



# Climate Resilience Investments in the Zambezi Watercourse

## Introduction

As the world continues to grapple with climate change and variability, efforts are being explored to reduce the negative impacts. The Zambezi Watercourse Commission (ZAMCOM) is embracing strategic climate resilience investments that incorporate predicted climate changes and variabilities during planning, designing and implementation of projects and programmes in order to reduce anticipated impacts.

This publication seeks to raise awareness among decision-makers on the need to have in place basin-wide measures addressing climate resilience as the basis for coordinated activities within the Zambezi Watercourse. It provides an overview of climate challenges facing the Zambezi Watercourse and the need for strategic climate-resilient investments as a measure to improve resilience and enhance socio-economic development.

Eight countries are Riparian to the Zambezi Watercourse. These are: Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe.

## What are climate-resilient investments?

Climate-resilient investments take into account predicted changes in climate. For infrastructure, investments are planned, designed, built and operated in a way that anticipates, prepares for, and adapts to changing climatic conditions. The investments withstand, respond to, and recover from disruptions caused by climate conditions. A climate-resilient infrastructure thus reduces risks of climate-related disruptions.

Projected impacts of climate change and variability are expected to increase investments required for infrastructure, particularly for energy generation, water storage, and water supply and sanitation.

Climate-resilient investments can be classified into hard, soft and natural. The hard investments are structural measures put in place to increase resilience to climate impacts. These include investments in flood protection infrastructure, smart climate agriculture, construction of multipurpose dams, groundwater, inter-basin water transfers, and hydro-meteorological observatories.

Soft climate resilience investments are non-structural. These include investments in policies and strategies, early warning systems or purchasing insurance to address the financial consequences of climate variability. They also include instruments for cooperation to support investments, information management systems, financial support, institutional development and stakeholder engagement.

Natural climate resilience investments are nature-based adaptation solutions that can be considered alongside structural adaptation measures. For example, watershed restoration can protect sources of drinking water and reduce the need for subsequent treatment. Environmental restoration and introduction of basin-wide environmental flows can improve fisheries production in the Zambezi Delta.

## Why interest in climate-resilient investments?

The Intergovernmental Panel on Climate Change reports have indicated that the Watercourse will be significantly impacted by anticipated changes to the climate in the coming decades and hence the need to prioritise investments that increase climate resilience. Ensuring that investments are climate-resilient assists in reducing direct losses and indirect costs of disruption. Infrastructure networks are affected by the physical impacts of climate variability and change, but play an essential role in building resilience to those impacts.

In establishing developmental paths for the Watercourse, the Strategic Plan for the Zambezi Watercourse (ZSP) considers investments that are both resilient to the effects of different possible climate change outcomes, and adaptable to accommodate uncertainties.

Irrigated agriculture, for example increases the resilience of crops to long periods of aridity and droughts and allows for crop diversification, thereby increases food security.

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.

Managing catchments can be a cost-effective way to reduce water treatment and purification costs in the production of potable water. Other benefits of climate investments include the protection of biodiversity and the management of floods.

As climate change and variability affect physical infrastructure networks, there is need to enhance resilience to the impacts. Power generation investments that take into account climate variability and change consider, among others, appropriate number and size of turbines and reservoirs. In the driest climate scenarios, failure to integrate climate change in the planning and design of power plants could lead to a reduction in hydropower generation and revenue losses.

In irrigation, particular consideration can be made in the sizing of schemes, canal design and selection of appropriate technologies. Losses in irrigation capacities may result in food insecurity.

### What are the characteristics of climate challenges facing the Zambezi Watercourse?

The Zambezi Watercourse, like the rest of southern Africa, is facing recurrent droughts and floods challenges due to cyclical weather patterns made worse by climate change and variability. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) released in 2021 confirms that the Zambezi Watercourse exhibits the 'worst' potential effects of climate change and variability among 11 major African watercourses. With reference to the 1961-1990 baseline, the watercourse is expected to be hotter and drier by 2050 with the major features of this phenomenon being a 0.3 – 0.6 Degrees Celsius increase in temperature per decade and with a 0.8 Degrees Celsius increase in the summer months, 10 to 25 per cent increase in evaporation, 10 to 15 per cent reduction in rainfall, and a 20 to 40 per cent reduction in runoff by 2050. The watercourse is already experiencing intense and frequent floods and droughts with severe implications on food security, energy, health, and damage to infrastructure.

The output from major Zambezi hydropower plants could decline by 10 to 20 per cent under a drying climate. A case in point is the electricity generation deficit experienced by Zambia and Zimbabwe due to the drought that occurred in the 2018/19 rain season.

The watercourse is characterized by a substantial infrastructure water supply and irrigation deficit, and no new major infrastructure has been built in the last 40 years.

Measures will have to be undertaken to manage as effectively as possible the risk of water related disasters.

### What is the enabling environment for strategic climate investments in the Zambezi Watercourse?

#### a. Legal and Policy Instruments

##### ZAMCOM Agreement

The ZAMCOM Agreement signed in 2004 provides overall framework for strategic interventions aimed at enhancing sustainable management of the Zambezi Watercourse. It makes provision for the preparation of a strategic development plan, which includes a general planning tool for the identification, categorization and prioritization of projects and programmes for the sustainable development and efficient management of the Zambezi Watercourse.

The requisite negotiations to establish ZAMCOM date back to the late 1980s. During those years, many developments took place, including negotiations and signing, ratification and entering into force of the regional legal and institutional tool, the SADC Revised Protocol on Shared Watercourses in 2003; establishment of a number of river basin organizations; and, formulation by SADC of the Regional Strategic Action

Plan (RSAP) for Integrated Water Resources Development and Management (IWRDM).

The role of ZAMCOM include promoting investments and transboundary integration and dialogue on infrastructure related issues, as well as ensuring that the design and implementation of investments meet the environmental and disaster risk management criteria agreed to in the ZSP.

#### Bilateral Agreements in the Zambezi Watercourse

**Zambezi River Authority** The Zambezi River Authority is a corporation jointly and equally owned by the governments of Zambia and Zimbabwe to operate and maintain the Kariba Dam. It plays a major role in implementation of strategic climate investments in the Zambezi Watercourse.

#### Zambezi Dam Operators Joint Operations Technical Committee

Joint Operations Technical Committee (JOTC) provides a framework for collaboration between institutions in Mozambique, Zambia and Zimbabwe responsible for water management and dam operations in the Zambezi River Basin. It provides a platform for exchange of hydro-meteorological and dam information to facilitate improved and informed management of the water resources, in accordance with the respective Member Institution's policies on data. The JOTC aims to achieve the following: better control of flood and drought situations in the basin, reduction of the negative effects of floods and droughts in the three countries, and networking for future projects.

#### b. Tools for cooperation

In mainstreaming climate resilience in development and planning processes and initiatives, the Watercourse countries are guided by the following instruments:

**The Strategic Plan for the Zambezi Watercourse** The 2018-2040 ZSP approved by the Riparian States in 2019 provides a framework for facilitating investments in the watercourse. The ZSP Strategic Objective D seeks to promote and facilitate climate-resilient infrastructure and development, and to manage and reduce risk to investments and to society at large.

The ZSP provides the basis for harmonised regional cooperation among the Riparian States in the implementation of projects and programmes that provide shared Watercourse benefits.

#### Rules and Procedures for Sharing of Data and Information Related to the Management and Development of the Zambezi Watercourse

The overall objective of the Rules and Procedures is to give effect to the provisions on information and data sharing in the ZAMCOM Agreement and the SADC Revised Protocol on shared Watercourses to ensure that relevant and quality data and information are shared effectively and efficiently between and among the Riparian States. to facilitate the uptake of informed decisions in relation to the management and development of the shared water resources of the Zambezi Watercourse.

**ZAMCOM Procedures for the Notification of Planned Measures** The notification of planned measures (projects and programmes) is an important element of international water law and crucial for the cooperative management and development of shared watercourses. For the Riparian States, the duty to notify is a legally binding international treaty obligation set out in the ZAMCOM Agreement, as well as in the Revised SADC Protocol on Shared Watercourses. The procedures provide clear guidelines to the Riparian States on detailed notification requirements, for example, timelines, format and required supporting information. The notification ensures faster project development, approval and implementation and reduces transboundary disputes.

**Zambezi Water Resources Information System** The Zambezi Water Resources Information System (ZAM-WIS) is an interactive data and information management system that provides a platform for data processing, storage, visualisation and presentation of hydrological, spatial and remote sensing. It serves as a common data and information reference point for thorough decision-making, in as far as the development and management of water resources of the shared Zambezi Watercourse is concerned.

**Programme for Infrastructure Development in Africa** At continental level, the Programme for Infrastructure Development in Africa (PIDA), endorsed in 2012 by African Heads of State and Government, lays out long-term plan for reducing Africa's infrastructure gap, including through major increases in hydroelectric power generation and water storage capacity. The infrastructure projects identified by PIDA, some of which are in the Zambezi Watercourse, require investments in the order of US\$360 billion by 2040. The World Bank's 2010 Africa Infrastructure Country Diagnostic Report estimates that the cost of meeting Africa's infrastructure deficit is around US\$93 billion per year (of which about US\$30 billion is required for maintenance), with an optimistic investment gap of US\$31 billion per year.

### What is the nature of climate-resilient investments in the Zambezi Watercourse?

Existing strategic climate investments in the Zambezi Watercourse include the following:

**Zambezi River Basin Management Project:** Supported by the World Bank, the project aims to strengthen ZAMCOM's role in promoting cooperative management and development within the Zambezi Watercourse through institutional strengthening, improved information sharing and decision support.

**The Zambezi River Basin Multi-Sectoral Investment Opportunity Analysis:** The Zambezi River Multi-Sector Investment Opportunity Analysis (MSIOA) conducted in 2010 to illustrate benefits of cooperation among the Zambezi Watercourse Riparian States identified more than US\$16 billion worth of investments at the pre-feasibility and feasibility stages of preparation.

It identified opportunities for the development of low-carbon hydropower resources in the Watercourse that could help balance the regional power mix and provide for low-carbon development and clean energy options. Development of these hydropower resources within the context of the ZSP will provide a series of climate-resilient investment options, improve adaptation measures related to disaster preparedness and enhance economic and social resilience.

**Infrastructure planning and development in the Zambezi Basin:** In its support of ZAMCOM ZSP, the Climate Resilient Infrastructure Development Facility (CRIDF) is supporting integration of climate resilience into the planning and development of water infrastructure, with a focus on all the Zambezi Riparian States. This will ensure water and food security for the rural poor and in so doing reduce vulnerability to climate change and variability. Further, CRIDF, the Global Mechanism of the United Nations Convention to Combat Desertification, and the African Development Bank (AfDB) are supporting the preparation of the Programme for Integrated Development and Adaptation to Climate Change in the Zambezi Watercourse (PIDACC Zambezi). The main objective of PIDACC Zambezi is to 'build strong communities that are resilient to climatic and economic shocks in the Zambezi Watercourse, through promoting inclusive, transformative investments, job-creation and ecosystem-based solutions'.

**Mashili Small Dam Resilience Project:** In Zambia, CRIDF is building climate resilience of communities around Mashili Dam in Shibuyunji, Lusaka Province, by providing water for livestock, fish farming and vegetable gardens. The Mashili Dam provides water for more than 50 households farming over 10 hectares of land, and is used to water more than 6,000 head of livestock.

**Songwe River Basin Development Programme:** Malawi and Tanzania are working together to develop dams and associated power stations, irrigation schemes and social development initiatives on the Songwe River. Through the AfDB, the two governments invested nearly £5 million on a detailed design project and requested CRIDF support to develop a financial strategy and provide an expert panel on dam safety, enabling both countries to fully explore the potential for public-private partnerships.

**Ruhuhu Irrigation and the Kikonge Dam:** CRIDF is implementing irrigation projects in the Ruhuhu River Basin that is located in southern Tanzania and drains into Lake Nyasa/Niassa/Malawi. The projects aim to promote climate resilience, transboundary water management and socio-economic development through climate change risk assessment. Kikonge Dam on the Ruhuhu River is earmarked for hydropower generation and water storage. The Kikonge Dam will store six billion cubic metres of water for agricultural use and hydropower generation. It will contribute to flood control and improved water supply for local communities.

## Summary of investment plan projects and portfolios, with estimated costs

| Programme                                 | Nature of investments  | Estimated costs (US\$)              |
|---|--|-------------------------------------|
| Hydropower                                | 9 transboundary projects,<br>18 national projects                                    | 19 384 000<br>7 158 000             |
| Agricultural water                        | 10 transboundary projects<br>46 national projects or portfolios                      | 55 000 000<br>549 000 000           |
| Water supply services                     | 4 transboundary projects and<br>portfolios<br>10 national projects<br>and portfolios | 1 068 000<br>60 000 000             |
| Catchment and<br>natural asset management | 4 national projects<br>present   | No estimate available at<br>present |
| Total estimated costs                     |  | 691 610 000                         |

Source: Strategic Plan for the Zambezi Watercourse

## What is the way forward towards increased climate-resilient investments in the Watercourse?

The Zambezi Watercourse is expected to face recurrent droughts and floods challenge due to climate change and variability. There is need to strengthen the capacity of Riparian States to plan, design and implement investment in the energy, water, agriculture and other sectors so as to increase resilience to climate change and variability. Through prioritising climate-resilient strategic climate investments highlighted in the ZSP, it is expected that economic resilience will increase and growth benefits will be sustained through reduced exposure to floods and adaptive measures to climate change.

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**THIS FACTSHEET** is part of a series produced by the Southern African Research and Documentation Centre for the Zambezi Watercourse Commission to focus on key issues in the Zambezi Watercourse and is targeted primarily for decision and policymakers, and for researchers, media, youth, and communities in the watercourse. The Factsheets seek to achieve the ZAMCOM Communication Strategy objective of communicating development in the Zambezi Watercourse and enhancing ZAMCOM's profile at national and regional levels through raising awareness about its activities.

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