction in average annual stream flow, with runoff estimated to decrease 26–40% by 2050.

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7. For example, in 2015, the south of Malawi and central Mozambique (along the Shire River) were affected by devastating floods caused by heavy rainfalls following Cyclone Bansi. These disrupted industrial activities and affected economic growth in the Shire Basin and throughout Southern Africa.



FIGURE 6: THE FARMING CONTINUUM AND WATER (ABRAMS, 2018)



The reason why ZAMCOM, as a Watercourse Commission, will be engaged in supporting the water related elements of rural livelihoods on a large scale throughout Zambezi Watercourse is because this is a watercourse-wide transboundary issue. Supporting the water related elements of rural livelihoods is required in order to achieve the Development Objectives of the Strategic Plan because water, poverty and the environment are all inter-related. Inclusive growth cannot be achieved in the Watercourse without addressing the water needs of the rural poor.

### 6.3.2 Water and Rural Livelihoods

Currently 3.6% of the arable land in the Watercourse is irrigated. This will increase to approximately 7% when all the proposed irrigation projects have been developed which are included in the national plans. Currently, therefore, the vast majority of agriculture in the Watercourse is rain-fed and this is expected to continue in the future.

The key to rain-fed water management is to maximise the water available to support plant growth (maximise transpiration). There are critical points in the growth

cycle of crops where plants need moisture – brief dry spells in the growing season may result in significantly reduced yields, even when the overall seasonal rainfall may be sufficient. Capturing and maintaining soil moisture to be available when the plants most need it is key to productive rain-fed agriculture.

The two key elements of increasing rain-fed water availability are water capture and soil moisture storage. Water capture increases the availability of water through reducing rainwater runoff and groundwater seepage, and soil moisture storage increases the water available for plant transpiration through reducing evaporation. Rainwater capture or harvesting can be done in a variety of ways including terracing, ponding, and the use of small dams. Soil moisture storage can be achieved through avoiding ploughing using conservation tillage methods, and through mulching, intercropping, windbreaks, and other methods.

### 6.3.3 Water and Rural Poverty

Figure 6 illustrates the “Farming Continuum” where the availability of water determines the productivity of the farmer which stretches from failed subsistence to

small scale agro-business. With variable annual rainfall and with inconsistent rainy seasons which may have dry spells during critical crop growth phases, the farmer faces uncertainty as to where on the continuum they will be in any particular year. Because of this uncertainty, they cannot risk expenses such as fertiliser or more expensive high yield seed varieties which will be wasted if the rains don't come. If there is a high likelihood of unpredictable dry years – which is the situation in most of the Zambezi Watercourse – then they become trapped in a necessarily risk averse subsistence state which in some years will result in failed crops and them being unable to feed themselves, and in all other years producing average yields. In seasons with average and good rains they will not be able to take advantage of greater potential yields because they could not risk the costs of inputs such as fertiliser, not knowing beforehand what the rainy season would be like.

The first step in transforming this situation and building sustainable livelihoods is ensuring that, at the very least, farmers do not fall below the “Subsistence Point” (Figure 6) through securing water which will be available in all but the most persistent droughts. This has the effect of removing uncertainty and increasing sustainability – replacing the vicious cycle of increasing poverty with the virtuous cycle of increasing wellbeing.

ZAMCOM regards this as the necessary first step – to get as many farmers as possible to the first stage of basic water security where they are able to confidently meet their own needs in bad years and begin to produce excess outputs in good years. This will not only have an impact on those directly involved in farming but will also provide the basis for other economic activities in the rural areas as demands increase for agricultural inputs and markets develop as a result of increased outputs. This in turn will drive other commercial activities not directly related to the agricultural value chain.

### 6.3.4 Livelihoods and Watercourse Degradation

Land degradation results in reduction in the productive capacity of land due to wind and water erosion of soil, loss of soil humus, depletion of soil nutrients, and the loss and deterioration of vegetation cover. This in turn further reduces agricultural output and increases poverty, forcing people into short-term coping strategies such as charcoaling and deforestation.

In the Zambezi Watercourse, 51% of land is moderately degraded and 14% is highly degraded – in two Member States in the Watercourse (Zambia and Zimbabwe) only 7% of the land is not degraded. This in turn leads to high sediment loads in rivers and the silting up of waterways and reservoirs, undermining investments in large scale water storage, especially for irrigation and hydropower production.

Supporting the water related aspects of improving rural livelihoods will encourage conservation agriculture, improved land management and use, and reduced poverty driven survival activities which further degrade the Watercourse.

### 6.3.5 Livelihoods Support Programme

A rural livelihoods support programme will be developed by ZAMCOM to promote poverty reduction and to reduce poverty induced degradation on the Zambezi Watercourse. This will be focused on improved smallholder rain-fed agriculture which is the basis of the rural economy throughout the Watercourse. A Livelihoods Support Programme will undertake the following activities and functions:

#### 6.3.5.1 'Hot-spot' Identification

ZAMCOM will work together with such organisations as the Climate Resilient Infrastructure Development Facility (CRIDF) in identifying 'hot spots' where rural poverty is particularly high and where improved rain-fed smallholder agriculture could improve the situation. Hot spots may also include places in the Watercourse where the conditions of poverty-induced environmental and land degradation are particularly extreme. Identification

## 6 STRATEGIC PLAN COMPONENTS

will include engagement with local communities and authorities to support the development of livelihood improvement investments.

### 6.3.5.2 Research and Analysis

The Livelihoods Support Programme, in addition to supporting specific livelihood focused development projects such as those identified below, will also support research and analysis into ways to enhance rain-fed smallholder agriculture in collaboration with partners, stakeholders, national government departments, and others. Methods of improving soil moisture retention and rainwater harvesting/small dams will be investigated, together with such factors as farmer support, training, small business support, community engagement etc. Many of these methods have been successful elsewhere in Africa and in other development contexts.

### 6.3.5.3 Livelihood Project Support

Livelihood projects at national and Watercourse-wide levels may take a variety of different forms and may be attached to other infrastructure development projects in the Watercourse. ZAMCOM will support national departments of rural development, water and agriculture in the design, financing and implementation of such projects. Projects could include the following:-

#### Agriculture:

- **Small-scale water storage and rainwater harvesting**, large scale programmes in small scale infrastructure investments such as small dams, sand-dams, wells, localized groundwater recharge etc.
- **Small scale irrigation**, using technology suited to local water availability and climate (e.g. channels, drip irrigation, tunnels, hydroponics, etc.) – with the intention of improving quality, quantity, diversity and consistency of produce to allow farmers to move beyond subsistence horticulture.

- **Climate smart agriculture practices**, adopting appropriate cropping schedules/rotations and modern agronomy techniques to optimize water usage and maintain the integrity of the soils. e.g. low/no-till.
- **Market access**, through the provision of accessible and sufficient storage and localised distribution facilities to bridge variations and mitigate risks during periods of low rainfall.

#### Environmental Management:

- **Catchment management programmes** which will reclaim degraded lands, conserve existing lands, reduce flooding, increase groundwater recharge and provide other benefits.
- **Payment for environment service schemes** to both improve rural livelihoods and reduce the costs of water treatment and the silting up of storage.

#### Energy:

- **Off-grid small-scale hydropower generation**, for household and productive use in remote locations – reducing extensive fuelwood and charcoal production (thus reducing biomass, increase soil erosion, sedimentation and evapotranspiration).
- **Solar power generation for household and productive use**. Expanding alternative sources of off-grid power increases the capacity of the power pool, and ultimately reduces the dependency on water for power generation.

#### Water Supply:

- **Assured water supply for domestic and small-scale productive use**, noting different sources (ground vs. surface water), infrastructure, governance and tariffing/payment mechanisms will be required for urban, peri-urban and rural areas.



### 6.4 COMPONENT 3: ENVIRONMENTAL RESOURCES PROTECTION AND UTILIZATION

#### 6.4.1 Introduction

The management and protection of the aquatic and riverine environment of the Zambezi Watercourse has been an ongoing activity and function of ZAMCOM for a number of years. This will continue to be an important function under the Strategic Plan through this component.

A number of important studies have been carried out in recent years which provide guidance to ZAMCOM in matters related to the environment including:

- The Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin (ZAMSTRAT), 2008,
- Zambezi River Basin Atlas of the Changing Environment, 2012, and
- Zambezi Environment Outlook (ZEO), 2015.

The guidance and strategies contained in these documents need to be actioned together with the new activities noted below which will arise as a consequence of implementing the Strategic Plan, especially related to the planned infrastructure investments to be developed under Component 1.

#### 6.4.2 Watercourse Environmental Health

The programme which will be undertaken by ZAMCOM under Component 3 of the Strategic Plan for the Zambezi Watercourse will be as follows:

##### 6.4.2.1 Watercourse-wide Environmental Health

ZAMCOM will continue to promote the conservation and protection of the aquatic and riverine environment of the Zambezi Watercourse, as well as its general environmental health. This will include the continued implementation of existing plans and commitments made under ZAMSTRAT (2008) and the ZEO (2015). Maintaining the general environmental health of the Watercourse will be in terms of the balance required

between environmental sustainability and equitable economic development, recognizing that the primary threat to the environment in the Watercourse at present does not come from economic development but from widespread rural poverty.

##### 6.4.2.2 Sensitive Areas

ZAMCOM will take special note of sensitive areas in the Watercourse including wetlands, the delta and sites such as the Victoria Falls which have both environmental importance as well as being valuable tourism destinations. These areas are particularly important in terms of the environmental services they provide to the river system as a whole and because of the role they play in the lives and economy of the communities which depend on them. Sensitive terrestrial areas which are critical for the overall functioning of the hydrology of the Watercourse such as the Angolan highlands and upper tributaries in northern Zambia – which form the ‘water tower’ of the Watercourse – will also require ongoing assessment and protection.

##### 6.4.2.3 Degradation Hot-spots

ZAMCOM will identify and pay special attention to degradation hot-spots caused primarily by rural poverty as a consequence of poor land use methods, deforestation, erosion, loss of soil fertility, overgrazing, etc. The environmental restoration of degraded areas will be undertaken in conjunction with the Livelihoods Support Component of the Strategic Plan – Component 2.

#### 6.4.3 Managing Environmental Impacts of Investments

The hydro-economic modelling of the investments planned in Component 1 indicates that the infrastructure plans of the Member States can be implemented utilising currently available water resources whilst also ensuring an acceptable level of environmental protection through the adoption and implementation of adequate environmental flows related to each project. The Plan also provides for the protection of sensitive areas of the Watercourse such as wetlands and the delta, together with protection against flooding. These environmental

requirements can only be met without adversely impacting the economic outputs of water uses such as hydropower generation, irrigation and water supply services, if high levels of operational co-operation are maintained between different users in the Watercourse.

ZAMCOM will therefore undertake a programme of managing the impacts of existing and future infrastructure developments in the Watercourse comprising:

### 6.4.3.1 Establishing Environmental Impact Guidelines

These guidelines will draw on the existing work done by ZAMCOM and others on environmental protection in the Watercourse, and will establish guidelines for environmental impact assessment and environmental operating rules including environmental flows and in-stream monitoring for existing and future developments in the Watercourse. The existence of such guidelines will provide greater certainty to both developers and financiers.

### 6.4.3.2 Engagement in Project Design and Implementation

ZAMCOM will be involved in the design and implementation stages of infrastructure projects to ensure that:

- The Environmental Impact Guidelines are being followed;
- Operating rules are established and agreed to, which meet environmental flow requirements, including the provision and maintenance of monitoring equipment; and
- Adequate financing arrangements are made and committed to which will cover the costs of compliance and monitoring during the design life of the project, including covering the monitoring costs of ZAMCOM.

### 6.4.3.3 Monitoring of In-stream Flow Requirements

ZAMCOM will establish an on-going monitoring programme to ensure that the environmental flow agreements and undertakings of existing and future projects are being met. The costs of this monitoring function should be provided for through a levy on each project.

### 6.4.3.4 Support to Operational Co-operation and Communication

In order to ensure that the agreed levels of environmental protection are maintained throughout the Watercourse (especially in sensitive areas – wetlands, delta etc.) without adversely impacting the economic outputs of key users (hydropower and irrigation), operational communication and co-operation is essential – ZAMCOM will put in place a procedure to actively promote and support these activities.



### 6.5 COMPONENT 4: WATER RESOURCES MANAGEMENT

#### 6.5.1 Introduction

IWRM is normally regarded as the main activity of river basin organisations and is similarly the prime function of the ZAMCOM in terms of the ZAMCOM Agreement. This Component includes a variety of functions, mostly at the watercourse level, and is closely related to the national level IWRM investment projects in Programme 4 of Component 1.

The overall objective of this Component is to ensure that there exists a solid, scientific, evidence-based platform of sound water resources management and development information, practice, knowledge and regulatory context to achieve the Development Objectives of the Strategic Plan for the Zambezi Watercourse.

#### 6.5.2 Water Data Capture, Storage, Management and Usage

Hydrological and climate related data capture and management is primarily a national level responsibility and undertaking but within the context of a shared international river basin there exists an important collating and analytical function at the watercourse level to provide a strategic oversight of trends and issues which may impact development and water use at a multi-country scale. Such information is of critical importance both for planning purposes in terms of new proposed water infrastructure and use, and for the day-to-day management and operation of the system.

ZAMCOM has already achieved substantial gains in this function with the establishment of the ZAMWIS. The ZAMWIS has an essential role in providing the overarching information system for the Zambezi Watercourse required to support the ZAMCOM in fulfilling its functions as described in the ZAMCOM Agreement. The ZAMWIS supports general informed decision making; planning, management and development leading to better information symmetry and understanding among the Member States.

ZAMWIS is currently being modernised and fully operationalised to provide an effective platform for data, information and knowledge collection, assessment and sharing in the Zambezi Watercourse. The improved ZAMWIS will include a Decision Support System for a variety of purposes – from Watercourse development scenario analysis to tools for flow forecasting and monitoring.

ZAMCOM has recently facilitated the adoption by the Member States of Rules and Procedures for the Sharing of Data and Information Related to the Management and Development of the Zambezi Watercourse which will enhance data capture and sharing in the future.

#### 6.5.3 Decision Support Systems

The description of the Strategic Plan for the Zambezi Watercourse in the ZAMCOM Agreement includes for the provision of *“a general planning tool and process for the identification, categorization and prioritization of projects and programmes”*. The Decision Support System embedded within the ZAMWIS, together with the models and scenario planning tools developed during the course of the preparation of the Strategic Plan (see Boxes 3 & 5), provide a powerful toolbox for ongoing use by ZAMCOM and the Member States.

#### 6.5.4 Knowledge Management

Knowledge and understanding of IWRM and the factors which influence water use and development in the Watercourse requires more than the static collation and holding of relevant information and data. ZAMCOM has an important role in actively promoting and facilitating knowledge transfer and sharing. Providing a repository through the ZAMWIS is an important element, however, ZAMCOM will go further than this to promote symposia, forums, technical discussions and stakeholder information sharing events on topics of interest and importance which impact the Watercourse. This will be done in close collaboration with partners and donors to ensure that events are as inclusive as possible.



The objective of such activities is to improve harmonisation and regional integration which in turn will improve planning and implementation of equitable and sustainable economic development throughout the Watercourse.

### 6.5.5 Policy and Legislation Support & Harmonisation

The international water law on which the ZAMCOM Agreement is based (both the 2000 Revised SADC Protocol on Shared Watercourses and the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses) is complex and has implications for national law related to water development, management and use when water within a country is part of an international watercourse. The management of shared international waters is facilitated when the national water laws and policy of Member States are based on similar principles. For this reason ZAMCOM has supported efforts aimed at harmonising – where possible – national laws related to trans-boundary water which will lead to more effective co-operation.

### 6.5.6 Disaster Risk Management

Due to high degrees of variability in the climate of the region, the Watercourse and its Member States are subject to climate related risks – periodic recurrent droughts and floods. The impacts of these events can be mitigated with operational collaboration amongst Member States including such mechanisms as dam synchronisation, flood & drought early warning systems, and through coordination between Member State disaster management structures. ZAMCOM has an important role in guiding and facilitating these activities.

In addition to encouraging communication and interaction between national disaster management structures, ZAMCOM has a role in coordinating emergency preparedness and response in the event of flood or drought related crises given its watercourse-wide system operational oversight function noted in Section 6.5.8 below.

### 6.5.7 Climate Change Monitoring

Component 1: Infrastructure Investment of the Strategic Plan (Section 6.2) is based on the historical climate currently prevailing in the Watercourse. There is no certainty regarding the precise ways in which the climate will change during the planning horizon of the Strategic Plan (2018 – 2040). The infrastructure investment programme will need to be adapted if climate changes are substantial during the course of the coming years. However, this will only become apparent with acceptable degrees of certainty if the relevant weather related data (including rainfall, evaporation and streamflow data) is collected and analysed thoroughly and continuously.

#### 6.5.7.1 'Climate Watch' Function

To support future planning and climate change adaptation during the course of the planning horizon of the Strategic Plan, ZAMCOM will take on a 'Climate Watch' function which will firstly establish its *modus operandi* through the development of a Climate Watch Plan, and then embark on a long-term process of gathering and analysing key climate related data in order to monitor actual observed climate change. This will be used as an input to planning and adaptation.

#### 6.5.7.2 Climate Change Knowledge Function

In addition to the Climate Watch function, ZAMCOM will ensure that it remains up to date with international and regional research and discussions on climate change, climate variability, climate resilience and climate adaptation. This is both to inform its own watercourse-wide planning activities and to be able to contribute to and support Member State activities related to climate change issues.

### 6.5.8 System Operational Oversight

The chosen development scenario on which the Strategic Plan is based (full development of the Member State plans [maximising economic benefits] together with provision for sustaining the environment, flood control and delta protection) will only be successful and produce optimal benefits if a high degree of interaction and collaboration is maintained in the day-to-day

## 6 STRATEGIC PLAN COMPONENTS

operation and management of the Watercourse through such mechanisms as dam synchronisation, scheduling of releases, integrated operating rules etc. This will primarily be the responsibility of individual Member States and the related jointly owned institutions in the case of multi-country infrastructure assets (such as the Zambezi River Authority – jointly owned by Zambia and Zimbabwe, which manages Kariba Dam). However, ZAMCOM will need to play an oversight function, in terms of the ZAMCOM Agreement, to ensure that all parties are managing the shared resources over which they have control according to the agreed principles of international water management –

- The principle of equitable and reasonable utilisation;
- The duty to prevent significant transboundary harm; and
- The general duty to cooperate.

On a day-to-day operational level this will require operational and data sharing protocols to be established. It is unlikely that this will require continuous monitoring except at critical times (drought and flood) but may require monthly or weekly *post facto* reporting.

An on-going operational monitoring system will also be needed to ensure that environmental flow agreements are observed at specific project sites and for sensitive parts of the Watercourse including wetlands and the delta. The costs to ZAMCOM of performing these monitoring and oversight functions on behalf of the Watercourse as a whole should be covered through levies paid by the development projects for this purpose.



Malawi NASC Meeting, Lilongwe / Len Abrams

## 7 INSTITUTIONAL REQUIREMENTS

### 7.1 INTRODUCTION

The Strategic Plan for the Zambezi Watercourse provides a course of action for the Member States of the Watercourse, through ZAMCOM, to proceed with the sustainable economic development of the resources of the Watercourse for the equitable and inclusive benefit of all the peoples of the Watercourse. To achieve this ZAMCOM will ensure that there is sufficient institutional backing and capacity to successfully implement the Plan. This will build further on the provisions already made in previous planning exercises such as the ZAMSTRAT. This chapter indicates the institutional requirements for implementing the Strategic Plan.

### 7.2 GENERAL FUNCTIONS OF ZAMCOM

The general functions of ZAMCOM include the following:

- To promote, support, coordinate and harmonise the management and development of the water resources of the Zambezi Watercourse;
- To collect, evaluate and disseminate all data and information on the Zambezi Watercourse as may be necessary for the implementation of the Agreement;
- To advise Member States on measures necessary for the avoidance of disputes among Member States with regard to planning, management, utilisation, development, protection and conservation of the Zambezi Watercourse; and
- To foster greater awareness among the inhabitants of the Zambezi Watercourse regarding the equitable


and reasonable utilisation and efficient management and sustainable development of the resources of the Zambezi Watercourse.

The subsidiarity principle holds that decisions made and activities undertaken should be at the most appropriate localised level possible, consistent with their successful resolution. In a transboundary river basin context this means that all issues which can be handled at country level should be, whilst the Watercourse Commission (ZAMCOM) should be involved in those issues which relate to two or more Member States or which apply throughout the Watercourse.

ZAMCOM therefore aims to ensure that a well led, professionally capable and well-resourced Secretariat exists to perform two primary roles, in addition to the general roles described above:

- Watercourse-wide transboundary water related activities required to implement the Strategic Plan (those activities which cannot be carried out by individual Member States), most of which are included in core Component 4, described in Section 6.5.
- Provide support to Member States to undertake transboundary water related activities required to implement the Strategic Plan at national level, especially support for implementation of the infrastructure projects included in core Component 1, described in Section 6.2.

**TABLE 15: SPECIFIC FUNCTIONS AND ACTIVITIES OF ZAMCOM**

1	<b>Infrastructure Investment</b> 	<ul style="list-style-type: none"> <li>● <b>Infrastructure development support unit</b> <ul style="list-style-type: none"> <li>• Economics of transboundary water</li> <li>• Support project design and preparation</li> <li>• Support project financing and packaging</li> <li>• Transaction management support</li> </ul> </li> </ul>
2	<b>Livelihoods Support</b> 	<ul style="list-style-type: none"> <li>● <b>Livelihood programme support unit</b> <ul style="list-style-type: none"> <li>• Poverty 'hot-spot' identification</li> <li>• Livelihood research and analysis</li> <li>• Livelihood project support</li> </ul> </li> </ul>
3	<b>Environmental Resources Protection and Utilization</b> 	<ul style="list-style-type: none"> <li>● <b>Environmental health monitoring</b> <ul style="list-style-type: none"> <li>• Watercourse monitoring</li> <li>• Sensitive areas (wetlands, delta, head-waters etc.)</li> <li>• Degradation hot-spots</li> </ul> </li> <li>● <b>Managing environmental impacts of investments</b> <ul style="list-style-type: none"> <li>• Establishing environmental impact guidelines</li> <li>• Engagement in project design and implementation</li> <li>• Monitoring of in-stream flow requirements</li> <li>• Support to operational co-operation and communication</li> </ul> </li> </ul>
4	<b>Water Resources Management</b> 	<ul style="list-style-type: none"> <li>● <b>Water resources management</b> <ul style="list-style-type: none"> <li>• Water data capture, and management including ZAMWIS</li> <li>• Decision Support Systems</li> <li>• Knowledge management</li> </ul> </li> <li>● <b>Notification coordination and support</b></li> <li>● <b>System operational oversight to promote coordinated energy production</b></li> <li>● <b>Policy and legislation support &amp; harmonisation</b></li> <li>● <b>Disaster risk management</b></li> <li>● <b>Climate change monitoring, including –</b> <ul style="list-style-type: none"> <li>• 'Climate Watch' function</li> <li>• Climate change knowledge function</li> </ul> </li> </ul>
	<b>Institutional Foundation</b> 	<ul style="list-style-type: none"> <li>● <b>Governance, co-operation and regional integration</b></li> <li>● <b>Communications</b></li> <li>● <b>Gender mainstreaming</b></li> <li>● <b>Capacity development</b></li> </ul>

### 7.3 SPECIFIC FUNCTIONS AND ACTIVITIES OF ZAMCOM

In addition to the general functions of ZAMCOM noted above in Section 7.2 above, Table 15 provides an indicative listing of the activities and functions which ZAMCOM will undertake to support the implementation of the Strategic Plan. Note that this list is not intended either to be exhaustive or fixed – as the implementation proceeds further activities may need to be added.

#### 7.3.1 Infrastructure Development Support

In order to successfully implement the Strategic Plan for the Zambezi Watercourse, ZAMCOM will need to augment its existing functions and capacity. As the main thrust of the Strategic Plan is the development of infrastructure to underpin the economies of the Member States, new areas of expertise are needed including planning, economics and transaction management.

## 7 INSTITUTIONAL REQUIREMENTS

ZAMCOM will establish a small Infrastructure Development Support Unit within the Secretariat to support Member States implement the Strategic Plan. The unit will retain a core group of experts including an economist, a project preparation expert, an infrastructure financing expert and a procurement/transaction specialist. The Unit would provide the following services which are described in greater detail in the sections below:

- Support for independent economic analysis of transboundary water issues;
- Support for project preparation;
- Support for the financing of projects; and
- Provide transaction management support.

### 7.3.1.1 Economics of Transboundary Water

The financing of infrastructure as well as its operation and maintenance depends on a clear understanding of the economics of water in both the Member State and Watercourse context. It is necessary to determine the value of proposed developments and their related costs and benefits in the context of the broad economy where the investments are planned. To do so it is necessary to understand the economy of water in relation to the primary water-dependent sectors in society. This has generally been undertaken by institutions such as the Development Banks whose main function is to provide infrastructure development credit, however it should be undertaken independently by the Member States themselves which are responsible for servicing the debt incurred.

Member States and specifically water-related government departments in the Watercourse generally do not have the expertise to undertake such analysis. ZAMCOM will therefore support Member States to undertake water sector economic analysis which will enhance the confidence of prospective financiers. In order to fully understand the economics of infrastructure investments in the water sector, analysis will need to include the sectors for which the water is being developed, be it agriculture, energy, or for urban commercial and industrial development. Furthermore, if a Nexus Approach to infrastructure investment is pursued, any

analysis will need to capture the interdependencies of investments made in each of these individual sectors.

Note that it is not the intention that ZAMCOM will develop and maintain the capacity and expertise to undertake such water economy analyses within the Secretariat but would provide support to Member States to undertake the analysis.

The activities which ZAMCOM will undertake in relation to economic analysis of transboundary waters, will be as follows:

- The preparation of guidelines for undertaking Independent Integrated Economic Analysis (IIEA) at project, country or Watercourse level;
- Provide support to Member States undertaking IIEA; and
- Establish a high level international Peer Review Board to ensure world class quality of analyses.

### 7.3.1.2 Project Preparation Support

The preparation of infrastructure projects is complex with multiple stages and takes a number of years from conception to commissioning. The expertise and experience required to prepare projects to meet internationally acceptable standards is generally accepted to be scarce in the Member States of the Zambezi Watercourse. ZAMCOM will include support for the preparation of projects in order to ensure that they are acceptable and 'bankable'.

Support will primarily be in the form of project preparation process support and advising counties on issues such as procurement of project preparation expertise – ZAMCOM and ZAMSEC will not be directly involved in the preparation of Member State level projects.

**TABLE 16: SUMMARY OF FINANCING SOURCES**

Type	Source	
Public sector	<ul style="list-style-type: none"> <li>• African national governments</li> <li>• African government entities and subnational authorities</li> <li>• Overseas development assistance from Organisation for Economic Co-operation and Development (OECD); non-OECD investors; Development Assistance Committee countries</li> <li>• Multilateral development banks</li> <li>• Regional or national development banks</li> </ul>	
Private sector	<ul style="list-style-type: none"> <li>• Commercial banks</li> <li>• Corporates</li> <li>• Capital markets</li> <li>• Infrastructure investment funds</li> </ul>	<ul style="list-style-type: none"> <li>• Institutional investors</li> <li>• Private equity</li> <li>• Venture capital</li> </ul>
Novel sources	<ul style="list-style-type: none"> <li>• Climate finance</li> <li>• Sovereign wealth funds</li> <li>• Foundations</li> </ul>	<ul style="list-style-type: none"> <li>• Remittances</li> <li>• Social investors</li> <li>• Philanthropists</li> </ul>

### 7.3.1.3 Project Financing Support

ZAMCOM will make provisions for supporting Member States with infrastructure financing, either individually or jointly, depending on the nature of the project.

In order to ensure the best fit between projects and potential finance sources and mechanisms, both the projects and the finance sources need to be analysed and categorised. Most of the financing of infrastructure projects will be undertaken at national level by Member States. ZAMCOM will assist in supporting Member States to finance projects.

**Project typologies:** The delivery of projects falls into different typologies such as national projects with transboundary implications, multi-country projects undertaken jointly by two or more Member States, watercourse-wide projects with implications for all Member States such as drought and flood management, etc.

**Financier typologies:** Infrastructure financiers fall into three main categories each of which has several sub-categories. These are summarised in Table 16. It is important to note that financing for any specific project may comprise a blend of different financing sources and mechanisms. The suitability of different finance sources also varies depending on the stage of the development of the project as it progresses from early conceptual stages through feasibility, design, procurement, construction, commissioning and finally to operation. Financier typologies extend to the preferences which financiers have for different sectors

and types of projects, and to preferences for different countries or regions.

### 7.3.1.4 Transaction Management Support

The project cycle of any large infrastructure project includes a well-established set of steps from initial concept through pre-feasibility to feasibility, basic design, financing, detailed design, contracting, construction, commissioning, and eventually, operation and maintenance. Whilst the project cycle appears to be logical and sequential, there is a great deal of complexity 'behind the scenes' in making sure that all the various processes happen correctly. These are listed in Table 17.

One of the reasons for the infrastructure deficit in the Zambezi Watercourse may be because of an inability to successfully undertake all the transactional steps required to implement infrastructure project development. Therefore, although at Watercourse and national levels all the ingredients are present including clear needs and demands for infrastructure, agreed programmes, secured funds and political will – yet no progress is made towards turning planning and strategies into physical infrastructure 'on the ground' which underpins economic growth, job creation and development. One of the major reasons is the absence of transaction management skills and experience.

The need for the skills and expertise to successfully navigate the implementation process is not confined to infrastructure investments in Africa. The same processes are needed throughout the world.



**TABLE 17: TRANSACTION MANAGEMENT ACTIVITIES**

Type of Support	Activities
Strategic support	<ul style="list-style-type: none"> <li>• Project Finance and Public-Private Partnership advisory services</li> <li>• Decision and Risk Analysis</li> <li>• Operations Improvement</li> <li>• Business Case development</li> <li>• General Transaction Management</li> </ul>
Procurement support	<ul style="list-style-type: none"> <li>• Procurement strategy advice &amp; process management</li> <li>• Compliance assurance with financiers' procurement requirements</li> <li>• Terms of Reference preparation &amp; Request for Proposals</li> <li>• Due Diligence and procurement risk analysis and advice</li> <li>• Short-listing &amp; bid eligibility assessment</li> <li>• Bid appraisal and reporting</li> <li>• Technical and financial closure</li> </ul>
Contracting support	<ul style="list-style-type: none"> <li>• Contracting strategy advice &amp; process management</li> <li>• Contract and legal documentation preparation</li> <li>• Contract negotiation and closure</li> </ul>
Contract management & supervision	<ul style="list-style-type: none"> <li>• Contract progress and delivery management, quality assurance</li> <li>• Contract payment certification and advice</li> <li>• Contract dispute management and advice</li> </ul>
Technical oversight	<ul style="list-style-type: none"> <li>• Environmental and Social safeguarding</li> <li>• Engineering and technical content review &amp; advice</li> </ul>
Strategic technical advisory service	<ul style="list-style-type: none"> <li>• Project conception and identification</li> <li>• Finance packaging</li> <li>• Analytical services and innovation</li> </ul>

The common practice of authorities in industrialised countries is to outsource these functions to specialist firms on a contract basis under the management of the commissioning authority. Very seldom are all of these skills retained 'in-house'. The skills and expertise to manage outsourced transaction management contracts needs to exist in-house but it is not necessary or effective to build the internal capacity to undertake all the transaction management functions internally.

#### 7.4 OPERATIONAL CO-OPERATION TO OPTIMISE ECONOMIC BENEFITS

In addition to the function of ZAMCOM to promote general co-operation between Member States, there is substantial evidence that significant economic benefit can be derived through specific operational co-operation between production facilities in the Watercourse, especially in the case of hydropower production.

The Multi Sector Investment Opportunity Analysis of the Zambezi Basin (MSIOA) (World Bank, 2010) found "coordinated operation of the system of hydropower

facilities can provide an additional 23% generation over uncoordinated (unilateral) operation. The value of co-operative generation therefore appears to be significant." Similarly the Dam Synchronisation and Flood Releases in the Zambezi River Basin Project (2010-2011) undertaken by SADC and the Interim ZAMCOM Secretariat, highlighted the need for dam synchronisation and conjunctive operation of dams in the Zambezi Watercourse for improved protection against flooding and increased hydropower production.

The hydro-economic analysis undertaken in the preparation of this Strategic Plan reinforces the finding that significant economic gains can be achieved through operational co-operation between all hydropower producing agencies and operators in the Watercourse, over and above what can be produced if each operation functions independently. Figure 7 indicates that increases of between 40 and 85% could be achieved through coordinated generation operations if historical climate conditions continue to 2040.

If climate change results in a drying future climate the need for coordinated operation is even greater with increases in firm power output being between 60 and 120%.

As highlighted in the Dam Synchronisation Study, achieving operational coordination requires substantial institutional, legal, financial and operational functions and commitments. However, the costs of not achieving operational coordination in terms of lost outputs and revenue, and the impacts on the economies of Member States due to energy deficiency, far outweigh the effort required to achieve operational coordination, especially given the uncertainties of climate change.

**ZAMCOM will therefore make achieving operational coordination and co-operation in the energy sector and in disaster risk management a priority.**

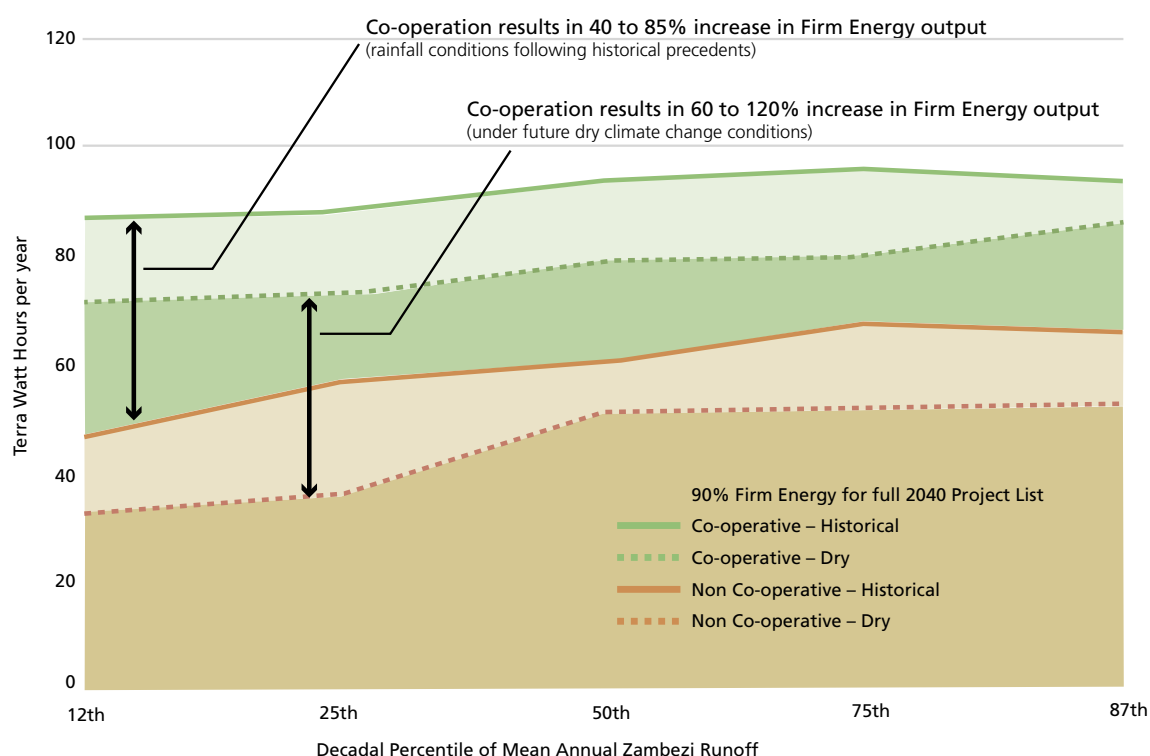
## 7.5 COLLABORATION WITH OTHER INSTITUTIONS

ZAMCOM will work in close collaboration with a variety of other organisations and institutions to achieve the Development Objectives of the ZAMCOM Agreement through the Strategic Plan. Such institutions including multi-lateral development agencies such as the World Bank and the African Development Bank; bi-lateral

agencies such as Danish International Development Assistance (Danida), the UK Department for International Development (DFID), the Swedish International Development Cooperation Agency (Sida), the German Gesellschaft für Internationale Zusammenarbeit (GIZ); regional development programmes such as CRIDF and SADC Water Fund, and such initiatives as the African Water Facility and CIWA (World Bank).

Other river basins in the region are faced with similar issues to those which face the Zambezi Watercourse. ZAMCOM will therefore seek close working relationships with river basin organisations such as OKACOM (the Permanent Okavango River Basin Water Commission), ORASECOM (the Orange-Senqu River Commission) and LIMCOM (Limpopo Watercourse Commission) with the possibility of developing shared capacity between the key river basin organizations of the Southern African region.

**FIGURE 7: ADVANTAGE OF CO-OPERATION VS NON CO-OPERATION IN FIRM ENERGY PRODUCTION**





Kazungula Ferry between Botswana and Zambia / Peter Qwist-Hoffmann

## 8 FINANCING THE STRATEGIC PLAN

There are three principal areas of financing required for the implementation of the Strategic Plan for the Zambezi Watercourse. These are:-

- The financing of infrastructure projects included in Component 1: Infrastructure Investment and Component 2: Livelihoods Support portions of the Plan;
- Financing of non-infrastructure activities and functions under Component 3: Environmental Resources Protection and Utilization and Component 4: Water Resources Management portions of the Plan; and
- Funding functions and activities of ZAMCOM and its organs.

### 8.1 FINANCING REQUIREMENTS

#### 8.1.1 Infrastructure Development Financing

The development of a rationalised framework for project prioritisation provides a clear overview of project and portfolio costs and characteristics, which differentiates between the two completion horizons (2017 and 2040) and forms the basis for investment structuring and packaging. However, given the Inventory's data limitations, the resultant outcomes of the analysis represent the type of results this tool provides and should be regarded as indicative only. Once Member States provide ZAMCOM with more complete information on all projects, the tool will be utilised to establish a prioritised investment programme suited to the Zambezi's highly complex, dynamic context.

The total cost of the Investment Framework as included in the Project Inventory currently totals 28 billion USD,<sup>8</sup> which equates to less than 1,000 USD per person in the Watercourse. As described in Section 4.1, infrastructure in the Watercourse is currently severely underdeveloped. Even full development of all planned projects in the Watercourse will not be sufficient to address this long-standing infrastructure gap and meet the socio-economic and environmental development demands of the Watercourse over the next 20 years. There is therefore a need to identify further developments that enhance inclusive growth in the Watercourse and to mobilise finance to develop the projects identified from early-stage/conceptual stages into bankable development projects.

The programmatic characterisation and clustering of projects in Component 1 of the Strategic Plan provides a basis for ZAMCOM to develop different approaches to financing projects in the Watercourse. In some national projects this role may focus on supporting inter-country notification; in others, particularly where complex joint ownership of assets is required, ZAMCOM will seek to provide specific advice on governance, ownership and oversight functions.

A variety of different 'Delivery Models' for financing infrastructure development are possible depending on different institutional and financial options (for example unilateral, bilateral and multi-lateral). Different Delivery Models will be used to link specific project structures

8. Noting that total costing figures are not yet available for a number of projects in Programmes 1, 2, 3 & 4.

and determine likely financing options and associated funding sources. This method will be used to identify potential financiers of infrastructure assets in the Zambezi Watercourse. Financiers will be grouped into subsets with common characteristics: investment mandates (including appetite for investment in distinct project phases), funding conditionality, return aspirations, risk appetite, thematic interests (i.e. sectors/programmes) and magnitude of funding.

The type of financing required to implement large developmental infrastructure varies across different infrastructure types (energy, agriculture etc.) as well as over the different phases of project or programme development. This situation is made more complex in a transboundary context which requires co-operation between Member States and adds to the numbers of institutions and authorities involved. These complexities, coupled with the extent of national and joint transboundary projects included in the Infrastructure Inventory, means that the matching of sources of financing to specific projects and portfolios needs to be undertaken at project level and cannot be aggregated to the scale of the Watercourse-wide Investment Framework.

However, the framework of analysis developed during the preparation of the Strategic Plan provides a tool for identifying financing options for projects as they proceed through the project preparation cycle. The analysis demonstrates the process of assessing possible Delivery Models and financiers, and unpacks the likely challenges faced by projects in the same programme area, at either a transboundary or national level.

ZAMCOM will therefore take a structured approach to supporting Member States within the highly complex context of the Watercourse – including differing sovereign development trajectories, climate change impacts on different sub-watercourses, and the ongoing degradation of the shared water resources of the Watercourse.

As noted in Section 7.3.3, ZAMCOM will collaborate closely with a range of other partners and institutions, particularly SADC, in attracting finance to promote investment preparation and implementation.

### 8.1.2 Financing Non-Infrastructure Activities

The Strategic Plan builds on existing policy and practice adopted by ZAMCOM for the financing of ZAMCOM activities. Activities which require funding have previously been listed in Table 15. Many of these functions are support activities to Member States to assist them to achieve the objectives of the Strategic Plan. Undertaking these activities will add value to government development processes in Member States and will result in strengthening economic growth and the reduction of poverty in the Watercourse, Member States and the region.

The ZAMCOM institutional costs which need ongoing funding include:

- Administrative and other costs of maintaining a functional river basin organisation secretariat – ZAMSEC;
- Member State co-operation;
- Communications;
- Gender balance; and
- Stakeholder engagement.

ZAMCOM will continue to make use of existing sources of funding for its functions, including ZAMSEC costs, and for non-infrastructure development projects and activities. Possible sources will include:

- Member State contributions;
- Grant funding from multi-lateral and bi-lateral sources;
- Technical assistance and other 'in kind' support; and
- Cost recovery from project preparation support services such as transaction management support.

In addition new sources of funding will be sought relating to specific activities such as climate change monitoring and rural livelihoods support.



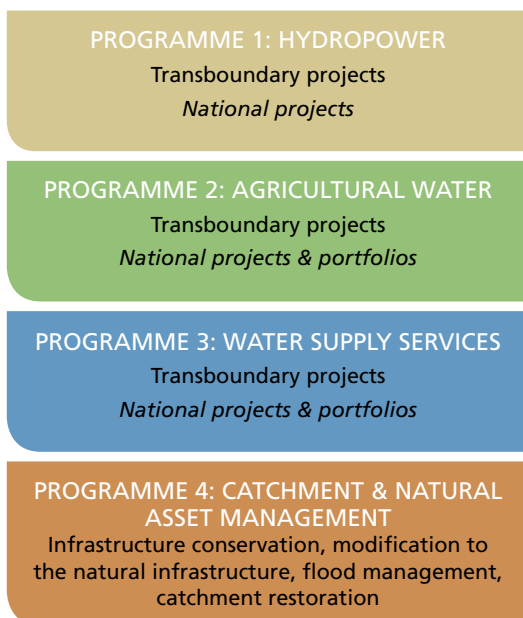


Lower Shire Basin, Malawi / Len Abrams

## 9 IMPLEMENTATION PLANNING

The implementation of the Strategic Plan will happen through two main spheres of activity – through activities and functions which are the responsibility of Member States acting individually or jointly, and through activities and functions which are the responsibility of ZAMCOM and its organs.

**FIGURE 8: COMPONENT 1: INVESTMENT PLAN PROGRAMMATIC STRUCTURE**



### 9.1 COUNTRY IMPLEMENTATION

Infrastructure development projects (Component 1 of the Strategic Plan – Figure 8<sup>9</sup>) will be undertaken at two different levels depending on the nature of the projects and programmes. These levels are:

- Multi-country transboundary level for joint development projects and programmes;
- Member State level for country projects with transboundary water implications.

During the development of the Strategic Plan for the Zambezi Watercourse, the projects included in the Project Inventory were modelled in terms of a range of criteria including the state of readiness of projects for implementation, depending on their level of preparedness (see Box 5). A dual planning horizon has been adopted creating two phases:

- Short Term – 2018-2027 and
- Medium Term – 2028-2040

9. Note that Figure 8 is identical to Figure 5 presented earlier. It is repeated here for ease of reference.

## 9 IMPLEMENTATION PLANNING

Notwithstanding the timing of the implementation of projects in Component 1 of the strategy as noted above, all of the projects will be undertaken by sovereign Member States under their own national planning and implementation timeframes and criteria, including joint projects involving more than one Member State. Developing an integrated implementation plan under the Strategic Plan across the entire Watercourse will therefore require both the co-operation of all Member States in the process of adopting and approving the Plan, as well as their co-operation in implementing it according to the agreed scheduling and timetable. ZAMCOM will therefore convene an Implementation Planning Meeting to track implementation progress and to amend and approve the Implementation Plan at regular intervals coinciding with other business of ZAMCOM.

### 9.2 ZAMCOM IMPLEMENTATION

In addition to the elements of the Strategic Plan which will be implemented by Member States as mentioned above, there are a range of functions and activities which are the responsibility of ZAMCOM in terms of the ZAMCOM Agreement.





Victoria Falls Power Station, Livingstone, Zambia / Peter Qwist-Hoffmann

## 10 MONITORING AND EVALUATION

**ZAMCOM will ensure that a Monitoring and Evaluation (M&E) Plan is prepared to measure the implementation of the Strategic Plan. The M&E Plan will identify the criteria by which progress, quality and value-for-money is both monitored and evaluated for each major activity and programme identified in the Strategic Plan.**






A specific M&E Plan will be developed to monitor and evaluate the performance of ZAMCOM and its organs in supporting and underpinning the implementation of the Strategic Plan.

A schedule for reporting on the progress of the project will be included in the M&E Plan. This will identify what occasional reporting is required (such as a Mid-term Review etc.), and the requirements of the regular Annual Progress Reporting process.

The M&E Plan will take cognizance of the M&E requirements of the several different parties which will be engaged in the implementation of the Strategic Plan such as the M&E requirements contained in Member State regulations, cooperating partner requirements, financiers' requirements etc.

# THE STRATEGIC PLAN

The Strategic Plan comprises four core components which are:

1	<b>Infrastructure Investment</b> 	<p>Investment in water related infrastructure is required throughout the Watercourse in order to underpin economic and social development and contribute towards achieving the national goals and aspirations of the Member States. The investment plan is developed over two planning horizons: Short term – 2018-2027 and Medium term – 2028-2040.</p> <p>The Infrastructure Investment Component has 4 Programmes with a total estimated cost of 28 billion USD. The four programmes are: 1-Hydropower, 2-Agricultural Water, 3-Water Supply Services and 4-Catchment &amp; Natural Asset Management.</p>
2	<b>Livelihoods Support</b> 	<p>Poverty and its impacts on the Zambezi Watercourse is the most pervasive problem threatening the future of the Watercourse. Increasing the availability of water for small-holder farmers and improving rain-fed agriculture practices, together with catchment management and conservation investments, will improve both rural livelihoods and the resilience of the Watercourse as a whole, whilst reducing the negative impacts of catchment degradation (high sediment loads, rapid siltation of dams etc.) throughout the Watercourse.</p>
3	<b>Environmental Resources Protection and Utilization</b> 	<p>In keeping with the stated Development Objectives and the ZAMCOM Agreement, development and management of the Watercourse will ensure the sustainable protection and conservation of natural riverine and aquatic ecosystems and resources. Instream flow targets will to be set and monitored, together with the monitoring of specific systems such as wetlands and the delta.</p>
4	<b>Water Resources Management</b> 	<p>The Zambezi Watercourse is large and complex, requiring collaborative, watercourse-wide management. Water resources management functions include water data capture, and Knowledge Management, including the use of tools such as ZAMWIS and Decision Support Systems to support water resources management. Support will be provided to Notification coordination and support, the harmonisation of policy and legislation, water related disaster risk management, climate change monitoring and overall operational oversight of the Watercourse.</p>
<b>Institutional Foundation</b> 		<p>This includes governance and management, harmonisation of policy and legislation in the Member States, together with the activities required to strengthen co-operation, communications, capacity development and gender mainstreaming.</p>



Chobe River, Kasane, Botswana / Peter Qwist-Hoffmann

# 11 CONCLUSION

The development and anticipated adoption of the Strategic Plan for the Zambezi Watercourse marks a milestone in the operationalising of the ZAMCOM Agreement and in fulfilling the mandate given to ZAMCOM by its Member States.

The Strategic Plan has been developed to further the objective of ZAMCOM as stated in the Agreement – *“to promote the equitable and reasonable utilization of the water resources of the Zambezi Watercourse as well as the efficient management and sustainable development thereof.”*

## The Strategic Plan strikes a balance between:

- Maximising the economic benefits of water development in the Zambezi Watercourse;
- Reversing rural poverty and poverty induced degradation through supporting smallholder rain-fed agricultural livelihoods;
- Ensuring the maintenance of moderate environmental flows;
- Disaster risk management of floods and droughts; and
- Building climate resilience.

ZAMCOM has a key role, on behalf of the Member States, to guide, oversee and support the development and management of the Watercourse through the implementation of the Strategic Plan. In order to provide the necessary support to Member States to be able to prepare, finance and implement transboundary related infrastructure projects, ZAMCOM will strengthen the capacity of the ZAMSEC through the provision of the necessary expertise and capacity in infrastructure development and livelihoods support, in addition to exiting water resources management functions.

The Strategic Plan is a dynamic tool and an ongoing process, the current form of which is captured in this document. The Strategic Plan Report will be reviewed on a five year cycle<sup>10</sup> which will take into account the progress made in implementing the Plan in the intervening years, and factors such as emerging clarity about climate change.

This Strategic Plan will be implemented under the leadership and guidance of the Council of Ministers of ZAMCOM in close collaboration with the governments of the Member States, SADC and the Development Partners.

10. While the Strategic Plan is to be reviewed and updated every five years, this is not to be confused with the Implementation Plan described in Chapter 9 which will be reviewed more frequently.

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