



**African Water Facility**  
**Facilité africaine de l'eau**

*Mobilising Resources for Water in Africa*  
*Mobiliser des ressources pour l'eau en Afrique*



# Project Appraisal Report

**REPUBLIC OF MOZAMBIQUE**

**Feasibility Studies for Building Climate Resilience of  
Limpopo Basin in Mozambique**

November 2014

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**African Water Facility | Facilité africaine de l'eau**

**African Development Bank | Banque africaine de développement**

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## LIST of ABBREVIATIONS and ACRONYMS

AWF	African Water Facility
AfDB	African Development Bank
AMCOW	African Ministers' Council on Water
ANAC	National Administration of Conservation Areas (Ministry of Tourism)
ARA-Sul	Southern Region Water Administration
B/C	Benefit – Cost ratio
CC	Climate Change
CIIF	Climate Investment Fund
CSS	Climate Safeguard System
DTM	Digital terrain model
DEM	Digital elevation model
E&S	Environmental & Social
EIRR	Economic Internal Rate of Return
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FAPA	Fund for African Private Sector Assistance
FAO	Food and Agriculture Organisation of the United Nations
FMS	financial Management System
GA	Grant Agreement
GoM	Government of Mozambique
ha	hectare
I&K	Information and knowledge
INIR	National Institute for Irrigation
ISS	Integrated Safeguards System
kV	kilovolt
LIDAR	Light Detection and Ranging
LIMCOM	Limpopo Watercourse Commission
MP	Multi-purpose
MW	Megawatt
m <sup>3</sup> /s	Meter cube per second
MZN	Mozambique Meticaís
MPD	Ministry of Planning and Development
NEPAD	New Partnership for Africa's Development
NPV	Net Present Value
O&M	Operation & Maintenance
ORPF	Procurement and Fiduciary Department of AfDB
PAP	Project Affected People
PAR	Project Appraisal Report
PCR	Project Completion Report
PPP	Public-Private Partnership
PT	Project Team
QCBS	Quality and Cost based Selection
RAP	Resettlement Action Plan
SRTM	Shuttle Radar Topography Mission
SADC	Southern African Development Community
S&E	Social and Environmental
SMEs	Small and Medium Enterprises
UGEA	Procurement Unit of ARA-Sul

UNDP United Nations Development Programme  
UNICEF The United Nations Children's Fund  
CCS Verified Carbon Standard

**CURRENCY:**

Local Currency : Mozambique Meticais (MZN)  
1 Euro (€) : 40.21 MZN (local exchange rate September 2014)

## Logical Framework

Country and Project Name: Feasibility Studies for Building Climate Resilience of Limpopo Basin in Mozambique						
Purpose of the project: Establish a consensus for implementation of the selected project, study the project at feasibility level, and mobilise resources for investments.						
RESULTS CHAIN		PERFORMANCE INDICATORS			MEANS OF VERIFICATION	RISKS / MITIGATION MEASURES
		Indicator	Baseline	Target (M0=approval month)		
IMPACT	Goal: Improving the resilience and reducing the risk of damages to communities, infrastructure and livelihoods in the lower Limpopo River basin	<ul style="list-style-type: none"> <li>- 50 years recurrence flood damages (infrastructure + crops)</li> <li>- Irrigated area (ha)</li> </ul>	<ul style="list-style-type: none"> <li>- To be estimated by the studies</li> <li>- 47,700 ha</li> </ul>	<ul style="list-style-type: none"> <li>- 80% reduction Target 2025</li> <li>- Up to 200,000 ha Target 2035</li> </ul>	<ul style="list-style-type: none"> <li>- Post-flood damage assessments</li> <li>- Ministry of Agriculture</li> </ul>	<p><b>Risk:</b> Potential conflicts over trans-boundary waters.</p> <p><b>Mitigation:</b> Engage with LIMCOM</p>
	Feasibility study findings broadly accepted among authorities, stakeholders and partners	<ul style="list-style-type: none"> <li>- No major opposition to the proposed intervention</li> </ul>	<ul style="list-style-type: none"> <li>- No opposition appearing in media</li> </ul>	<ul style="list-style-type: none"> <li>- Feasibility reports approved by authorities, and supported by stakeholders and funding partners.</li> <li>Target T0+2.5 year</li> </ul>	<ul style="list-style-type: none"> <li>- Letter of endorsement from ministry</li> <li>- No major opposition against project in media</li> </ul>	<p><b>Risk:</b> Poor acceptance of dam by local, provincial, and national stakeholders and authorities</p> <p><b>Mitigation:</b> Considerable focus on ESIA resettlement and compensation schemes, transparency, active stakeholder involvement, and communication activities</p>
OUTCOMES	Project financing and partnership arrangements for the construction are structured, public funding committed, PPP identified, Stakeholders mobilised to implement the SMEs Development Plan.	<ul style="list-style-type: none"> <li>- Public funding committed</li> <li>- Investment packages suitable for private funding identified</li> <li>- Measures aimed at fostering SMEs development in agricultural value chains identified</li> </ul>	<ul style="list-style-type: none"> <li>- No funding mobilised</li> <li>- No investment packages for private funding in place</li> <li>- No measures identified</li> </ul>	<ul style="list-style-type: none"> <li>- 100% public funding pledged</li> <li>Target T0+3 year</li> <li>- Packages for private funding schemes identified</li> <li>Target year T0+3 Year</li> <li>- Multi-sectoral plan approved</li> </ul>	<ul style="list-style-type: none"> <li>- Letters of commitment from GoM and donors</li> <li>- Letter of endorsement of the private funding scheme and SMEs development plan from ministry</li> </ul>	<p><b>Risk:</b> Inadequate funding response by GoM, investors, and donors.</p> <p><b>Mitigation:</b> Transaction advisory services engage with GoM, private sector (PPP) and donors to promote partnerships and mobilise resources for investments</p>
	COMPONENTS					
OUTPUTS	I Pre-feasibility Assessment and	Pre-feasibility Report delivered on time	<ul style="list-style-type: none"> <li>- No report</li> </ul>	<ul style="list-style-type: none"> <li>- Pre-feasibility Report approved</li> </ul>	<ul style="list-style-type: none"> <li>- QPR</li> </ul>	<p><b>Risk:</b> Decision taken on a weak basis</p> <p><b>Mitigation:</b> Ensure sufficient allocation of</p>

**Country and Project Name: Feasibility Studies for Building Climate Resilience of Limpopo Basin in Mozambique**  
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RESULTS CHAIN	PERFORMANCE INDICATORS			MEANS OF VERIFICATION	RISKS / MITIGATION MEASURES
	Indicator	Baseline	Target (M0=approval month)		
Strategic Decision Making.			Target M0+12 months		budget to the plan
II. Multipurpose Dam options assessed and technical, economic, social and environmental feasibility established including realistic multi-purpose economic viability.	Feasibility studies delivered on time	- No appropriate feasibility studies in place	- Feasibility studies approved Target M0+27 months	- QPR	
III. Environmental, and Social impacts and all required adaptation, mitigation, resettlements, and compensation measures accepted by stakeholders and approved by authorities.	ESIA, Environmental, Social Management Plan (ESMP), and RAP approved by MICOA	- No ESIA, ESMP, or RAP prepared	- ESIA, ESMP and RAP approved Target M0+29 months	- Environmental compliance certificate issued by MICOA	<b>Risk:</b> ESIA and associated mitigation plans are not accepted by MICOA <b>Mitigation:</b> ESIA conducted under ruling national and international regulations and professional standards. ARA-Sul-PT reinforced with environmental TA
IV. Irrigation and SMEs development plans endorsed	- Irrigation and SMEs Development Plan established and endorsed by SC and Ministry of Agriculture	- No plans in place for Lower Limpopo	- Plans prepared and approved - Target M0+27 months	- SC Minutes - Letter from Ministry of Agriculture	<b>Risk:</b> Ministry of Agriculture not supporting the irrigation development plan. <b>Mitigation:</b> Ministry of Agriculture will be member of the SC and will nominate an officer to be member of the PT. <b>Risk:</b> Stakeholders of the agricultural value chains not mobilised. <b>Mitigation:</b> Private sector stakeholders represented in the Consultative Forum and Technical Committee.

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RESULTS CHAIN	PERFORMANCE INDICATORS			MEANS OF VERIFICATION	RISKS / MITIGATION MEASURES
	Indicator	Baseline	Target (M0=approval month)		
V. Financing and partnership development strategy for Mapai dam project developed and effective	<ul style="list-style-type: none"> <li>- Strategy endorsed</li> <li>- Follow-up funding committed by GoM</li> </ul>	<ul style="list-style-type: none"> <li>- No strategy in place. No funding committed by GoM</li> </ul>	<ul style="list-style-type: none"> <li>- Strategy prepared and endorsed</li> <li>- Target M0+29 months</li> </ul>	<ul style="list-style-type: none"> <li>- SC minutes</li> <li>- Letter from Ministry of Planning and Development</li> </ul>	<p><b>Risk:</b> Inadequate interest and involvement of the Private Sector. <b>Mitigation:</b> Transaction Advisor will promote the project, propose balanced risk allocation and organise events to gauge interest in a PPP</p>
VI. Effective Project Management, Consultation, Communication and Monitoring	<ul style="list-style-type: none"> <li>- Project Team (PT) members appointed and PT functioning</li> <li>- SC appointed and functioning</li> <li>- Dam Safety Panel (DSP) established</li> <li>- Consultation Forum (CF) established and functioning</li> </ul>	<ul style="list-style-type: none"> <li>- No PT in place</li> <li>- No SC in place</li> <li>- No DSP in place</li> <li>- No CF in place</li> </ul>	<ul style="list-style-type: none"> <li>- PT established: M0+1 month</li> <li>- SC established: M0+3 months</li> <li>- DSP established M0+10 months</li> <li>- CF established M0+5 months</li> </ul>	<ul style="list-style-type: none"> <li>- Progress reports</li> <li>- MTR</li> <li>- Review reports, Project Evaluation</li> </ul>	<p><b>Risk:</b> Weak mobilisation and performance of project management.  <b>Mitigation:</b> Supplementary TA to ARA-Sul/PT and procurement support from Massingir team.</p>
<b>KEY ACTIVITIES</b>	<p>Component I: Pre-feasibility Assessment and Strategic Decision Making  Component II: Feasibility Studies  Component III: Environmental and Social Studies  Component IV: Irrigation Development Studies  Component V: PPP Feasibility and Financing Strategy  Component VI: Project Management Communication, Consultation and Monitoring, Dam Safety Panel (DSP)</p>				<p>INPUTS:  Total Input: EUR 4,506,540  FAPA: EUR 713,790  AWF: EUR 3,423,751  GoM: EUR 369,000</p>

## Executive Summary

### *Context*

As the lower end riparian country, Mozambique is facing huge challenges due to intensive water development and water-use upstream combined with increasing hydrological variations and extremes exacerbated by climate change. The dry season flows into Mozambique have decreased and the river sometimes remains nearly dry for periods of up to 8 months in a year. In addition, the lower reaches are vulnerable to devastating floods and considerable loss of lives and livelihood and damages to infrastructure and crops occurred in the last decades. For example, the extreme flood in 2013 caused the death of 40 people and directly affected some 250,000 inhabitants of which more than 170 000 people were displaced. The damages were estimated to be in the order of USD 250 million.

In addition, irrigation represents a huge opportunity for climate change adaptation: various studies assessed the potentialities of irrigable soils from 150,000 to 300,000 ha. Currently, in addition to the 25 000 ha dedicated to smallholders, private investors are irrigating about 10,000 ha, and are developing around 50,000 ha. This will lead to a total of around 90,000 ha, which is the maximum irrigable area with the only existing storage, the Massingir Dam located on the Rio dos elefantes, a tributary to the Limpopo River. Other investors have expressed interest to develop new schemes in the middle Limpopo if water is available.

### *The Project*

The proposed project aims at building climate resilience in the Limpopo basin. This could be implemented through developing a multi-purpose water storage capacity (at Mapai or elsewhere in the basin) that would provide a significant long-term response to the hydrological variability and climate change induced challenges. It would also allow the development of hydropower, and thus participate in climate change mitigation. However, this option promoted by the Government, is to be confronted to alternatives to make sure it is technically, economically, socially and environmentally the best solution. The project beneficiaries will be the population of Gaza province (some 1.4 million people) especially those living in the Mozambican part of the Limpopo basin totalling some 572,000 people. The project will contribute to food security and socio-economic development of the country.

Planning, financing and constructing a large dam requires addressing several social, environmental, technical and economic challenges through a comprehensive set of feasibility studies, for which the Government of Mozambique is requesting a grant from the African Water Facility with complementary funding from Fund for African Private Sector Assistance (FAPA).

The feasibility studies will apply a step-wise approach to allow strategic decision making on the most appropriate solution and the associated way forward before embarking on subsequent stages. The major project components are: (i) pre-feasibility assessment and strategic decision making; (ii) feasibility studies; (iii) environmental and social studies; (iv) irrigation development studies; (v) Public-Private-Partnership (PPP) feasibility and financing strategy; and (vi) project management communication, consultation and monitoring including

Dam Safety Panel (DSP). The project will use the preliminary results of the World Bank funded Limpopo Flood Control Master Plan in particular for the definition of the scenarios to be assessed at the pre-feasibility stage. The estimated total project costs including contingencies are EUR 4,506,540 out of which EUR 3,423,750 will be financed by AWF grant funding, EUR 713,790 funded by FAPA, , and GoM's contribution will be EUR 369,000. The overall project duration is 36 months from the date of approval.

The recipient will be the Government of the Republic of Mozambique (GoM) and the Implementing Agency will be the Southern Region Water Administration (ARA-Sul) under the Ministry of Public Works and Housing. Due to the complexity of the project, ARA-Sul will be assisted by short-term Technical Assistants in the fields of environment, hydropower, and irrigation. Procurement support will be provided by the Massingir dam team, AfDB funded. A Steering Committee will oversee project implementation and will be supported by a Technical Committee.

The Limpopo climate resilience project is consistent with Mozambique's national policies and strategic frameworks and has the potential to be a major asset for adaptation to the increasing hydrological extremes and enhancing climate change resilience. It will have important socio-economic effects in Mozambique, especially in the Gaza Province, through the mitigation of the extreme floods and droughts impacts, provision of water for hydropower, irrigation, and other multi-purpose benefits including mechanisms for local benefit sharing, improved social equity. It will also ensure environmental flows are managed and maintained. The project will contribute to fostering a green and inclusive growth, in line with the AfDB Long Term Strategy. It is also consistent with the AWF 2012-2016 strategy whose first priority is the preparation of bankable water sector investment projects.

Based upon a critical assessment of the relevance, effectiveness, and sustainability of the project, as well as the credibility and capacity of the Implementing Agency, it is recommended that a grant of EUR 3,423,751 from AWF, out of a total cost estimate of EUR 4,506,540, be extended to the Government of Mozambique for the implementation of the Feasibility Studies for Building Climate Resilience of Limpopo Basin in Mozambique.

## 1.0 BACKGROUND

### 1.1 Project Rationale and Origin

1.1.1 The Limpopo River Basin has a total catchment area of approximately 408 000 km<sup>2</sup> (basin map presented in Annex 1). The entire basin presently comprises a population of about 17 million inhabitants and is projected to increase to almost 23 million by 2040. The population of the Mozambican part of the basin totals 572,000 people (32,000 in the Middle-Lower and 540,000 in the Lower Limpopo). The catchment characteristics of the Limpopo River Basin are very diverse, covering different climatic and topographic zones as well as land use types, including protected areas, such as the Greater Limpopo Trans-frontier Conservation Area. Levels of social and economic development across the basin are also highly diverse as the Limpopo Basin countries exhibit considerable macro-economic variability, with the per capita Gross Domestic Product (GDP) for Zimbabwe, South Africa, and Botswana being 3, 13, and 16 times higher respectively compared to Mozambique<sup>1</sup>.

1.1.2 The Limpopo Basin is characterised by both drought and floods. As the lower end riparian country of the Limpopo river basin, Mozambique is facing severe challenges due to intensive water development and water-use upstream combined with hydrological variations exacerbated by climate change. This has resulted in significantly reduced dry season flows into Mozambique so that the river sometimes remains dry for a period of up to 8 months in a year. A report on disaster preparedness and response in the Limpopo Basin<sup>2</sup> suggests that droughts in the region occur every 7 to 11 years and another FAO report<sup>3</sup> states that extreme droughts occur in the basin every 10 to 20 years. The lower reaches of the river are also prone to highly devastating floods that damage infrastructure and undermine the livelihood of the riverine populations. A report<sup>4</sup> had registered a quite number of severe floods in the last 50 years, especially on 1955, 1967, 1972, 1975, 1977, 1998, 2000, and 2013.

1.1.3 These severe floods have sparked off flood response investment programs to restore damaged infrastructure supported by the World Bank and African Development Bank in association with other multi- and bilateral funding agencies. The World Bank fielded a mission to Mozambique to carry out flood assessments and response scoping, in close collaboration with GoM, the UN organisations and other development partners, following the floods of January 2013. The objectives were inter alia to: i) contribute to the preliminary assessment of the extent of the flooding, its impact on the population and the response to date, based on existing rapid assessments; ii) develop and agree with GoM and key development partners on the next steps for flood recovery and long-term disaster resilience; and, iii) identify the availability of financial support to the flood response. The Mapai dam located on the main stem of the Limpopo River was among the identified longer term needs for large investments. The Government has paid ample attention to the construction of the Mapai dam on the main stem of the Limpopo River to strengthen the resilience of the lower Limpopo population against climate change and hydrological extremes. The Government has therefore given high priority

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<sup>1</sup> Limpopo Basin Strategic Plan for Reducing Vulnerability to Floods and Droughts Draft for discussion with the Riparian Governments July 2007

<sup>2</sup> FAO 2004: Drought impact mitigation and prevention in the Limpopo River Basin A situation analysis Prepared by the FAO Sub-regional Office for Southern and East Africa Harare

<sup>3</sup> Same as above FAO 2004

<sup>4</sup> 10th International Multidisciplinary Scientific GeoConference - SGEM2010, www.sgem.org, SGEM2010 Conference Proceedings/ ISBN 10: 954-91818-1-2, June 20-26, 2010, Vol. 1, 1019-1026 pp

to speeding up feasibility studies concerning the Mapai dam project and associated interventions.

1.1.4 The idea of constructing the Mapai dam was conceived in the 70s and followed up in the 80s in response to the emerging needs for flood control and increased dry season river flows. The proposed Mapai dam (map Annex 1) would be located about 80 km from the Pafuri border between Mozambique and South Africa and about 240 km north of Chokwe. The proposed dam would have a height of 52 m, a total storage capacity in the order of 6.4 billion m<sup>3</sup> and an estimated hydropower potential of 40 MW. Other key information about the dam is presented in Annex 5.

The appraisal team has noted that the initial studies of the Mapai Dam were technically incomplete and outdated. The framework conditions (hydrological conditions, development situation in the lower Limpopo, upstream countries interventions, multi-purpose approach, social and environmental safeguarding requirements, national park concerns, etc.) have changed considerably. The need for an up-to-date and modernised conceptual platform has therefore been taken into account in the scoping of the feasibility study by introducing an initial assessment phase before embarking on the more detailed investigations and in-depth studies. It is indeed necessary to check that Mapai Dam is the best option to mitigate climate change and natural climate variability.

## **1.2 Sector Status and Priorities**

1.2.1 The Mapai Dam is a government priority and the project was debated in the Parliament in March 2013. The Mapai dam feasibility study project will contribute to the achievement of the GoM's Poverty Reduction Action Plans by paving the way for increased output and productivity in the agriculture and fisheries sectors, enhanced employment, and fostering human and social development. The 2011-2014 plan is the government's medium-term strategy for putting into operation the Five-Year Government Program (2010-2014), focused on the objective of combating poverty, with a view to achieving inclusive economic growth and reducing poverty and vulnerability in the country.

1.2.2 The project is consistent with several other national policies and strategies. The National Water Policy (2007) promotes the development of irrigation, and stresses the necessity to attract private sector investments. It also prioritizes the development of hydropower schemes, targeting national demand as well as export. In addition, it stresses the necessity to include a flood control function in large dams. The National Irrigation Policy and its Implementation Strategy were adopted in 2002 and revised in 2010, recognizing the great strategic importance vested with irrigation. The Energy Policy (1998) promotes investment programs targeted at developing hydropower. The project is also in line with Mozambique's Strategic Program for Climate Resilience (SPCR), the Pilot Program for Climate Resilience (PPCR), and the National Adaptation Program of Action (NAPA). AfDB is involved in several projects on climate change resilience building in Mozambique, the most relevant being the Baixo Limpopo Irrigation & Climate Resilience Project.

1.2.3 The project will foster inclusive green growth and it will also correspond well to the focal areas of intervention of the Africa Water Vision 2025 for equitable and sustainable use of water for socio-economic development and the priorities of AMCOW and NEPAD on accelerated infrastructure investments to enhance water and energy security and adaptation to climate change and variability risks. AWF's funding support to the preparation of the Limpopo Climate Resilience project is also consistent with the AWF's (2012-2016) strategy with the first priority being the preparation and promotion of bankable water sector infrastructure projects.

1.2.4 At the regional level, the Revised SADC Protocol on Shared Watercourses is the key instrument for trans-boundary water management that contains the generic rules for the management of shared rivers within the SADC region. The commitment of the riparian states managing their water resources together dates back to 1986, when the “Limpopo Basin Permanent Technical Committee” was jointly established. In 2003, this cooperation was fostered through the multilateral agreement to establish the Limpopo Watercourse Commission (LIMCOM) that entered into force in 2011 after the ratification requirements were met. Concerning the Limpopo Climate Resilience project, GoM will follow the notification requirements stipulated in Article 4 of the new SADC Protocol<sup>5</sup> in terms of (i) information concerning planned measures; and (ii) before permit issuing or implementation of the dam project, GoM will notify the other water course states on the planned measures accompanied by technical data and information and environmental impact assessment.

## **1.3 Problem Definition**

### ***Disaster Risk Management***

1.3.1 The lower reaches of Limpopo are extremely vulnerable to disasters related to natural hydrological variations increased by climate change and variability effects and these areas are stricken by frequent flooding causing major damages. These extreme and highly devastating floods destroy infrastructures and livelihoods of the riverine populations in the Mozambican parts of the river. The January 2013 flood caused the death of 40 people, displaced more than 170 000 inhabitants, and badly damaged roads, irrigation schemes and crops. According to UNICEF some 250,000 people were affected by the floods in Mozambique in 2013<sup>6</sup>. Chokwe was one of the hardest-hit districts, but also communities in the Mid-Lower Limpopo were seriously impacted by the flood. According to the World Bank post-flood mission, damages were estimated to be in the order of USD 250 million. In an earlier major flood that occurred in 2000, about 700 people lost their lives, and the flood damaged roads, irrigations schemes, crops and the Chokwe and Xai-Xai Cities.

### ***Climate Change Vulnerability and Adaptation***

1.3.2 Mozambique remains extremely vulnerable to climate variability and change. This has affected the country’s economic performance. Increased variability of weather and climate patterns could slow and even reverse the progress made on poverty reduction in recent years in Mozambique. While uncertainties remain, it seems likely that climate and weather variability will increase exerting important impacts on the water sector and related livelihoods. Economic development in the upstream portions of the international basin may further increase the variability of surface water flows and could seriously reduce overall cross-border water volumes. In addition inter-annual variability was predicted to increase dramatically, suggesting extreme weather events such as droughts and floods may become more frequent. The future temperature of Mozambique is predicted to increase by 1°C to 2°C by 2015, while the seasonal variability is narrowing as the average minimum temperature has increased, which combined may lead to greatly increased potential evapotranspiration year round. At the same time, precipitations are likely to become increasingly variable and uncertain.

### ***Food Insecurity***

1.3.3 In 2013, the food security of most rural households across Mozambique was considered to be relatively favourable. Food is generally available, markets are adequately supplied, and prices are generally affordable<sup>7</sup>. There are pockets of stressed food insecurity in need of

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<sup>5</sup> Revised Protocol on Shared Watercourses in the Southern African Development Community (SADC).

<sup>6</sup> [http://www.unicef.org/infobycountry/mozambique\\_67664.html](http://www.unicef.org/infobycountry/mozambique_67664.html)

<sup>7</sup> Mozambique Food Security Outlook January to June 2013 USAID.

[http://www.fews.net/docs/Publications/Mozambique\\_OL\\_2013\\_01\\_final.pdf](http://www.fews.net/docs/Publications/Mozambique_OL_2013_01_final.pdf)

emergency food assistance to meet peoples' basic dietary requirements in parts of southern and central Mozambique, especially Gaza Province was affected by production shortfalls last season and recent floods<sup>8</sup>. The district town of Chókwe, a centre for employment, agricultural processing and trade also supports Mozambique's largest irrigation schemes (47,700 ha), on what is perhaps the most productive farmland in the country. Despite the great food production potential of the Gaza Province, the province is extremely vulnerable to natural disasters such as floods and drought aggravated by the threat of poverty and food insecurity<sup>9</sup>. The outcomes of this project would therefore be to pave the way for highly relevant investments to boost the national food production and alleviate the periodic food insecurity at local level in the province.

### ***Energy Insecurity and Climate Change Mitigation***

1.3.4 Mozambique is well endowed with energy resources, ranging from fossil fuels (natural gas and coal) to renewable resources (solar, hydro, wind, geothermal and tidal sources of power). However, the exploitation of these resources for national use is limited because they are unevenly distributed around the country, and access rate remains low. The extension of the electricity grid along the Limpopo River will benefit the electricity supply for the lower and mid-lower Limpopo area. According to EDM, the Mapai dam hydropower scheme, if confirmed by the pre-feasibility, would be connected to the national grid via the new sub-station in Mapai and contribute to the electricity security at regional and national levels. The hydropower scheme would also contribute to climate change mitigation by substituting electricity produced (some 40 MW) from fossil fuels thus reducing carbon emissions to the atmosphere. This would also provide a basis for earning verified carbon benefits.

### ***Gaza the 4<sup>th</sup> Poorest Province in the Country***

1.3.5 Gaza Province, with a population of about 1.4 million people, is the 4<sup>th</sup> poorest province in the country. Agriculture is the main activity in the Province and accounts for 90% of all economic activity. The Province needs considerable investments in infrastructure assets to spur economic activities for sustainable development and reduce poverty. In this respect, the Limpopo Climate Resilience project would provide significant multiple opportunities as elaborated in this appraisal report.

### ***Environmental and Social Issues***

1.3.6 The project could exert significant environmental and social (E&S) impacts if not adequately addressed. The proposed site for the dam and reservoir is located in the buffer zone of the Limpopo National Park. The Limpopo River Basin includes sensitive ecosystems and there is a high socio-economic dependence by riparian citizens on these ecosystems including important nature reserves such as those that form the Greater Limpopo Trans-frontier Conservation Area that includes the Kruger National Park. This makes the project sensitive from a wildlife and ecological perspective. The environmental and social impact studies and establishment of associated action plans and mitigation measures will apply the appropriate procedures and approaches used by the multi-lateral development banks in close cooperation with MICOA and other relevant authorities. The project will address and safeguard a broad range of environmental and social impacts caused by the dam that will alter the natural distribution and timing of the stream flow: (i) Physical, chemical, and geomorphological consequences; (ii) Impacts on the biological environment (flora, wildlife, ecosystem and biodiversity); (iii) Cumulative impacts such as the impacts of other dams and associated infrastructure upstream and downstream; (iii) Involuntary physical and economic resettlement; (iv) Socio-economic activities downstream (agriculture, fishing) and reduce access to natural

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<sup>8</sup> FAO Global Information and Early Warning System on Food and Agriculture World Food Programme – Special Report FAO/WFP-Crop and Food Security Assessment Mission to Mozambique 12 August 2010

<sup>9</sup> Republic of Mozambique Government of Gaza Province Strategic Development Plan for Gaza Province, FAO-UNDP, October 2006

resources; (v) Impact on human health; (vi) Impact on archaeology and cultural heritage; (vi) Risk of damage on cultural resources; and (vii) Other positive/negative impacts on the human environment.

## **1.4 Beneficiaries and Stakeholders**

1.4.1 The direct beneficiary authorities of the project will be the GoM represented by the Ministry of Public Works and Housing, Directorate of Water (DNA) and ARA-Sul, the Gaza Province authorities. Other indirect beneficiaries will be:

- The population of Gaza province (some 1.4 million people) especially those who live in the alluvial plain from the national border in the north to Xai-Xai in the south totalling some 572,000 people.
- The local entrepreneurs, service providers, small scale farmers and companies, livestock farmers, fishermen, tourist sector workers, and other small scale economic actors depending on water and electricity.
- Private sector actors engaged in water infrastructure development such as investors or firms involved in “out-grower” arrangements that offer farmers access to water, inputs and markets, the supply of irrigation equipment, and extension services.
- Women, children, and disadvantaged groups will specifically be identified and addressed under the different studies in the respective ToRs.

## **1.5 Justification of AWF Intervention**

1.5.1 The project is well embedded in the overall goal of the Facility, which states: “An Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment. The project is also consistent with the Bank’s Long Term Strategy, which “focuses on two objectives to improve the quality of Africa’s growth: inclusive growth and the transition to green growth”.

1.5.2 The project is in line with the first strategic pillars of AWF: Prepare investment project. Another quality of the project related to the strategic objectives of AWF’s strategy is that it will from the outset of the project ensure “quality at entry” by focusing on (i) climate resilience building; (ii) gender equality and social equity; (iii) environmental and social safeguarding of project interventions; and (iv) knowledge and information management by a GIS based system.

1.5.3 The project is expected to spark off opportunities for attainment of economic and social development objectives in the context of building climate change resilience. More specifically, the Facility’s support to the feasibility study and structuring phase of the climate resilience building of the Limpopo Basin will be a catalyst for private and public investments.

## **2.0 THE PROJECT**

### **2.1 Goals, Impacts, and Outcomes**

The overarching development goal/impact of this project is to improve the resilience and reduce the risk of damages to communities, infrastructure and livelihoods in the lower Limpopo River basin. The overall outcomes are that: (i) Feasibility study findings broadly accepted among authorities, stakeholders and partners; (ii) Project financing and partnership arrangements for the construction project are structured, public funding committed, PPP identified.

## 2.2 Outputs

2.2.1 The main outputs of the project are: (i) Pre-feasibility assessment and decision making reports validated and approved; (ii) Multipurpose development options including those attributed to the dam construction alternative assessed and technical, economic, social and environmental feasibility established including realistic multi-purpose economic viability; (iii) Environmental, and social impacts and all required adaptation, mitigation, resettlements, and compensation and gender and social equity measures accepted by stakeholders and approved by authorities; (iv) Irrigation development potential and socio- economic prospects related to the desired development option established; (v) Transaction and financing and strategy in place; and (vi) Effective Project Management, Consultation, Communication and Monitoring .

## 2.3 Activities

### 2.3.1 Overview

2.3.1 As illustrated in the figure below, the project implementation follows a step-wise approach to allow validation of project outcomes and associated strategic decision making on the most appropriate solution and the way forward before launching the following step. This approach will include the following three stages:

- **Stage 1: Pre-feasibility Assessment and Decision Making** aimed at examining the Mapai Dam and alternative options to improve climate change resilience in the Mozambican part of the Limpopo River Basin. In Particular, this stage shall assess various optional interventions to mitigate the impacts of climate change and extreme river flow variations. This stage will culminate in a high level GoM decision based on the findings and recommendations of Component I: either (i) proceed with the dam feasibility studies, in Mapai or in an alternative site (Section 2.3.3); or (ii) proceed with a recommended solution based on a combination of strategic, integrated multi-sectoral investments found more viable than the large dam option.
- **Stage 2: Feasibility Studies and ESIA** aimed at preparing the preliminary designs and validate the technical feasibility, economic viability and environmental and social safeguarding of the selected option that will provide a basis for Stage 3.
- **Stage 3: Financing Strategy** including PPP feasibility, financial mobilisation and partnership arrangements for investments and operations of the infrastructure and associated multi-purpose utilities.

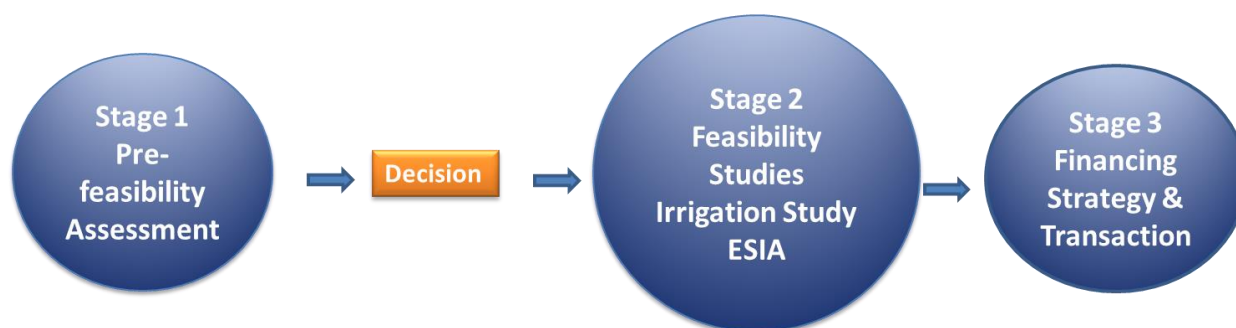


Figure 2-1 Main Project Stages

2.3.2 The project is structured as follows:

Component I: Pre-feasibility Assessment and Strategic Decision Making (AWF funding)

Component II: Feasibility Studies (AWF funding)

Component III: Environmental and Social Studies (AWF funding)

Component IV: SMEs development plan in the irrigated agriculture value chain (FAPA funded)

Component V: PPP feasibility and Financing Strategy (FAPA funded)

## Component VI: Project Management Communication, Consultation and Monitoring

2.3.3 The specific activities of each component have been specified more in detail in the respective ToR of this PAR. The scope of sub-components and related activities is presented in the following.

### **2.3.2 Component I: Pre-feasibility Assessment and Strategic Decision Making**

2.3.4 The pre-feasibility assessment is aimed to (i) establish an appropriate climate change strategic framework for the project; (ii) assess infrastructure options; (iii) provide initial technical, economic, environmental and social considerations for the assessment of options; and (iv) support strategic decision making (Figure 2-1). The activities will interact with the development of the emerging Limpopo Flood Control Master Plan including the on-going floods assessment and response initiative supported by the World Bank and others. The definition of the infrastructure options to be compared will take into account the preliminary findings of the Flood Control Master Plan. However, resilience to climate change also implies water storage, and one or several dam will be in any case part of the selected options. All along the further stages of the study, the consistence with the Flood Control Master plan will be ensured. The sharing between the pre-feasibility and the feasibility stage is based on the following approach: Investigations requiring costly mobilisation of equipment should be carried out during the feasibility stage.

#### ***Sub-component Ia: Climate Change Vulnerability and Resilience Assessment***

2.3.5 The main types of activities of this component will be to: (i) review climate change parameters (T°, rainfall, ETP, flood and drought frequency), (ii) build climate change scenarios for Limpopo River Basin in Mozambique, (iii) qualitatively assess vulnerability of and probable effects on main activities in the Mozambican part of the river basin (agriculture, livestock, cities, etc.), (iv) map most vulnerable activities, and (v) review project and programs on-going or planned in the river basin and assess to which extent they will increase the resilience of the most vulnerable activities.

#### ***Sub-component Ib: Assessment of Alternative Development Options***

2.3.6 The proposed Mapai dam will be a long term and expensive infrastructure investment. It is therefore important to address the feasibility and viability of alternative solutions to a large dam at an early stage to ensure an appropriate decision making platform to guide the feasibility studies. The purpose of this sub-component will be to review and identify a series of strategic, integrated multi-sectoral investments aimed at improving the resilience and reducing the risk of damage from flooding to communities, infrastructure and livelihoods in lower Limpopo. Building of infrastructure to secure the water availability during the long dry season and attenuating the floods will provide ample opportunities for socio-economic development and contribute significantly to reduction of climate change vulnerability. The considered options will have various socio-economic effects on water retention, drought mitigation, development of irrigated agriculture, hydropower production, fisheries and fish farming, water supply, tourism; water for livestock production; and others. The benefits from the future investments will have important climate change resilience building effects such as poverty reduction and improved food, energy and water security. The activities will also include preliminary estimation of the water demands and allocation between the various uses.

2.3.7 The activity will build inter alia on the previous and ongoing initiatives and projects and existing hydrodynamic models of the river system and evaluate a range of potential flood and drought management options. This would include pre-feasibility level assessments for identified structural interventions to define an optimal solution for improving flood and drought prevention, mitigation and management. Potential alternatives to Mapai dam may include: (i) smaller dams on the main stem of Limpopo River or tributaries in Mozambique; (ii)

opportunities for an improved network of dedicated dykes, levees, river bunds, and off channel diversions/storage for flood protection combined with a smaller dam. Since drought mitigation is a main objective of the project, any option will include one or several dams.

### ***Sub-component Ic: Technical, Economic, and Environmental Conditions for the Mapai Dam***

2.3.8 In order to establish a sound basis for optimum design and comparison of the Mapai dam alternative against other CC resilience options, it is necessary to establish the technical and economic constraints and planning conditions and associated uncertainties and risks. The scope of this sub-component, which will have to be indicated in the ToR for this stage of the study will comprise: (i) topographical investigations using SRTM<sup>10</sup> data files in conjunction with the Global Mapper software or equivalent. (ii) geophysical investigations (seismic survey) at critical locations of the project area; (iii) a minimum of topographic surveys and mapping activities, mainly based on the use of existing maps, photos and digital data files; (iv) an adequate amount of test pits and related soils identification and standard tests, implemented at appropriate locations on the project site in order to map the global geotechnical conditions of the sites at pre-feasibility stage; (v) hydrological and flooding assessments; (vi) evaluation and selection of dam site (vii) broad economic assessment; and (viii) broad initial Environmental and Social Impact Assessment (ESIA) and resettlement issues; and (ix) analysis of a wide spectre of risk factors e.g. hydrological, siltation, geotechnical conditions, economic/financial, operational risks, etc..

### ***Sub-component Id: Assessment of Mapai Dam versus Alternative Options and Strategic Decision Making and Way Forward Opportunities***

2.3.9 This sub-component will compare the identified options through a multi-criteria approach, and qualify the most appropriate solutions and associated recommendations and ensure a well justified and agreed framework for the continuation of the project.

2.3.10 The findings and recommendations of the assessment of the dam versus alternative solutions will represent an important milestone of the project. The results and recommendations of Component I will be subject to further elaboration and consultations by the Project Steering Committee and relevant bodies before final endorsement. A high level decision will be made by GoM based on the findings and recommendations of Component 1 to either (i) proceed with the Mapai dam feasibility studies or (ii) proceed with an alternatively recommended solution based on a combination of strategic, integrated multi-sectoral investments aimed at improving the resilience and reducing the flood and drought risk leading to enhanced livelihoods in the lower Limpopo River basin.

## **2.3.3 Component II: Feasibility Studies**

### ***Sub-component II.a: Feasibility Study of the selected infrastructure(s)***

2.3.11 The feasibility study of the selected infrastructure(s) will provide preliminary designs and cost estimates of all components. The field surveys and investigations will be carried out in close consultations with relevant stakeholders based on a structured stakeholder survey as part of the initial phase. The feasibility study will imply more accurate topographic surveys on the area where the infrastructures will be located in order to establish the drawings and corresponding bills of quantities. The topography of the reservoir(s) area will be detailed through either the use of LIDAR<sup>11</sup> system to establish DTM (digital terrain models) and DEM (digital elevation models) or through ortho-photogrametry. The LIDAR DTM and aerial ortho-

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<sup>10</sup> Shuttle Radar Topography Mission

<sup>11</sup> LIDAR—Light Detection and Ranging—is a remote sensing method used to examine the surface of the Earth

photographs financed by the World Bank will be key input for this sub-component. These data will be also used for the hydraulic model for simulating the flood routing in the lower Limpopo River basin and the impact/thread on urban areas. Main tasks will include: (i) topographic surveys; (ii) geological, geotechnical and seismological investigations<sup>12</sup>; (iii) hydrological assessments; (iv) hydraulic modelling and disaster risk assessment; (v) suspended solids and bed-load sediment transport Study; (vi) climate change risks as well as climate change risk management and adaptation options and (vii) preliminary designs of Dam; (viii) access roads and other infrastructure; (ix) temporary structures during construction; and (x) preparation of dam safety plans and associated cost estimates.

#### ***Sub-component II.b: Feasibility Study of Other Multi-purpose Development Options***

2.3.12 The purpose of this sub-component is to assess potential multi-purpose benefits of promoting other development opportunities related to the dam(s) as well as cost estimates and development plans for the envisaged sector interventions. These multi-purpose development opportunities are closely related to the environmental and social studies and so close cooperation and information exchanges with Component III will be needed. The key activities will address: (i) Fisheries and Fish Farming (will be linked to the fisheries thematic study of the ESIA); (ii) Community Water Supply Development; (iii) Development of Tourism; (iv) Water for Livestock Production; and (v) Other Multi-purpose Benefits.

#### ***Sub-component II.c: Detailed Climate Change Evaluation and Climate Risk Management Adaptation***

2.3.13 An initial screening of climate change risks, based on the Bank's Climate Change Safeguards, was conducted during the appraisal, and it was found that both for hydropower and cropping the scoring exceeded the threshold for Category 1. Such projects require a detailed evaluation of climate change risks and adaptation measures to ensure that comprehensive, practical risk management and adaptation measures are integrated into the project design and implementation plans.

2.3.14 The scope of activities will be (i) to carry out a detailed evaluation of climate change vulnerability and risks for the selected development option; (ii) prepare data and risk assessments to the hydrological modelling for dam(s) design and operation under Sub-component II.a and for the financial and economic viability and multi-purpose benefits analysis under Sub-component II.e; and (iii) prepare detailed costing of the measures required to manage climate risks and adaptation. The output of this sub-component will be a climate risk management and adaptation plan, which is fully embedded into the design of the investment, and an Adaptation Evaluation Report. Further to the work associated with the climate proofing of the investment, sub-component II.d will encompass an assessment of GHG emission offset, and advise the government on possible alternative financing possibilities from dedicated climate change mitigation funds.

#### ***Sub-component II.d: Analysis of Financial and Economic Viability and Multi-purpose Benefits***

2.3.15 The construction and future operation of the infrastructure will require substantial structural and non-structural investments. The cost estimates shall establish the overall costs of the entire project including the multi-purpose benefit components and present the economic viability of the project in standard economic terms. This will involve: (i) determination of optimum water allocation between uses and related reservoir(s) operations as an input to the financial and economic analysis; (ii) development of multi-purpose economic benefit models and analysis to establish the attractiveness of the respective multi-purpose functions; (iii)

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<sup>12</sup> AWF: Feasibility Studies for Building Climate Resilience of Limpopo Basin in Mozambique - Report on the Reconnaissance Mission for the MAPAI dam (March – April 2014)

evaluation of economic and financial. The economic viability and direct and indirect (multiplier) economic impacts will be evaluated in terms of incremental agricultural production, hydropower production, fisheries, tourism, drought mitigation, reduction of flood damages, and others. It is important that the viability analysis present realistic project profitability scenarios in the financial analysis, based on optimistic, average and pessimistic hypotheses and assumptions. The sensitivity of the economic and financial viability analysis shall also be examined taking into account all relevant risk factors including hydrological risks attributed to climate change and variations.

#### ***Sub-component II.e: Local Benefit Sharing, Gender Equality and Social Equity***

2.3.16 This sub-component section will focus on how the generated benefits can be shared with the local populations. Local benefit sharing is an approach to strengthen the social equity and sustainability of hydropower and multi-purpose dam projects. Benefit sharing is considered as important as compensation and mitigation measures arising from the ESIA, RAP, and Environmental and Social Action Plans. The project will carefully address and design benefit sharing arrangements and associated gender equality and social equity analysis to ensure that the future multi-purpose economic and other benefits are duly shared with the local communities. This will require a disaggregated mapping of the gender situation and dynamics including relevant associated gender oriented interventions among the targeted communities. The design of the benefit sharing program will have to be consistent with other studies (technical-economic, environmental and social) and address legal and regulatory framework, stakeholder consultations, beneficiaries of sharing programs, sharing mechanisms and arrangements, and implementation through benefit sharing programs.

#### **2.3.4 Component III: Environmental and Social Studies**

2.3.17 According to the AfDB's environmental and social procedures, the dam is likely to be categorised as Category 1 and by the national legislation as category A and in both instances requires an Environmental and Social Impact Assessment and a Resettlement Action Plan. The ESIA and ESMP will be elaborated in compliance with the national legislation and the African Development Bank's procedures and policies. Given the sensitivity of the project and in order to facilitate resource mobilization, the ESIA and related documents will comply with best international E&S practices, the World Bank safeguards and the recommendations from the World Commission on Dams.

2.3.18 The Mapai dam and reservoir is likely to encroach on the buffer zone of the Greater Limpopo National Park, but the direct impact area will not reach the Banhine National Park. Nevertheless, for the latter it will be necessary to assess the possible indirect impacts of the dam project on the hydrological balance and possible migratory routes. There may also be positive impacts of the dam due to better access to drinking water for the animals. The national park issues will be addressed as part of the environmental and social studies in terms of conservation and management programs, animal distribution, endangered species, migratory routes and access roads, environmental flows estimation, social impacts, resettlements of people residing in the parks etc. The detailed activities of Component I, III and IV have been specified in the respective ToR.

#### ***Sub-component III.a: Environmental and Social Impact Assessment (ESIA)***

2.3.19 The ESIA and ESMP will be elaborated in compliance with the national legislation and the African Development Bank's procedures, policies and guidelines. The ESIA will include assessment of alternatives, national and international framework, the description of the current natural and human environment as well as the identification of key E&S impacts, according to their severity and likelihood; An Environmental and Social Management Plan will also be prepared. The ESIA will be supported by a number of thematic assessments that tentatively will include: (i) Thematic assessments of alternatives; (ii) Water quality; (iii) Vegetation; (iv)

Wildlife; (v) Fishery; (vi) Biodiversity; (vii) Social impact assessment; (viii) Health impact assessment; (ix) Labour condition health and safety; (x) Cultural heritage and archaeology; (xi) Public consultations; (xii) Associated infrastructures and facilities for project construction; (xiii) Impact of dam rupture; (xiv) Downstream hydraulic impact including geomorphological impacts; and (xv) Cumulative impacts. Additional studies to the ones mentioned above may be recommended by the ESIA consultant during the elaboration of the scoping report.

#### ***Sub-component III.b: Resettlement Action Plan (RAP)***

2.3.20 It is likely that the project will lead to involuntary resettlement of people and livelihoods within the impact areas of the dam project. Therefore a Resettlement Action Plan will have to be developed in conjunction with the feasibility studies and further developed during the subsequent detail design and planning stages in compliance with the national legislation and with the Bank's ISS and Involuntary Resettlement Policy, as well as the Operational Policy 4.12 of the World Bank. In connection with the current feasibility phase, the RAP will be prepared in coordination with the consultant responsible for the elaboration of the preliminary designs (Component II). These assessments will be carried out under Component II. The detailed tasks are further elaborated in the ToR for the social and environmental studies.

### **2.3.5 Component IV: SMEs development plan in the irrigated agriculture value chain study**

2.3.21 The study of SMEs development plan in the irrigated agriculture value chain will be developed under a participatory approach, in close cooperation with local small and large scale farmers, authorities, and the private sector. It will provide (i) a framework for a planned and controlled development of irrigation taking into account environmental land and social challenges and, (ii) a strategy to develop SMEs intervening in the agricultural value chains.

#### ***Sub-component IV.a: Irrigation Development Plan***

2.3.22 This sub-component is aimed at preparing a preliminary irrigation development plan as a basis for the overall Multi-Purpose (MP) benefit assessment of the Mapai Dam, and prepare a strategy and mechanisms for fostering private sector development in the agricultural value chains. The initial diagnosis phase will include: (i) agro-economic diagnosis of the farming and livestock systems, (ii) marketing assessment, including for exports in neighbouring countries, (iii) value chain assessment, (iii) soil suitability for irrigation and for various crops, (iv) land use mapping in the floodplain and nearby areas, (v) institutional assessment of the management of existing schemes, and (vi) environmental constraints mapping (biological corridors, fragile ecosystems, etc.). Based on this diagnosis, the Consultant will develop an irrigation development plan which will encompass: (i) physical development of the irrigation schemes (priority areas, water requirements, type of irrigation scheme and inlet structure, broad costs estimate), (ii) agricultural development (measures to foster the intensification of the farming systems, including credit, inputs supply, food processing, marketing, etc.), (iii) institutional development (institutional structuration of the scheme operation and capacity building), and (iii) private sector development in the value chain.

#### ***Sub-component IV.b: Irrigation Benefits of Mapai dam***

2.3.23 Irrigation benefits will be a centre piece in the multi-purpose benefits (MP) benefit analysis. This sub-component will involve economic cost-benefit assessments with/without irrigation. This will serve as inputs to the Financial and Economic Viability and Multi-purpose Benefits under Component II.

#### ***Sub-component IV.c: Equitable Land Allocation and Appropriate Land Governance***

2.3.24 The project shall actively prepare the ground for equitable land allocation and land governance to avoid "land grabs" and land disputes at the expense of local communities, environment, and the wild life in the Middle-Lower and Lower Limpopo basin. This

component will engage with Government officials, civil society, experts and the private sector to address the issues of large-scale land allocation and land governance in the context of large scale agribusinesses development versus small scale farming, forestry, and environmental impact concerns. This sub-component will include the diagnostics of the legal and regulatory framework and development of a clear policy, agreed strategy, and lines of accountability for the planned agriculture investments associated with the Mapai Dam project.

### **2.3.6 Component V: PPP Feasibility and Financing Strategy**

2.3.25 The preparation and promotion of a financing strategy is key to successful mobilisation of financial partners for implementation. It is therefore agreed to engage a Transaction Advisory team comprising a transaction advisor, a financial analyst, a national legal specialist, and an institutional specialist to strengthen the capacity of the Ministry and ARA-Sul to govern the future financing and construction of the Mapai dam. The advantage with such advisory services is that this will provide legitimacy to the financing process through public relations to enhance investors' confidence; and create an opportunity for knowledge transfer to the Ministry, ARA-Sul and other related government institutions. The transaction advisory services will include a diagnostic of the institutional and legal framework to check the appropriateness for PPP and assessment of the project components that are most suitable for public financing schemes and PPP arrangements. As the control of the Mapai Dam or any alternative identified for the Mozambique side of the basin will depend on the control of structures in the upstream countries, the diagnostic of the institutional framework will also look critically at the best options for ensuring a cooperative management of all these structures. It will in particular assess to which extent the Limpopo Watercourse Commission (LIMCOM) status and capacities will allow for such a cooperative optimisation.

The Transaction Advisor will in addition advise the Government on the financial and institutional structuration of the PPPs, on the risk allocation matrix, prepare the project documentation and undertake market tests to boost private sector interest in the project. It shall also engage with international donors and assess the potential for mobilising climate finance. Finally, it shall consolidate the public and private funding opportunities in a comprehensive financing strategy.

### **2.3.7 Component VI: Project Management, TA, Communication, Consultation and Monitoring**

2.3.26 Component VI aims to perform efficient and effective management and coordination of project implementation including communication, consultations, and supervision.

#### ***Dam Safety Panel***

2.3.27 The project shall support the establishment of Dam Safety Panel for the dam(s) and its functioning during the project period. The general task of the panel is to review all relevant design, engineering and dam safety aspects, for the proposed project through its feasibility and design stages and initiate corrective measures to ensure dam(s) safety. The Dam Safety Panel will (i) ensure due diligence and international quality standards in the studies, including integration of international standards for data, methodologies, benchmarks for impacts, and design criteria; (ii) provide high level and professional independent advice and guidance to support objectivity and credibility in the assessment process, and (iii) share technical expertise and knowledge and so contribute to dialogue amongst consultants, the Government of Mozambique and riparian countries. The primary outcome of these activities is to ensure that the dam will meet international standards of design, risk evaluation and impact assessment, and to build a level of confidence amongst the international community in the quality and integrity of the assessment process and findings. The proposed panel should include a dam engineer, a geotechnical engineer, and a dam hydrologist.

### ***Communication Advisor***

2.3.28 The Communication Advisor will organise the participation/consultation process for the design of the scheme with the support of the consultants in charge of the feasibility studies. A stakeholder assessment will be undertaken as part of Component I by the Communication Advisor. Based on this assessment, the Communication Advisor shall prepare and coordinate the implementation of a public consultation and communication plan. During project implementation, the consultants will engage in public consultations and inform all stakeholders about the proposed project interventions to ensure that all concerns are adequately addressed in the studies and reports.

### ***Cooperation and Synergies with Climate Resilience Building Strategies***

2.3.29 It will be the role of the Project Coordinator to ensure smooth collaboration with national climate change resilience building programs. These are: (i) Strategic Program for Climate Resilience (SPCR); (ii) National Adaptation Program of Action (NAPA); (iii) Limpopo Basin Strategic Plan for Reducing Vulnerability to Floods and Droughts; (iv) Pilot Program for Climate Resilience (PPCR), in particular the Baixo Limpopo Irrigation & Climate Resilience Project (AfDB). The feasibility studies will also be carried out in close cooperation and consultation with the World Bank supported projects and projects supported by other bi-lateral and multi-lateral institutions such as WMO (Telemetry and early warning), FAO (agriculture projects), as well as private sector investment projects in the identified multi-purpose sectors.

### ***Information and Knowledge Management***

2.3.30 A project information data base and geographical information system (GIS) will be established for systematic storing of data and other outputs of the project. The feasibility study consultant will be in charge of defining the GIS structure, and other consultants shall provide their data at the requested format for integration in the master GIS. These GIS and database shall be handed over to ARA-Sul by the consultants to be used all along the further phases of the project.

## **2.4 Risks and Mitigation Measures**

2.4.1 The risks threatening the overall efficiency of the Mapai dam project and jeopardizing the achievement of the objectives as they appear in the LFA matrix are as follows:

- Risk: Potential conflicts over trans-boundary waters. Mitigation: Engage with LIMCOM
- Risk: Poor acceptance of dam by local, provincial, and national stakeholders and authorities  
Mitigation: Considerable focus on ESIA resettlement and compensation schemes, transparency, active stakeholder involvement, and communication activities;
- Risk: Inadequate funding response by GoM, investors, and donors. Mitigation: Transaction advisory services engage with GoM, private sector (PPP) and donors to promote partnerships and mobilise resources for investments;
- Risk: Decision taken on a weak basis. Mitigation: Ensure sufficient allocation of budget to the plan;
- Risk ESIA and associated mitigation plans are not accepted by MICOA. Mitigation: ESIA conducted under ruling national and international regulations and professional standards. ARA-Sul-PT reinforced with environmental TA;
- Risk: Ministry of Agriculture not supporting the irrigation development plan. Mitigation: Ministry of Agriculture will be member of the SC and will nominate an officer to be member of the PT.
- Risk: Inadequate interest and involvement of the private sector. Mitigation: Transaction Advisor will “sell” the project, propose balanced risk allocation and organize events to gauge interest in a PPP;

- Risk: Weak mobilization and performance of project management. Mitigation: Supplementary TA to ARA-Sul/PT and procurement support from Massingir team.

## 2.5 Costs and Financing

2.5.1 The project cost amounts EUR 4,506,540, of which EUR 3,423,751 (76%) will be funded by AWF, EUR 713,790 (16%) by the Fund For African Private Sector Assistance (FAPA), and EUR 369,000 by the Government. Annex 2 provides a detailed provisional cost estimate. Table 2-1 gives the cost estimate (including contingencies) by component and Table 2-2 shows the cost estimate per cost category.

Table 2-1: Project Cost Estimate by Component and Funding Source (Euro)<sup>13</sup>

COMPONENT	TOTAL (EUR)	FUNDING SOURCE		
		AWF	GoM	FAPA
<b>Component I. Pre-feasibility assessment</b>	471 240	471 240	0	0
<b>Component II: Feasibility studies</b>	2 081 200	2 081 200	0	0
<b>Component III. Environmental and social studies</b>	871 310	871 310	0	0
<b>Component IV. Irrigation development studies</b>	517 990	0	0	517 990
<b>Component V. PPP feasibility and financing strategy</b>	195 800	0	0	195 800
<b>Component VI. project management, communication, and monitoring</b>	369 000	0	369 000	0
<b>Total cost estimate</b>	4 506 540	3 423 750	369 000	713 790

Table 2-2: Project Cost Estimation per Cost Category (Euro)

CATEGORY	TOTAL	AWF	GoM	FAPA
<b>Services</b>	4 137 540	3 423 750	0	713 790
<b>Operation</b>	369 000	0	369 000	0
<b>Sub-total</b>	4 130 400	3 423 750	369 000	713 790
<b>Total</b>	4 506 540	3 423 750	369 000	713 790
<b>Percentage</b>	100%	76%	8%	16%

## 3.0 PROJECT IMPLEMENTATION

### 3.1 Recipient and Implementing Agency

3.1.1 The Recipient of the AWF grant for the studies will be the Government of Mozambique (GoM). The Implementing Agency will be the Southern Region Water Administration (ARA-Sul) a water agency under the Ministry of Public Works and Housing, responsible for the river basins in southern Mozambique, including the trans-boundary flood prone rivers Limpopo and Maputo.

### 3.2 Implementation Arrangements

3.2.1 A Project Team (PT) will be established in ARA-Sul and comprise: (i) a full-time Project Coordinator recruited by the EA, (ii) ARA-Sul experts in hydrology, water engineering,

<sup>13</sup> The table reflects the proposed funding sharing between the funding partners. The table might be subject to revision when the funding applications have been processed and possibly approved

environmental assessment, financial management, accounting, procurement and IT on a part-time basis; as well as support staff including driver and secretarial services. A focal point shall be nominated by the Ministry of Agriculture to be part of the PT and manage the SMEs development plan in the irrigated agriculture value chain study, in order to ensure ownership from the line Ministry. Due to the complex nature of this feasibility study including the envisaged social and environmental safeguarding requirements, the PT will be reinforced by periodic TA support for advisory services and review of study deliverables funded by GoM under Component IV. These experts will be in the fields of environment, hydropower engineering, and irrigation. The implementation of the project will also benefit from the presence and local connections of ARA-Sul’s River Basin Management Unit for the Limpopo River Basin based in Chokwé. The Unit will provide complementary local information and facilitate the field missions and associated meetings with provincial and local authorities and stakeholders. The project team will be reinforced by the procurement specialist involved in the Massingir project.

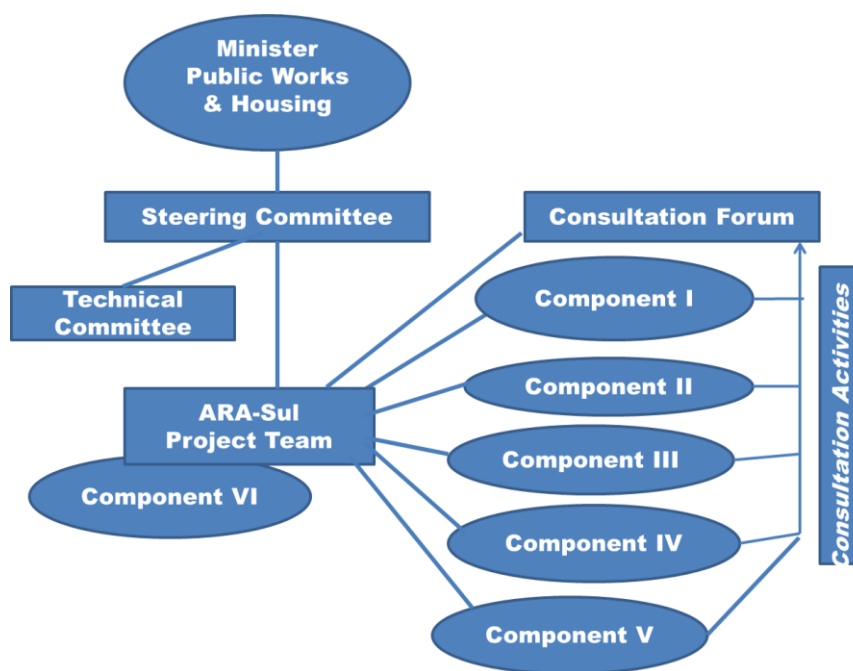


Figure 3-1 Project Implementation Structure

3.2.2 GoM will establish a Steering Committee (SC), consisting of representatives from the concerned ministries including the Ministry of Economy and Commerce, and chaired by the National Director of Water. A Technical Committee (TC), chaired by the Director of ARA-Sul and composed of representatives from the provincial administration and from qualified national experts from universities and research institutes will be in charge of advising the Steering Committee and reviewing the studies.

3.2.3 The implementation of each component of the project will involve wide-ranging participatory consultations with relevant communities, local and provincial authorities and other stakeholders. As illustrated in Figure 3-1, a Consultation Forum will be established to follow and discuss the consultation activities, express opinions and propose corrective actions for the consideration of ARA-Sul and the SC. The participant of the forum will represent different groups of stakeholders such as authorities, private sector, community and village committees, and various beneficiaries and interest groups. The members of the forum will be

selected by ARA-Sul/PT taking into consideration that the composition of the forum should be representative for the diversity of interests. The forum will be facilitated by ARA-Sul/PT and meet 3-4 times during the course of the project.

### 3.3 Financial Management and Auditing

3.3.1 An assessment of ARA-Sul’s FM arrangements for the implementation of the project (that included a review of the budgeting, accounting, internal controls, flow of funds, financial reporting and auditing arrangements) indicates that these meet the Bank’s minimum requirements to ensure that the funds made available for the financing of the project are used economically and efficiently and for the purpose intended. The overall responsibility for project accounting and FM rests with the head ARA-Sul Department of Administration and Finance (DAF).

3.3.2 The Agency will use accounting software to account for project funds, resources and expenditures, to be procured and installed no later than four months after the project effectiveness. It will be required to submit Quarterly Progress Reports (within 30 days after the end of each quarter). The contents of these reports should consist of financial reports, including all sources and uses of funds reports by project components and categories together with Physical Progress Reports linking financial information with physical progress and highlighting issues that require attention.

3.3.3 The annual project financial statements will be audited by an independent private external auditor competitively recruited by AWF. The project financial statements will be audited in accordance with Bank approved audit terms of reference with the audit carried out in accordance with international auditing standards as promulgated by the International Federation of Accountants (IFAC). An interim audit shall be undertaken once the project is sufficiently advanced i.e. 12 months after the signature of the feasibility study contract.

### 3.4 Procurement Arrangements

3.4.1 ARA-SUL will be responsible for the procurement of the study. An assessment of the capacity of the Implementing Agency to implement procurement actions for the project has been carried out by the Bank and included a review of the human capacities (Annex 8). In terms of human capacity, it was found that Ara-Sul has a Procurement Unit (UGEA) which is responsible for handling all procurement issues of the institution and is comprised of 4 people. The most experienced member of the UGEA has been working with Procurement for four years and the least experienced joined the unit three months ago. None of the members has any experience working with Multilateral Development Bank’s procedures, despite the fact that two of them attended trainings on World Bank Procurement procedures. Therefore, the Procurement Unit has been counting on the valuable experience of the procurement expert working for the Massingir Dam Emergency Rehabilitation Project, funded by the Bank. Considering the lack of experience of the Ara-Sul procurement unit, the procurement expert of the Massingir Dam Project, familiar with the Bank’s procurement Rules will be part of the Project team in order to supervise and coordinate the procurement activities of the project. This support will be covered will be covered by GoM under Component IV.

3.4.2 All procurement arrangements of this project will be in accordance with AWF Operational Procedures, Bank Rules and Procedures. The use of relevant Bank Standard Bidding documents is mandatory. Procurement arrangements are summarized in Table 3-1 and described below. The possibility of using advance contracting for acquisition will only be applicable to the Feasibility Study in order to allow saving a few months.

Table 3-1: Procurement Arrangements (Euro)

Services: Description/Contract Package	QCBS	Shopping	Other*	Total
--	------	----------	--------	-------

<b>Feasibility Study (including pre-feasibility)</b>	2 320 400			2 320 400
<b>Environmental and Social Studies</b>	792 100			792 100
<b>Irrigation Development Studies</b>	470 900			470 900
<b>Transaction Support and Financing Strategy</b>	178 000			178 000
<b>Project Management Communication, Consultation and Monitoring</b>			369 000	369 000
<b>Contingencies</b>				376 140
<b>TOTAL</b>	3 761 400	0	369 000	4 506 540

\* GoM funding

3.4.3 There will be four (4) QCBS consultancy contracts amounting to EUR 3,761,400. Project management costs amounting to EUR 369,000 will be covered by GoM and procured according to the national rules. The acquisition of consultancy services will be carried out using the selection procedure based on quality and cost based selection (QCBS) in compliance with the Bank's "Rules and Procedures for using Consultants". ARA-Sul/PT will be responsible for the procurement of the services. General and Specific Procurement Notices (GPN and SPN) for services will be prepared by the PMU-ARA-Sul and subject to review and no objection by the AWF before submission for publication and advertised in local media, in accordance with the Bank's procurement rules and procedures.

### 3.5 Disbursement terms and conditions

3.5.1 The disbursement methods for AWF financed contracts will be the Direct Payment method to the consulting firms recruited for the implementation of the studies, or or the reimbursement method in case of pre-financing by the Implementing Agency. Disbursement under the project will be in accordance with rules and procedures as set out in the Bank's disbursement handbook. Payments related to each of the AWF funded consultancy contracts (Table 3.1) will be made in Euro according to disbursement arrangements, stipulated in the respective consultancy agreements. The tentative time schedule (Annex 3) indicates the duration of the respective contracts. The conditions precedent to first disbursement will be conditioned to:

- Nomination of a project coordinator and accountant acceptable to the Bank;
- Provision of the memorandum from ARA-Sul nominating the members of the Protect Team;
- Provision of a letter attesting that resources have been committed to cover ARA-Sul cash contribution.
- Inclusion of the procurement expert from Massingir Dam in the team.

3.5.2 A key milestone will be the GoM's approval of the Pre-feasibility Assessment (Component I) and the continuation of the implementation of the remaining components (II, III, IV, and V) will be conditioned to:

- Submission of a letter of the Government stating the decision to endorse the conclusions of the study and carry-on with the feasibility studies;
- Non-objection of the Bank to carry on the studies.

3.5.3 Should the Pre-Feasibility study conclude that the project is not feasible (very unlikely), the grant balance would be cancelled in line with the relevant Bank rules and procedures.

### 3.6 Implementation Schedule

3.6.1 The duration of the project is estimated to 36 months from the date of approval. This will include about 26 months for the studies, some 10 months for procurement of consultancy

services and nomination/mobilization of the Project Team. Annex 3 presents a tentative implementation schedule.

### 3.7 Performance management plan

3.7.1 Project supervisions will be based on the results-based management model in which the logical framework approach principles play a key role. The project’s logical framework matrix indicates the goal and objectives related to expected outcomes. The table below indicates the project target time frame (see annex 3 for detailed schedule).

Table 3.2: Project timeframe and main milestones

Events		Timing Months
<b>1.</b>	<b>Advance contracting</b>	<b>T0</b>
<b>2.</b>	<b>Project approval</b>	<b>T0+3</b>
<b>3.</b>	Signing of Grant Agreement GoM-AfDB/AWF	<b>T0+6</b>
<b>4.</b>	<b>Pre-feasibility and Feasibility study consultant contracted</b>	<b>T0+8</b>
<b>5.</b>	Final pre-Feasibility Report submitted	<b>T0+16</b>
<b>6.</b>	<b>GoM decision to proceed with Feasibility Study or not</b>	<b>T0+18</b>
<b>7.</b>	EIA and SMEs development plan in the irrigated agriculture value chain consultants contracted	<b>T0+20</b>
<b>8.</b>	Financing Strategy consultant contracted	<b>T0+24</b>
<b>9.</b>	Final SMEs development plan in the irrigated agriculture value chain report submitted	<b>T0+28</b>
<b>10.</b>	<b>Final feasibility report submitted</b>	<b>T0+30</b>
<b>11.</b>	Final EIA and financing strategy reports submitted	<b>T0+32</b>
<b>12.</b>	<b>Project closure and PCR</b>	<b>T0+36</b>

### 3.8 Monitoring and Reporting Arrangements

3.8.1 The Implementing Agency shall be responsible for the day to day supervision of the consultancy services and for liaising with the Consultants to ensure timely production and delivery of the outputs of the study. The Logical Framework matrix shall serve as an overall basis for the result based assessment of the outputs of the project during implementation and after completion.

3.8.2 The Project Coordinator will collaborate with the AWF Task Manager during project implementation to discuss matters arising and ensure rapid processing of necessary formalities e.g. issuing of non-objection etc. The AWF will also monitor project implementation, as well as review the progress reports. In addition, the AWF may undertake field supervision missions as the need to do so arises.

3.8.3 The Technical Committee shall ensure the quality of the project outputs including the reports and deliverables submitted by consultants. These reports, prepared at various stages of the assignment, will be reviewed and validated by the TC and approved by the Steering Committee at planned meetings. These meetings will ensure that the outputs presented are acceptable before proceeding with downstream activities of the study.

3.8.4 The Implementing Agency shall submit quarterly progress reports to the Facility in a form to be agreed with all partners, and that clearly indicates the level of attainment of results and addresses any discrepancies from the set targets. The Implementing Agency shall also prepare and submit a project completion report attesting the completion of the study and showing lessons learnt from the implementation.

## 4.0 EFFECTIVENESS, EFFICIENCY, VIABILITY, AND SUSTAINABILITY

### 4.1 Effectiveness and Efficiency

4.1.1 The project effectiveness and efficiency will be guaranteed by: (i) the step-wise approach which will help the Government select the best option before embarking on the full-fledged feasibility studies, (ii) the consultation process and, (iii) the financing strategy that will support financiers' mobilization.

### 4.2 Viability

4.2.1 The comprehensive project preparation approach that addresses institutional, financial and economic aspects, in particular through the financing strategy, will ensure the project viability.

### 4.3 Sustainability

4.3.1 The project has been designed in the view to ensure long-term financial, physical, environmental and social sustainability of the future climate change resilience investments. The project will also address the potential risks that might threaten the sustainability of the project and introduce necessary mitigation measures. Important features of the proposed project that will contribute to enhanced long-term sustainability include:

- Environmental and social safeguarding and **climate change resilience** building systematically addressed;
- Highly participatory and **consultative approaches** engaging with and preparing the local communities for the project;
- Ample emphasis on **active communication** at all levels facilitated by the Communication Forum;
- Engaging in **transaction advisory services** in close cooperation with GoM, the Ministry and ARA-Sul to validate the economic viability of the project and develop a partnership arrangements (including PPP) and a financing **strategy for leveraging resources** for investments and ensure financially viable and environmentally acceptable development operations;
- Preparation of mechanisms and a project interventions to **avoid land grab and land use conflicts** and ensure equitable land acquisitions, appropriate land governance taking into consideration poverty alleviation and small scale farmers' concerns, including environmental, **gender equality**, and social equity issues;
- Development of **local benefit sharing** and gender equality promotion mechanisms and interventions to ensure that local communities are duly benefitting from the multi-purpose benefits generated by the dam;

## **5.0 CONCLUSION AND RECOMMENDATIONS**

### **5.1 Conclusion**

5.1.1 The proposed project is consistent with related national policies and strategic frameworks in Mozambique. The project will pave the way for infrastructure investments that will contribute to improving the climate change resilience and reducing the risk of damages to communities, infrastructure and livelihoods in the lower Limpopo River basin. Such investments will also provide multi-purpose benefit opportunities for private sector development, economic diversification, reinforcing food, energy and water security, and fostering an inclusive green growth, being thus in line with the AfDB Long Term Strategy. The funding of the preparation studies for Limpopo climate resilience project is also consistent with the AWF 2012-2016 strategy whose first priority is the preparation of bankable infrastructure projects.

5.1.2 The total project duration is 36 months. The project is estimated to cost EUR 4,506,540 to be funded by an expected AWF grant of EUR3,423,750, a FAPA grant of EUR 713,790, and a GoM contribution of EUR 369,000.

### **5.2 Recommendations**

5.2.1 Based upon a critical assessment of the relevance, effectiveness, and sustainability of the Project, as well as the credibility and capacity of the Implementing Agency, it is recommended that a grant of EUR 3,423,750 (76%) out of a total cost estimate of EUR 4,506,540, from the AWF be extended to the Government of Mozambique for the implementation of the project described in this appraisal report. The conditions precedent to first disbursement will be:

- Nomination of a project coordinator and accountant acceptable to the Bank;
- Provision of the memorandum from ARA-Sul nominating the members of the Protect Team;
- Provision of a letter attesting that resources will be committed to cover ARA-Sul cash contribution.
- Inclusion of the procurement expert from Massingir Dam in the team.

A key milestone will be the GoM's approval of the Pre-feasibility Assessment (Component I) and the continuation of the implementation of the remaining components (II, III, IV, and V) will be conditioned to:

- Submission of a letter of the Government stating the decision to endorse the conclusions of the study and carry-on with the feasibility studies;
- Non-objection of the Bank to carry on the studies

# ANNEXES

## ANNEX 1: MAP LIMPOPO RIVER BASIN



Map of Limpopo River Basin<sup>14</sup>

<sup>14</sup> Based LIMCOM map

## ANNEX 2: COST ESTIMATE

<b>COMPONENT I : PRE-FEASIBILITY ASSESSMENT AND STRATEGIC DECISION MAKING</b>												
<b>COMPONENT 2: FEASIBILITY STUDIES</b>	<b>Staff Origin</b>	<b>Tot I Pre-Feas</b>	<b>Tot II Feas</b>	<b>Total</b>	<b>Unit Cost</b>	<b>Tot I Pre-Feas</b>	<b>Tot II Feas</b>	<b>Total Cost</b>	<b>AWF</b>	<b>GoM</b>	<b>FAPA</b>	
1. Remuneration												
Consultant Team Member		p-m	p-m	p-m								
Team Leader IWRM Specialist	I	3	15	18	20 000	60 000	300 000	360 000				
Hydrologist and CC Expert	N/I	2	4	6	19 000	38 000	76 000	114 000				
Dam Civil Engineer Deputy TL	N/I	1	5	6	12 000	12 000	60 000	72 000				
Hydro-morphodynamic Engr.	I	2	2	4	18 000	36 000	36 000	72 000				
GIS mapping expert	N	1	4	5	6 000	6 000	24 000	30 000				
Geologist	N/I	1	3	4	12 000	12 000	36 000	48 000				
Geotechnical Engineer	N/I	2	4	6	12 000	24 000	48 000	72 000				
Electromechanical Engineer	I	1	1	2	18 000	18 000	18 000	36 000				
Hydraulic/Hydro-mechanical Engineer	I	1	3	4	18 000	18 000	54 000	72 000				
Power Engineer Hydropower	I	1	3	4	18 000	18 000	54 000	72 000				
Power Engineer Transmission	N/I	0	2	2	12 000	0	24 000	24 000				
Road Engineer	N	0	2	2	6 000	0	12 000	12 000				
Fisheries Expert	N/I	0	1	1	12 000	0	12 000	12 000				
Tourism Expert	N/I	0	1	1	12 000	0	12 000	12 000				
Flood Management Specialist	I	1	3	4	18 000	18 000	54 000	72 000				
Economist/Financial Expert	N/I	1	2	3	12 000	12 000	24 000	36 000				
Support staff	N	2	18	20	2 000	4 000	36 000	40 000				
Sub-Total 1 Remuneration		19	73	92		276 000	880 000	1 156 000				
2. Travel, lodging, per diem, operations												
International Air Travel Per diem 10%						27 600	88 000	115 600				
Operation communication transport 5%						13 800	44 000	57 800				
Sub-Total 2 Travel per diem						41 400	132 000	173 400				
3. Surveys and Investigation Services												

Mapping, imagery, digital aerial photos and ortho maps					L/S	10 000	90 000	100 000			
Topographical surveys drafting, mapping, geodetic Control					L/S			0			
Mobilization/Demobilization/Reporting					L/S	20 000	180 000	200 000			
Geology (Desk work)					L/S	15 000	25 000	40 000			
Geophysics					L/S	35 000	10 000	45 000			
Drillings and boreholes					L/S	0	370 000	370 000			
Test pits + Lab Tests on soils					L/S	20 000	115 000	135 000			
Sub-total 3a						100 000	790 000	890 000			
Water quality laboratory sediment analysis					L/S	1 500	4 500	6 000			
Preliminary socio-surveys					L/S	3 000	27 000	30 000			
Translation and Editing Services					L/S	3 500	31 500	35 000			
Optional services/equipment					L/S	3 000	27 000	30 000			
Sub-total 3b						11 000	90 000	101 000			
Sub-Total 3						111 000	880 000	991 000			
<b>TOTAL COST COMPONENT I. &amp; II.</b>						<b>428 400</b>	<b>1 892 000</b>	<b>2 320 400</b>	<b>232 400</b>	<b>0</b>	<b>0</b>
<b>COMPONENT III. ENVIRONMENTAL AND SOCIAL STUDIES</b>											
1. Remuneration	Staff Origin			Total	Unit Cost			Cost	AWF	GoM	FAPA
Consultant Team Member				p-m							
Environmental Specialist (TL)	I			9	20 000			180 000			
Environmentalist II Deputy TL	N			12	6 000			72 000			
Social Expert	N/I			4	12 000			48 000			
Hydrologist & Engineer	N/I			2	12 000			24 000			
Hydro-morphologist	N/I			2	12 000			24 000			
Environmental Experts (various)	N			6	6 000			36 000			
Gender specialist	N			6	6 000			36 000			
Sociologist	N			8	6 000			48 000			
Health experts (various subjects)	N			2	6 000			12 000			
Anthropologist	N			1	6 000			6 000			

Archaeologist	N			2	6 000			12 000			
Social Expert/Resettlement Planner	I			3	18 000			54 000			
Socio-economist	N			4	6 000			24 000			
Land Surveyor	N			3	6 000			18 000			
Agronomist	N			2	6 000			12 000			
Assistants , technicians, enumerators	N			24	2 000			48 000			
Sub-Total 1 Remuneration				90				654 000			
2. Travel, lodging, per diem, operations											
International Air Travel Per diem 10%								65 400			
Operation communication transport 5%								32 700			
Sub-Total 2 Travel per diem								98 100			
3. Surveys and Investigation Services											
Field Travel Vehicles								25 000			
Translation services								15 000			
Sub-Total 3 Surveys, investigations services								40 000			
<b>TOTAL COMPONENT III.</b>								<b>792 100</b>	<b>791 100</b>	<b>0</b>	<b>0</b>
<b>COMPONENT IV. IRRIGATION DEVELOPMENT STUDIES</b>											
1. Remuneration	Staff Origin			Total	Unit Cost			Cost	AWF	GoM	FAPA
Consultant Team Member				p-m							
Agro-economist (Team Leader)	I			6	20 000			120 000			
Socio-economist	N			6	5 000			30 000			
Irrigation Engineer	I			4	18 000			72 000			
Soil specialist	N/I			5	12 000			60 000			
Environmentalist	N			3	6 000			18 000			
Food marketing specialist	N/I			1	12 000			12 000			
Agro-processing specialist				1	12 000			12 000			
GIS Expert	N			3	6 000			18 000			
Assistants , technicians, enumerators	N			12	2 000			24 000			
Sub-Total 1 Remuneration								366 000			
2. Travel, lodging, per diem, operations											
International Air Travel Per diem 10%								36 600			

Operation communication transport 5%							18 300			
Sub-Total 2 Travel per diem							54 900			
<b>3. Surveys and Investigation Services</b>										
Field Transport					L/S		20 000			
Translation services					L/S		15 000			
More items (to be specified)					LS		15 000			
Sub-Total 3 Surveys, investigations services							50 000			
<b>TOTAL COMPONENT IV.</b>							<b>470 900</b>	<b>0</b>	<b>0</b>	<b>470 900</b>
<b>COMPONENT V. PPP FEASIBILITY AND FINANCING STRATEGY</b>										
<b>1. Remuneration</b>	<b>Staff Origin</b>			<b>Total</b>	<b>Unit Cost</b>		<b>Cost</b>	<b>AWF</b>	<b>GoM</b>	<b>FAPA</b>
Consultant Team Member				p-m						
Transaction Adviser	I			4	30 000		120 000			
Financial Analyst	N/I			1	20 000		20 000			
National Legal Expert	N			1	10 000		10 000			
Institutional Specialist	N			1	10 000		10 000			
Travel per diem, facilities,					15%		18 000			
<b>TOTAL COMPONENT V.</b>							<b>178 000</b>	<b>0</b>	<b>0</b>	<b>178 000</b>
<b>SUB-TOTAL I, II, III, IV and V</b>							<b>3 761 400</b>	<b>1 276 125</b>	<b>0</b>	<b>648 900</b>
Contingencies 10%							376 140	127 613	0	64 890
<b>TOTAL I,II, III, IV and V</b>							<b>4 137 540</b>	<b>3423 751</b>	<b>0</b>	<b>713 790</b>

<b>COMPONENT VI : PROJECT MANAGEMENT, COMMUNICATION, AND MONITORING</b>											
Government Contribution	Staff Origin			Total	Unit Cost			Cost	AWF	GoM	FAPA
1.Study Coordinator and ARA-Sul Staff											
Study Coordinator (p-m)				18	3 000			54 000			
Secretary (p-m)				18	700			12 600			
Driver (p-m)				18	500			9 000			
Staff time				36	1000			36 000			
Sub-total 1 Study Coordinator and ARA-Sul Staff								111 600			
2. Dam Safety Panel and TA											
Dam Safety Panel				3	23 000			69 000			
TA Environmental Specialist (p-m)				1,5	12 500			18 750			
TA Hydropower engineer				1,5	12 500			18 750			
TA Hydrologist				0,5	12 500			6 250			
Communication Adviser I				4	6 000			24 000			
Sub-total 2 Dam Safety Panel and TA								136 750			
Sub-total 3 Operational Expenses								120 650			
<b>SUB-TOTAL COPMPONENT VI.</b>								<b>369 000</b>	<b>0</b>	<b>369 000</b>	<b>0</b>
<b>TOTAL COST ESTIMATE</b>								<b>4 506 540</b>	<b>3 423 751</b>	<b>369 000</b>	<b>713 790</b>

### ANNEX 3: TENTATIVE TIME SCHEDULE

T0	Approval = T0+3 Month																																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		
COMPONENT 1:																																						
Component 1 Pre-Feas. Assessment	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	d	f																						
Decision making by GoM																	Blue	Blue	Blue																			
Component II Feasibility Studies																																						
Component III: ESIA RAP																																						
Component IV: Irrigation Dev.																																						
Component V: PPP & Financing																																						
Component VI: Project Mgmt.																																						
Dam Safety Panel																																						
Project Mgmt. & Consultations	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	
Project Closure																																						Blue

T0= advance contracting starting time = approval date less 3 months

Procure & mobili   
 Working period:   
 Draft Report  d  d  
 Final Report  f  f

**ANNEX 4: PHOTOS**



Approx. Dam Site



Part of Reservoir Area



Downstream Dam Site

Photos from Flood Plain at Mabalane Hydrometric Station



Agriculture perimeter for prison camp Limpopo Flood Plain.



River bed near Mabalane in Middle-Lower Limpopo River

## ANNEX 5: PROVISIONAL KEY INFORMATION MAPAI DAM

The below data below are abstracted from the funding application and old preparatory studies (1970s and 80s) providing some indicative figures.

### Provisional Mapai dam information

Parameter	Provisional figure
Height	52 m
Total storage capacity	6370 Mm <sup>3</sup>
Useable storage capacity	4670 Mm <sup>3</sup>
Full supply level	164.6 m.a.s.l.
Minimum supply level	134.0 m.a.s.l.
Maximum flood level	169.5 m.a.s.l.
Crest level	173.7 m.a.s.l.
Crest length	3,470 m
Maximum flooded area	352 Km <sup>2</sup>
Spillway width	265 m
Spillway minimum level	150 m.a.s.l.
Evaporation Losses	817 million m <sup>3</sup> /year
Anticipated effective lifetime	60 years
Hydropower station	40 MW
Tentative Irrigation Area Potential	40,000 – 90,000 ha

**ANNEX 6: TENTATIVE TOR PRE-FEASIBILITY AND FEASIBILITY STUDY**

**FEASIBILITY STUDY FOR BUILDING CLIMATE RESILIENCE OF  
LIMPOOP BASIN IN MOZAMBIQUE**

**TERMS OF REFERENCE**

**COMPONENT I: PRE-FEASIBILITY ASSESSMENT AND  
COMPONENT II: FEASIBILITY STUDIES FOR BUILDING CLIMATE  
RESILIENCE OF  
LIMPOPO BASIN IN MOZAMBIQUE**

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# 1. PROJECT BACKGROUND

## 1.1 Introduction

The Limpopo River Basin has a total catchment area of approximately 408 000 km<sup>2</sup> (basin map presented in Annex 1). The entire basin presently comprises a population of about 17 million inhabitants and is projected to increase to almost 23 million by 2040. The population of the Mozambican part of the basin totals 572,000 people (32,000 in the Middle-Lower and 540,000 in the Lower Limpopo). The catchment characteristics of the Limpopo River Basin are very diverse, covering different climatic and topographic zones as well as land use types, including protected areas, such as the Greater Limpopo Trans-frontier Conservation Area. Levels of social and economic development across the basin are also highly diverse as the Limpopo Basin countries exhibit considerable macro-economic variability, with the per capita Gross Domestic Product (GDP) for Zimbabwe, South Africa, and Botswana being 3, 13, and 16 times higher respectively compared to Mozambique.

As the lower end riparian country of the Limpopo river basin, Mozambique is facing severe challenges due to intensive water development and water-use upstream combined with hydrological variations exacerbated by climate change. This has resulted in significantly reduced dry season flows into Mozambique so that the river sometimes remains dry for a period of up to 8 months in a year. The lower reaches of the river are also prone to highly devastating floods that damage infrastructure and undermine the livelihood of the riverine populations.

These severe floods have sparked off flood response investment programs to restore damaged infrastructure supported by the World Bank and African Development Bank in association with other multi- and bilateral funding agencies. The World Bank fielded a mission to Mozambique to carry out flood assessments and response scoping, in close collaboration with GoM, the UN organisations and other development partners, following the floods of January 2013. The objectives were inter alia to: i) contribute to the preliminary assessment of the extent of the flooding, its impact on the population and the response to date, based on existing rapid assessments; ii) develop and agree with GoM and key development partners on the next steps for flood recovery and long-term disaster resilience; and, iii) identify the availability of financial support to the flood response. The Mapai dam located on the main stem of the Limpopo River was among the identified longer term needs for large investments. The Government has paid ample attention to the construction of the Mapai dam on the main stem of the Limpopo River to strengthen the resilience of the lower Limpopo population against climate change and hydrological extremes. The Government has therefore given high priority to speeding up feasibility studies concerning the Mapai dam project and associated interventions.

The idea of constructing the Mapai dam was conceived in the 70s and followed up in the 80s in response to the emerging needs for flood control and increased dry season river flows. The proposed Mapai dam (map Annex 1) would be located about 80 km from the Pafuri border between Mozambique and South Africa and about 240 km north of Chokwe. The proposed dam would have a height of 52 m, a total storage capacity in the order of 6.4 billion m<sup>3</sup> and an estimated hydropower potential of 40 MW. Other key information about the dam is presented in Annex 5. The appraisal team has noted that the initial studies of the Mapai Dam were technically incomplete and outdated. The framework conditions (hydrological

conditions, development situation in the lower Limpopo, upstream countries interventions, multi-purpose approach, social and environmental safeguarding requirements, national park concerns, etc.) have changed considerably. The need for an up-to-date and modernised conceptual platform has therefore been taken into account in the scoping of the feasibility study by introducing an initial assessment phase before embarking on the more detailed investigations and in-depth studies. It is indeed necessary to check that Mapai Dam is the best option to mitigate climate change and natural climate variability.

The project will also pay ample attention to social and environmental safeguarding according to applicable national and international standards. Some specific points of concern are the resettlement issues, the need to ensure local sharing of multi-purpose benefits created by the dam, and to ensure equitable land management and avoid “land grabbing” issues related to irrigated agriculture development. The project will also address specific gender equality and social equity concerns and prepare recommendations for suitable actions to improve these aspects under the auspices of the project.

The feasibility study project will build on the previous and on-going studies, such as the EU financed flood study following the floods of 2000, the Limpopo Basin Monograph being financed by GIZ, the AfDB PPCR program, and the USAID financed RESLIM Program. Based on existing hydrodynamic models of the river system, the feasibility study will evaluate a range of potential flood management options and provide assessments for identified structural interventions to define an optimal solution to improving flood prevention, mitigation and management.

## **1.2 Problem Definition**

### **1.2.1 Disaster Risk Management**

The lower reaches of Limpopo are extremely vulnerable to disasters related to natural hydrological variations increased by climate change effects and these areas are stricken by frequent flooding causing major damages. These extreme and highly devastating floods destroy infrastructures and livelihoods of the riverine populations in the Mozambican parts of the river. The January 2013 flood caused the death of 40 people, displaced more than 170 000 inhabitants, and badly damaged roads, irrigation schemes and crops. According to UNICEF some 250,000 people were affected by the floods in Mozambique in 2013. Chokwe was one of the hardest-hit districts, but also communities in the Mid-Lower Limpopo were seriously impacted by the flood. According to the World Bank post-flood mission, damages were estimated to be in the order of USD 250 million. In an earlier major flood that occurred in 2000, about 700 people lost their lives, and the flood damaged roads, irrigations schemes, crops and the Chokwe and Xai-Xai Cities.

### **1.2.2 Climate Change Vulnerability and Adaptation**

Mozambique remains extremely vulnerable to climate variability and change. Droughts, severe flooding, and coastal storms are increasing in frequency and severity. This has affected the country’s economic performance. Increased variability of weather and climate patterns could slow and even reverse the progress made on poverty reduction in recent years in Mozambique. While uncertainties remain, it seems likely that climate and weather variability will increase exerting important impacts on the water sector and related livelihoods. Economic development in the upstream portions of the international basin may further increase the variability of surface water flows and could seriously reduce overall cross-border

water volumes. In addition inter-annual variability was predicted to increase dramatically, suggesting extreme weather events such as droughts and floods may become more frequent. The future temperature of Mozambique is predicted to increase by 1°C to 2°C by 2015, while the seasonal variability is narrowing as the average minimum temperature has increased, which combined may lead to greatly increased potential evapotranspiration year round. At the same time, precipitations are likely to become increasingly variable and uncertain.

### **1.2.3 Food Insecurity**

In 2013, the food security of most rural households across Mozambique was considered to be relatively favourable. Food is generally available, markets are adequately supplied, and prices are generally affordable. There are pockets of stressed food insecurity in need of emergency food assistance to meet peoples' basic dietary requirements in parts of southern and central Mozambique, especially Gaza Province was affected by production shortfalls last season and recent floods. The district town of Chokwe, a centre for employment, agricultural processing and trade also supports Mozambique's largest irrigation schemes (47,700 ha), on what is perhaps the most productive farmland in the country. Despite the great food production potential of the Gaza Province, the province is extremely vulnerable to natural disasters such as floods and drought aggravated by the threat of poverty and food insecurity. The outcomes of this project would therefore be to pave the way for highly relevant investments to boost the national food production and alleviate the periodic food insecurity at local level in the province.

### **1.2.4 Energy Insecurity and Climate Change Mitigation**

Mozambique is well endowed with energy resources, ranging from fossil fuels (natural gas and coal) to renewable resources (solar, hydro, wind, geothermal and tidal sources of power). However, the exploitation of these resources for national use is limited because they are unevenly distributed around the country, and access rate remains low. The extension of the electricity grid along the Limpopo River will benefit the electricity supply for the lower and mid-lower Limpopo area. According to EDM, the Mapai dam hydropower scheme would be connected to the national grid via the new sub-station in Mapai and contribute to the electricity security at regional and national levels. The hydropower scheme would also contribute to climate change mitigation by substituting electricity produced (some 40 MW) from fossil fuels thus reducing carbon emissions to the atmosphere. This would also provide a basis for earning verified carbon benefits.

### **1.2.5 Gaza the 4th Poorest Province in the Country**

Gaza Province, with a population of about 1.4 million people, is the 4th poorest province in the country. Agriculture is the main activity in the Province and accounts for 90% of all economic activity. The Province needs considerable investments in infrastructure assets to spur economic activities for sustainable development and reduce poverty. In this respect, the Limpopo Climate Resilience project would provide significant multiple opportunities as elaborated in this appraisal report.

### **1.2.6 Environmental and Social Issues**

The project may exert significant environmental and social (E&S) impacts if not adequately addressed. The proposed site for the dam and reservoir is located in the buffer zone of the Limpopo National Park. The Limpopo River Basin includes sensitive ecosystems and there is a high socio-economic dependence by riparian citizens on these ecosystems including important nature reserves such as those that form the Greater Limpopo Trans-frontier Conservation Area that includes the Kruger National Park. This makes the project sensitive

from a wildlife and ecological perspective. The environmental and social impact studies and establishment of associated action plans and mitigation measures will apply the appropriate procedures and approaches used by the multi-lateral development banks in close cooperation with MICOA and other relevant authorities. The project will address and safeguard a broad range of environmental and social impacts caused by the dam that will alter the natural distribution and timing of the stream flow: (i) Physical, chemical, and geomorphological consequences; (ii) Impacts on the biological environment (flora, wildlife, ecosystem and biodiversity); (iii) Cumulative impacts such as the impacts of other dams and associated infrastructure upstream and downstream; (iv) Involuntary physical and economic resettlement; (v) Socio-economic activities downstream (agriculture, fishing) and reduce access to natural resources; (vi) Impact on human health; (vii) Impact on archaeology and cultural heritage; (viii) Risk of damage on cultural resources; and (ix) Other positive/negative impacts on the human environment.

### 1.2.7 Implementation Partnership and Financing Arrangements

An important part of the feasibility study will be to pave the way for timely financing and implementation of the Limpopo Climate Resilience project by engaging with different funding partners including private investors. Some project components may be suitable for Public-Private Partnerships (PPP) schemes, such as hydropower and irrigation. In this respect, the national policy is very conducive to private sector participation in investments, a PPP law was approved in 2011, and investors already expressed their interest in the project. The project will also foster Small and Medium Enterprises (SMEs) development through providing opportunities for irrigation, fisheries and tourism.

### 1.3 Provisional Key Information about the Dam

The data in the table below are abstracted from the old preparatory studies and are only meant to provide some initial order of magnitude figures.

Table 1-1 Provisional Mapai dam information <sup>15</sup>

Parameter	Provisional figure
Height	52 m
Total storage capacity	6,370 Mm <sup>3</sup>
Useable storage capacity	4,670 Mm <sup>3</sup>
Full supply level	164.6 m.a.s.l.
Minimum supply level	134.0 m.a.s.l.
Maximum flood level	169.5 m.a.s.l.
Crest level	173.7 m.a.s.l.
Crest length	3,470 m
Maximum flooded area	352 Km <sup>2</sup>
Spillway width	265 m
Spillway minimum level	150 m.a.s.l.
Evaporation Losses	817 million m <sup>3</sup> /year
Anticipated effective lifetime	60 years
Hydropower station	40 MW
Assumed irrigation Area potential	40,000 – 90,000 ha

<sup>15</sup> Funding application to AWF from ARA-Sul

## **2. THE PROJECT**

### **2.1 Goals, Impacts, and Outcomes**

The overarching development goal/impact of this project is to improve the resilience and reduce the risk of damages to communities, infrastructure and livelihoods in the lower Limpopo River basin. The overall outcomes are that: (i) Feasibility study findings broadly accepted among authorities, stakeholders and partners; (ii) Project financing and partnership arrangements for the construction project are structured, public funding committed, PPP identified and established.

### **2.2 Outputs**

The main outputs of the project are: (i) Pre-feasibility assessment and decision making reports validated and approved; (ii) Multipurpose development options including those attributed to the dam construction alternative assessed and technical, economic, social and environmental feasibility established including realistic multi-purpose economic viability; (iii) Environmental, and social impacts and all required adaptation, mitigation, resettlements, and compensation and gender and social equity measures accepted by stakeholders and approved by authorities; (iv) Irrigation development potential and socio- economic prospects related to the desired development option established; (v) Transaction and financing and strategy in place; and (vi) Effective Project Management, Consultation, Communication and Monitoring

### **2.3 Activities**

#### **2.3.1 Overview**

As illustrated in the figure below, the project implementation follows a step-wise approach to allow validation of project outcomes and associated strategic decision making before launching the following step. This approach will include the following three stages:

- Stage 1: Pre-feasibility Assessment and Decision Making aimed to examine the Mapai Dam and alternative options to improve climate change resilience in the Mozambican part of the Limpopo River Basin. In Particular, this stage shall assess various optional interventions to mitigate the impacts of climate change and extreme river flow variations. This stage will culminate in a high level GoM decision based on the findings and recommendations of Component 1 either (i) proceed with the dam feasibility studies, in Mapai or in an alternative site (Section 2.3.3); or (ii) proceed with a recommended solution based on a combination of strategic, integrated multi-sectoral investments found more viable than the large dam option.
- Stage 2: Feasibility Studies and ESIA to prepare the preliminary designs and validate the technical feasibility, economic viability and environmental and social safeguarding of the selected option that will provide a basis for Stage 3.
- Stage 3: Financing Strategy including PPP feasibility, financial mobilisation and partnership arrangements for investments and operations of the infrastructure and associated multi-purpose utilities.

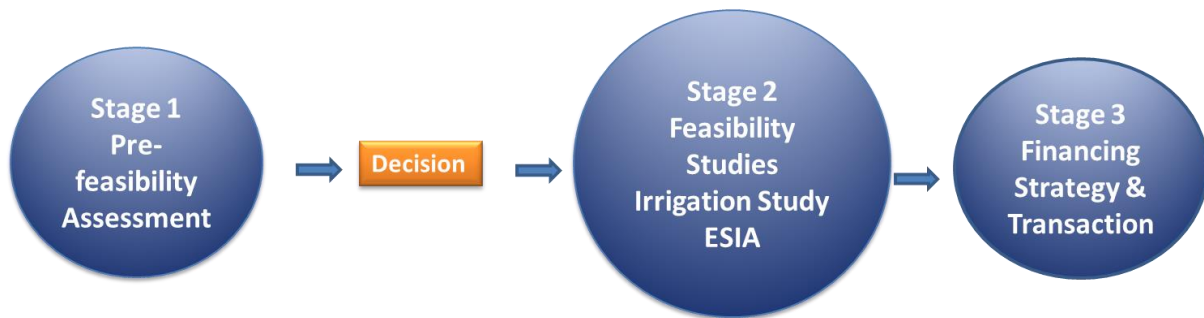


Figure 2-1 Main Project Stages

The project is structured as follows:

**Component I: Pre-feasibility Assessment and Strategic Decision Making**

- a) Climate Change Vulnerability and Resilience Assessment
- b) Assessment of Options
- c) Pre-feasibility Assessment of the Mapai Dam
- d) Comparative Assessment of Mapai Dam vs. Alternative Options
- e) Strategic Decision Making on Way Forward

**Component II: Feasibility Studies**

- a) Feasibility Study of the selected option including hydropower development
- b) Feasibility Study of Other Multi-purpose Development Options
- c) Detailed Climate Change Evaluation and Climate Risk Management
- d) Financial and Economic Viability and Multi-purpose Benefits
- e) Local Benefit Sharing and Improved Gender Equality and Social Equity

**Component III: Environmental and Social Studies (AWF funding)**

- a) Environmental and Social Impact Assessment (ESIA)
- b) Resettlement Action Plan (RAP)

**Component IV: SMEs development plan in the irrigated agriculture value chain**

- a) Irrigation Development Plan
- b) Irrigation economic benefits of the Limpopo climate resilience project
- c) Equitable Land Acquisitions and Appropriate Land Governance

**Component V: PPP feasibility and Financing Strategy**

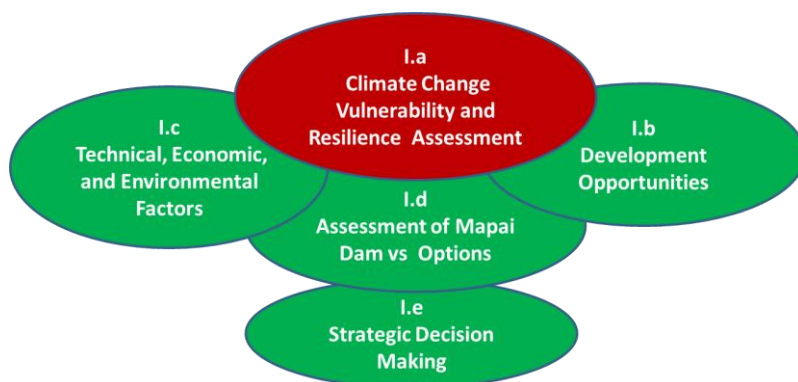
**Component VI: Project Management Communication, Consultation and Monitoring including Dam Safety Panel (DSP)**

### **3. CONSULTANCY SERVICES**

This ToR document relates to Component I Pre-feasibility Assessment and Component II Feasibility Studies.

### 3.1 Component I: Pre-feasibility Assessment

The pre-feasibility assessment is aimed to (i) establish an appropriate climate change strategic framework for the project; (ii) assess development options (iii) provide initial technical, economic, environmental and social considerations for the assessment of options and, (iv) support strategic decision making (see Figure below). The activities will interact with the development of the emerging Limpopo Flood Control Master Plan including the on-going floods assessment and response initiative supported by the World Bank and others.



#### Component I: Pre-feasibility Assessment

This activities will be carried out in a consultative manner at national and local level to ensure that all critical issues and aspects of the proposed dam are duly addressed and taken into account to create an appropriate technical and economic basis for Component II Feasibility Studies. It is important to establish working relations with institutions and projects relevant to the Limpopo Climate Resilience Project, such as the Limpopo Flood Control Master Plan, LIMCOM, and National Institute for Disaster Management (INGC); Electricity of Mozambique (EDM) and others. The consultant will in particular make sure a full consistency is ensured all along the various stages of the study with the preliminary findings of the Flood Control Master Plan. Frequent meetings with the consultant in charge of the Master Plan shall be organised.

#### Sub-component Ia: Climate Change Vulnerability and Resilience Assessment

The main conceptual platform for the feasibility studies of the Mapai Dam will be reduction of the CC vulnerability and building of CC resilience of Limpopo Basin in Mozambique in line with AWF and AfDB's large engagement in CC mitigation and adaptation in Africa. The activities will include but be not limited to:

- Review climate change parameters (T°, rainfalls, ETP, floods and drought frequency),
- Build climate change scenarios for Limpopo River Basin in Mozambique,
- Qualitatively assess vulnerability of and probable effects on main activities in the Mozambican part of the river basin (agriculture, livestock, cities, etc.),
- Map most vulnerable activities,
- Review project and programmes under-going or planned in the river basin and assess to which extent they will increase the resilience of the most vulnerable activities, identify gaps and
- Propose measures to bridge the gaps.

The sub-component will provide the key framework conditions and directions for the assessment of development options and strategic decision making.

### **Sub-component I.b: Assessment of Development Opportunities**

Addressing the unavailability of water during the long dry season through water storage(s) would provide huge opportunities for socio-economic development and contribute significantly to reduction of climate change vulnerability.

- Undertake an initial identification and assessment of the development opportunities linked to water storage: flood attenuation, drought mitigation, development of irrigated agriculture, hydropower production, fisheries and fish farming, water supply, tourism; water for livestock production; and others.
- Make a rapid assessment of potential multi-purpose benefits from the dam construction in terms of poverty reduction and improved food, energy and water security that will have important climate change resilience building effects.
- Broadly assess economic spin-off effects from identified activities.
- Carry out a preliminary estimation of the water demands and allocation between the various uses.

### **Sub-component Ic: Technical, Economic, and Environmental Conditions for the Mapai Dam**

The purpose of this sub-component is to establish a sound basis for optimum design and comparison of the Mapai dam alternative against other CC resilience options.

#### **Mapping**

- Make a rapid initial mapping of the technical and economic constraints and planning conditions and associated uncertainties and risks.
- Make a field visit and rapid assessment of alternative sites based limited cross-sections and available topographical maps and aerial photography.
- Undertake minimum topographic surveys required to compare the sites;
- Based on available 1/25000 maps, map the various sites including dam site, reservoir area;

#### **Initial Geology and Geotechnical Assessment**

- Propose to ARA-Sul and conduct initial geological and geotechnical mapping and investigations for the dam sites, or other required survey and assessments in order to obtain adequate information to justify site selection and prepare broad cost estimate.
- Carry out preliminary geotechnical studies to estimate the depth and characteristics of the soil overlay and the bedrock and the depth of weathering of the bedrock at potential sites;
- Characterise the properties of the overlay to establish excavation needs and feasibility and consider geophysical test pit investigations for key sites;
- Assess the risks associated with geological and geotechnical conditions;

#### **Rapid Hydrological Assessments**

- Collect, examine, and validate rapidly all available historical hydrological information and data series of the Limpopo River;
- Provide an updated long-term runoff record;

And, for each of the selected sites:

- Make preliminary assessment of average flows and frequency and magnitude of floods;
- Assess tentatively the maximum probable flood for each of the selected sites, as well as floods of various frequency (as needed for the feasibility study);
- Conduct a preliminary assessment of water demands and water balance scenarios between the various multi-purpose uses (flood control, irrigation, hydropower,

tourism, fisheries, water supply, environmental flows) taking into account possible conflicting interests;

- Make an approximate simulation flood attenuation and hydropower production over a number of years for alternatives;
- Carry out a rapid sediment transport analysis and assess the order of magnitude implications of the effective lifetime of the dam;

#### Dam Optimisation and Cost

- Undertake supplementary studies, if required, for the appropriate site;
- Make a preliminary multi-criteria assessment of the optimum storage volume of the reservoir size in terms of flood control benefits, irrigation enhancement, hydropower production, and other multi-purpose benefits;
- Based on the anticipated optimum reservoir size, perform a preliminary comparative assessments of identified dam sites and associated dam size, configurations, and appropriate technical designs of the dam;
- Develop a pre-feasibility design (broad technical characteristics) of each site option;
- Prepare preliminary cost estimates (investment and O&M) of the site options.
- Undertake a multi-criteria comparative assessment of the alternative dam sites and recommend dam site for the feasibility studies;

#### Preliminary ESIA

- Carry out a preliminary social and environmental Impacts assessments of project alternatives in interaction with the ESIA Team under Component III;
- Make a preliminary assessment of positive and negative impacts on the management of national parks and buffer zones, resettlement issues, wildlife impacts, tourism against the negative effects of changed hydrological regime;

#### Economic and Financial Assessment

- Conduct preliminary economic and financial study and multi-purpose benefit assessments;
- Make a preliminary assessment of essential major risk factors related to environmental and social impacts, hydrology, sedimentation and sediment management, technical risks such as geotechnical conditions, and economic/financial issues;

#### Reporting

- Synthesise all findings, assessments and recommendations in a report that shall serve as a basis for: (i) assessment of options to the dam project (Sub-component Ib); and (ii) Feasibility Studies (Component II).

#### **Sub-component I.d: Assessment of Mapai Dam versus Alternative Options**

The Mapai dam is assumed to be the most efficient and effective option to address the river flow challenges (exacerbated by climate change) facing the lower reaches of Limpopo River and to support the socio-economic development of the basin. Justification of the dam as a measure for flood control, climate change adaptation and driver of socio-economic development will need to look into options for achieving flood damage reduction (multiple small dams, river training, dykes, reducing flood peaks in natural flood plains etc.) and boosting the economic potentialities listed above. These activities will include but not be limited to the following:

- In consultation with the World Bank funded Flood control master plan study team, identify options (including Mapai dam) aimed at attenuating floods, promoting climate change resilience, and boosting water related socio-economic development in Limpopo River Basin in Mozambique;

- Examine the various water related problems and development needs that the dam is going to address in order to compare the Mapai dam alternative against other options in terms of technical, economic environmental and social viability;
- Identify and discuss optional solutions to reduce flood damages, seasonal water scarcity, and develop irrigation development;
- Undertake a broad multi-criteria comparative evaluation of the dam option versus alternative solutions (e.g. many small dams, river training, embankments, dikes etc.) in terms of economic, financial, environmental, and social aspects. Also take into consideration the risks and implementation time required for the various options;
- Qualify the most appropriate solutions and associated recommendations and ensure a well justified and agreed framework for the continuation of the project.
- Prepare a summary report (with annex reports as required) with conclusions and recommendations to guide GoM’s consideration and decision making on the possible continuation of the feasibility studies (Sub-component I.c).

### **Sub-component I.e: Strategic Decision Making on Way Forward**

The findings and recommendations of the assessment of the dam versus alternative solutions will represent an important milestone of the project. The results and recommendations of Component I will be subject to further elaboration and consultations by the Project Steering Committee and relevant bodies before final endorsement and decision making by GoM involving the following alternatives: (i) go ahead with the feasibility studies (i.e. Component II-VI) of the dam option; or (ii) exit the project and recommend further actions to establish a new or re-designed project based on recommended options. The activities of the consultants shall be to facilitate the assessment and decision making process including presentations of findings, assessments and recommendations, and drafting of minutes and proceedings. This will include but not necessarily be limited to:

- Present the findings and recommendations of Component I to GoM (ARA-Sul/PT, Project Steering Committee) for review and hearing;
- Assist ARA-Sul/PT and SC in orchestrating the decision making process.

## **3.2 Component II Feasibility Studies**

The purpose of this component is to assess the feasibility of the selected option and prepare the preliminary design, outline drawings and specifications including cost estimates. The field surveys and investigations should be carried out in close consultations with relevant stakeholders and to an appropriate level of detail and accuracy. The feasibility studies will be a continuation of the activities that were performed under the pre-feasibility assessments. The Dam Safety Panel for the Mapai dam will be established as part of the project and be a focal point for reviewing and safeguarding the safety aspects of the dam designs and preparation of the operating rules and the dam safety plan.

### **Sub-component II.a Feasibility Study of the Dam**

Topographic Surveys and mapping

- Continue gathering of available topographical and thematic mapping material (paper, aerial photo, satellite, and digital) of the project related areas;
- Conduct mapping of the upstream reservoir area of provisional capacity, storage volume, expected sediments delta and a buffer zone Tentative map scale of 1:10,000 and contour interval of 2 meters (to be considered).

- Carry out topographic dam site mapping survey and prepare a dam site map with a suitable grid system, say of 50 metres interval an appropriate scale and contour interval of 0.5 metres (to be considered).
- Undertake topographic mapping of the potential construction areas. Prepare topographical maps of potential access roads, site camp, and permanent housing area and construction facilities with an appropriate scale.
- Carry out all topographic surveys required to develop a transient-flow hydraulic model of the Limpopo River from the dam site until the ocean, aimed at mapping the flood plain. A lidar map will be provided by the client (see annex 2 for geographical coverage).
- Determine location of associated infrastructures including spillway, access road, telecommunication, electricity and borrow pits location for dam construction materials,
- Determine communities' settlement areas, and infrastructure, and livelihood aspects in the project influence areas.

#### Geological, Geotechnical and Seismological Investigations

The primary purpose of geological site investigations for the Mapai dam project is to provide the information required to design a safe dam structure and to be able to estimate the costs of the dam. All geological and geotechnical tests should be in compliance with FIDIC and International Commission on Large dams (ICOLD) standards. The geological and geotechnical investigations of the dam foundation, embankment, the proposed reservoir area, and dam axis will include the activities to the extent considered necessary at feasibility level by the Consultant as suggested in the following.

- Conduct a series of geological investigations/tests, such as seismic refraction surveys, core drilling, bore-holing/logging, water leakage tests drilling, trial pits, in-situ and laboratory tests for measuring soil/rock type classification, shear stress, permeability, grouting procedures, etc.
- Drill boreholes with appropriate depth and spacing downstream of the proposed dam axis to identify possible liquefiable materials, conduct borehole logging and prepare lithological profile.
- Conduct seismology assessment of the dam site and surrounding areas for determining seismic loads for dam design.
- Perform test pit and trench excavations in the dam and reservoir areas and at potential source sites for construction materials to: (i) identify nature of soil overburden types with respect to slope stability, future foundation design and excavation works;(ii) investigate to the extent necessary the potential material sources for filter and impervious cores in embankment dams; (iii) investigate potential aggregate materials; (iv) evaluate stability of banks in the future reservoir(s); (v) assess depth of loose and weak materials to be removed at dam foundations; and (vi) allow for disturbed and undisturbed soil sampling for laboratory testing.
- Locate borrow pit and quarry areas and investigate the suitability and volume of dam construction materials such as aggregates for concrete mixes, embankment /filter/fill materials, etc.
- Prepare a Geological/Geotechnical report.

#### Hydrological Assessments

The activities will be a completion of the initial activities under the pre-feasibility assessment:

- Collect, examine, and validate complementary hydrological information and data series of the Limpopo River;
- Provide an updated long-term runoff record at the level of the dam site;
- Refine the assessment of average flows and frequency and magnitude of floods undertaken in the pre-feasibility stage;
- Confirm the design flood (maximum probable flood or other method) for the selected site, as well as floods of various frequency (peaks and hydrograms);
- Conduct a detailed assessment of water demands and water balance scenarios between the various multi-purpose uses (flood control, irrigation, hydropower, tourism, fisheries, water supply, environmental flows) taking into account possible conflicting interests;
- Route the design flood through the reservoir and simulate flood attenuation and hydropower production over a number of years for alternatives;

#### Hydraulic Modelling and Disaster Risk Assessment

- Develop a transient flow hydraulic model of the flood plain that will be handed over to ARA-Sul with the software license at the end of the study.
- Simulate, without and with the dam, three different floods including the design flood (frequency to be approved by ARA-Sul).
- Provide mapping of the flood risk with and without the dam for the three types of floods, in the most vulnerable areas.
- Simulate a dam failure and provide a risk mapping for a flood to be approved by ARA-Sul.
- If the geotechnical analysis of the reservoir bank stability shows potential risk of landslides in the reservoir, simulate the effect of a landslide downstream and in the reservoir (map the risk downstream to the dam).
- Propose adaptations of the dam and associated structure to mitigate the effect of a failure or of a landslide in the reservoir.

#### Suspended Solids and Bed-Load Sediment Transport Study

- Assess the amount of sediments, which can be expected to be accumulated in the reservoir.
- Determine the most productive areas of the basin, and prepare ToR for a study aimed at preparing a watershed management projects in priority areas;
- Assess the influence of future land use within the catchment, in order to evaluate the risks for increased sediment transport due to deforestation, increased agricultural activities etc.
- Determine the nature of the sediments that can be expected to enter the project's waterways, in order facilitate design and choice of equipment.
- Carry out a sediment transport analysis and assess the order of magnitude of the effective lifetime of the dam and assess the impact on the sediment transport along the River as well as on the coastline;
- Assess the need for and, if found necessary, determine the design of, de-sanders, in order to economically reduce the accumulation of sediments in the reservoirs and entry of sediments into the project's waterways.
- Similarly propose adaptations of the dam discharge structures and operation rules to manage the sedimentation.
- Based on the above, as well as on technical constraints, determine the optimal volume of the reservoir.

### Volume and Surface Area Curves for Reservoirs

- Update the reservoir volume analysis and surface extension as a function of water depth.
- Produce input for the power-generation benefit model for the river.
- Provide input to the environmental and social impact assessments in the form of maps of the reservoir extension, indicating inundated areas for the various potential project designs as a basis for the planning of resettlement and compensation arrangements for people living in areas that will be inundated or harmed by the new dam.

### Preliminary Designs of Dam

- Optimise the design parameters in terms of (i) Storage reservoir size; (ii) Size of flood-regulation reservoir, (iii) Spillway capacity; (iv) Dam height, slopes and other key dam data; (v) Design head; (vi) Design discharge; (vii) Tunnel and gate sizes; (viii) Type and number of turbines.
- Design of spillway and other critical dam elements based on the optimal solution in terms of construction and operation.
- Provide a complete preliminary design of the dam, the hydraulic structures, and associated electromechanical systems.

### Preliminary assessment of needed Access Roads and Other Infrastructure

- Assess the needs for roads and other infrastructures related to the building and construction of the dam to make preliminary cost estimates for the economic evaluation.
- Analyse the traffic conditions, carrying capacity and available materials.
- Locate and prepare preliminary designs of the required drainage system, culverts and other structures.
- Prepare plan/profile drawings, illustrating the horizontal and vertical alignment and describe typical cross sections and road-construction principles.
- Identify and design river crossings (preliminary design).

### Temporary Structures during Construction

- Prepare preliminary design of the diversion arrangement i.e. dimensions of bypass tunnel/canal, and height of coffer-dams. The use of a diversion tunnel as a future bottom outlet or by-pass should be considered.
- Prepare design of the temporary power supply system to cover the needs during construction.
- Identify, and map construction camp sites and associated temporary facilities needed during the construction period. In spite of their temporary nature, these sites cause such significant impacts in regards to the ESIA studies.

### Hydrological monitoring and early warning systems

Functioning flood forecasting and early warning system are fundamental for effective actions to reduce the damages caused by extreme flood and optimise dams operation. The consultants shall engage with projects supported by WMO under the LIMCOM Strategic Plan and FAO Global Information and Early Warning System.

- Identify the needs for enhanced real time hydrological monitoring and early warning systems in cooperation with LIMCOM.
- Assess the existing early warning (including telemetric) system in the river and interact with the ongoing early warning projects supported by WMO, FAO and others.

- Prepare a preliminary design of the system (focusing on the dam operation), including mapping of complementary hydro-meteorological station needed and interlinks with the existing and planned warning systems.

#### Operating Rules and Dam Safety Plan

Efficient, timely, and coordinated operation of the dam is required to manage water effectively, ensure the safety of the dam, and to achieve the benefits for which the dam was designed while paying attention to economic and social responsibilities and environmental restrictions. Effective and timely decision making will require agreed driving rules and lines of responsibility through the Operating Rules. A Dam Safety Panel for the Mapai dam will be established as part of the project and be a focal point for the preparation of the operating rules and the dam safety plan. The consultancy activities will be as follows.

- Analyse the most appropriate combination of reservoir management actions under different flood scenarios, including (i) required safety level of respective areas; (ii) optimum combination of flood management infrastructures including the Massingir dam.
- Analyse the most appropriate combination of reservoir management actions under different hydrological year scenarios (at least three scenario, to be priorly approved by ARA-Sul).
- Prepare Operating Rules and associated Decision Support Systems (DSS) that clearly regulates actions and responsibilities for the Mapai dam to enable effective management of the water resources under unpredictable and variable hydrological conditions, or disastrous situations. The Rules shall be applicable to reservoir operations under “normal” and “extreme” situations, taking into consideration the different operating objectives of the economic sectors linked to the dam operations.
- Facilitate the review, finalisation, and approval of the Operating Rules and the dam safety plan between GoM ministries and different interest groups.
- The consultant shall in consultation with the Dam Safety Panel:
  - Prepare a Dam Safety Plan covering all aspects in the dam safety safeguard policy according to applicable international and national rules and directives.
  - Prepare a preliminary Operation and Maintenance (O&M) Plan including the first impoundment and dam safety inspection procedures.

#### **Sub-component II.b Feasibility of Hydropower Development**

Hydropower development (estimated to 40 MW in case of the Mapai dam) will be a significant contributor to the economic viability of the dam and the task of the consultant will be to establish the feasibility of inclusion of a hydropower station connected to the new sub-station in Mapai (or elsewhere).

#### Feasibility of Hydropower Production

- In cooperation with EDM, review the new electrification master plan for the region including rural electrification and map out the roles and opportunities for the proposed Mapai hydropower station.
- Propose and agreed on framework design specifications and parameters to ensure incorporation of the Mapai hydropower station in the rural electrification programme and the national electricity development plans.
- Undertake preliminary design of intake and water conveyance system considering advantages and disadvantages in costs, and construction time.
- Undertake feasibility outline design of all electro-mechanical equipment and works to establish cost estimates for the scheme.

- Evaluate and recommended turbines in terms of type and number preliminary design level specifications and tentative integration in the hydropower plant design.
- Prepare preliminary design and cost estimates for the entire hydropower plant.
- Carry out energy- generation modelling and optimisation exercise.

#### Surveys for Electrical Power Transmission and Distribution

- Map out and conclude the most viable alternative for connecting the projects to the Mapai sub-station.
- Carry out the necessary supplementary topographic and geotechnical survey of the transmission line alignments for the site of the up-coming Mapai sub-station.
- Perform necessary supplementary site investigations for design of the transmission line as required.

#### Contribution to Rural Electrification

- Review the EDM rural electrification Master Plan and assess the opportunities of how the Mapai dam project may contribute to rural electrification and economic development.
- Analyse gender and social equity issues and propose actions to effectively integrate these concerns in the proposed development activities.

### **Sub-component II.c Feasibility Study of Other Multi-purpose Development Options**

The purpose of this activity is to make rapid assessments of the feasibility of promoting other multi-purpose development opportunities that can benefit from the Mapai dam including tentative cost estimates and income potential for the identified sector interventions as inputs the overall multi-purpose benefit analysis. These multi-purpose development opportunities are closely related to the environmental and social studies and that will require close cooperation and information exchange with Component III ESIA. The key activities will address: (i) Irrigation, (ii) Fisheries and Fish Farming; (iii) Community Water Supply Development; (iv) Development of Tourism; (v) Water for Livestock Production; and (vi) Other Multi-purpose Benefits.

#### Irrigation potential

Make a rapid assessment of the irrigation potential related to the dam in order to establish a tentative basis for and input to the overall multi-purpose benefits assessments. Detailed irrigation development studies and preliminary plans will be addressed under Component IV of the project.

#### Fisheries and Fish Farming

This activity will address the fisheries and fish farming development opportunities associated with the Mapai dam reservoir and will be interacting with the fisheries thematic study of the ESIA. Fisheries and fish farming in reservoirs have developed as a viable economic activity in many reservoirs in southern Mozambique, such as Massingir and Corumana dams that contributes to improved livelihood and food security in the communities. For example, the Massingir Dam provides employment opportunity to about 550 fishermen with an average annual catch of 3,350 tons. Such activities contribute to improved livelihood and food security in the adjacent communities. The activities will i.a. include:

- Carry out an assessment of the general fisheries and fish farming potential, opportunities, and constraints of the proposed Mapai dam;
- Examine the environmental and social impacts of various development options;
- Explore the interest and potential among local fishermen and organisations for future development of fisheries and fish farming in the reservoir;

- Estimate the economic and financial volume and viability of such economic activities;
- Define the necessary support measures (extension, agro-processing, credit, etc.), the institutional framework for these measures, and their cost;
- Assess possible revenue collection and fair tariff structures for this sector's contribution to the O&M of the dam;
- Provide economic and financial information inputs to the overall multi-purpose benefit analysis of the Mapai dam.

#### Community Water Supply Development

This will imply an initial assessment at reconnaissance level of the rural and urban water supply options generated from the dam. The consultancy will include but not necessarily limited to the following.

- Carry out a rapid reconnaissance review of water supply situation (number of people concerned) and water resources needs in areas that potentially may benefit from the dam.
- Carry out overall assessment of the order of magnitude of possible multi-purpose benefits as inputs to the overall modelling.

#### Development of Tourism

Gaza Province has especially good eco-tourism potential, especially due to the scenic landscape and wildlife attractions of the area which borders the Limpopo National Park. The tourism opportunities related to the dam, the river itself and the adjacent national park need to be explored and quantified in close cooperation with Ministry of Tourism, the Limpopo National Park Administration, and local stakeholders. The possible negative impacts of the dam on the tourism will be assessed by the ESIA Consultant. The scope of activities will include but not necessarily limited to:

- Analyse in consultation with the ESIA study team the opportunities and potential for improved tourism attributed to the Mapai dam.
- Assess and quantify the potential of enhanced tourism related to the Mapai dam, especially in the Middle-Lower Limpopo basin, and provide economic input to the joint multi-purpose benefit assessment connected to the Mapai dam.
- Define support measures to develop eco-tourism, their institutional framework and cost.

#### Water for Livestock Production

Livestock production is widespread in the Mapai dam region, but its further development is hampered by insufficient and unreliable supplies of water and livestock watering facilities. The Mapai dam project may contribute enhanced livestock production as an important economic activity and food security element in the adjacent districts by providing water all along the year in the River. The consultant shall engage with and benefit from the findings of the ESIA/thematic studies Component III. The scope of activities will include but not necessarily limited to:

- Undertake a reconnaissance survey of the existing livestock production systems;
- Assess the potential and constraints of increased water from the dam or via the downstream reaches of the river and examine associated and constraints;
- Prepare cost estimates and economic analysis inputs to the overall multi-purpose benefits analysis of the Mapai dam project.

### Other Multi-purpose and Multiplier Benefits

This task is to identify and evaluate other multi-purpose or notable multiplier effects of the dam. The on-going rehabilitation of the main road from Chokwe to Mapai (some 250 km) will improve the accessibility to the dam. One benefit provided by the dam project that will be subject to further assessment, is the opportunities provided by improved all-season river crossing enabled by the dam itself and the regulated down-stream river flow. Other benefits may be related to improved forestation and forestry management.

- Identify, analyse and evaluate other potential multi-purpose benefits of the Mapai dam project, such as forestry management and reforestation, improved river crossing opportunities provided by the dam;
- Identify and analyse multiplier effects such as work opportunities, associated service delivery, etc.
- Provide technical and economic information and assessment of the above for inclusion in the multi-purpose benefit analysis.

### **Sub-component II.d Detailed Climate Change Evaluation and Climate Change Risk Management and Adaptation Plan**

The AfDB is currently rolling out a Climate Safeguard System (CSS) as a set of decision-making tools and guides that enable the screening of projects in vulnerable sectors for climate change risks and to identify appropriate adaptation measures to reduce vulnerability. As a result of the nature of the project, a preliminary assessment has classified the Mapai Dam as a development which may be very vulnerable to climate risk (Category 1). This requires a detailed evaluation of climate change risks and adaptation measures, and the development of comprehensive risk management and adaptation measures which are to be integrated into the project design and implementation plans. The scope of activities will include a detailed evaluation of climate change risks associated with the proposed Mapai dam investment project described in the following:

- Carry out a review of available climate change policies, assessments and related projects in Mozambique and identify critical knowledge gaps and uncertainties;
- Conduct analysis based on available information and confirm the initial CSS screening classification;
- Carry out a climate change and variability assessment, with a particular focus on (i) temperature, (ii) evapotranspiration, (iii) precipitation, (iv) the hydrological regime and (v) the incidents of extreme weather events;
- Prepare and select probable scenarios;
- Undertake hydrological modelling to determine changes to the flood regime and dam inflow caused by climate change;
- Estimate impacts and risks on the viability of the Mapai Dam, including (but not limited to): (i) reduced inflows; (ii) higher reservoir evaporation; (iii) infrastructure damage due to changing flood regimes; (iv) changes to water borne diseases; (v) risks of eutrophication and salinization; (vi) risks to increased siltation;
- Estimate impacts of climate change on flood and drought in the catchment area downstream; and
- Identify and discuss potential impacts of climate change on beneficial uses of water from the dam, including potential increase failure to meet design specifications (irrigation, hydropower, flood control, etc.);
- Estimate the additional costs for required infrastructure adjustments to manage climate change related risks;

- Estimate potential amounts of GHG emissions from the proposed reservoir, and the amount of GHG emission offset through the generation of energy from renewable resources;
- Advise the government on possible alternative financing possibilities from dedicated climate change mitigation funds;
- Prepare a climate risk management and adaptation plan related to both design and operation and an Adaptation Evaluation Report.

### **Sub-component II.e Financial and Economic Analysis**

The construction and future operation of the Mapai dam will require substantial structural and non-structural investments and related O&M. The cost estimates shall establish the overall costs of the entire Mapai project and the multi-purpose benefit components and present the economic viability of the project in standard economic terms (economic prices). This will involve development of multi-purpose economic benefit models and analysis to establish the attractiveness of the respective multi-purpose functions as a basis for the projected economic and financial performance and the financial mobilisation plan. The economic merit of the Mapai dam project will have bearings on the socio-economic development of the Limpopo River Basin in Mozambique and its contributions to the local, provincial and national economy. This sub-component will include but not limited to the following activities.

#### **Cost Estimates**

The cost estimates will be at feasibility level detail level, both in financial and economic prices. The general considerations to be taken into account for the cost estimates are the following: (i) Breakdown of costs into local and foreign components; (ii) Estimation of price contingencies and price escalation; (iii) Inclusion of taxes and duties, if applicable; (iv) Explore the possibilities for inclusion of certified CO<sub>2</sub> credits as part of the revenues of the dam. The consultant will:

- Develop/adapt methodologies and models for economic and multi-purpose economic benefit assessments.
- Estimate costs for all project components, engineering services, physical contingencies, administration, and project management. The consultant shall establish the bills of quantities and costs of each item/component based on international competitive-bidding prices for recently completed similar projects.
- Estimate the cost of environmental mitigation measures and land acquisition, compensation and resettlement (input from Component III).
- Estimate operation and maintenance (O&M) costs for the dam and identified multi-purpose investments.

#### **Multi-purpose Economic Benefit Optimisation**

The Consultant shall create a basis for economic optimisation of the dam operations taking into account the different (and partly conflicting) multi-purpose interests. In this regard, the major contradicting interests are the need (i) to keep the stored water in the reservoir as low as possible to absorb possible extreme floods, (ii) to keep the water reserves as high as possible to ensure water security for hydropower production, irrigation water supply and other dry season water needs, (iii) to maintain as stable as possible the water level for touristic activities and landscape reasons. There may also be needs to release water for artificial floods to ensure annual flood plain inundation. The multi-purpose interest analysis will be a combined assessment involving economic, social and environmental concerns. The task will include but not necessarily be limited to:

- Propose suitable analytical tools and approaches for evaluation of direct economic impacts of the Mapai dam project in terms of additional output of the identified multi-purpose benefits e.g. agricultural commodities, hydropower, navigation, fishing, tourism, prevention of droughts and reduction in flood damages.
- Propose suitable analytical tools and approaches for evaluation of indirect economic impacts (multiplier effects) as a result of for example increase in the demand for inputs from other services and sectors, and due to increased consumption arising as a result of increase in incomes and wages generated by the direct outputs of the dam.
- Obtain appropriate economic inputs on investment costs, annual O&M costs and annual revenues/benefits from the various multi-purpose beneficiaries.
- Establish hydrological-economic models to analyse and optimise the individual and collective economic direct and indirect impacts as net multi-purpose annual benefits (EUR/year). This model shall include on a decade or monthly basis, the simulation of the reservoir level, water uses abstractions along the river, direct and indirect benefits, both in financial and economic terms.
- Evaluate the economic viability and direct and indirect (multiplier) economic impacts of the predicted multi-purpose benefits in terms of agricultural production, hydropower production, fisheries, tourism, drought mitigation, reduction of flood damages, and others.
- Analyse and synthesise the multi-purpose benefits in sufficient detail to satisfy the information and documentation requirements of the major lending agencies, private investors, and political decision makers.
- Validate the realism of the chosen project viability scenarios in the financial analysis, and conduct sensitivity assessments by applying optimistic, average and pessimistic hypotheses and assumptions using reasonable uncertainties affecting the main parameters.
- Present a summary report on the findings of the multi-purpose benefit optimisation analysis.

#### Economic Analysis

- Evaluate the overall economic viability of the dam construction including each of the multi-purpose activities in standard economic terms.
- The Consultant shall undertake a sensitivity analysis and assess the impact of the variation of main hypothesis (cost, agricultural yield, electricity price, etc.) on the main economic indicators (IRR, NPV, etc.).

#### **Sub-component II.f: Local Benefit Sharing**

This section will focus on how the benefits potentially generated by Mapai dam can be shared with the local populations. According to the World Bank, local benefit sharing is a promising approach for implementing hydropower projects sustainably as a supplement to the requirements of compensation and mitigation. Such approach is also highly applicable to dam projects that provide a broader spectre of multi-purpose benefits. For local benefit sharing mechanisms to work, the key enabling conditions are government policies, the legal and regulatory framework, corporate social responsibility strategies of development companies, and the capacity of local communities. Stakeholder engagement is essential in initiating and designing benefit sharing programs.

- Identify opportunities for local benefit sharing both monetary opportunities (cash sharing) and non-monetary (e.g. social uplift programs, support for health and education and job opportunities, in particular labor intensive works).

- Propose, assess, and recommend appropriate benefit sharing arrangements to ensure that the future multi-purpose economic and other benefits are equitably shared with the local communities including clear objectives and carefully defined target populations, including women.
- Address constraints related to effective implementation of benefit sharing arrangements, such as technical-economic, environmental, social, legal, regulatory, and political issues.
- Design a benefit sharing program, with a gender component, and propose implementation arrangements.

## 4. EXPERTISE REQUIRED

### 4.1 Consultancy Team

The Consultant shall provide a broad range of expertise as indicated in the table below, and the team should preferably have a balanced composition of local and international experts. T.

### 4.2 Qualification and Responsibilities of Team Members

The consultant shall make available personnel with the qualifications and experience necessary to perform project tasks to a high standard necessary for the completion of each project component and the entire assignment. The individual qualifications and tentative responsibilities of each consultancy team member are presented in the following. The Consultant can propose a single expert for several positions if h/she has the relevant qualification and experience.

#### **Team Leader IWRM Specialist**

Qualifications: The Team Leader shall be a professional engineer with proven experience IWRM in international river basins that include large (preferable multi-purpose) dams and be familiar with large dam design, planning and construction disciplines. S/he shall have a minimum MSc degree qualification and a minimum of twenty (20) years overall experience and fifteen years (15) years relevant experience on similar dam design projects and proven experience in leading multidisciplinary teams and/or team leader for externally financed projects preferably in developing countries. Fluent in written and spoken English and an ability to draft concise reports; good communication skills; excellent computer skills, working experience with project management systems are essential. The TL should preferably be conversant with Portuguese at working level.

Responsibilities: The Team Leader Dam Specialist will be responsible for the overall management and coordination of the overall assignment and cooperate closely with ARA-Sul/PT that will include but not necessarily limited to: (i) Manage, coordinate, and ensure quality assurance and timely delivery of all sub-packages of the assignment; (ii) Manage the relationship with ARA-Sul/PT, and the overseeing bodies of the project; (iii) Supervise and guide the individual specialists and ensure that the different experts are coherently engaged in project activities to collectively deliver the required services and outputs; (iv) Lead and coordinate the implementation of A.1 Sub-Package A.1: Initial Mapping and Dam Development Options and Sub-Package A.2: Feasibility Study of the Dam; (v) Manage the procurement of project related third party services and project related equipment; and (vi) Take a lead in the preparation and submission of reports and outputs of the assignment.

### **Dam Civil Engineer and Deputy TL**

Qualifications: The Dam Civil Engineer shall be a professional engineer with proven experience in large dam design, planning and construction disciplines. S/he shall have an MSc in Civil Engineering or equivalent and a minimum of 15 years overall experience and 10 years relevant experience on similar dam design projects in developing countries.

### **Hydrologist and CC Expert**

Qualifications: The Hydrologist shall be a professional with proven experience in hydrological data analysis and modelling in connection with river basin management and dam designs in developing countries. H/She shall also have proven track record in (i) climate change modelling and scenario building, and (ii) climate change impacts on river basins and associated economic activities and large-scale infrastructure, including dams. The hydrologist and CC Expert shall also have experience in hydrological and flood modelling related to the multi-purpose benefit assessments in cooperation with the economist.

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of fifteen (15) years overall experience and ten years (10) years relevant experience.

### **Hydro-morphodynamic Engineer**

Qualifications: The Expert shall have documented experience in the field of hydro-morphodynamic and experience in from similar large projects. S/he shall have a minimum BSc degree/Advanced Diploma qualification and have a minimum of 8 years overall experience and 5 years relevant GIS experience in similar assignments.

### **GIS Mapping Expert**

Qualifications: The Expert shall have documented experience in GIS based topographical and thematic mapping digital thematic and experience in from similar large projects. S/he shall have a minimum BSc degree/Advanced Diploma qualification in GIS and have a minimum of 8 years overall experience and 5 years relevant GIS experience in similar assignments.

### **Geologist**

Qualifications: The Geologist shall be a professional engineer with proven experience in the planning and design of big dams geotechnical investigation works and safety analysis. S/he shall have a minimum MSc degree qualification in a relevant field and will have a minimum of 20 years overall experience and 15 years relevant experience,

### **Geotechnical Engineer**

Qualifications: The Geotechnical Engineer will possess a Master degree in Geotechnical subjects and proven experience in geotechnical investigations and analysis including safety aspects in the context of planning and design of big dams. S/he shall have a minimum MSc degree qualification in a relevant field as well as post graduate qualifications in water dam design. Shall have a minimum of fifteen (15) years overall experience and seven years (10) years relevant experience including surface exploration of physical conditions of sites, geophysical methods, and sub-surface investigations.

### **Electromechanical Engineer**

Qualifications: The Expert shall have documented experience in electromechanical subjects and experience in from similar large projects. S/he shall have a minimum BSc

degree/Advanced Diploma qualification and have a minimum of 8 years overall experience and 5 years relevant GIS experience in similar assignments.

### **Hydro-mechanical Engineer**

Qualifications: S/he shall be a professional hydro-mechanical engineer with proven experience in hydropower design and planning assessments in developing countries. The engineer shall have a minimum BSc degree qualification in a relevant field as well as post graduate qualifications in demand assessment and development of water utility services. S/he shall have a minimum of fifteen (15) years overall experience and seven years (7) years relevant experience.

### **Power Engineer Hydropower**

Qualifications: The Hydropower engineer must have a proven experience in design and assessment of hydropower plants and associated infrastructure related to large dam projects. He or she will have a minimum MSc degree qualification in hydro-power engineering and minimum of 15 years overall experience from road design and construction and 10 years relevant experience from similar projects.

### **Power Engineer Transmission**

Qualifications: The Power transmission engineer must have a proven experience in design, O&M and assessment of transmission systems and associated sub-stations and infrastructure related to large dam projects. He or she will have a minimum MSc degree qualification in road engineering and minimum of 10 years overall experience from transmission system design and construction and 5 years relevant experience from similar projects.

### **Road Engineer**

Qualifications: The Road Engineer must have a proven experience in design and assessment of road-works related to large dam projects. S/he will have a minimum BSc degree qualification in road engineering and minimum of 10 years overall experience from road design and construction and 5 years relevant experience from similar projects.

### **Economist/Financial Expert**

Qualifications: The Economist shall have a minimum MA degree qualification in economy – as well as relevant post graduate qualifications. The Economist shall have a minimum of fifteen (15) years overall experience and seven years (7) years relevant experience. S/he shall have proven experience in the economic analysis related to construction of large multi-purpose schemes and, cost benefit analysis, and multi-purpose benefit modelling of water projects including economic benefits attributed to irrigation development, tourism, water supply for municipal and economic use.

### **Hydraulic Engineer**

Qualifications: The Hydraulic/ Engineer will possess a Master degree in hydraulics and proven experience in flow mechanics and hydraulic modelling and analysis in the context of planning and design of big dams. S/he shall have a minimum of 10 years overall experience and 5 years relevant experience from similar projects.

### **Flood Management Specialist**

Qualifications: The Flood Management Specialist will possess a Master degree in hydraulics, civil engineering or any relevant discipline and proven experience in big flood management

projects. S/he shall have a minimum of 10 years overall experience and 5 years relevant experience from similar projects.

#### **Fisheries Expert**

Qualifications: The Fisheries Expert will possess at least a Master degree in Fisheries or any relevant discipline and proven experience in feasibility studies in Africa. S/he shall have a minimum of 10 years overall experience and 5 years relevant experience from similar projects.

#### **Tourism Expert**

Qualifications: The Tourism Expert will possess at least a Master degree in Tourism Development or any relevant discipline and proven experience in feasibility studies in Africa. S/he shall have a minimum of 10 years overall experience and 5 years relevant experience from tourism development projects, preferably regarding eco-tourism.

## **5. ASSIGNMENT IMPLEMENTATION AND OVERSEEING ARRANGMENTS**

### **5.1 Implementation Arrangements**

#### **Facilities, Equipment and Data Provided by the Consultant**

The Consultant shall provide office facilities and all necessary transport and equipment it deems necessary to undertake the assignment. The Consultant shall supply its own computing equipment and basic software.

#### **Inputs Provided by the Client**

At the commencement of the assignment Client will make available to the Consultant all data, information, and reports in their possession which are deemed necessary for the assignment. Consultant will also need to get with the support of the Client other reports from relevant institutions. .

### **5.2 Project Steering and Monitoring Arrangements**

#### **Steering Committee and Technical Advisory Committee**

The Government of the Mozambique represented by the Ministry of Planning and Development (MPD) will govern and coordinate the funding aspects of the study and ARA-Sul will be the Implementing Agency. The GoM will establish a Study Steering Committee, consisting of representatives from the concerned ministries and key stakeholders, and Chaired by the National Director of Water. A Technical Committee, chaired by the Director of ARA-Sul and composed of representatives from the stakeholders, provincial administration and from qualified national experts from universities and research institutes will be in charge of advising the Steering Committee and reviewing the study deliverables and supervise the overall consultancy process and other technical and administrative matters.

#### **Dam Safety Panel of Experts**

In compliance with Dam Safety requirement OP.4.37, GoM will establish a Panel of Experts for dam safety comprising three experts, i.e. Dam (civil) engineer, Geotechnical specialist, and Hydrologist, independent from this consultancy. The Panel of Experts will have the

responsibility of providing oversight and guidance for this consultancy as defined in a separate ToR. The Panel of Experts will provide independent technical review and guidance for technical matters related to this assignment on behalf of the client in this assignment. However, the consultant should follow other legal requirements for the outputs to be cleared with regulatory authorities (environmental and social issues).

### **5.3 Consultative Meetings and Workshops**

There will be three main stakeholders' Consultative Meetings/Workshops with appropriate authorities, stakeholders, and committees called and organised by ARA-Sul/PT who will meet all costs of hosting meetings and workshops. A plan for necessary consultative meetings during project implementation will be prepared in the Inception Report. The main envisaged workshops are:

1. Workshop to present and discuss the results and recommendations of the Draft Feasibility Study report.
2. End of Assignment Workshop.

The Consultant and ARA-Sul/PT shall prepare and agree on the workshop format and the Consultant shall:

- Prepare and distribute workshop papers for use by the participants.
- Prepare sufficient copies of the workshop papers for each attendee and official copies.
- Workshop materials must be in both English and Portuguese to allow all participants understand and contribute to the project.

At the conclusion of the workshop, the Consultant shall compile and submit the proceedings of the workshop to the ARA-Sul/PT for further processing and distribution.

In addition, the Consultant shall propose in its methodology the modalities of the field consultation with local stakeholders.

## **6. DURATION OF THE STUDY AND REPORTING SCHEDULE**

The study duration is 22 months, including 3 months for the decision making phase at the end of component I. The Consultant may propose and justify a different duration in its technical offer.

Consultant will prepare and submit the following tentative list of reports and notes to be produced to the satisfaction of the ARA-Sul/PT, GoM and AWF-AfDB. In addition to the Main reports and annexes under each Sub-Package.

The consultant will submit Quarterly Progress Reports (QPR) that will summarise progress made over the covered period for each of the project activities. These reports should identify any mayor issue or constraint that has arisen during the reporting period and is having a negative impact on project progress. The report should then recommend means to resolve these constraints in a timely fashion. Issues that have not been successfully resolved or pending issues should be highlighted for the attention of senior management. To simplify the preparation of these reports a standardized template with charts and table should be used.



**ANNEX 7: TENTATIVE TOR ENVIRONMENTAL IMPACT ASSESSMENT**

**TERMS OF REFERENCE**

**FEASIBILITY STUDIES FOR BUILDING CLIMATE RESILIENCE OF  
LIMPOPO BASIN IN MOZAMBIQUE**

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT  
AND ENVIRONMENTAL, SOCIAL MANAGEMENT PLAN, AND  
RESETTLEMENT ACTION PLAN**

Revised Draft July 2014  
TERMS OF REFERENCE

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# 1. PROJECT BACKGROUND

## 1.1 Introduction

The Limpopo River Basin has a total catchment area of approximately 408 000 km<sup>2</sup> (basin map presented in Annex 1). The entire basin presently comprises a population of about 17 million inhabitants and is projected to increase to almost 23 million by 2040. The population of the Mozambican part of the basin totals 572,000 people (32,000 in the Middle-Lower and 540,000 in the Lower Limpopo). The catchment characteristics of the Limpopo River Basin are very diverse, covering different climatic and topographic zones as well as land use types, including protected areas, such as the Greater Limpopo Trans-frontier Conservation Area. Levels of social and economic development across the basin are also highly diverse as the Limpopo Basin countries exhibit considerable macro-economic variability, with the per capita Gross Domestic Product (GDP) for Zimbabwe, South Africa, and Botswana being 3, 13, and 16 times higher respectively compared to Mozambique .

As the lower end riparian country of the Limpopo river basin, Mozambique is facing severe challenges due to intensive water development and water-use upstream combined with hydrological variations exacerbated by climate change. This has resulted in significantly reduced dry season flows into Mozambique so that the river sometimes remains dry for a period of up to 8 months in a year. The lower reaches of the river are also prone to highly devastating floods that damage infrastructure and undermine the livelihood of the riverine populations.

These severe floods have sparked off flood response investment programs to restore damaged infrastructure supported by the World Bank and African Development Bank in association with other multi- and bilateral funding agencies. The World Bank fielded a mission to Mozambique to carry out flood assessments and response scoping, in close collaboration with GoM, the UN organisations and other development partners, following the floods of January 2013. The objectives were inter alia to: i) contribute to the preliminary assessment of the extent of the flooding, its impact on the population and the response to date, based on existing rapid assessments; ii) develop and agree with GoM and key development partners on the next steps for flood recovery and long-term disaster resilience; and, iii) identify the availability of financial support to the flood response. The Mapai dam located on the main stem of the Limpopo River was among the identified longer term needs for large investments. The Government has paid ample attention to the construction of the Mapai dam on the main stem of the Limpopo River to strengthen the resilience of the lower Limpopo population against climate change and hydrological extremes. The Government has therefore given high priority to speeding up feasibility studies concerning the Mapai dam project and associated interventions.

The idea of constructing the Mapai dam was conceived in the 70s and followed up in the 80s in response to the emerging needs for flood control and increased dry season river flows. The proposed Mapai dam (map Annex 1) would be located about 80 km from the Pafuri border between Mozambique and South Africa and about 240 km north of Chokwe. The proposed dam would have a height of 52 m, a total storage capacity in the order of 6.4 billion m<sup>3</sup> and an estimated hydropower potential of 40 MW. Other key information about the dam is presented in Annex 5. The appraisal team has noted that the initial studies of the Mapai

Dam were technically incomplete and outdated. The framework conditions (hydrological conditions, development situation in the lower Limpopo, upstream countries interventions, multi-purpose approach, social and environmental safeguarding requirements, national park concerns, etc.) have changed considerably. The need for an up-to-date and modernised conceptual platform has therefore been taken into account in the scoping of the feasibility study by introducing an initial assessment phase before embarking on the more detailed investigations and in-depth studies. It is indeed necessary to check that Mapai Dam is the best option to mitigate climate change and natural climate variability.

The project will also pay ample attention to social and environmental safeguarding according to applicable national and international standards. Some specific points of concern are the resettlement issues, the need to ensure local sharing of multi-purpose benefits created by the dam, and to ensure equitable land management and avoid “land grabbing” issues related to irrigated agriculture development, and also address gender equality and social equity concerns.

The feasibility study project will build on the previous and on-going studies, such as the EU financed flood study following the floods of 2000, the Limpopo Basin Monograph being financed by GIZ, the AfDB PPCR program, and the USAID financed RESLIM Program. Based on existing hydrodynamic models of the river system, the feasibility study will evaluate a range of potential flood management options and provide assessments for identified structural interventions to define an optimal solution to improving flood prevention, mitigation and management.

## **1.2 Problem Definition**

### **1.2.1 Disaster Risk Management**

The lower reaches of Limpopo are extremely vulnerable to disasters related to natural hydrological variations increased by climate change effects and these areas are stricken by frequent flooding causing major damages. These extreme and highly devastating floods destroy infrastructures and livelihoods of the riverine populations in the Mozambican parts of the river. The January 2013 flood caused the death of 40 people, displaced more than 170 000 inhabitants, and badly damaged roads, irrigation schemes and crops. According to UNICEF some 250,000 people were affected by the floods in Mozambique in 2013 . Chokwe was one of the hardest-hit districts, but also communities in the Mid-Lower Limpopo were seriously impacted by the flood. According to the World Bank post-flood mission, damages were estimated to be in the order of USD 250 million. In an earlier major flood that occurred in 2000, about 700 people lost their lives, and the flood damaged roads, irrigations schemes, crops and the Chokwe and Xai-Xai Cities.

### **1.2.2 Climate Change Vulnerability and Adaptation**

Mozambique remains extremely vulnerable to climate variability and change. Droughts, severe flooding, and coastal storms are increasing in frequency and severity. This has affected the country’s economic performance. Increased variability of weather and climate patterns could slow and even reverse the progress made on poverty reduction in recent years in Mozambique. While uncertainties remain, it seems likely that climate and weather variability will increase exerting important impacts on the water sector and related livelihoods. Economic development in the upstream portions of the international basin may further increase the variability of surface water flows and could seriously reduce overall cross-border water volumes. In addition inter-annual variability was predicted to increase dramatically, suggesting extreme weather events such as droughts and floods may become more frequent.

The future temperature of Mozambique is predicted to increase by 1°C to 2°C by 2015, while the seasonal variability is narrowing as the average minimum temperature has increased, which combined may lead to greatly increased potential evapotranspiration year round. At the same time, precipitations are likely to become increasingly variable and uncertain.

### **1.2.3 Food Insecurity**

In 2013, the food security of most rural households across Mozambique was considered to be relatively favourable. Food is generally available, markets are adequately supplied, and prices are generally affordable. There are pockets of stressed food insecurity in need of emergency food assistance to meet peoples' basic dietary requirements in parts of southern and central Mozambique, especially Gaza Province was affected by production shortfalls last season and recent floods . The district town of Chókwe, a centre for employment, agricultural processing and trade also supports Mozambique's largest irrigation schemes (47,700 ha), on what is perhaps the most productive farmland in the country. Despite the great food production potential of the Gaza Province, the province is extremely vulnerable to natural disasters such as floods and drought aggravated by the threat of poverty and food insecurity . The outcomes of this project would therefore be to pave the way for highly relevant investments to boost the national food production and alleviate the periodic food insecurity at local level in the province.

### **1.2.4 Energy Insecurity and Climate Change Mitigation**

Mozambique is well endowed with energy resources, ranging from fossil fuels (natural gas and coal) to renewable resources (solar, hydro, wind, geothermal and tidal sources of power). However, the exploitation of these resources for national use is limited because they are unevenly distributed around the country, and access rate remains low. The extension of the electricity grid along the Limpopo River will benefit the electricity supply for the lower and mid-lower Limpopo area. According to EDM, the Mapai dam hydropower scheme would be connected to the national grid via the new sub-station in Mapai and contribute to the electricity security at regional and national levels. The hydropower scheme would also contribute to climate change mitigation by substituting electricity produced (some 40 MW) from fossil fuels thus reducing carbon emissions to the atmosphere. This would also provide a basis for earning verified carbon benefits.

### **1.2.5 Gaza the 4th Poorest Province in the Country**

Gaza Province, with a population of about 1.4 million people, is the 4th poorest province in the country. Agriculture is the main activity in the Province and accounts for 90% of all economic activity The Province needs considerable investments in infrastructure assets to spur economic activities for sustainable development and reduce poverty. In this respect, the Limpopo Climate Resilience project would provide significant multiple opportunities as elaborated in this appraisal report.

### **1.2.6 Environmental and Social Issues**

The project may exert significant environmental and social (E&S) impacts if not adequately addressed. The proposed site for the dam and reservoir is located in the buffer zone of the Limpopo National Park. The Limpopo River Basin includes sensitive ecosystems and there is a high socio-economic dependence by riparian citizens on these ecosystems including important nature reserves such as those that form the Greater Limpopo Trans-frontier Conservation Area that includes the Kruger National Park. This makes the project sensitive

from a wildlife and ecological perspective. The environmental and social impact studies and establishment of associated action plans and mitigation measures will apply the appropriate procedures and approaches used by the multi-lateral development banks in close cooperation with MICOA and other relevant authorities. The project will address and safeguard a broad range of environmental and social impacts caused by the dam that will alter the natural distribution and timing of the stream flow: (i) Physical, chemical, and geomorphological consequences; (ii) Impacts on the biological environment (flora, wildlife, ecosystem and biodiversity); (iii) Cumulative impacts such as the impacts of other dams and associated infrastructure upstream and downstream; (iii) Involuntary physical and economic resettlement; (iv) Socio-economic activities downstream (agriculture, fishing) and reduce access to natural resources; (v) Impact on human health; (vi) Impact on archaeology and cultural heritage; (vi) Risk of damage on cultural resources; and (vii) Other positive/negative impacts on the human environment.

#### 1.2.7 Implementation Partnership and Financing Arrangements

An important part of the feasibility study will be to pave the way for timely financing and implementation of the Limpopo Climate Resilience project by engaging with different funding partners including private investors. Some project components may be suitable for Public-Private Partnerships (PPP) schemes, such as hydropower and irrigation. In this respect, the national policy is very conducive to private sector participation in investments, a PPP law was approved in 2011, and investors already expressed their interest in the project. The project will also foster Small and Medium Enterprises (SMEs) development through providing opportunities for irrigation, fisheries and tourism.

#### 1.3 Provisional Key Information about the Dam

The data in the table below are abstracted from the old preparatory studies and are only meant to provide some initial order of magnitude figures. In addition, as exposed above, the Mapai Dam may not be the option selected to be studied at the feasibility level.

Table 1-1 Provisional Mapai dam information <sup>16</sup>

Parameter	Provisional figure
Height	52 m
Total storage capacity	6,370 Mm <sup>3</sup>
Useable storage capacity	4,670 Mm <sup>3</sup>
Full supply level	164.6 m.a.s.l.
Minimum supply level	134.0 m.a.s.l.
Maximum flood level	169.5 m.a.s.l.
Crest level	173.7 m.a.s.l.
Crest length	3,470 m
Maximum flooded area	352 Km <sup>2</sup>
Spillway width	265 m
Spillway minimum level	150 m.a.s.l.
Evaporation Losses	817 million m <sup>3</sup> /year
Anticipated effective lifetime	60 years
Hydropower station	40 MW
Assumed irrigation Area potential	40,000 – 90,000 ha

<sup>16</sup> Funding application to AWF from ARA-Sul

## **2. THE LIMPOPO CLIMATE RESILIENCE PROJECT**

### **2.1 Goals, Impacts, and Outcomes**

The overarching development goal/impact of this project is to improve the resilience and reduce the risk of damages to communities, infrastructure and livelihoods in the lower Limpopo River basin. The overall outcomes are that: (i) Feasibility study findings broadly accepted among authorities, stakeholders and partners; (ii) Project financing and partnership arrangements for the construction project are structured, public funding committed, PPP identified and established.

### **2.2 Outputs**

The main outputs of the project are: (i) Pre-feasibility assessment and decision making reports validated and approved; (ii) Multipurpose development options including those attributed to the dam construction alternative assessed and technical, economic, social and environmental feasibility established including realistic multi-purpose economic viability; (iii) Environmental, and social impacts and all required adaptation, mitigation, resettlements, and compensation and gender and social equity measures accepted by stakeholders and approved by authorities; (iv) Irrigation development potential and socio-economic prospects related to the desired development option established; (v) Transaction and financing and strategy in place; and (vi) Effective Project Management, Consultation, Communication and Monitoring

### **2.3 Activities**

As illustrated in the figure below, the project implementation follows a step-wise approach to allow validation of project outcomes and associated strategic decision making before launching the following step. This approach will include the following three stages:

- Stage 1: Pre-feasibility Assessment and Decision Making aimed to examine the Mapai Dam and alternative options to improve climate change resilience in the Mozambican part of the Limpopo River Basin. In Particular, this stage shall assess various optional interventions to mitigate the impacts of climate change and extreme river flow variations. This stage will culminate in a high level GoM decision based on the findings and recommendations of Component 1 either (i) proceed with the dam feasibility studies, in Mapai or in an alternative site (Section 2.3.3); or (ii) proceed with a recommended solution based on a combination of strategic, integrated multi-sectoral investments found more viable than the large dam option.
- Stage 2: Feasibility Studies and ESIA to prepare the preliminary designs and validate the technical feasibility, economic viability and environmental and social safeguarding of the selected option that will provide a basis for Stage 3.
- Stage 3: Financing Strategy including PPP feasibility, financial mobilisation and partnership arrangements for investments and operations of the infrastructure and associated multi-purpose utilities.

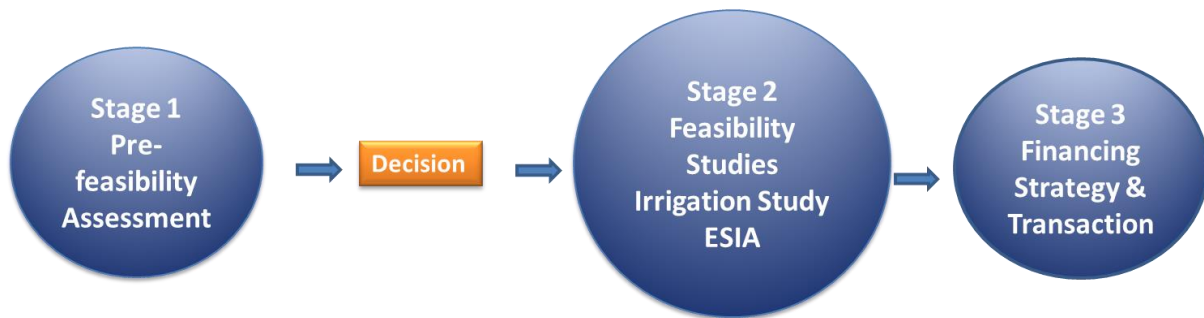


Figure 2-1 Main Project Stages

The project is structured as follows:

Component I: Pre-feasibility Assessment and Strategic Decision Making

- f) Climate Change Vulnerability and Resilience Assessment
- g) Assessment of Options
- h) Pre-feasibility Assessment of the Mapai Dam
- i) Comparative Assessment of Mapai Dam vs. Alternative Options
- j) Strategic Decision Making on Way Forward

Component II: Feasibility Studies

- f) Feasibility Study of the selected option including hydropower development
- g) Feasibility Study of Other Multi-purpose Development Options
- h) Detailed Climate Change Evaluation and Climate Risk Management
- i) Financial and Economic Viability and Multi-purpose Benefits
- j) Local Benefit Sharing and Improved Gender Equality and Social Equity

Component III: Environmental and Social Studies (AWF funding)

- c) Environmental and Social Impact Assessment (ESIA)
- d) Resettlement Action Plan (RAP)

Component IV: SMEs development plan in the irrigated agriculture value chain

- d) Irrigation Development Plan
- e) Irrigation economic benefits of the Limpopo climate resilience project
- f) Equitable Land Acquisitions and Appropriate Land Governance

Component V: PPP feasibility and Financing Strategy

Component VI: Project Management Communication, Consultation and Monitoring including Dam Safety Panel (DSP)

## 3. CONSULTANCY SERVICES

### 3.1 Overview

This ToR document relates to the Component III “Environmental and Social Studies”. According to the AfDB’s environmental and social procedures, the dam is likely to be categorised as Category 1 and by the national legislation as category A and in both instances requires an Environmental and Social Impact Assessment and a Resettlement Action Plan.

The ESIA and ESMP will be elaborated in compliance with the national legislation and the African Development Bank's procedures and policies. Given the sensitivity of the project and in order to facilitate resource mobilization, the ESIA and related documents will comply with best international Environmental and Social (E&S) practices, the World Bank safeguards and the recommendations from the World Commission on Dams.

The Mapai dam and reservoir is likely to encroach on the buffer zone of the Greater Limpopo National Park, but the direct impact area will not reach the Banhine National Park. Nevertheless, for the latter it will be necessary to assess the possible indirect impacts of the dam project on the hydrological balance and possible migratory routes. There may also be positive impacts of the dam due to better access to drinking water for the animals. The national park issues will be addressed as part of the environmental and social studies in terms of conservation and management programs, animal distribution, endangered species, migratory routes and access roads, environmental flows estimation, social impacts, resettlements of people residing in the parks etc.

Component III: Environmental and Social Studies will include the following sub-components:

- a) Environmental and Social Impact Assessment (ESIA)
- b) Resettlement Action Plan (RAP)

The ESIA will include assessment of alternatives, national and international framework, the description of the current natural and human environment as well as the identification of key E&S impacts, according to their severity and likelihood (see annex). An Environmental and Social Management Plan will also be prepared. The ESIA will be supported by a number of thematic assessments that tentatively will include:

- (i) Social impact assessment; this task will be implemented within the Resettlement Action Plan (RAP) and the findings will be used by the ESIA;
- (ii) Health impact assessment;
- (iii) Impact of dam rupture: this task will be implemented in the context of the feasibility study and Dam Safety Panel and the findings will be used by the ESIA;
- (iv) Downstream hydraulic impact including geomorphological impacts: this task will be addressed the feasibility study and the findings will be used by the ESIA;

Additional assessments to the ones mentioned above may be recommended by the ESIA consultant during the elaboration of the scoping report.

Although the dam site and reservoir areas are sparsely populated due to the fact that most inhabitants have moved away from the river bed because of the frequent floods, structures (mostly housing) will be affected. Moreover, the project's impact on livelihood is likely to be important, as most of the land along the river is used by the local population for subsistence agriculture activities. The project is thus highly likely to result in involuntary resettlement. As a result, one of the E&S studies required for this project is a Resettlement Action Plan (RAP). The Resettlement Action Plan (PAR) is a planning instrument designed to outline the key measures necessary to mitigate resettlement impacts and restore livelihoods of project-affected communities as early as possible in project development. Its primary goal is to provide explicit guidance to the project owner as well as a sound budget estimate for compensations and implementation arrangements. The Terms of Reference (ToR) are designed to outline the key tasks to be undertaken by the Consultant in order to deliver a RAP that is compliant with the national legislation, the AfDB's Policy on Involuntary Resettlement and Integrated Safeguard System (ISS) as well as international best practices in resettlement,

in particular the World Bank's O.P 4.12 and the recommendations of the World Commission on Dams.

The RAP will identify project affected people (PAP) who will be economically or physically affected by the project's construction and operations activities as well as by any other infrastructure associated with the project (e.g. access roads, borrow pits). The study will include a socio-economic analysis and consultation specific to the people affected by resettlement, identifying vulnerable people as well as gender risks and opportunities. It will identify common and individual assets and livelihoods that may be affected as well as any impact on access to natural resources. The RAP will outline compensation measures as well as additional activities designed to not only restore the PAP's conditions to pre-project level but to improve their livelihood.

## **3.2 Description of the Tasks**

### **3.2.1 ESIA**

The major tasks in the preparation of an ESIA are:

#### **Task 1: Assessment of Enabling Environment**

- Prepare a synthetic description of the project relevant components and presenting plans, maps, figures and tables;
- Identify the policy, legal and administrative framework relevant to the project;
- Define the project study area for the assessment of environmental and social impacts;
- Undertake initial consultations with primary and secondary stakeholders to sensitise their views and concerns about the project. These consultations shall occur during the preparation of the ESIA;
- Conduct preliminary consultations with primary and secondary stakeholders to sensitise their views and concerns about the project.

#### **Task 2: Baseline Assessment**

- Describe and analyse the baseline situation in the study area, in the context of the findings of the feasibility studies, the following conditions:
  - Environmental: (i) physical, (ii) biological; (iii) water quality including sediment transport; (iv) vegetation; (v) wildlife; and (vi) biodiversity
  - Social: (i) human environment and existing settlements; (ii) health conditions; (iii) food security, (iv) livelihood and economic; (v) cultural heritage; and (vi) archaeology
- Analyse the interrelations between environmental and social factors and the importance that the society and local populations attach to these factors, in order to identify the environmental and social issues of high value or presenting a particular interest.

#### **Task 3: Specific Impacts Related to Multi-purpose Benefits**

- Carry out, in consultation with the feasibility studies (Component II), specific impact assessments related to identified multi-purpose benefits in terms of:
  - Positive and negative impacts of the dam on the tourism related to opportunities and potential for improved tourism attributed to the Mapai dam;
  - Positive and negative impacts of the dam on fish resources in the context of fisheries and fish farming potential.

#### **Task 4: Impact Assessments**

- For the selected alternative, identify and assess potential importance of beneficial and adverse environmental and social, direct and indirect, short and long-term, temporary and permanent impacts;
- Define appropriate mitigation/enhancement measures to prevent, minimise, mitigate, or compensate for adverse impacts or to enhance the project environmental and social benefits, including responsibilities and associated costs;
- Address potential cumulative effects taking into account other initiatives planned in the study area;
- Present and analyse alternatives to the proposed project, including the “without project” option, by identifying and comparing the alternatives on the basis of technical, economic, environmental and social criteria;
- Prepare the draft ESIA Report;
- Undertake follow-up consultations with primary and secondary stakeholders to present the preliminary findings of the ESIA to identify key environmental and social issues and impacts, and after completion of the draft ESIA Report to obtain comments from stakeholders on the proposed mitigation/enhancement measures;
- Prepare Final ESIA Report

#### Task 5: ESIA Implementation and Monitoring Arrangements

- Prepare an Environmental and Social Management Plan (ESMP). This management plan shall be presented as a distinct document from the ESIA Report.
- Develop an environmental and social monitoring program, including indicators, institutional responsibilities and associated costs.
- As appropriate, prepare an environmental hazard plan including an analysis of the risk of accident, the identification of appropriate security measures and the development of a preliminary contingency plan.
- Identifying institutional responsibilities and needs for capacity building (to be carried out during the design phase) if necessary to implement the recommendations of the environmental and social assessment.

### 3.2.2 Resettlement Action Plan

The scope of work of the Consultant will include the following activities:

#### **Definition of the direct zone of influence of the project**

The Consultant will define the focus area(s) of the RAP, which include any area that will bear the direct impacts of the project related to involuntary physical and economic resettlement. A detailed map of the focus area(s) must be included in the RAP document. The focus area includes but is not limited to:

- Area submerged by the reservoir
- Area impacted by the dam infrastructure
- Area impacted by the transmission line to the Mapai substation
- Area impacted by associated infrastructures (borrow pits, access roads, bridges, etc...)
- Area that the project will become inaccessible to the Project Affected Person (PAP) once the dam is operational

#### **Analysis of the legal framework**

The Consultant will analyze and describe the applicable laws and regulations related to land ownership and tenure (private, public and customary rights), as well as administrative procedures and practices associated to the public utility declaration and the expropriation in the name of public interest. The Consultant will describe the agencies responsible for

implementing resettlement activities measures and compensations, as well as the remedies available to displaced persons in the judicial process.

### **Analysis of other applicable requirements**

The Consultant will describe additional applicable requirements to which the RAP will have to comply to and analyze the discrepancies between these requirements and the legislative framework. These applicable requirements include the AfDB's Involuntary Resettlement Policy (2003) and Integrated Safeguard System (ISS), the World Bank Operational Policy on Involuntary Resettlement (O.P. 12) as well as recommendations provided by the World Commission on Dams.

### **Definition of eligibility**

The criteria determining eligibility for compensation and other resettlement assistance will be clearly defined in the RAP. The RAP will also take into consideration practices and lessons learned from similar projects in Mozambique involving resettlement.

Identification of affected persons and assets

This will include the following elements:

- (a) A population census: the census will include the project affected households (PAHs) - or owner of the affected property - and the total number of Project Affected Persons (PAPs). The census will be gender-segregated;
- (b) The identification of disadvantaged groups or persons for whom special provisions may have to be made;
- (c) An inventory of assets of displaced households; the magnitude of the expected loss – total or partial for individual or group assets, and the extent of physical and economic displacement;
- (d) Public infrastructure and social services that may be affected;
- (e) Sacred sites that may be affected

### **Socio-economic analysis**

- (a) The description of the production systems, household organization, baseline information on livelihoods and standards of living of the displaced population;
- (b) Inventory and estimate of the financial loss per household related to impacts on livelihoods;
- (c) Description of land tenure systems, including common property and non-title based land ownership or allocation system recognized locally;
- (d) Social and cultural characteristics of displaced communities.
- (e) A gender analysis

### **Description of consultation process:**

The RAP will be elaborated based on a participatory approach, in consultation with the displaced communities and host communities (if applicable). The participatory approach and methodology of the consultation process will be described and the main findings, concerns and opinions expressed, as well as preferred forms compensation, summarized. More details on the consultation process will be included in an annex. Information about the consultation approaches and processes will be shared with the Consultation Forum of the project for consideration.

### **Identification of potential relocation sites (in case of physical resettlement)**

The Consultant will provide recommendations of at least three potential sites for the physical resettlement of affected people. This will include the description of land site acquisition procedures, as well as the budget estimates for the development of future settlements

### **Valuation methodology for losses and compensation matrix**

The RAP will include the description of the different compensation packages and other assistance measures that will assist each category of eligible displaced persons (including vulnerable persons). Additionally, the RAP will outline the measures proposed to compensate for the loss of public infrastructure (if applicable). Finally, the RAP will include a section describing the methodology used in valuing losses to determine their replacement cost. This description should take into account a description of the proposed types and levels of compensation under local laws and such supplementary measures to achieve replacement cost for lost assets. All this information will be summarized in a compensation matrix

### **Description of grievance mechanism**

The RAP will propose a conflict-resolution mechanism to address complains, with a clear go-to person, and timeframe for response.

### **Implementation schedules**

An implementation schedule covering the time frame expected to undertake all resettlement activities from preparation through implementation will be proposed.

#### **Costs and budget**

Tables indicating breakdown of cost estimates for all resettlement and compensation activities, including contingencies and implementation costs will be provided.

### **Implementation arrangements**

The document will outline the roles and responsibilities of all actors involved in the implementation of the RAP (project owner/Implementing Agency, contractor, external support). It will make recommendations on staffing requirements and capacity building, as well as the need to involve outside expertise/actors (if applicable).

### **Monitoring and evaluation**

The Consultant shall define internal and external monitoring and evaluation mechanisms of resettlement activities as well as their cost arrangements. These should include indicators to be monitored by the Implementing agency, measuring inputs, outputs, and outcomes for resettlement activities, and the evaluation of the impacts of resettlement for a reasonable period of time after the resettlement activities have been completed. Moreover, this section should integrate evaluation activities from independent experts, such as resettlement audits to ensure complete and objective information.

#### 4. EXPERTISE REQUIRED

The Consultant shall provide a broad range of expertise, and the team should preferably have a balanced composition of local and international experts.

The consultant shall make available personnel with the qualifications and experience necessary to perform project tasks to a high standard necessary for the completion of each project component and the entire assignment.

##### **Team Leader Environmental Specialist (international expert)**

Qualifications: The Team Leader shall be an environmental specialist with proven experience in ESIA and RAP in international river basins. S/he shall have a minimum MSc degree qualification and a minimum of twenty (20) years overall experience and fifteen years (15) years relevant experience on similar dam design projects and proven experience in leading multidisciplinary teams and/or team leader for externally financed projects preferably in developing countries. Fluent in written and spoken English and an ability to draft concise reports; good communication skills; excellent computer skills, working experience with project management systems are essential. The Portuguese at working level is an advantage.

##### **Lead Resettlement Action Plan (international Expert)**

Master's degree in social sciences; headed the elaboration of at least three (3) Resettlement Action Plans (RAP) and at least ten (10) years of professional experience in the design, organization and monitoring of resettlement programs or socio-economic surveys. Experience in working in Africa preferred.

##### **Social development specialist**

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of fifteen (15) years overall experience and ten years (10) years relevant experience.

##### **Biodiversity specialist**

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of fifteen (15) years overall experience and ten years (10) years relevant experience.

##### **Agronomist**

S/he shall have a minimum MSc degree qualification in a relevant field, with at least five (5) year experience in who have good experience in studies of environmental and social impact ;

##### **A legal expert**

with at least five (5) year experience in land rights and some experience in environmental and social impact assessments

##### **Fishery specialist**

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of fifteen (15) years overall experience and ten years (10) years relevant experience.

##### **Forestry/Natural resources management expert**

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of fifteen (15) years overall experience and ten years (10) years relevant experience.

**Geomorphologist (international Expert)**

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of ten (10) years relevant experience.

**Health and Safety specialist**

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of ten (10) years relevant experience.

**Archeological specialist**

S/he shall have a minimum MSc degree qualification in a relevant field with a minimum of ten (10) years relevant experience.

**5. DURATION OF THE STUDY AND REPORTING SCHEDULE**

The study duration is 12 months. The Consultant may propose and justify another duration in its technical offer.

Consultant will prepare and submit the following tentative list of reports and notes to be produced to the satisfaction of the ARA-Sul/PT, GoM and AWF-AfDB.

The consultant will submit Quarterly Progress Reports (QPR) that will summarise progress made over the covered period for each of the project activities.

The Consultant shall prepare and submit the draft and final Main Reports and associated Annex Reports/Notes to ARA-Sul/PT according to the tentative schedule below.

**Tentative Reporting Schedule**

To be prepared ion the final version of the ToR


## ANNEX 1: THEMATIC STRUCTURE OF THE ESIA

### i. Policy, Legal and Administrative Framework

This chapter concerns the policy, legal and administrative framework within which the ESIA is carried out. It presents the relevant environmental and social policies of the Bank and Mozambique, as well as the national legal requirements and related constraints (e.g. practices that may discriminate or exclude any stakeholder group) relevant to the project. It provides information on the environmental requirements of any co-financiers, and identifies relevant international environmental/social agreements to which the country is a signatory.

### ii. Project Description and Justification

The first part of this chapter shall describe the proposed project and its geographic, ecological, social, economic and temporal context: project location, various project components, capacity, construction activities, facilities, staffing, working conditions, availability and source of raw materials, production methods, products, schedule of works, land tenure, land use system, potential beneficiaries, affected groups (directly and indirectly), and offsite investments that may be required. It shall at least include a map showing the project location and area of influence.

The project justification should be based on combined economic, environmental and social assessments. To this end, this chapter shall describe the current situation in the sector, explain the problems or the needs to be satisfied by the project and present the constraints associated with the project implementation.

### iii. Description of the Project Environment

This chapter shall first determine the limits of the study area that shall be defined in order to encompass all project direct and indirect impacts. The description and analysis of the physical, biological and human conditions shall address relevant environmental and social issues within this area, including any changes anticipated before project implementation.

Within the human environment, key issues that shall be considered include population characteristics and trends, revenue disparities, gender differences, health problems, natural resource access and ownership, land use patterns and civil society organisation level. A particular attention shall be given to the rare, threatened, sensitive or valorised environmental and social components.

The information presented shall be relevant to decisions about project location, design, operations as well as environmental and social management. Maps, figures and tables shall be included in this chapter to better illustrate the various environmental and social components.

### iv. Project Alternatives

This part of the ESIA Report consists in analysing the various feasible alternatives of the project, including the "without project" option and the option of replacing the dam with other investments in the catchment to reduce the flood problems. The selected alternative shall be the most environmentally and socially sustainable, taking into account the technical and economic feasibility.

## v. Potential Impacts and Mitigation/Enhancement Measures

This chapter presents a detailed analysis of beneficial and adverse impacts of various components of the selected project alternative on the physical, biological and human (social, cultural and economic) environments. The below long-list of impacts and concerns of different relevance for the Mapai dam project will serve as a check list for the assessment of E&S impacts.

- Increase in economic activity and employment;
- Induced development due to new opportunities such as in fisheries and dam related projects (irrigation, hydropower, etc.);
- Disruption of existing activities particularly floodplain agriculture and artisanal fisheries downstream;
- Loss of livelihood for those who are living and/or cultivating the land in the flooded areas;
- Disruption of activities in catchment areas, particularly if they represent potential sources of pollution for the reservoir;
- Development of additional skills for those taking advantage of new opportunities;
- Uncertainty and increased perturbations due to a lack of information and communication;
- Development of new infrastructures;
- Destruction of existing infrastructures in the dam and reservoir area;
- Reliable water supply for irrigation, domestic and other uses;
- Contamination of domestic water supplies due to the mismanagement of the reservoir;
- Increased pressures on existing social services due to migration;
- Degradation of air quality by dust, heavy machinery atmospheric emissions and waste disposal;
- Increase in ambient noise during construction;
- Flood control;
- Interruption of surface water flows during and after construction;
- Changes in the level of groundwater table resulting from changes in the drainage and water flow;
- Contamination of surface and underground waters by wastewater and hazardous materials;
- Alteration of water flow downstream impairing agricultural activities on floodplains;
- Proliferation of aquatic weeds in reservoir and downstream impairing dam discharge, irrigation schemes, navigation and fisheries;
- Degradation of the reservoir water quality;
- Runoff erosion resulting in sedimentation problems;
- Contamination of soils from spilling of hazardous materials;
- Landslides and other types of soil movements in the works areas;
- Soil compaction and erosion during construction;
- Soil erosion due to water level changes in the reservoir;
- Loss of productive soils by flooding;
- Soil destabilisation as a result of excavation;
- Destruction of ecosystems of particular interest;
- Degradation of ecologically sensitive areas;
- Loss of biodiversity;
- Destruction of vegetation;

- Loss of forest products (fuel wood, timber, non- timber forest products, medicinal plants);
- Impact on the fish species;
- Creation of a new fish habitat in the reservoir facilitating fisheries development;
- Loss of existing wildlife and fish habitats;
- Disruption of wildlife migrations;
- Increase in poaching due to non-resident workers;
- Adverse impact on fishes due to changes in water flow and limnology, disruption of fish migrations, and degradation of water quality;
- Loss of sites of cultural, archaeological or historical importance by flooding;
- Loss of productive land and natural resources in flooded areas;
- Disruption of natural resources exploitation activities, particularly fisheries;
- Derangement of livestock grazing and traditional agriculture, particularly flood recession agriculture;
- Insufficient arable land to satisfy subsistence agricultural needs;
- Loss of territory for local populations;
- Changes in land and water uses, access and rights, that can lead to social conflicts;
- Increased pressure on natural resources due to migration;
- Social conflicts associated with the venue of migrant workers and new settlers (divorces, ethnic tension, etc.);
- Degradation of the visual quality of the landscape due to land clearing, construction works, new infrastructures, etc.
- Health and safety impacts;
- Etc.

The methodology of assessment, based on a rigorous scientific method, shall be first presented. Then all environmental and social, direct and indirect, short and long-term, temporary and permanent impacts shall be described and assessed, indicating their importance level and their probability of occurrence. The importance level may be assessed on the basis of the nature, extent, intensity and duration of the impact, as well as on the sensitivity of the concerned environmental and social components and perceptions of the public. Irreversible or unavoidable impacts shall be clearly identified. Cumulative effects shall also be addressed taking into account other projects or actions planned in the study area.

Appropriate mitigation measures shall be identified to prevent, minimise, mitigate or compensate for adverse environmental and/or social impacts. Moreover, enhancement measures shall be developed in order to improve project environmental and social performance. Roles and responsibilities to implement measures shall be clearly defined. The cost of the measures shall be estimated, including the cost for environmental and social capacity building and gender mainstreaming, if necessary. Residual impacts shall be presented.

The below long-list is meant to serve as a guiding check-list for the assessment of E&S impacts and mitigation measures.

- Give preference to local employment (men and women) and local inputs (food, basic material) to the extent possible.
- Offer appropriate compensations or alternative income opportunities to men and women having a reduced access to or loosing productive means.

- Ensure that the poor and other vulnerable groups can continue to safely satisfy their basic needs.
- Provide adversely affected people, men and women, with the training required to benefit from new opportunities.
- Plan information, education and communication activities during and after project implementation to increase awareness of all users (men and women) on safety measures that shall be followed.
- Before construction, consult concerned ministries to verify the adequacy of current and proposed infrastructures.
- Involve the population (men and women) in the maintenance and management of new infrastructures to ensure their sustainability.
- Ensure adequate social services, including drinking water supplies, for addressing the basic needs of the local populations, non-resident workers and migrants.
- Assist social service administrations in coordinating their efforts to offer additional services and improve service delivery if required.
- Promote safety net measures to protect the poor and other vulnerable groups against a service price increase.
- Establish quality control for water supplies.
- Near the residential areas, avoid noisy works after regular working hours.
- Maintain vehicles and machinery in good condition in order to minimise gas emissions and noise.
- Use dust and noise attenuators, such as vegetation hedges along transport corridors in order to minimise noise and the aerial transport of dust.
- Plan and set up on-site sanitary facilities for the disposal of wastewater.
- Maintain vehicles, machinery and equipment in good condition in order to avoid leaks and spill of hazardous materials (hydrocarbons, chemical products, etc.).
- Ensure a safe management of hazardous materials (hydrocarbons, chemical products, etc.).
- Take all precautions during the refuelling of vehicles and machinery, and forbid the refuelling near water bodies.
- Avoid crossing permanent waterways; if necessary, locate the crossing where the banks are stable and the waterway the most narrow.
- Conserve the vegetation along water bodies and near wetlands.
- Plan emergency response measures in case of accidental spill.
- Assess the relevance of clearing the vegetation before flooding the reservoir.
- Avoid areas sensitive to erosion.
- Carry out the construction works in the dry season.
- Limit the circulation of heavy machinery to minimal areas.
- Avoid establishing access roads along steep slopes; instead, locate the access roads perpendicularly or diagonally to the slope.
- Use existing borrow pits rather than creating new ones; after the works, restore borrow pits by stabilising slopes and facilitating vegetation regeneration.
- Stabilise the soils in order to reduce potential erosion.
- At the end of construction works, level off the soils and facilitate vegetation re-generation.
- Implement integrated watershed management in order to control soil erosion.
- Prevent land clearing in watershed and facilitate the reforestation of cleared areas.
- Design the works in order to release sediments (hydraulic release).
- Dredge accumulated sediments.
- Regulate water flow to minimise soil salinisation.

- Design the project by taking into account ecosystems of particular interest and ecologically sensitive areas.
- Protect equal areas of ecosystems of particular interest to offset losses.
- Establish a perimeter of protection around sensitive ecosystems such as wetlands and unique habitats sheltering endangered species.
- Minimise the length of work in ecologically sensitive areas.
- Design the project by taking into account wildlife reproduction areas and migration corridors.
- Do not carry out any work in reproduction areas during the reproduction periods.
- Minimise sedimentation in spawning grounds downstream.
- Relocate animals before flooding the reservoir.
- Control illegal fishing and hunting, particularly by non-resident workers.
- Maintain a minimum water flow for fishes.
- Provide appropriate means of passage for fishes.
- Facilitate the development of culture fisheries in reservoir as a mean of compensation.
- Before construction, carry out an archaeological search in the potential areas containing artefacts and preserve discovered artefacts.
- Negotiate with traditional authorities the preservation of important cultural, religious, historical and aesthetic sites and resources and agree on potential compensation for the communities.
- During construction, ensure an archaeological surveillance in the potential areas containing artefacts and in case of a discovery, advise the concerned authorities.
- Involve traditional authorities in monitoring cultural, religious, historical and aesthetic sites and resources during the various phases of the project.
- Provide equivalent or better housing and accompanying facilities to involuntarily displaced men and women in accordance with consultation results.
- Plan adequate settlement areas with appropriate housing and services (water and sanitation) for non-resident workers and their families.
- Provide temporary food supplies to involuntarily displaced men and women, as needed.
- Provide complementary training /support to men and women to facilitate adjustment during the transition period.
- In accordance with priorities of displaced men and women, ensure appropriate funding for resettlement as well as for productive land compensation to men and women owning or occupying/cultivating the land.
- Establish access mechanisms to land in the watershed in order to control unorganised settlements.
- Take into account the various land uses while designing the project in order to minimise the loss of land, particularly productive land.
- Involve traditional authorities in the design of the project, particularly in siting settlements and in defining flooded areas.
- Wherever possible, compensate the loss of land by protecting an equivalent land area in the region.
- Offer compensation or alternative revenue opportunities to men and women losing land and/or productive means, e.g. to owners and those occupying/cultivating the land.
- Develop alternative grazing areas to compensate for those lost.
- Integrate land management priorities into land planning instruments to take into account various land uses.
- Clearly define water rights and establish water user fees in consultation with concerned stakeholders.

- Build on the respective knowledge and experience of women and men in water management.
- Etc.

vi. Environmental Hazard Management

This chapter shall describe the security measures and propose a preliminary contingency plan for the construction and operation phases of the project (possible contingency situations, major actions to properly react to accidents, responsibilities and means of communications).

The ESIA shall include an analysis of the technological accident risk: identification of hazard and potential consequences, estimation of the consequences' magnitude and frequency, and risk estimation and evaluation.

The main risks of the project are related to:

- Health impacts (Vector-borne and other communicable diseases, HIV and sexually transmitted infections Injuries and Malnutrition)Activities associated with construction works such as the manipulation of fuel, waste and hazardous materials,
- Flooding and management of the reservoir
- Changes in land and water uses, access and rights, that can lead to social conflicts.
- Social conflicts associated with the venue of migrant workers and new settlers (divorces, ethnic tension, etc.).
- Dam rupture, causing sudden flooding of the downstream area and resulting in the loss of human lives and serious economic damages. This aspect will be analyzed by the feasibility study. The ESIA will summarise the main findings of the dam rupture analysis.
- Etc.

In order to prevent or minimise these hazards, appropriate risk management measures shall be designed and implemented.

vii. Environmental and Social Monitoring Program

The first section of this chapter shall describe the surveillance measures aiming at ensuring that the proposed mitigation and enhancement measures are effectively implemented. The second section concerns the environmental and social monitoring activities designed to measure and evaluate the project impacts on some key environmental and social components of concern and to implement remedial measures, if necessary. Indicators, roles and responsibilities shall be clearly defined. The cost of the program shall be estimated, including the cost for environmental and social capacity building if necessary.

viii. Public Consultations

This chapter shall summarise the actions undertaken to consult the groups affected by the project, as well as other concerned key stakeholders including Civil Society Organisations. The Consultant should establish a consultation mechanism with traditional authorities to ensure that their views are considered during the planning and implementation phases. men and women should have the opportunity to organise themselves in groups representing their collective interests. The detailed record of the consultation meetings shall be presented in annex to the ESIA Report.

ix. Conclusion

The Conclusion shall specify the environmental and social acceptability of the project, taking into account the impacts and measures identified during the assessment process. It shall also identify any other condition or external requirement for ensuring the success of the project.

x. Annexes

- List of the professionals and organisations having contributed to the preparation of the ESIA Report.
- List of consulted documents, including project-related reports.
- Baseline data referred to in the Report.
- Record of consultation meetings with primary and secondary stakeholders.
- The specific studies prepared in the framework of the ESIA.

## ANNEX 2: CONTENT OF THE RAP

- Executive summary
- Project Description
- Analysis of the institutional and legal framework and other applicable requirements
- Eligibility criteria
- Impacts: census and survey findings
- Socio-economic analysis
- Impact on vulnerable persons or groups and special provisions
- Public infrastructure and social services that will be affected
- Consultation process
- Valuation methodology and compensation matrix
- Recommendations for new sites (in case of physical movement)
- Organizational Procedures (who does what and when?)
- Implementation schedule
- Grievance mechanisms
- Monitoring and evaluation
- Cost and Budget
- Publication and dissemination of RAP

### Annexes:

- Asset Survey
- Consultations details

## ANNEX 8: FINANCIAL MANAGEMENT ASSESSMENT

This annex was prepared as an initial analysis document in connection with the project appraisal. It provides important assessments and inputs to the Main text of this PAR. Should there, however, be inconsistencies between this annex and the main report, the latter will be applicable.

### Introduction

The financial management (FM) assessment of Mapai Dam Feasibility Studies Project was carried out in accordance with the Bank's *Guidelines for the Financial Management and Financial Analysis of Projects (2007)* and the Provisional ORPF FMS Tool Kit of 2010. The assessment is aimed at reviewing the financial management systems at the borrower's Implementing Agency (EA) to determine its acceptability or not, and where necessary identify areas to work together with the EA to strengthen the system and bring it within the minimum acceptable limits as per the requirements of the Bank. The financial management system of the project must be capable of (i) correctly and completely recording all transactions and balances relating to the project; (ii) facilitating the preparation of regular, timely and reliable financial statements; (iii) safeguarding the project's assets; and (iv) can be subjected to auditing arrangements acceptable to the Bank. The arrangements aimed to facilitate disbursements and ensure effective use of project resources while using the country's own systems to the extent possible. To this end, overall coordination of the project's financial management aspects will be under the responsibility of the Administration and Finance Department of the Implementing Agency, the ARA Sul

### Executive Summary

ARA-Sul is a water agency, under the Ministry of Public Works and Housing, responsible for the river basins in southern Mozambique, including the trans-boundary flood prone rivers Limpopo and Maputo. It is strongly involved in the hydrological modelling including water availability, dam operation and flood forecasting. At the national level, water management is the responsibility of the National Water Directorate (DNA), while at the regional levels the three Regional Water Administrations (ARAs) are responsible. ARA - Sul is in charge of water management in the southern part of the country up to the Save River. The Government through the Ministry of Public Works and Housing and ARA -SUL intends to construct a multi-purpose dam on the Limpopo River, aimed at controlling floods, producing hydropower, and providing water for the development of irrigation schemes. This project is preparation phase of Mapai Dam construction, including: feasibility study, Environmental and Social Impact Assessment, and the stakeholder consultation process.

The Project financial management matters will be handled within the Ara Sul's Finance Department (DAF), which currently comprises about twelve finance staff with varying experience. The overall responsibility of the project financial management matters will be with the head of Finance Department, an experienced and capable finance practitioner, who will provide oversight to the finance staff.

The ARA Sul uses SISTAFE for processing its transactions especially those related to the National Budget and Excel to manage its internal revenue. However, the system is still being configured for projects reporting, therefore, it is not capable of producing the required project

financial reports. For this operation, the ARA Sul will procure and install a standalone accounting software capable of recording its transactions and produce financial reports required to monitor and effectively manage the project. All finance staff should be trained in use of such software.

Financial reports will be designed to provide quality and timely information on Project performance not only to project management but also to the Bank. The consolidated quarterly IFR with its relevant annexes shall be submitted by Project Management team to the Bank within 45 days after the end of each calendar quarter. In compliance with International Public Sector Accounting Standards and the Bank/AWF requirements, the Project will produce also annual financial statements which will constitute the entry point of the annual external auditor's diligences.

All the Bank's disbursement methods will be available for the Project. However, it is anticipated that most of payments will be mainly made through the Direct Payment Method or reimbursement. The main consultancies of feasibility study will be paid through direct payment. A Bank account in local currency shall be opened to accommodate local currency payments.

ARA –Sul's annual financial statement are audited by a private audit company BDO recruited under government procurement procedures for the period from 2010 - 2012. Both 2010 and 2011 Ara Sul's audit reports were qualified. As basis of their qualifications auditors stated that they could not get confirmation of the Balances with commercial Banks. Furthermore, the Management could not provide any comment on the management letters. As at mission time the 2012 Audit report was almost ready and the Management letter was to be submitted to Ara Sul's Board of Director for comments. The main issues of the Management letters are related to poor filing system and lack of appropriate justifications of expenditures. The Auditor's management letters are discussed at ARA Sul's Governing Board level where action plans are drawn to overcome the identified weaknesses. The drawn action plan for 2011 audit included the improvement of the filling system and assurance of the financial department that none payment could be processes without proper documentation and receipts, and these should be properly filled. ARA – Sul will start soon a new procurement process for recruitment of external auditor for three years term starting from 2013. The terms of reference for external audit will be amended to include project transactions. The project financial statements will be audited by an independent private audit firm in accordance with a Bank approved audit ToR with audit carried out in accordance with International Auditing Standards as promulgated by the International Federation of Accountants (IFAC). The ARA-Sul audit TORs will be reviewed to incorporate the project audit requirements. The Project Implementing Agency will be required to submit separate audited Annual Financial Statements for the project, within six months after financial year-end with costs of audit financed from the Grant. In addition to expressing an opinion on the Annual Financial Statements in compliance with International Standards on Auditing (ISAs), the auditors will be required to form an opinion on the compliance with Bank/AWF rules and procedures. Furthermore, the external auditors will prepare a Management Letter giving observations, comments, and recommendations for improvements in accounting records, systems, controls and compliance with financial covenants in the Grant Agreement.

The results of the Bank's assessment concluded that Financial Management overall risk rating is moderate after mitigating measures. The requisite mitigating measures have been identified and will be incorporated in project design. Details of the assessment are included below

FM Lessons Learned from Ongoing Projects Implemented by ARA Sul.

ARA SUL is currently implementing two Bank projects namely Massingir Dam and Smallholder Agriculture project (P-MZ-AA0-026) and Massingir Dam Emergency Rehabilitation Project (P-MZ-AAC-002). A supplementary Loan for Emergency has been approved earlier last year. However such projects are implemented through a stand-alone Project Implementing Unit (PIU) and its main challenges are related to lack of accounting software and non-segregation of FM functions as the FM capacity comprised only the Finance Manager. The Project Management is yet to implement the FM action plan as well as recommendations from supervision missions. Regarding the Audit, there is strong commitment from the project team on timely submission of audit reports. In the last two years, acceptable audit reports were submitted to the Bank within the established time frame and the audit opinions were unqualified. This project will be implemented within the existing ARA Sul's organizational structure and no PIU will be created. The head of ARA Sul's Finance Department will be leading a team of twelve finance staff who will be in charge for day to day project financial management. Furthermore, stand-alone accounting software will be purchased for recording project transactions.

### **Country Issues**

The Mozambique's 2008 and 2010 Public Expenditure and Financial Accountability (PEFA) assessments have observed good improvements in public financial management over the years since Government of Mozambique (GoM) started implementing its public sector reform programs. One of those programs implemented by the Government of Mozambique is the Public Financial Management Reform as an integral part of a wider Public Sector Reform aiming at promoting good governance. Commitment to the Public Financial Management Reform was demonstrated with drafting and approving the State Financial Administration System Law (SISTAFE Law) and regulation in 2002 and 2004 respectively. The SISTAFE Law covers the 5 functional areas: public sector budgeting, accounting, fixed asset management, treasury operations and internal control and set out a vision for Public Financial Management in line with international standards. Some notable improvements have been registered in fiscal control with good progress made in the implementation of principles of transparency and accountability.

The objectives of SISTAFE are to establish and harmonize treasury management, budget execution, control and public resource evaluation rules and procedures. One other relevant achievement to be mentioned here is the successful implementations of Multicurrency Single Treasure Account CUT, *Conta Unica do Tesouro (CUT)*, which aims to relieve the exchange rate risk between the time external funds are received and their actual use due to continued instability of the local currency – Metical.

Despite the improvements mentioned above, there was weak performances indicators related to the credibility of budget (indicator PI-2) especially in terms of credibility of expenditures outturn at the level of organic institutions with budgetary expressions and the legislative scrutiny of annual budget law performance (indicator PI-27).

### **Financial Management Risk Analysis**

The Bank/AWF's principal concern is to ensure that project funds are used economically and efficiently for the purpose intended. Assessment of the risks that the project funds will not be so used is an important part of the financial management assessment work. The risk features are determined over two elements: the risk associated to the project as a whole (inherent risk)

and the risk attached to a weak control environment of the project implementation (control risk). The table below identifies the key risks that the project management may face in achieving these objectives and provides a basis for determining how management should address these risks.

Table 1: Risk Assessment

Risk	Risk Rating	Risk Mitigation Measures Incorporated	Risk after Mitigation
<b>Inherent Risk</b>			
Country- Weak performance of Indicators PI 2 and PI 27)	H	The continuous implementation of ongoing PFM reforms and all ongoing Government efforts with Development Partner's support to improve the Country PFM system	S
Entity – Lack of Experience in implementing Bank Projects. The Ongoing Massingir Dam projects are implemented through a stand-alone PIU out of Ara Sul's organizational structure	S	The Management of ARA Sul will be encouraged to put in place a knowledge sharing strategy and use as much as possible skills and experience from PIU staff. ARA-Sul is also encouraged to provide training opportunities to finance staff on FM and related matters.	M
Project Level – The project finance staff may not be capable of performing their duties due to lack of experience in handling Bank-financed projects	S	The Bank will organize training on Banks rules and guidelines to all finance staff at project launching phase. In addition continuous trainings will be organized through implementation of fiduciary clinics	M
Overall Inherent Risk: M			M
<b>Control Risk</b>			
Budgeting–Under budgeting, weak budget control and budgetary execution.	S	The ministry has experience in budgeting for project activities and annual budgets are prepared for Massingir dam projects. Its budget process will be comprehensive and pass through various levels of clearance and approval which builds on internal checks and balances before submission to the Ministry of Finance. The Project Annual Work Plan and Budget will be cleared by the Ara Sul and by the Bank, and it should be included in the government annual budget	M
Accounting –Lack of accounting software and the project will be exposed to risks	S	Accounting software will be procured to record project transactions. All finance staff will be trained on the use of the software	M

Risk	Risk Rating	Risk Mitigation Measures Incorporated	Risk after Mitigation
associated with use of excel spreadsheet for record of project financial transactions.			
Internal Control – Absence of internal audit department and limited coverage of internal audit reviews by Inspeção Geral das Finanças could not prevent to non-compliance to key internal controls and procedures.	H	Project Management team will ensure clear allocation of FM responsibilities so that each process can have different review and approval stages. In addition, the existing Finance manual will be reviewed to provide clear guidelines on project implementation.	S
Funds Flow - Delay in disbursement to contractors/ consultants resulting in delay in project implementation. Delay in provision of Government funds for VAT.	S	The Bank's Field Office in Mozambique will provide first line advice to the project and ensure timely preparation and submission of quality withdrawal requests.  Furthermore, disbursement, procurement and FM trainings will be conducted at project launching phase. The Mozambican Central Bank, the Ministry of Finance and Implementing Agency will ensure timely availability of counterpart funds.	M
Financial Reporting Delays in submission of the quarterly financial progress report and preparation of annual financial statements due to inadequate transaction records.	S	The Bank will work with the ARA SUL to ensure deadlines are adhered to. In addition the Bank will notify the project whenever a disbursement is released so that the project can record the exact amounts disbursed. Bank Reporting requirements will be covered during the training scheduled at Project launching	M
External Audit – Delay in submission of audit reports to the Bank due External auditors recruited out of Bank's guidelines for recruitment of consultants	S	TORs for recruitment of external auditor for ARA SUL will be reviewed to include audit of project transactions.	M
Overall Control Risk: M			Moderate
Overall Risk Assessment: M			Moderate

H = High, S = Substantial, M = Moderate, L = Low

The overall residual risk is assessed as Moderate after the mitigation of identified risks in the risk assessment matrix above.

**Strengths and Weaknesses**

Key strengths: The main project strengths are related to the fact that: i) two ongoing Bank projects are implemented by a PIU within the EA hence some EA staff have knowledge of Bank rules and procedures; ii) Existence of suitable and experienced finance staff in Finance Department, who are capable of performing well their duties and responsibilities.

Main weaknesses: (i) Lack of accounting software; and (ii) nonexistence of an internal control/ internal inspection Department within the ARA SUL.

**Financial Management Action Plan**

The financial management action plan described below will need to be in place to have a strong and adequate financial management system for the project.

Table 1: Action Plan

Issue	Recommended Remedial Action	Responsibility	Completion Date
Accounting	Purchase and installation of accounting software. Staff trained on the use of software	EA	Four months after project effectiveness
Financial Reporting	Training of FM staff on Bank financial reporting and auditing requirements.	AfDB /EA	During Project Launching
External Auditing	Revision of ARA SUL’s External auditor TORs to include project transactions	PCU	Immediate

**Implementing Agency and Implementing Entity**

The project’s Implementing Agency is ARA SUL. The Head of Finance Department of ARA Sul will be lead a team of two finance staff ( selected within Finance Department) who will be responsible for the overall financial management and reporting of project. The ARA Sul has twelve finance staff members from which eight of them have university degree, three are almost to finish the University and one is a medium level accountant. The ongoing Massingir Dam projects (P-MZ-AA0-026 and P-MZ-AAC-002) are implemented through a standalone PIU created out of SRA Sul’s organizational structure. Since this project will be implemented within the organizational structure of ARA sul, the Finance Department will have overall responsibility for project FM and it should make appropriate and clear allocation of duties to ensure that adequate project financial records by components, activities and categories are maintained throughout its implementation.

**Budgeting Arrangements**

The Budget of ARA SUL is currently derived from three different sources: Government National Budget, internal revenue derived from water supply and tourism (ARA Sul has been constructing touristic infrastructures attached to the big dams which constitute one of internal income source. Another source of internal income is the water supply either for irrigation or water supplied to Water Supply Companies for further treatment and distribution to communities) and AfDB budget from Massingir Dam Projects. ARA-Sul budget is submitted to the Ministry of Finance through the Ministry of Public Works and Housing for its consolidation into the government budget and submission to the parliament for approval.

For purposes of this project, the FM and technical teams will prepare an Annual Work Plan and Budget and Disbursement Projections for implementing the project activities which shall be adequately disaggregated in accordance with the categories of expenditures, components and subcomponents to facilitate comparison of cost and actual expenditure. The Project shall also make appropriate expenditure forecasts over the project life taking into consideration procurement and contract management issues. The project Annual Work Plan and Budgets will be incorporated into global Work Plan of ARA SUL and then submitted to the Ministry of Finance and thereafter to the Bank/AFW for approval not later than December 31 of the preceding year

### **Key Accounting Policies and Procedures**

The ARA Sul uses SISTAFE for processing its transactions especially those related to the National Budget and Excel for management of its internal income. However, the e-SISTAFE is still being configured for projects reporting, therefore, is not capable of producing financial reports as required by the Bank. For this operation, the ARA Sul will procure and install accounting software capable of recording its transactions and produce financial reports required to monitor and effectively manage the project. The software will also be used for management of internal income of ARA Sul. All finance staff should be trained in use of such software.

### **Internal Control and Internal Audit**

Internal control system is aimed at ensuring (i) the effectiveness and efficiency of operations, (ii) the reliability of financial reporting, and (iii) the compliance with applicable laws and regulations.

The existing ARA SUL's Accounting, and Financial Procedures Manual should be reviewed to reflect the project design and requirements. This manual would be used to provide guidance in project implementation. The financial transactions will be processed through accounting software to be installed and the financial and Accounting Manual will provide sufficient guides on information flow, authorization, and timing, delegation of authority, job segregations and compliance with project objectives, rules and regulations. The application of such manual will be mandatory within the project. The Implementing Agency should ensure adequate segregation of duties for the project functions thought its implementation.

### **Funds Flow and Disbursement Arrangements**

All the Bank's disbursement methods will be available for the Project. However, it is anticipated that most of payments will be primarily made through reimbursement and Direct payment Methods. The main consultancies of feasibility study will be paid through direct payment. Therefore, ARA-Sul shall prepare disbursement applications with invoices or acceptance certificates attached and submit to the Bank. The Bank's Disbursement Letter will be issued stipulating clearly key disbursement requirements, procedures and practices.

### **Financial Reporting**

Financial reports will be designed to provide quality and timely information on Project performance not only to ARA -Sul but also to the Steering Committee and to the Bank. The quarterly Interim Financial Report (IFR) will include the following financial statements: statement of sources and uses of funds; statement of expenditures classified by project components and/or disbursement category (with additional information on expenditure types as appropriate), showing comparisons with budgets for the reporting quarter and cumulatively for the project life; cash forecast; explanatory notes to the IFR; A consolidated quarterly IFR

including all project transactions shall be submit by Project Management to the Bank within 45 days after the end of each calendar quarter.

In compliance with International Public Sector Accounting Standards (IPSAS) and the Bank requirements, the Project will produce annual financial statements according to applicable rules and practises. The financial statements will constitute the entry point of the external auditor's annual diligences.

### **External Audit**

ARA-Sul financial statements are audited annually by a private external audit firm hired under government procurement rules and regulations. The auditors expressed unqualified opinion on ARA-Sul financial statements for the fiscal years ended 31 December 2011 and 31 December 2012. They also noted internal control weaknesses and non-compliance to key procedures such poor filing system and lack of appropriate justifications of expenditures. The Auditor's management letters are discussed at ARA Sul's Governing Board level where action plans are drawn to overcome the identified weaknesses. The drawn action plan for 2011 audit included the improvement of the filling system and assurance of the financial department that none payment could be processes without proper documentation.

The project financial statements will be audited by an independent private audit firm in accordance with the a Bank approved audit terms of reference with the audit carried out in accordance with International Standards on Auditing, as promulgated by the International Federation of Accountants (IFAC). The ARA-Sul audit TORs will be reviewed to incorporate project audit requirements The Implementing Agency will be required to submit separate audited Annual Financial Statements for the project, within six months after financial year-end with costs of audit financed from the Grant.

In addition to expressing an opinion on the Annual Financial Statements in compliance with International Standards on Auditing (ISAs), the auditors will be required to form an opinion on the compliance with Bank rules and procedures. Furthermore, the external auditors will prepare a Management Letter giving observations, comments, and recommendations for improvements in accounting records, systems, controls and compliance with financial covenants in the Protocol Agreement.

### **Supervision Plan**

A risk based approach will be adopted for the supervision of the project. The supervision will entail the review of the entire financial management issues, fixed asset register and management, disbursements, audit reports and IFRs, and provision of advice to task team on all FM issues. The on-site visit supervisions will be conducted once a year as part of the normal project supervisions including the procurement monitoring and evaluation and disbursement supervisions.

### **Conclusion**

The financial management arrangements of Mapai Dam Feasibility Studies Project have been found to be adequate (subject to the above mitigation measures) to provide, with reasonable assurance, accurate and timely accounts/information on the status of the Project as required by the Bank. Follow up will be made to ensure actions are taken on the items detailed in the above-mentioned Financial Management Action Plan

## ANNEX 9: PROCUREMENT OF GOODS, WORKS AND CONSULTANCY SERVICES

### National Procedures and Regulations - Use of Country Procurement System

A Country National Competitive Bidding procedures assessment (NCB Report) for Mozambique was conducted by the Bank in 2011. The Country's Procurement Regulations were analyzed to establish the extent to which the procedures for National Competitive Bidding were in line with the requirements of the Bank's Rules and Procedures for Procurement of Goods and Works. The analysis focused on good practice principles that meet the procurement objectives of economy, efficiency, transparency and equal opportunity deemed to be in conformity with provisions of the Bank's Rules and Procedures.

There are provisions identified in the national procurement procedures that differ from the Bank's procedures under NCB. The Procurement law in the Country provides for mandatory domestic preference clause for NCB. Preclusion from applying domestic preference is dependent upon approval by the Minister of Finance. Also, foreign firms are not allowed to bid under NCB, unless they have a local representative, and there's no independent complaint and appeals review mechanism.

Other major deviations are:

	DEVIATIONS
SBD GOODS	(i) Sections missing from Instructions to Bidders: <ul style="list-style-type: none"> <li>• Purchaser's right to vary quantities at the time of award</li> <li>• Eligibility</li> </ul> (ii) Sections missing from the GCC <ul style="list-style-type: none"> <li>• Application</li> <li>• Country of origin</li> <li>• Standards</li> <li>• Incidental expenses</li> <li>• Liquidated damages</li> <li>• Termination for convenience</li> <li>• Applicable law</li> <li>• Suspension of AfDB Loan</li> </ul>
SBD WORKS	(i) Sections missing from Instructions to Bidders: <ul style="list-style-type: none"> <li>• Eligible Goods and Services</li> <li>• Documents establishing eligibility of goods and related services</li> </ul> (ii) Sections missing from GCC <ul style="list-style-type: none"> <li>• Inspections and Audit by the Bank</li> <li>• Changes in the contract price</li> <li>• Staff and Labor provisions</li> <li>• Changes in the Contract Price</li> <li>• Suspension of Bank Loan or Credit</li> <li>• Eligibility</li> </ul>

All of the discrepancies identified in the NCB report and which have been summarized in the GAP presented in section B.5.7 will be reflected in an annex of the Financing Agreement of the Project.

Mozambique is updating its legal, regulatory and institutional framework in public procurement with assistance of Development Partners, where the African Development Bank is an active member. This modernization process will make Mozambique's system aligned to international good practices. Procurement system is decentralized. Despite an extensive work from UFSA to provide training at all levels, capacity is uneven among the UGEAs. Those with more experience in implementing multilateral funded-projects such as from the African Development Bank and the World Bank have built some capacity in procurement and can implement national Regulation with accuracy. At local level, the capacity is somehow weak, mainly due to the absence of procurement professionals' category, and the mobility of staff plays a major role. With development of e-SISTAFE, including all public finance management reform, professionals in the procurement sector feel that there is now an appreciable capacity and knowledge at the central level, which may lead to the use of national procedures to implement part of projects funded by international partners.

### **Procurement Arrangements**

Procurement consulting services financed by the Bank will be in accordance with AWF operational procedures and the Bank's Rules and Procedures: "Rules and Procedures for the Use of Consultants", dated May 2008, revised July 2012, using the relevant Bank Standard Bidding Documents, and the provisions stipulated in the Financing Agreement.

The various items under the consultancy category and related procurement arrangements are summarized in Table 3.1 p.15. Each contract to be financed by the Grant, the different procurement methods or consultant selection methods, estimated costs, prior-review requirements, and time frame are agreed between the Borrower and the Bank project team and are provided in the Procurement Plan (see section B.5.5).

### ***Goods***

Goods: N/A

### ***Consulting Services***

**Consultancy:** The procurement of consulting services i.e. the various studies financed by the Fund will be in accordance with revised July 2012 Bank Group *Rules and Procedures for the Use of Consultants*, using the relevant Standard Bank Group Bidding Documents. The procedure for selecting consultants for the component 1 of the Project will be based on the "Quality and Cost Based Selection" method.

The possibility of using advance procurement (or contracting) for acquisition will only be applicable to the Feasibility Study in order to allow saving a few months.

When the amount of the contract is less than UA 200,000, the Borrower may limit the publication of a Specific Procurement Notice (SPN) requesting for expressions of interest to national or regional newspapers. However, any eligible consultant, being regional or not, may

express his desire to be short-listed. For contracts expected to cost more than UA 200.000 advertisement on UNDP and Bank's website is mandatory.

### **Assessment of the Implementing Agency**

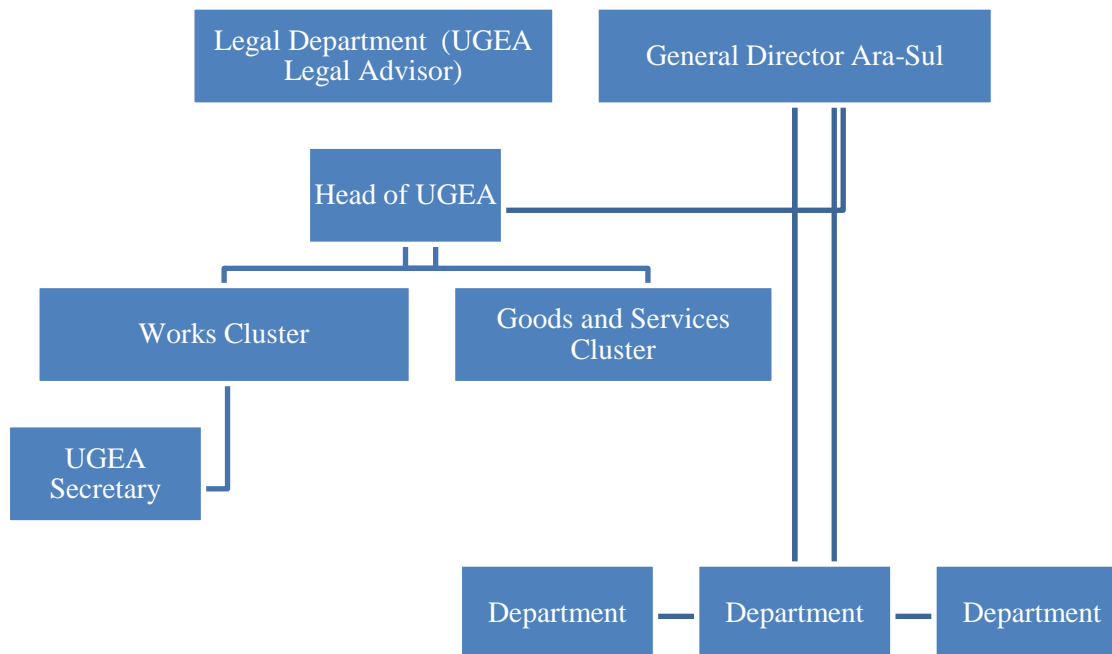
ARA-SUL will be responsible for the procurement of the study. An assessment of the capacity of the Implementing Agency to implement procurement actions for the project has been carried out by the Bank and included a review of the human capacities. The assessment reviewed the organizational structure for implementing the project and the interaction between the project's staff responsible for procurement activities and the Implementing Agency's relevant central unit for administration and finance. In terms of human capacity it was found that Ara Sul has a Procurement Unit (UGEA) which is responsible for handling all procurement issues of the institution and is comprised of 4 people. In October 2013, the most experienced member of the UGEA had been working with Procurement for four years and the least experienced had joined the unit three months ago.

The unit operates mostly with National Procedures enforced by the decree 15/2010 of 24<sup>th</sup> of May, and none of the members has any experience working with Multilateral Development Bank procedures, despite the fact that two of them attended trainings on World Bank Procurement procedures. Up until the moment this assessment was prepared the unit ran 12 Procurement processes for Consultancy Services, 15 for Goods and Services and 9 for works

The Procurement Unit has been counting on the valuable experience of the procurement expert working for the Massingir Dam Emergency Rehabilitation Project, funded by the Bank. Lack of experience of the Ara Sul procurement unit can be mitigated by taking advantage of the Massingir Dam procurement expert to coordinate procurement activities under this project.

During the implementation phase attention will need to be directed to the administration of the consultant's contract by the procurement unit of Ara Sul, which requires closer monitoring.

The Procurement Unit reports to the General Director of ARA-Sul which is the entity responsible for approving all procurement stages, such as bidding documents, nomination of evaluation committee, evaluation reports, handling of complains from bidders and draft contracts as shown on the chart below.



The UGEA is also responsible for the procurement planning. The planning consists only of list of goods, services and works to be contracted without a set timeframe.

The record keeping capacity of the Agency is good, all procurement files are kept in a room and the files are comprised of all the procurement documents ranging from all the requests and approvals needed to initiate a procurement process up to the signed contract. The UGEA does not keep any documents related to payments or contract management. After contract signature a contract manager is assigned to each contract and is responsible for a day by day monitoring of the contract.

The resources, capacity, expertise and experience Ara-Sul, taking into consideration the relatively low procurement activity of the project, are adequate to carry out the procurement. Most of the risks concerning the procurement component for implementation of the project have been identified and include delays in the implementation of the project due to weak knowledge of bank procurement procedures. The corrective measures which have been agreed are to take advantage of the presence of the Procurement Specialist assigned to Massingir Dam which the tasks include supporting UGEA in all procurement issues as needed. The Bank will provide training to the UGEA during the project launching on record keeping, monitoring of the Bank's procurement plan, preparation of the administrative and financial internal guidelines, mentoring staff, sensitization on fraud and corruption. Also, training on the use of Bank procedures for recruitment of consultancy services will be provided.

The overall project risk for procurement taking to account the presence of the procurement expert of the Massingir Dam Project to supervise and coordinate the procurement activities is low.

**General Procurement Notice**

The text of a General Procurement Notice (GPN) will be agreed with Ara Sul and it will be issued for publication in UNDB online and in the Bank’s Internet Website, upon approval by the Board of Directors of the Financing Proposal.

**Procurement Plan**

The Borrower, at appraisal, developed a tentative Procurement Plan for project implementation which provides the basis for the procurement methods. This plan has been agreed between the Borrower and the Project Team on October 2013, and will be available at Ara-Sul in Maputo. It will also be available in the Project’s database and in the Bank’s external website. This Procurement Plan will be updated by the Borrower’s Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. Any revisions proposed to the Procurement Plan shall be submitted to the Bank prior no objection. The Borrower shall implement the Procurement Plan in the manner in which it has been agreed with the Bank.

**Prior Review Threshold:** Procurement Decisions subject to Prior Review by the Bank as stated in Appendix 1 to the Rules and Procedures for Procurement of Goods and Consultancy Services:

No	Expenditure Category	Procurement Method	Contracts Subject to Prior Review
1	Consulting Services	QCBS	All contracts
		LCS	All contracts

**Any Other Special Selection Arrangements:** The possibility of using advance contracting for acquisition of the expertise is under consideration only for launching the Feasibility Study to save a few months . Such disbursement method will include a mechanism for reimbursement.

**Short list comprising entirely of national consultants:** Short list of consultants for services, estimated to cost less than UA\_200.000 equivalent per contract, may comprise entirely national consultants in accordance with the provisions of paragraph 2.7 of the Rules and Procedures for the Use of Consultants.

**Frequency of Procurement Post Review mission**

In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended procurement supervision missions to visit annually the project and carry out post review of procurement actions.

**Global Action Plan for improvement to National Procurement Procedures.**

The following discrepancies with the Bank’s Rules and Procedures: “Rules and Procedures for Procurement of Goods and Works”, dated May 2008, have been identified in the national procurement law and regulation (decree 15/2010 of May 24<sup>th</sup>), and shall not be used for procurement activities financed by the Bank:

ISSUES	REQUIRED CHANGES
Discrepancies identified in the National Procurement Act and its Regulations	
<p>The Public Regulations excludes: Principle of Eligibility</p> <ul style="list-style-type: none"> <li>• Requirement to open bids immediately after bid submission date and time.</li> <li>• Foreign firms are allowed to bid under NCB, unless have local representatives.</li> <li>• The official languages of the Bank are English and/or French.</li> </ul> <p>Principle of Fairness</p> <ul style="list-style-type: none"> <li>• An independent complaints and appeals review mechanism.</li> </ul>	<p><i>Revise the Procurement Regulations to include the clauses on:</i> Requirement to open bids immediately after bid submission date and time (Bank Rules Clauses 2.45), Foreign firms are allowed to bid under NCB without requirement for have local representatives, (Bank Rules Clauses 1.6), The official languages of the Bank are English and/or French (Bank Rules Clauses 2.15), provision for an independent complaints and appeals review mechanism (Bank Rules Clauses 2.43).</p>
Discrepancies identified in the National Standard Bidding Documents	
<p>Instructions to Bidders and General Conditions of Contract for Goods exclude: Principle of Eligibility</p> <ul style="list-style-type: none"> <li>• Eligible bidders</li> </ul> <p>Principle of Efficiency</p> <ul style="list-style-type: none"> <li>• Purchaser's Right to Vary Quantities at Time of Award</li> </ul>	<p>Inclusion of appropriate standard Clauses on Eligible bidders (Bank Rules Clauses 1.6) and Purchaser's Right to Vary Quantities at Time of Award (Bank Rules Clauses 2.38).</p>
<p>Instructions to Bidders and General Conditions of Contract for Small Works exclude: Principle of Eligibility</p> <ul style="list-style-type: none"> <li>• Eligible goods and services</li> <li>• Documents Establishing the Eligibility of Goods and Related Services</li> <li>• Suspension of Bank Loan or Credit</li> <li>• Eligibility</li> </ul>	<p>Inclusion of appropriate standard Clauses on Eligible goods and services (Bank Rules Clauses 1.6), Documents Establishing the Eligibility of Goods and Related Services (Bank Rules Clauses 1.6), Suspension of Bank Loan or Credit, (Bank Rules Clauses 1.6), and Eligibility (Bank Rules Clauses 1.6).</p>

## ANNEX 10: COMMUNICATIONS AND VISIBILITY GUIDELINES

Communication and brand visibility greatly matter to the AWF. The AWF views communication as a strategic function firmly tied to its strategies and business objectives. Steady communication with AWF stakeholders helps build credibility and secure their trust and esteem, which in turn, helps AWF build and protect its reputation. Communications is also about disclosure. The AWF is a multi-donor fund, and is accountable to a Governing Council that expects the AWF to hold itself to the highest level of accountability and transparency. The AWF is committed to making every effort to disclose, share and report information useful and relevant to its stakeholders and the greater public. This entails effectively communicating its achievements, progress, and results by using all means available, in a timely manner. All these elements are important for business and essential to attract and retain donors, and for AWF to maintaining its social license to operate.

Brand awareness is about making sure the public knows AWF exists and can tell the AWF apart from other water funds or organisations. The brand is a visual, memorable trigger, or a logo, that embodies the AWF and captures its core identity. Brand awareness is achieved over time, through activities meant to increase brand visibility, by repeated use and exposure of the logo at strategic places and times. The AWF logo is used as a seal or a signature used to signal AWF financial support or special collaboration.

The AWF has established **Communication and Visibility Guidelines** to the attention of partners, AfDB regional offices and grant recipients to help AWF more effectively achieve its brand and communications objectives, as laid out in the AWF Long Term Communications Strategy 2006 approved by the AWF Governing Council in 2006.

### 1. GENERAL REQUIREMENTS

- 1.1 At an early stage, when preparing communication activities related to an AWF supported event of project, contact the Communication Officer at AWF Secretariat, copying the AWF Project Manager.
- 1.2 At a minimum, and wherever possible, the AWF logo should be applied to outreach materials that pertain to AWF supported projects or events. The proper use of the logo should be discussed with the AWF Communication Officer.
- 1.3 The AWF should be verbally mentioned as donor of the project it is funding at public speaking events where the project is discussed, and also be mentioned as donor in any Power Point presentations relevant to the project funded by the AWF, using the name and the logo of the AWF appropriately.
- 1.4 The logo is to be obtained upon request from the AWF Communication Officer.
- 1.5 Documents and publications related to an AWF supported project or sponsored publication should contain the AWF logo, as well as this phrase on the cover page: *“This project/program/study is funded by the African Water Facility”*.

1.6 Implementing and Implementing agencies should always have a link to the AWF website on the page of their website relevant to an AWF-funded project/activity. The website is: [www.africanwaterfacility.org](http://www.africanwaterfacility.org)

1.7 The AWF asks that grant recipients report back to the AWF Secretariat, any special mention, award nominations or recognition that the project may have received.

## 2 VALIDATION PROCESS

2.1 The AWF management is responsible for the final clearance of AWF communications products/outputs.

## 3 PRESS RELEASES & MEDIA ADVISORIES

3.1 The AWF will issue an AWF-branded press release every time a project is approved and/or signed, and when completed (handover).

3.2 AWF press releases must always include a quote from the Coordinator of the AWF, which must be cleared by the Coordinator.

3.3 The AWF encourages and appreciates initiatives to issue joint press releases with its grant recipients. A standard joint press release can be issued at any time agreed with the AWF (between launch and completion).

3.4 When the grant recipient wishes to produce a press release, liaising with the AWF Communication Officer is required, as well as receiving a quote from the AWF Coordinator, as appropriate, and getting approval and clearance.

3.5 The AWF should be included in the title and/or first paragraph of the press release, as appropriate.

3.6 The press release should incorporate the AWF logo, mention that funding was provided by the AWF, and mention the amount of the AWF funding.

3.7 If a press conference is planned, the press release should include the name of an AWF senior representative who will be present at the press conference, when relevant.

3.8 All press releases must bear the name and contact information of the AWF Communication Officer, and if possible that of the communication/media representative from the grant recipient.

3.9 The AWF boilerplate text (“About the AWF”) must be added to the text, including the AWF web site address. Please contact the AWF Communication Officer for the latest version.

3.10 The AWF has final validation of all its press releases, following a review process involving reviewers.

3.11 The rules above also apply to media advisories.

#### 4 PRESS CONFERENCES

- 4.1 Press conferences to launch projects funded by the AWF should be organized in cooperation with the AWF, as much as possible.
- 4.2 The invitations should bear an AWF logo.
- 4.3 The AWF logo of a visible size should appear on any banner or poster to be displayed at the site of the conference.
- 4.4 Press kits need to include a press release with the AWF logo.
- 4.5 Whenever possible, an AWF banner should be on hand and set up to serve as a backdrop for TV and photo purposes.

#### 5 PRESS VISITS

- 5.1 When appropriate, journalists should be invited to visit the project funded by AWF, accompanied by representatives of the AWF or the AWF Focal Point in the respective authority / government of the grant recipient.

#### 6 VISITS BY GOVERNMENT OFFICIALS, AWF DONORS

- 6.1 Visits to projects by government officials and AWF donors are encouraged. Those should be prepared in coordination with the AWF and the AWF Focal Points of the host government. This can include meetings with local beneficiaries.
- 6.2 These visits may also include government officials and AWF donors' participation to roundtables and other events, as relevant.

#### 7 LEAFLETS, Brochures and Newsletters

- 7.1 All leaflets and brochures relevant to the project/program financed by AWF should incorporate the basic elements of the AWF visual identity, i.e. the AWF logo -with or without tagline.
- 7.2 Leaflets and brochures produced by a grant recipient must also incorporate a definition of the AWF (boilerplate text).
- 7.3 The cover page of all documents pertaining to the project financed by the AWF must clearly identify the activity as being part of an AWF-funded activity.
- 7.4 Copies, including electronic copies of the publications, should be made available to the AWF.

#### 8 ELECTRONIC Communication

- 8.1 Electronic communication disseminating information on AWF-funded projects including websites, newsletter, and social media platforms, should link to the AWF website.

## 9 SIGNAGE

9.1 The grant recipient should produce display panels, posters or banners to promote their AWF-funded or AWF-related activities at exhibitions and other events, placed in strategic locations for all to see.

## 10 Vehicles, Supplies and Equipment

10.1 AWF generally requests that vehicles, supplies and equipment funded by AWF be clearly identified, and visibly carry the AWF logo and the phrase “Provided with the support of the African Water Facility” in English, French or Portuguese, as relevant.

10.2 This requirement is subject to negotiation between AWF and the grant recipient as some supplies and equipment may be exempt.

10.3 The grant recipient must provide evidence of compliance with this rule (digital photos sent by email are recommended.)

## 11 Photographs and Audiovisual Productions

11.1 Professional high resolutions (300 Dpi) digital photographs of the project funded by AWF should be supplied to the AWF throughout the different phases of the project, to document the progress of actions and events related to these, and to be used in print and online publications.

11.2 All photos should be submitted with full caption and credit information.

11.3 The AWF will be entitled to use or reproduce photos submitted to it without payment of royalties.

11.4 Whenever relevant, audio-visual materials should acknowledge AWF support, by featuring the AWF logo at the beginning and/or end of the movie/documentary.

11.5 Copies of the movie(s) / documentary (ies) should be supplied to the AWF.

## 12 Commemorative Plaques or SIGNAGE

12.1 Whenever relevant, the grant recipient should place a permanent plaque, or some other type of large, commemorative signage on the most visible part of the building, infrastructure or nearby the project site, which received funding by AWF, beside the name of the Implementing Agency and/or name of the project, for visitors to see.

12.2 When appropriate, the plaque or signage could contain the following sentence: “This [name of the infrastructure] was funded by the African Water Facility” alongside the AWF logo.

## 13 Promotional Items

13.1 Before taking any decision on the production of such items, the Communication Officer at the AWF should be consulted.

13.2 Promotional items bearing the AWF logo can be distributed to support communications activities related to the project funded by AWF. This may include T-shirts, caps, pens, notebooks, USB keys, etc.