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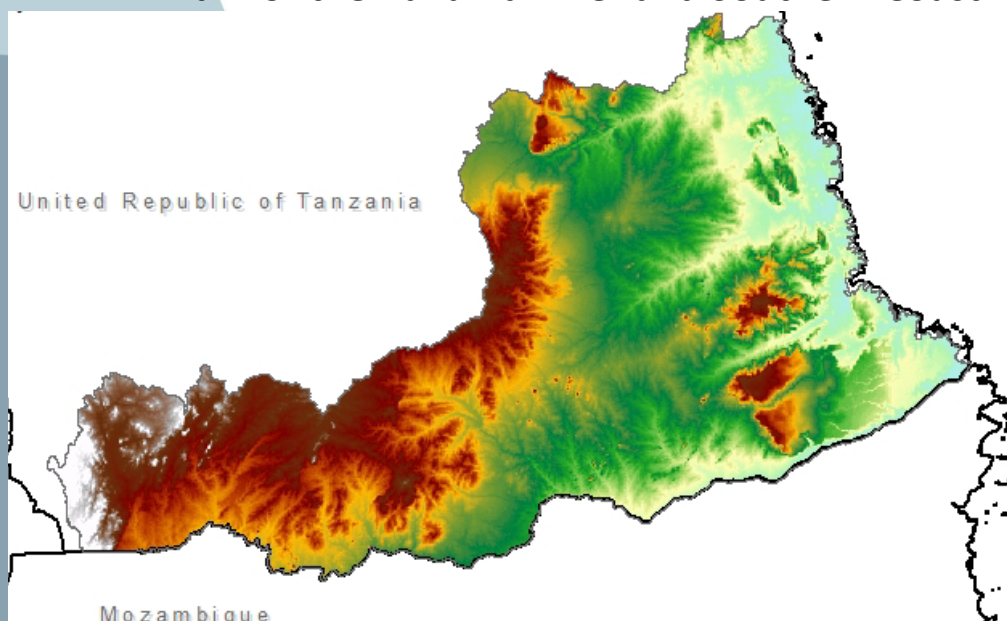
The United Republic of Tanzania

MINISTRY OF WATER



RFP No: ME-011/2009-10/C/09
Water Sector Development Programme (WSDP)
(Credit NO. Cr.4259-TA)

**Provision of Consultancy Services for Preparation of an
Integrated Water Resources Management and Development
Plan for the Ruvuma River and Southern Coast Basin**



**Component 5: Integrated Water Resources Management
And Development Plan – Implementation Strategy And
Action Plan**

Volume 2: Implementation Action Plan

December 2014

In association with



Howard Humphreys (Tanzania) Limited

Consulting Engineers

Notice

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Document history

Job number: 50113701			Document ref: 1A			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1		OC, ND	ND	IM		
2		ND	ND	IM	IM	13/08/14
3	After comments from Client on 30/09/2014	ND	ND	IM	IM	27/12/14

Client signoff

Client	United Republic of Tanzania Ministry of Water
Project	Preparation of an Integrated Water Resources Management and Development Plan for the Ruvuma River and Southern Coast basin
Document title	Integrated Water Resources Management and Development Plan
Job no.	50113701
Copy no.	
Document reference	

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LIST OF ACRONYMS

AfDB	African Development Bank
ASDS	Agricultural Sector Development Strategy
AusAID	Australian Aid for International Development
BBM	Building Block Method
BMU	Beach Management Unit
BWB	Basin Water Board
CBFM	Community Based Forest Management
CCIAM	Climate Change Impact, Adaptation and Mitigation
CDM	Clean Development Mechanism
COMESA	Common Market for Eastern and Southern Africa
COWSO	Community Owned Water Supply Organisation
CROPWAT	FAO's Cropwater Requirement Model
CSO	Civil Society Organisation
CWC	Catchment Water Committee
DC	District Council
DFID	Department for International Development
DMD	Disaster Management Department
DoE	Department of Environment
DSS	Decision Support System
EA	Environmental Assessment
EAC	East African Community
ECOSAN	Ecological Sanitation Initiative
EFR	Environmental Flow Requirement
EMA	Environmental Management Act
EMC	Ecological Management Class
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EU	European Union
FAO	Food and Agriculture Organisation
JF	January-February Season
JFM	Joint Forest Management
JJAS	June-July-August-September Season
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gases
GIS	Geographic Information System
GTZ	German Technical Cooperation
GW	Groundwater
GWh	Giga watt hour
GWP	Global Water Partnership
HIV/AIDS	Human Immune-Deficiency Syndrome
HP	Hydropower
IDP	International Development Partner
IO	Irrigators Organisation
IPCC	International Panel on Climate Change
IWRM(D)	Integrated Water Resources Management (and Development)
JICA	Japanese International Cooperation Agency
LGA	Local Government Authority

LGRP	Local Government Reform Programme
LUWASA	Lindi Urban Water and Sewage Authority
MCUM	Million cubic meters
MAFSC	Ministry of Agriculture, Food Security and Cooperatives
Makonde WSA	Makonde Water Supply Authority
MAM	March-April-May season
MANAWASA	Masasi Nachingwea Water Supply and Sanitation Authority
MAR	Mean Annual Runoff
MAUWASA	Masasi Urban Water and Sewage Authority
MBREMP	Mnazi Bay Ruvuma Estuary Management Park
MC	Municipal Council
MDG	Millennium Development Goal
MEM	Ministry of Energy and Minerals
MIS	Management Information System
MKUTATA	National Strategy for Growth and Reduction of Poverty II
Mld	Million litre per day
MLFD	Ministry of Livestock and Fisheries Development
MNRT	Ministry of Natural Resources and Tourism
MoW	Ministry of Water
MtDC	Mtwara Development Corporation
MTUWASA	Mtwara Urban Water and Sewage Authority
MW	Megawatt
M&E	Monitoring and Evaluation
NADMAC	National Disaster Management Committee
NAPA	National Adaptation Programme for Action
NAWAPO	National Water Policy
NAWSDS	National Water Sector Development Strategy
NBCBN	Nile Basin Capacity Building Network
NCCFP	national Climate Change Focal Point
NCCSC	National Climate Change Steering Committee
NCCTC	National Climate Change Technical Committee
NDC	National Development Corporation
NEMC	National Environmental Management Council
NGO	Non-governmental Organization
NIMP	National Irrigation Management Programme
NORAD	Norwegian Agency for Development Cooperation
NWB	National Water Board
OND	October-November-December season
PAP	Project Affected Person
PET	Potential Evapo-Transpiration
PES	Present Ecological Status
PIDG	Private Infrastructure Development Group
PIM	Participatory Irrigation Management
PMO	Prime Minister Office
PMO-RALG	Prime Minister Officer Regional Administration and Local Government
PPP	Public-Private Partnership
PRSP	Poverty Reduction Strategy Paper
REDD	UN Programme on Reducing Emissions from Deforestation and Forest Degradation
RJWC	Ruvuma Joint Water Committee
RSCB	Ruvuma and Southern Coast Basin

RSCBWB	Ruvuma and Southern Coast Basin Water Board
RUMAKI	Rufiji-Mafia-Kilwa Seascape
SADC	Southern African Development Community
SCB	Southern Coast Basin
SESA	Strategic Environmental and Social Assessment
SHILDA	Southern Highlands Livestock Development Association of Tanzania
SOUWASA	Songea Urban and Sewage Authority
SPATSIM	Spatial and Time Series Information Modelling
STP	Sewerage Treatment Plant
SWC	Soil and Water Conservation
TANDREC	Tanzania Disaster Relief Committee
TANESCO	Tanzania Electric Supply Company Limited
TMAA	Tanzania Mineral Auditing Agency
TNA	Technology Needs Assessment
TZS	Tanzanian Shilling
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollar
URT / GoT	United Republic of Tanzania / Government of Tanzania
UWASA	Urban Water and Sanitation Authority
VPO	Vice President's office
WDM	Water Demand Management
WMA	Wildlife Management Area
WRDP	Water Resources Development Programme
WRMA	Water Resources Management Act
WS	Water Supply
WSDP	Water Sector Development Programme
WUA	Water Users Association
WUG	Water User Group
WWF	World Wide Fund for Nature / World Wildlife Fund

1. INTRODUCTION

1.1. Project Background

The Tanzanian Ministry of Water (MoW) is presently implementing the Water Sector Development Programme (WSDP) 2006-2025 and the creation of Integrated Water Resources Management and Development Plans (IWRM&D) for Tanzania's river basins is a key objective of the WSDP. The plans will provide a blueprint for sustainable development and management of the country's water resources. The outputs from this project will assist the Basin Water Board, Mtwara (BWB) with the implementation of these plans for the Ruvuma River and Southern Coast Basin (RSCB).

MoW has set out the approach for the development of the plan for the RSCB through the completion of five components set out in the Request for Proposals. These components are:

Component 1: Review and inventory of water use and demand and water resources assessment comprising:

- Volume 1: Surface Water Resource Assessment
- Volume 2: Groundwater Resource Assessment
- Volume 3: Water Demand Assessment
- Volume 4: Water Quality and River Health
- Volume 5: Fisheries, Wildlife and Limnology
- Volume 6: Protection and Conservation of the Mtwanya and Mikindani Aquifers

Component 2: Institutional, Policy and legal framework comprising

- Volume 1: Institutional, Policy and Legal Framework and Stakeholders
- Volume 2: Socio-Economic Assessment

Component 3: Sector/Thematic Water Plans

- Volume 1: Sector/Thematic Water Plans
- Volume 2: Flood and Drought Management
- Volume 3: Water Resources Monitoring and Management Systems

Component 4: Integrated Water Resources Management and Development Plan

- Volume 1: IWRMD Plan

Component 5: IWRMD Plan Implementation Strategy and Action Plan

- Volume 1: IWRM Implementation Strategy
- Volume 2: IWRM Implementation Action Plan (This document)

Final Report

Appendix Reports

- Volume 1: Upper Ruvuma Sub-Basin Plan
- Volume 2: Likonde Sub-Basin Plan
- Volume 3: Upper Middle Ruvuma Sub-Basin Plan
- Volume 4: Lower Middle Ruvuma Sub-Basin Plan
- Volume 5: Lower Ruvuma Sub-Basin Plan
- Volume 6: Mambi Sub-Basin Plan
- Volume 7: Lukuledi Sub-Basin Plan
- Volume 8: Mbwemkuru Sub-Basin Plan
- Volume 9: Mavuji Sub-Basin Plan
- Volume 10: Matandu Sub-Basin Plan
- Volume 11: Implemented Capacity Building Activities
- Volume 12: Map Volume

This document presents the status of water resources in the basins, future scenarios regarding water demand and proposes management options for the periods up to 2035. The plan has been developed

on the basis of previous studies on the water resources in these basins. Strategic actions for the enhancement of sustainable water resources management are then presented in the Implementation Plan where roles and responsibilities for the implementation of specific actions are proposed.

Information contained in the tables and figures is drawn from the suite of reports presented under Components 1 to 3 as listed above.

1.2. The Purpose of the IWRMD Plan

This plan is aimed at meeting the requirements of the first component of the WSDP which is Water Resources Management and Development (WRMD) with the overall objective to:

- (i) develop a sound water resources management and development framework in all nine water basins, for optimising the utilisation of the water resources in a sustainable manner for the various competing uses;
- (ii) promote good governance of water resources through empowering water users, encouraging participatory and transparent decision-making in the allocation, utilization, protection and conservation of water resources, devolving ownership to the user level, and granting secure water use permits with responsibilities to the water users, community groups, local government and basin water offices; and promote economic instruments to encourage wise use of water, and
- (iii) strengthen the capacity of Basin Water Boards to address trans-boundary water resources issues.

The development of Integrated Water Resources Management and Development Plans (IWRMD) for each of the country's nine river basins is a key objective of the Water Sector Development Programme (WSDP). These plans are expected to provide a blueprint for sustainable development and management of the water resources in these basins. While the Ruvuma River Basin can be classified as a near pristine system with very rich biodiversity and little water infrastructure development, the need for planning for effective management of water resources in this basin is driven by the increasing exploitation of the region's natural capital. Recent discoveries of off shore natural gas reserves and the increased mining activities in the region have the potential to increase water demands in the Ruvuma Basin. Increased economic activity will be accompanied by increases in population resulting in increased water abstraction and pollution from anthropogenic sources. These developments will therefore have a bearing on the management of the RSCB and hence the need for the IWRMD Plan.

1.3. IWRM Principles

Water resources management has come into greater focus in recent years with the increased recognition that it is a primary resource for the achievement of poverty alleviation and national economic development goals. Its cross-cutting nature demands the adoption of an integrated approach to its management and development. The concept of Integrated Water Resources Management has been developed to further this new understanding. IWRM is defined in a number of different ways but the central tenets of the process are that it is a participatory planning tool for the management of water in ways that promote a balance between social and economic development with environmental sustainability. This requires the institutionalisation of a multidisciplinary approach to the management of the resource in an environment where there are usually competing interests. IWRM is therefore guided by the following principles:

- Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment;
- Water development and management should be based on a participatory approach involving users, planners and policy-makers at all levels;
- Water has an economic value in all its competing uses and should be recognized as an economic good.

1.4. The IWRMD Plan Development Process

The IWRMD Plan presented in this document was developed through a three Phase process that included:

- a) An **Inception Phase** where the consultant presented their proposed approach to the assignment;
- b) An **Assessment Phase** where the consultant presented a comprehensive water resources survey/assessment of the Ruvuma River and Southern Coast Basins' surface and groundwater resources, demand analysis and water balance studies
- c) A **Planning Phase** where the sector reports were prepared and also consultation meetings. This report is the outcome of this phase.

The IWRMD Plan was presented under the Volume 1 of Component 4 report. Five key areas have been identified to prepare the plan. They are

Key Area 1: Water for domestic purposes

Key Area 2: Water for development

Key Area 3: Water for environment

Key Area 4: Community participation

Key Area 5: Institutional capacity building

Followed by the IWRMD Plan, the strategy was evolved to implement the Plan and the same is presented in the Volume 1 of Component 5 report and this report (Volume 2 of Component 5) presents the implementation action plan.

1.5. The IWRMD Plan Implementation Action Plan

The strategies outlined in the Plan needs to be translated into implementable actions. The action plan covers the procedures, time frame and responsibilities. This will also cover a procedural framework for implementation, administration and review of the water resources management plan. The responsibilities of various players, resource allocations, financing and legal ramifications are also outlined in this report.

This report should be studied with Component 4 Volume 1 Report and Component 5 Volume 1 report.

2. IWRM PLAN KEY AREAS AND STRATEGIES

The IWRM&D Plan for the RSCB includes all the relevant sectors and is consistent with the national and RSCB goals. The analysis of challenges in the basin led to identification of key areas to include in the plan as guided by the content of the Vision for the basin. The key areas are as follows

1. Water for Domestic Purposes
2. Water for Development
3. Water for Environment
4. Community Participation
5. Institutional Capacity Building

2.1 Key Area 1: Water for Domestic Purposes

The water supply and sanitation needs should be met as a first priority among all water uses in order to improve the standard of living. The water needs to be provided to the community continuously either from groundwater or surface water. At the same time the water supply should be part of a multi-purpose project or as a standalone project. Key Area 1 promotes the idea of giving all sections of society access to water supply and sanitation. The objectives and strategies are presented below. Details could be found in the Component 4 Volume 1 and Component 5 Volume 2 respectively.

Table 2-1: Objectives and Strategies of Key Area 1

Objectives	Strategies
Objective 1: Achieving water supply and sanitation to all the urban people of the sub-basin	<p>Strategy 1-1: Undertake feasibility studies and implement Songea water supply proposals</p> <p>Strategy 1-2: Develop comprehensive water supply schemes to meet urban rural water demands (in addition to the present plan of Ruvuma-Mtwara Water Supply Scheme)</p> <p>Strategy 1-3: Rehabilitation and extension of Mtawanya and Mikindani Aquifers</p> <p>Strategy 1-4: Identify new sources for water supply</p> <p>Strategy 1-5: Develop comprehensive water supply schemes to meet both urban and rural water demands</p> <p>Strategy 1-6: Develop and implement sewerage master plans for all cities and towns</p> <p>Strategy 1-7: develop programmes under ECOSAN and improve existing sanitation</p>
Objective 2: Achieving water supply and sanitation to all the rural people of the sub-basin	<p>Strategy 1-4: Identify new sources for water supply</p> <p>Strategy 1-5: Develop comprehensive water supply schemes to meet both urban and rural water demands</p> <p>Strategy 1-6: Develop and implement sewerage master plans for all cities and towns</p> <p>Strategy 1-8: Undertake feasibility studies and implement rural water supply proposals</p> <p>Strategy 1-9: Rehabilitation and extension of Makonde Water Supply Scheme</p>

Objective 3: Surface and groundwater resources conservation and modelling to support water supply	Strategy 1-10: Groundwater risk zone identification and develop of management plans
Objective 4: The water supply infrastructure is capable of operating at design capacity	Strategy 1-11: Improve the efficiency of water supply infrastructure
Objective 5: Sustainable asset management practices are in place for all the water supply infrastructure	Strategy 1-12: Develop and implement water supply asset management plans

2.2 Key Area 2: Water for Development

This area is mainly to improve the socio-economic situation of the residents of RSCB. Thus it concerns development of irrigation, hydropower, livestock and fisheries including multipurpose water resources infrastructure which is important for economic development. Some of the infrastructure will be multipurpose e.g. water supply and sanitation or dams for flood, drought and environmental flow management. While developing these structures protection must be given to downstream riparian rights and ecosystem needs, social and cultural aspects and immediate environmental management. The objectives and strategies are presented below. Details could be found in the Component 4 Volume 1 and Component 5 Volume 2 respectively.

Table 2-2: Objectives and Strategies of Key Area 2

Objectives	Strategies
Objective 1: Developed irrigation systems should have considered water availability, social and environmental needs	Strategy 2-1: Develop irrigation infrastructure in a sustainable manner
Objective 2: Achieve sustainable Participatory Irrigation Management (PIM) in existing and developed irrigation schemes	Strategy 2-2: Promote and facilitate participatory irrigation management
Objective 3: Develop livestock watering infrastructure to provide sustainable water resources for livestock development	Strategy 2-3: Develop livestock watering infrastructure (dips, charco dams and dams)
Objective 4: Develop aquaculture systems to increase the fish production	Strategy 2-4: Encourage aquaculture to increase fish production
Objective 5: Utilisation of excess water for water storage	Strategy 2-5: Develop water resources schemes
Objective 6: Utilise the hydropower potential of the sub-basin	Strategy 2-6: Develop mini-hydropower schemes Strategy 2-7: Develop multipurpose international and multipurpose dams
Objective 7: All water development infrastructure to be capable of operating at design capacity	Strategy 2-8: Apply appropriate measures to increase efficiency of irrigation water use (mainly for improved schemes)
Objective 8: Sustainable asset management practices should be in place for all water-related infrastructure in the basin	Strategy 2-9: Prepare and implement asset management plans for all water development infrastructures in the Upper Ruvuma sub-basin

2.3 Key Area 3: Water for Environment

This area is mainly to meet the environmental demand of the RSCB. Environmental reserves, flow management and protection of the environment have all been recognised as important as socio-economic use of water. The environmental degradation in the sub-basin is minimal but pollution of water resources, both surface and groundwater, from domestic wastes, artisanal mining, erosion and deforested catchments is starting to have an effect on the available water resources. The main impacts of this pollution are on the biodiversity of the aquatic habitats of the stream and also the terrestrial habitats and preventative action is required. The objectives and strategies are presented below. Details could be found in the Component 4 Volume 1 and Component 5 Volume 2 respectively.

Table 2-3: Objectives and Strategies of Key Area 3

Objectives	Strategies
Objective 1: Prepare watershed development plans, including appropriate agricultural best management practices, to reduce erosion and to increase the economic value of the land	Strategy 3-1: Develop watershed development plans for the degraded sub-basin
Objective 2: Protect forest resources from illegal logging and deforestation activities	Strategy 3-2: Develop and implement reforestation programmes
Objective 3: Provide sufficient water for wildlife in forest and game reserves	Strategy 3-3: Develop water resources plan for the forest and game reserves
Objective 4: Ensure adequate environmental flows are released for ecological maintenance	Strategy 3-4: Environmental flow requirement update and flow management
Objective 5: Reduced pollution load entering into the water resources	Strategy 3-5: Develop restoration plan for the polluted areas Strategy 3-6: Provide buffer zone for water resources and ecosystem protection Strategy 3-7: develop and implement solid waste management plans for cities and towns
Objective 6: Enhance the capacity of the sub-basin to adapt to climate change	Strategy 3-8: Develop Climate Change Adaptation Plan
Objective 7: Determination of the reserve and allocation of reserves in line with the requirement as per WRMA 2009	Strategy 3-9: Reserve for future needs
Objective 8: Develop landslide risk management plan	Strategy 3-10: Landslide risk management plan
Objective 9: Management of estuaries	Strategy 3-11: Protection of estuaries from the Ruvuma river in the south to the Somanga river estuary in the north
Objective 10: Arresting salt water intrusion of aquifers	Strategy 3-12: Conducting detailed salt water intrusion study along the coast and setting up monitoring procedure

2.4 Key Area 4: Community Participation

Participation of all stakeholders, especially the local community, is essential for effective water resources management. Since the communities do not have wider knowledge outside their immediate area it is important to create awareness of the importance of public participation for a wider benefit. Participation helps decision making in terms of development and implementation of strategies at local levels and sometimes provides resources during implementation. The plan sometimes needs a change of socio-economic activity and the involvement of communities from the planning stage is essential to achieve this. Community participation is possible through various strategies such as creation of forums, awareness campaigns, classroom education and also by using communication channels such as radio, television, internet and messaging services. It does also cover inclusive participation with greater care to gender, vulnerable group and youths. The objectives and strategies are presented below. Details could be found in the Component 4 Volume 1 and Component 5 Volume 2 respectively.

Table 2-4: Objectives and Strategies of Key Area 4

Objectives	Strategies
<p>Objective 1: Awareness programmes to the local communities, non-governmental organisations, civil society organisations, media on water resources management, mainly conservation, efficient use and protection of the resources</p>	<p>Strategy 4-1: Develop and implement an Information, Education and Awareness Strategy</p> <p>Strategy 4-2: Undertake awareness programmes for technical areas</p> <p>The technical areas identified are</p> <ul style="list-style-type: none"> a) the dangers of inappropriate use of agricultural chemicals b) Advantages of saving water for the domestic consumers c) Protection of water resources points d) Safe use of mercury in the gold mining e) Land and water management for the artisanal miners f) Disadvantages of deforestation and advantages of forest conservation g) Watershed development h) Soil and water conservation i) Livestock water management j) Environmental management issues in the livestock sector k) Safe fishing techniques l) Safe disposal of wastes m) Coastal management n) Increasing water use efficiency for the irrigators
<p>Objective 2: Create a forum or opportunity for the local communities to participate in the planning, implementation and monitoring of IWRMD Plan</p>	<p>Strategy 4-3: Develop appropriate institutional arrangement to allow the communities to participate in water resources management</p>
<p>Objective 3: Community participation should be inclusive of women and vulnerable groups</p>	<p>Strategy 4-4: Undertake awareness programmes for management areas and cross cutting issues</p> <p>Strategy 4-5: Undertake awareness programmes in the schools</p>

2.5 Key Area 5: Institutional Capacity Building

There are several institutions in the water resources management organisational set up in Tanzania and they have been established with policies, strategies and laws. The Ruvuma and Southern Coast Basin Water Board (RSCBWB) has been established as part of this institutional arrangement and the next level of Catchment Water Committees (CWCs) are yet to be formed. The RSCBWB is currently fulfilling its roles in water and discharge permits and revenue collection from these permits. However there are areas where the RSCBWB needs support to manage the water resources of the basin efficiently and sustainably. One such area is the linkage between regional/district authorities and the RSCBWB.

The other area for RSCBWB institutional strengthening is in monitoring, data collection and analysis. The support is needed not only in the hydrological sector but also in the environmental and socio-economic areas as well. The strategies below will provide a robust information system that will give reliable and timely information for decision making. The objectives and strategies are presented below. Details could be found in the Component 4 Volume 1 and Component 5 Volume 2 respectively.

Table 2-5: Objectives and Strategies of Key Area 5

Objectives	Strategies
Objective 1: An effective advisory and coordination mechanism for transboundary water resources management	Strategy 5-1: Continuation of Ruvuma Joint Water Commission (RJWC) tasks and enhancement of its action areas
Objective 2: Strengthen the BWB	Strategy 5-2: Strengthen the BWB by employing sufficient staff and providing office furniture and equipment
Objective 3: Capacity building programme for the BWB and CWC	Strategy 5-3: Conduct training programme for the BWB and CWC staff
Objective 4: An effective advisory, coordination and funding mechanism for water resources management at sub-basin level	Strategy 5-4: Establish Sub-basin Water Committee (CWC) for ten sub-basins and provide sufficient logistics Strategy 5-5: Establish Water User Groups (WUGs) and provide sufficient logistics Strategy 5-6: Operationalisation of National Water Investment Fund (Maji Trust Fund) in the Water Supply and Sanitation Act 2009
Objective 5: A holistic, accountable, transparent and integrated sub-basin water resources planning mechanism in place	Strategy 5-7: Implementation, monitoring, review and update of sub-basin plans
Objective 6: An optimal water resources monitoring network is established to cover both quantity and quality aspects	Strategy 5-8: Upgrade the water resources monitoring network
Objective 7: Comprehensive water resources database with sharing arrangement for all water related features and structures to support decision making on sustainable water resources management	Strategy 5-9: Develop database for water resources related sectors Strategy 5-10: Update the developed DSS Model and link with MIKEBASIN model

3. ACTION PLAN

3.1 Overview

The actions required to achieve the above objectives and strategies (Section 3) are presented in this section. This section also provides information on the indicative timeframe and the responsibility for implementation. The profiles of some of these interventions are presented in the next chapter with more information such as rationale, detailed description of the intervention and rationale. The existing plans and projects are also listed here but not in the interventions profiles.

3.2 Implementation Action Plan

The action plan for the basin is presented in the Table 4.1 and for the sub-basin, it is presented in Sub-Basin Plans (Appendix Volume 1 to 10).

Table 3-1: Implementation Action Plan

No	Objectives	Strategy	Actions	Time-frame	Responsibility
Key Area 1: Water Domestic Purposes					
1	Objective 1: Achieving water supply and sanitation to all the urban people of the basin	1-1,1-2 and 1-3	<p>The list of water supply schemes, where feasibility studies are to be conducted is presented in Sub-Basin Plans (Appendix Volume 1 to 10). In addition they have been presented in Table 4.2 below.</p> <ul style="list-style-type: none"> • Get the funding for feasibility study from the UWASA funds or external funds • Conduct the feasibility study including hydrological, hydro-geological study and water demand • Get funding for the implementation • Implement the projects • Operate and maintain efficiently • Monitor the quantity, quality and O&M 	<p>To 2020</p> <p>To 2020</p> <p>To 2020</p> <p>The rest of the activities to 2040</p>	MTUWASA, LUWASA, MAWASA, SOUWASA
2	Objective 1: Achieving water supply and sanitation to all the urban people of the basin Objective 2: Achieving water supply and sanitation to all the rural people of the basin	1-4 and 1-5	<p>The list of water supply schemes, where new and comprehensive water supply schemes identified, are presented in Sub-Basin Plans (Appendix Volume 1 to 10). They are</p> <p>(a) Ruvuma –Mtwara water supply feeding the villages enroute also</p> <p>(b) Ruvuma-Mangaka & Masasi</p> <p>(c) Muhwesi – Tunduru</p>		MoW and DCs and UWASAs

			<p>(d) Matandu – Kilwa</p> <p>Actions</p> <ul style="list-style-type: none"> • Get the funding for feasibility study from the MoW funds or external funds • Conduct the feasibility study including hydrological study and water demand • Get funding for the implementation • Implement the projects • Operate and maintain efficiently • Monitor the quantity, quality and O&M 	<p>Feasibility for (a) completed for the rest to 2020</p> <p>To 2025</p>	
3	Objective 2: Achieving water supply and sanitation to all the rural people of the basin	1-8	<p>The list of water supply schemes, where feasibility study conducted is presented in Sub-Basin Plans (Appendix Volume 1 to 10). In addition they have been presented in Table 4.2 below.</p> <ul style="list-style-type: none"> • Get the funding • Implement the projects • Form WUGs • Train WUGs on operation and maintenance, fee collection, etc. • Monitor the quantity, quality and O&M 	<p>To 2016</p> <p>To 2020</p> <p>The rest activities to 2040</p>	All DCs
4	Objective 2: Achieving water supply and sanitation to all the rural people of the basin	1-4 and 1-8	<p>The list of water supply schemes, where feasibility studies are to be conducted is presented in Sub-Basin Plans (Appendix Volume 1 to 10).</p> <ul style="list-style-type: none"> • Get the funding for feasibility study from the DC funds or external funds • Conduct the feasibility study including hydrological, hydro-geological study and water demand • Get funding for the implementation • Implement the projects • Form WUGs • Train WUGs on operation and maintenance, fee collection, etc.. • Monitor the quantity, quality and O&M 	<p>To 2020</p> <p>To 2020</p> <p>To 2020</p> <p>The rest of the activities to 2040</p>	All DCs
5	Objectives 1 and 2 above	1-6	Sewerage Master Plan for the cities (Songea, Masasi, Mtwara)		UWASAs and DCs

			and Lindi) and towns (Mbinga, Tunduru, Mangaka, Newala, Tandahimba, Ruangua, Nachingwea, Kilwa and Liwale) <u>Actions</u> 1. Get funding for the Sewerage Master Plan preparation 2. Prepare Sewerage Master Plan including feasibility studies 3. Identify actions to be implemented 4. Prepare tender documents 5. Appoint contractors to implement 6. Implement the activities 7. Operate and maintain efficiently 8. Create awareness among the public on the sanitation aspects including hygiene	To 2016 To 2020 To 2020 Rest of the activities to 2040	
6	Objectives 2 above	1-7	Sanitation – Piloting and promoting ECOSAN initiatives	To 2020	All DCs
7	Objective 2 above Objective 4 The water supply infrastructure is capable of operating at design capacity	1-9, 1-11	Rehabilitation and extension of Makonde Water Supply Scheme. The rehabilitation feasibility study has been completed. <u>Actions</u> a. Identify funding sources b. Prepare tender documents c. Appoint contractors to implement d. Implement the activities e. Operate and maintain efficiently f. Create awareness among the public on the sanitation aspects including hygiene	To 2020	MoW
8	Objectives 3: Surface and groundwater resources conservation and modelling to support water supply	1-10	Groundwater risk zone identification and develop management plans for such zones <u>Actions</u> 1. Identify the areas of groundwater risk 2. Develop groundwater model 3. Prepare a detailed aquifer management plan for these risky areas 4. Declare them as areas of high groundwater risk areas	To 2025	BWB

			5. Implement the aquifer management plan		
9	Objective 5: Sustainable asset management practices are in place for all the water supply infrastructure	1-12	<p>Asset management plan</p> <ul style="list-style-type: none"> • Carry out a survey of all water supply and sewerage infrastructure assets to determine the current status of these, and prepare an asset management plan (include the survey on their operational efficiency) • Categorise the assets • Prioritise the assets for maintenance and rehabilitation • Implement the asset management plan • Prepare asset management manuals for all the categories of assets 	To 2020	BWB / UWASAs / DCs and MoW
Key Area 2: Water Development					
1	<p>Objective 1: Have developed irrigation systems considering water availability, social and environmental needs</p> <p>Objective 2: Achieve sustainable participatory irrigation management (PIM) in the existing and proposed irrigation schemes</p> <p>Objective 7: Have all water development infrastructures capable of operating at design capacity</p>	2-1 and 2-2	<p>Irrigation schemes: Schemes listed in Annexure 1 of Component 4 Volume 1</p> <p>Action Plan</p> <ul style="list-style-type: none"> • Conduct feasibility studies • Prepare designs and tender documents • Float the tenders • Implement the rehabilitation / new construction • Simultaneously form Irrigators' Organisations (IOs) • Prepare O&M manual • Train IOs on O&M and organisational management • Handover the schemes, as per PIM principles, to IOs for regular O&M activities • Train farmers on water saving techniques such as System of Rice Intensification (SRI) methods 	<p>Short term (2015-2020): Development of 14,896 ha</p> <p>Medium term (2021-2030): Development of 25,912 ha</p> <p>Long term (2031-2040): Development of 25,174 ha</p>	MAFSC / All DCs
2	Objective 3: Develop livestock watering infrastructures to provide sustainable water resources for	2-3	The lists of identified charco dam sites are presented in the Sub-Basin Plans. They are expected to be implemented in the coming years depending on the budget	By 2016	All DCs (with the support from MLFD) and private sector

	livestock development		In future, at least one livestock watering points (dips, charco dams) per ward by 2025. At least half of them could be tried under private participation. Another one per ward by 2035 and all of them are expected under private participation One charco dam per ward by 2020 is suggested for the Lindi Region only to meet the additional demand for the migrating livestock from Ihefu wetland	103, 177, 352 watering structures by 2020, 2030 and 2040 respectively	
3	Objective 3: Develop livestock watering infrastructures to provide sustainable water resources for livestock development	2-3	Extension services (no. of trainings) to create awareness on pollution abatement works due to livestock development (one training per sub-basin per year)	60 (2020), 100 (2030) and 100 (2040)	MFLD and BWB and Districts
4	Objective 4: Develop aquaculture systems to increase the fish production	2-4	Aquaculture demonstration fish ponds (one per sub-basin per district in the first year) and then private firms @ 1 per ward by 2030 and another one per ward to 2040	31(2020), 109(2030) 219(2040)	Districts with support from MLFD and private sector
5	Objective 4: Develop aquaculture systems to increase the fish production	2-4	Extension services (No of trainings) – aquaculture demonstration, awareness on fisheries, water and environmental legislation	60 (2020), 100 (2030)and 100 (2040)	Districts and MLFD with support from BWB
6	Objective 5: Utilisation of excess water available for development	2-5	<ul style="list-style-type: none"> • Construction of 18 schemes <ul style="list-style-type: none"> ○ Conduct feasibility study ○ Conduct ESIA and ESMP ○ Implementation ○ Operation and maintenance 	Feasibility study - 2020 Construction – by 2030	BWB / MoW
7	Objective 6: Utilise the hydropower potential of the basin	2-6	<ul style="list-style-type: none"> • Identified mini-hydropower schemes are Lupilo and Lumeme sites and Kwitanda HP <ul style="list-style-type: none"> ○ Conduct feasibility study by 2020 ○ Conduct ESIA and ESMP ○ Implement ○ Operate and Maintain 	Feasibility study - 2020 Construction – by 2030	MWM / TANESCO / Private
8	Objective 6: Utilise the hydropower potential of the	2-7	<ul style="list-style-type: none"> • Identified multi-purpose, transboundary HP schemes are HP1 to HP6 <ul style="list-style-type: none"> ○ Conduct feasibility study 	Feasibility study - 2020 Construction – by 2030	MWM / TANESCO / Private

	basin		<ul style="list-style-type: none"> by 2020 <ul style="list-style-type: none"> o Conduct ESIA and ESMP o Implement o Operate and Maintain 	and partly by 2040	
9	<p>Objective 7: Have all water development Infrastructures to be capable of operating at design capacity</p> <p>Objective 8: Have sustainable asset management practices in place for all water-related infrastructure in the basin</p>	2-8 and 2-9	<ul style="list-style-type: none"> • Carry out a survey of all water infrastructure assets, other than water supply ones, to determine the current status of these, and prepare an asset management plan • Make rehabilitation plans • Categorise the assets • Prioritise the assets for maintenance and rehabilitation • Implement the asset management plan • Prepare asset management manuals for all the categories of assets 	<p>To 2020</p> <p>To 2040</p>	BWB / MoW / TANESCO / Private
Key Area 3: Water for Environment					
1	Objective 1: have watershed development plans, including appropriate agricultural best management practices, to reduce the erosion and also to increase the economic values of the land	3-1	<ol style="list-style-type: none"> 1. Watershed management plans are to be prepared for the catchments (identified locations could be seen at sub-basin plans) 2. Identify further degraded catchments in the basin 3. Implementing the plans 	<p>To 2016</p> <p>To 2016</p> <p>To 2020</p>	All DCs
2	Objective 1 as above	3-1	<p>Restoration of Chidya lake supply channel</p> <ol style="list-style-type: none"> 1. Prepare feasibility study for restoring the supply channel and other management practices required to improve the water quality of the lake 2. Appoint a contractor to implement the activities 3. Monitor the improvements (monitoring system is included in the Key Areas 5) 	<p>2016</p> <p>2018</p>	BWB
3	Objective 2: Have protected forest resources from illegal logging and deforestation activities	3-2	<p>Management of the forest reserves and WMA from the illegal and deforestation activities (the lists of the reserves are provided in the Sub-basin Plan)</p> <ol style="list-style-type: none"> 1. Nursery development to 	To 2020	DCs / MNRT

			maintain the forest area in the above areas		
4	Objective 3: Provide sufficient water for wildlife animals in forest and game reserves	3-3	<ol style="list-style-type: none"> 1. Prepare water management plan for the forest areas 2. Implementation of plan 	<p>To 2016</p> <p>To 2020</p>	DCs/MNRT
5	Objective 4: to ensure adequate environmental flow is released for ecological maintenance	3-4	<ol style="list-style-type: none"> 1. Assess and update the existing environmental management category at all the abstraction points (water permit holders) through river health assessment 2. Decide the environmental category to be maintained at the source 3. Impose regulations on water abstraction / water discharge permits 4. On implementation of proposed dams, operate the dams to release EFR 	To 2035	BWB
6	Objective 5: Reduce pollution load entering into the water resources	3-5	<ol style="list-style-type: none"> 1. Identify the pollution entry hotspots – mainly livestock settled areas and proposed mining areas and 2. Prepare plans to reduce the impact of pollution 3. Implement the plan 	<p>2016</p> <p>2016 To 2040</p>	BWB
7	Objective 5: as above	3-6	<ol style="list-style-type: none"> 1. Identify the buffer zone area for water resources systems (all rivers in the sub-basin) for ecosystem protection. Initially the river banks in the towns and villages have to be considered for this survey and protection 2. Survey and assess the current status and health (composition of biodiversity) of riparian buffer zones 3. Suggest the method to derive a buffer zone size and demarcation 4. Develop plans to implement the protection of buffer zones and also support present users to be away from the buffer zone 5. Implement the plans 	To 2025	BWB
8	Objective 5: as above	3-7	Solid Waste Management Master Plan for the cities (Songea, Masasi, Mtwara and		MCs and DCs

			<p>Lindi) and towns (Mbinga, Tunduru, Mangaka, Newala, Tandahimba, Ruangua, Nachingwea, Kilwa and Liwale)</p> <p>Actions</p> <ol style="list-style-type: none"> 1. Get funding for the Solid Waste Master Plan preparation 2. Prepare Solid Waste Master Plan including feasibility studies 3. Identify actions to be implemented 4. Prepare tender documents 5. Appoint contractors to implement 6. Implement the activities 7. Operate and maintain efficiently 8. Create awareness among the public on the solid waste management aspects including hygiene 	<p>To 2016</p> <p>To 2020</p> <p>To 2020</p> <p>Rest of the activities to 2040</p>	
9	Objective 6: Enhance the capacity of the sub-basin to adapt to climate change	3-8	<ul style="list-style-type: none"> • Prepare a climate change adaptation plan for all the sub-basins. • Prepare an action plan for implementation • Identify the financial and technical sources to implement the adaptation plan • Implement the plan • Monitor and update the plan as and when needed 	<p>To 2016</p> <p>To 2016</p> <p>To 2020</p> <p>To 2030</p> <p>To be continuous</p>	BWB
10	Objective 7: Determination of the reserve and allocation of such reserves in line with the requirement as per WRMA 2009	3-9	<ul style="list-style-type: none"> • Identify methodology for the reserve calculation • Prepare an action plan for reserve allocation and management • Implement the plan • Monitor and update the plan as and when needed 	<p>To 2015</p> <p>To 2016</p> <p>To 2020</p> <p>To be continuous</p>	BWB
11	Objective 8: Development of landslide risk management plan	3-10	<ul style="list-style-type: none"> • Identify the risky areas are the Makonde and Rondo plateaus. • Prepare risk management plan • Implement the plan through infrastructure development and through non-infrastructure measures such as awareness creation, 	<p>To 2016</p> <p>To 2040</p>	

	resources				
2	Objective 1: as above	4-2	<ul style="list-style-type: none"> • Identify technical areas where the public needs awareness – initial areas identified are <ul style="list-style-type: none"> a) the dangers of inappropriate use of agricultural chemicals b) Advantages of saving water for the domestic consumers c) Protection of water resources points d) Safe use of mercury in the gold mining e) Land and water management for the artisanal miners f) Disadvantages of deforestation and advantages of forest conservation g) Watershed development h) Soil and water conservation i) Livestock water management j) Environmental management issues in the livestock sector k) Safe fishing techniques l) Safe disposal of wastes m) Coastal management n) Increasing water use efficiency for the irrigators • Identify appropriate awareness creation tool • Conduct the awareness programmes 	To 2016 To be continued	BWB and other related Ministries
3	Objective 2: Create a forum or opportunity for the local communities to participate in the planning, implementation and monitoring of IWRMD Plan	4-3	<ul style="list-style-type: none"> • Identify interest groups at the village and ward level, through a survey, and assess their ability to participate • They could be combined and formed as a catchment water committees at sub-catchment level • Form water user groups such as irrigators organisations and water supply committees • Provide technical and 	To be continuous	MoW and BWB through legal means

			<p>organisational development support</p> <ul style="list-style-type: none"> • See that at least 50% of the interest group members are women and vulnerable groups 		
4	Objective 3: Community participation should be inclusive of women and vulnerable groups	4-4	<ul style="list-style-type: none"> • Identify cross cutting areas where the public needs awareness – initial areas identified are <ul style="list-style-type: none"> a) Gender mainstreaming b) Good governance c) Sensitisation on HIV/AIDS d) Involvement of youth e) Involvement of vulnerable, mainly poor, people • Identify appropriate awareness creation tool • Conduct the awareness programmes 	To be continuous	BWB and CWC
5	Objective 3: as above	4-5	<ul style="list-style-type: none"> • Exhibition in the school on the water resources protection, resources and demand management • Conduct drawing, essay or speech competitions on the above subjects • Take the children to water supply and sewerage stations and catchment management areas • Include a chapter in the syllabus on the above subjects 		
Key Area 5: Institutional Capacity Building					
1	Objective 1: An effective advisory and coordination mechanisms for transboundary water resources management (Basin level)	5-1	<p>Main strategy is continual of RJWC tasks and enhancement of its action areas. The actions required are</p> <p>Actions:</p> <ul style="list-style-type: none"> • As per the protocol of Shared Water Courses, establish watercourse agreement for Ruvuma basin between the URT and RM. • RJWC focus areas should be (a) Capacity building focusing on institutional, governance and 	To 2020	BWB, MoW RJWC and SADC

			<p>management requirements. (b) Empowerment on financial viability and organisational sustainability, reflecting the phased evolution of the Ruvuma JWC, and (c) Accelerate the assumption of legal persona / corporate identity by shared watercourse institutions, based on guidelines on options for the formal registration of these institutions and their possible secretariats.</p> <ul style="list-style-type: none"> • Implement the recommendations of the SADC's Project on '<i>Development of the Ruvuma River Basin Monograph and Joint Integrated Water Resources Management Study</i>'. 		
2	Objective 2: Strengthening of BWB	5-2	<ul style="list-style-type: none"> • The BWB needs to be strengthened by <ul style="list-style-type: none"> ○ Appointment of vacant posts ○ Provide technical and management training (covered by next objective) ○ Office refurbishment 	2015 Continuous Recently refurbished	MoW / BWB
3	Objective 3: Capacity building programme for the BWB and CWC jointly	5-3	<ul style="list-style-type: none"> • Develop awareness programme plan for the BWB and CWCs on <ul style="list-style-type: none"> ○ technical trainings (included under Key Area 4) ○ cross cutting areas (included under Key Area 4) • Implement the awareness programmes • Monitor the awareness levels and alter the programmes as necessary 	2016 To be continuous	BWB / MoW
4	Objective 4: an effective advisory and coordination mechanism for water resources management at sub-basin level	5-4	<ul style="list-style-type: none"> • Establish Sub-basin CWCs after getting an agreement signed between MoW and RSCBWB • Ensure that the CWCs have enough legal back up and it has specific 	To 2015 To 2016	BWB

			<p>mandate, operational procedure, appointment procedures and fund</p> <ul style="list-style-type: none"> The fund should be made available for all its infrastructure needs, staff remuneration, technical know-how and software development Ensure that the staff appointed have appropriate skills, water resources management knowledge and experience and it is without any gender bias. Ensure that CWCs meet regularly and report it to the BWB Ensure CWCs and RSCBWB meet regularly on IWRMD issues Ensure that it implements some of the IWRMD Plan projects. 	<p>To 2020</p> <p>To 2020</p> <p>Continuous</p> <p>Continuous</p> <p>Continuous</p>	
5	Objective 4: as above	5-5	<ul style="list-style-type: none"> WUA (or WUG) establishment and strengthening <ul style="list-style-type: none"> Formation of WUAs for all the water supply points Provide training to WUAs on operation and maintenance of schemes, and on organisational management Develop an Information, Education and Awareness Strategy to reach the communities Develop Ruvuma river and RSCB awareness kits Identify the media services to reach target audiences Implement the strategy Ensure that the communities understand and have interest in IWRM meetings and decision making process 	<p>To be continuous</p> <p>2016</p> <p>2016</p> <p>2016</p> <p>2016 onwards</p> <p>2016 onwards</p>	BWB
6	Objective 4: as above	5-6	<ul style="list-style-type: none"> The water authorities and community organisations could be asked to prepare 	To 2016	UWASAs, DCs and WUGs

			<p>protection plan for the water resources</p> <ul style="list-style-type: none"> • The community organisations may contribute part of the investment needs and the rest may be obtained from the maji trust fund • Submit the plans to the maji trust fund for the funding • Implement the protection plan 		
7	Objective 5: A holistic, accountable, transparent and integrated water resources planning mechanism in place	5-7	<ul style="list-style-type: none"> • Get approval of this sub-basin plan in CWC's meeting • Review and update the plan at intervals no more than five years 	2015 2020	BWB and CWCs
8	Objective 6: An optimal water resources monitoring network is established to cover both quantity and quality aspects	5-8	<p>The list of water resources monitoring stations are provided in Table 9-1 and Figures 9-1 to 9-6 in Component 5 Volume 1.</p> <ul style="list-style-type: none"> • Establish <ul style="list-style-type: none"> ○ Automatic weather stations ○ Rain gauges ○ River monitoring stations ○ Lake monitoring stations ○ Groundwater monitoring stations • Establish water quality stations for regular monitoring • Develop rating curves for the hydrological stations • Update a database for storage and analysis of data 	2015 2015 2015 2016 2016	BWB
9	Objective 7: A Comprehensive water resources database, with sharing arrangement, for all the water related features	5-9 and 5-10	<ul style="list-style-type: none"> • Develop a database for the sectors below in association the relevant ministries <ul style="list-style-type: none"> (a) Irrigation sector – Monitoring irrigated area, irrigation volume consumed and crop 	2016	BWB and all relevant Ministries

	and structures to support decision making on sustainable water resources management		yields (b) Fisheries sector – Monitoring the quantity of water used to produce fishes, fish yield and the quality of water drained from the fish ponds (c) Livestock sector – Monitoring the prime livestock locations on water usage, pollution and associated environmental degradation such as overgrazing, erosion hazards and drainage of wastes into natural water resources (d) Tourism sector – Monitoring the usage of water and discharges of polluted/treated water (e) Mining sector – Monitoring the quantity of water consumed and discharges of polluted/treated water and level of awareness created among the artisanal mining agencies, etc. <ul style="list-style-type: none"> • Train all the staff related to these databases –data collection, analysis and reporting • Update the developed DS model and make a linkage with MIKEBASIN model • Prepare monthly / quarterly report 	2016-17 2016 Continuous	
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Table 3.2 presents the cost estimate for all the actions with costs. The breakdowns of costs for some of the items are presented in the Annexure 3. For some of the items such as water supply infrastructures a lumpsum amount is provided as they need pre-feasibility study to prepare the detailed estimate. For some of the items only feasibility study costs alone included. The detailed cost could be added in the next version of IWRMD Plan, which is expected to be prepared in five years time. The capital expenditure (CAPEX) and Operation Expenditure (OPEX) by key areas are presented in the table. The CAPEX needed is USD 725 million and the OPEX needed is USD 11.7 million per annum. The cost per key area and by sub-basin is presented in Table 3.3. The total cost needed for this IWRMD Plan is USD 830.5 million.

Table 3-2: Implementation Action Plan (with costs)

	Activities	Time period & Activity			Cost ('000 USD)			Responsibility	Remarks	Capital Expenditure ('000 USD)			Operational costs needed ('000 USD)			
		Short term (to 2020)	Medium term (2021-2030)	Long term (2031-2040)	Short term (to 2020)	Medium term (2021-2030)	Long term (2031-2040)			Short term (to 2020)	Medium term (2021-2030)	Long term (2031-2040)	Short term (to 2020)	Medium term (2021-2030)	Long term (2031-2040)	
Key Area 1: Water for Domestic Purposes																
Objective 1: Achieving water supply and sanitation to all the urban people of the sub-basin																
	Songea Water Supply	Feasibility & Implementation	Operation and Maintenance	Operation and Maintenance	2,700	500	500	Songea MC			2,700			50	50	
	Masasi and Mangaka Water Supply from the Ruvuma river	Feasibility study	Implementation		800			Masasi and Nanyumbu DCs	Costs include only for feasibility studies		800					
	Mtwara-Ruvuma water supply	Implementation			1,700			MTUWASA			1,700					
	Mtwanya well fields	Feasibility study and implementation			800			MTUWASA			800					
	Lindi Water Supply	feasibility and implementation			200			LUWASA	Only for feasibility study		200					
	Songea and Mbinga Urban Sewerage Master Plan	Plan Preparation	Implementation	Operation and Maintenance	2,100	1,600	500	Songea MC and Mbinga DC			2,100	1,600			50	
	Sewerage facilities to Masasi, Tandahimba and Newala	Master plan and feasibility study			1,200			Respective DCs	Only for feasibility study		1,200					
	Sewerage facilities to Mtwara and Mikindani	Master plan and feasibility study			1,200			MTUWASA	Only for feasibility study		1,200					
	Sewerage facilities to Lindi MC	Master plan and feasibility study			800			LUWASA	Only for feasibility study		800					
Objective 2: Achieving water supply and sanitation to all thrural people of the sub-basin																
	Transboundary water supply to Mbinga	Feasibility	Operation and Maintenance	Operation and Maintenance	1,700	500	500	Mbinga DC			1,700			50	50	
	Makonde Water Supply Scheme Rehabilitation	Implementation			1,700	500	500	MoW			1,700			50	50	
	Improvements to Kilwa water supply	Feasibility study	Implementation		300			Kilwa DC	Costs include only for feasibility studies		300					
	Liwale town water supply	Feasibility study	Implementation		300			Liwale DC	Costs include only for feasibility studies		300					
	Rural Water Supply coverage	70%	90%	100%	19,595	21,260	18,578	All DCs			19,595	18,848	16,411			
	Sewerage facilities to Nachingwea town	Master plan and feasibility study			400			Nachingwea DC	Only for feasibility study		400					
	Sewerage facilities to Ruangua town	Master plan and feasibility study			400			Ruangua DC	Only for feasibility study		400					
	Sewerage facilities to Kilwa	Master plan and feasibility study			400			Kilwa DC	Only for feasibility study		400					
	Sewerage facilities to Liwale town	Master plan and feasibility study			300			Liwale DC	Only for feasibility study		300					
	Sewerage facilities to Tunduru town	Master plan and feasibility study			400			Tunduru DC	Only for feasibility study		400					
	Rural sanitation investments	Pilot study	Training	Training	2,200	1,000	1,000	All DCs			2,200			100	100	
Objective 3: Surface and groundwater resources conservation and modelling to support water supply																
	Rainwater harvesting	Pilot study	Monitoring & Support	Monitoring & Support	1,250	1,000	1,000	All DCs			1,250			100	100	
	Groundwater modelling and management plans	Plan & Implementation	Monitoring and Management	Monitoring and Management	203	50	50	BWB			203			50	50	
Objective 4: The water supply infrastructure is capable of operating at design capacity																
Objective 5: sustainable asset management practices are in place for all the water supply infrastructure																
	Urban Water Supply Asset Management System (Songea, Masasi, Mtwara and Lindi MCs)	Asset Plan	Management	Management	650			Operators (UWASAs)			650					
	Rural Water Supply Asset Management	Asset Plan	Management	Management	500			Operators (WUGs and DCs)			500					
Sub-Total					41,798	26,410	22,628				41,798	20,448	16,411	100	400	450
TOTAL							90,836						78,657			950

Key Area 2: Water for Development																			
Objective 1: Developed irrigation systems should have considered water availability, social and environmental needs																			
	Irrigation Development	92 schemes (10,273 ha)	76 schemes (20,765 ha)	57 schemes (27,606 ha)				MoAFC and DCs											
	- Feasibility study				514	1,038	1,380					514	1,038	1,380					
	- Construction /Rehabilitation				71,397	144,317	191,862		More details in Annexure 1			71,397	144,317	191,862					
Objective 2: Achieve sustainable Participatory Irrigation Management (PIM) in existing and developed irrigation schemes																			
	Improved Agricultural Practices							MoAFC and DCs											
	- Development of best management practices and disseminating procedures	Development			50							50							
	- Volumetric measurements installation	116 schemes	77 schemes	60 schemes	1,775	2,090	2,775					1,775	2,070	2,755					
	- Maintenance and Monitoring	116 schemes	150 schemes	176 schemes	485	2,815	5,243								81	282	524		
Objective 3: Develop livestock watering infrastructure to provide sustainable water resources for livestock development																			
	Livestock watering infrastructure	110	177	352	1,650	2,655	5,280	MLFD and DCs				1,650	2,655	5,280					
	Pollution abatement training	60 (once every year for each sub-basin)	100 (once every year for each sub-basin)	100 (once every year for each sub-basin)	1,200	2,000	2,000	MLFD, DCs and BWB							200	200	200		
Objective 4: Develop aquaculture systems to increase the fish production																			
	Aquaculture systems (fish ponds)	31	109	219	465	1,635	3,285	MLFD and DCs				465	1,635	3,285					
	Training on legal fishing systems and awareness creation among river and lake fishermen	60 (once every year for each sub-basin)	100 (once every year for each sub-basin)	100 (once every year for each sub-basin)	1,200	2,000	2,000	MLFD, DCs and BWB							200	200	200		
Objective 5: Utilisation of excess water for water storage																			
	Number of planned small dams (18 schemes)	Feasibility study	Implementation		6,780			MoW				6,780							
Objective 6: Utilise the hydropower potential of the sub-basin																			
	Lupilo and Lumeme sites	pre-feasibility study	Implementation		400			MEM, TANESO, and private	only feasibility			400							
	Kwitanda HP	pre-feasibility study	Implementation		200			MEM, TANESO, and private	only feasibility			200							
	Multi purpose dams across Ruvuma river (HP1 to HP6)	pre-feasibility study	Implementation	Implementation	3,200			RJWC, MoW and SADC	only feasibility			3,200							
Objective 7&8: Capable of operating and design capacity and sustainable asset management practices																			
	Asset management plans				1,000			BWB and operators				1,000							
Sub-Total					90,316	158,550	213,825				87,431	151,715	204,562	481	682	924			
TOTAL							462,690					443,708				2,087			

Key Area 3: Water for Environment														
Objective 1: Watershed development plans and best management practices														
	Community based watershed development programme in the eastern and southern part of the basin	Planning and implementation			3,200				All DCs		3,200			
	Restoration of Chidya lake supply channel	Planning and implementation			800				MoW		800			
Objective 2: Forest resources protection														
	Restoration and maintenance of the forest areas	Planning and implementation			7,200	720	720		MNRT and DCs		7,200	72	72	
Objective 3: Provide sufficient water for wildlife														
	Wildlife watering points in forest areas and WMAs	Planning and implementation			870				Reserve Management, MNRT, DCs		870			
Objective 4: Ensure adequate environmental flows														
	River health assessment and restoration of riparian rights	Planning and implementation	repeating once every five years	repeating once every five years	400	800	800		Ministry of Water / PDRWB			80	80	80
Objective 5: Reduced pollution load into the water resources														
	Pollution control at mining sites in UR sub-basin (mainly Lumeme river)	Planning and implementation			200				MEM, NEMC & BWB		200			
	Pollution control at Mironji and Likonde rivers	Planning and implementation			200				MEM, NEMC and BWB		200			
	Pollution control at Lukwika and Muhwesi rivers	Planning and implementation			200				MEM, NEMC and BWB		200			
	Pollution control at Lukwika and Muhwesi rivers	Planning and implementation			200				MEM, NEMC and BWB		200			
	Pollution control at Mbangala and Miesi catchments	Planning and implementation			200				MEM, NEMC and BWB		200			
	Pollution control at Mambi catchments	Planning and implementation			100				MEM, NEMC and BWB		100			
	Pollution control at Lukuledi catchment	Planning and implementation			200				MEM, NEMC and BWB		200			
	Pollution control at Mbwemkuru catchments	Planning and implementation			200				MEM, NEMC and BWB		200			
	Pollution control at Mawuji catchment	Planning and implementation			200				MEM, NEMC and BWB		200			
	Pollution control at Matandu catchments	Planning and implementation			200				MEM, NEMC and BWB		200			
	Solid waste management to Liwale town	Master plan and feasibility study			250				Liwale DC		250			
	Solid waste management to Kilwa town	Master plan and feasibility study			200				Kilwa DC		200			
	Solid waste management to Ruangua town	Master plan and feasibility study			200				Ruangua DC		200			
	Solid waste management to Lindi MC	Master plan and feasibility study			300				Lindi MC		300			
	Solid waste management to Nachingwea town	Master plan and feasibility study			200				Nachingwea DC		200			
	Solid waste management to Mtwara-Mikindani MC	Master plan and feasibility study			400				Mtwara-Mikindani MC		400			
	Solid waste management to Masasi, Tandahimba and Newala	Master plan and feasibility study			800				Respective DCs		800			
	Solid waste management to Tunduru town	Master plan and feasibility study			250				Tunduru DC		250			
	Solid waste management to Songea MC and Mbinga town	Master plan and feasibility study			700				Songea MC and Mbinga DC		700			

	Water resources protection	Planning and implementation	Implementation	Implementation	1,000	1,000	1,000	BWB and respective water supply authorities		1,000	1,000	1,000			
Objective 6: Enhance the capacity of the sub-basin to adapt to climate change															
	Development of disaster management plans and response systems	Planning and implementation			1,300			DMD of PMO and BWB		1,300					
	Climate change adaptation plan	Planning and implementation			100			BWB		100					
Objective 7: Determination of the reserve and allocation of reserves for future															
	Development of criteria and plan	BWB and MoW could plan						BWB and MoW	No cost required						
Objective 8: Development of landslide risk management plan															
	Planning and implementation of the landslide risk management plan	Planning and implementation			200			DCs		200					
Objective 9: Management of Estuaries to improve															
	MBREMP Area protection plan and training	Planning and implementation			450			MBREMP		450					
	Lindi DC Estuaries Area protection plan and training	Planning and implementation			150			Lindi DC		150					
	RUMAKI Area (Mbwekuru estuary to Rufiji estuary protection plan and training	Planning and implementation			750			RUMAKI and Kilwa DC		750					
Objective 10: Arresting salt water intrusion of aquifers															
	Monitoring of the wells along the coast and conduct specific study on salt water intrusion	Planning and implementation			200			BWB		200					
Sub-Total					21,820	2,520	2,520			21,420	1,000	1,000	80	152	152
TOTAL							26,860					23,420			384
Key Area 4: Community Awareness Creation and Participation															
Objective 1: Awareness programmes to the communities, NGOs and CSOs															
	WUA establishment and Strengthening	10 WUAs per year per sub-basin	11 WUAs per year per sub-basin	12 WUAs per year per sub-basin	25,531	42,551	42,551	CWC		25,531	42,551	42,551			
	Awareness for water users on WRMA No.11 of 2009 and EMA 2004	6 trainings x 2 days x 20 participants from 10 WUAs per year per sub-basin	6 trainings x 2 days x 20 participants from 10 WUAs per year per sub-basin	6 trainings x 2 days x 20 participants from 10 WUAs per year per sub-basin	1,389	2,314	2,314	BWB and MCDGC					231	231	231
	Ruvuma river awareness kit	Development	Maintenance and update	Maintenance and update	110	10	10	RJWC & BWB		110			10	10	10
	RSCB awareness kit	Development	Maintenance and update	Maintenance and update	110	10	10	BWB		110			10	10	10
	Information and Dissemination Costs other above kits(leaflets, video documents, photos, press, etc..)	Printing and distribution	Printing and distribution	Printing and distribution	138	230	230	BWB					23	23	23
Objective 2: Create forum for the local communities to participate in the planning through legal means															
Objective 3: Community participation should be inclusive of women and vulnerable groups															
	Development of inclusive participatory plan and implementation	Development and implementation			200			MCDGC and BWB		200					
Sub-Total					27,477	45,115	45,115			25,951	42,551	42,551	274	274	274
TOTAL							117,708					111,053			823

Key Area 5: Institutional Development																		
Objective 1: Operationalisation of RJWC																		
	Complete establishment of RJWC and operational costs	Establishment by 2016 and running	Running	Running	850	1,000	1,000	RJWC		450			100	100	100			
Objective 2: Strengthening of BWB																		
	Salaries for Basin Employees	USD 923k per annum	USD 923k per annum	USD 923k per annum	3,355	5,592	5,592	BWB					559	559	559			
	minor repairs and office rehabilitation works BWB and its offices	USD 50k per annum	USD 50k per annum	USD 50k per annum	182	303	303	BWB					30	30	30			
	Operating costs for RSCBWB	USD 90k per annum	USD 90k per annum	USD 90k per annum	327	545	545	BWB					54	54	54			
Objective 3: capacity building programme jointly for the BWB and CWC staff																		
	Awareness for BWB on good governance, performance and sensitisation on HIV/AIDS awareness	5 trainings twice a year for every year at basin level	5 trainings twice a year for every year at basin level	5 trainings twice a year for every year at basin level	322	537	537	BWB					54	54	54			
	Technical training and workshops	6 trainings per annum at basin level	6 trainings per annum at basin level	6 trainings per annum at basin level	617	1,028	1,028	BWB					103	103	103			
	To prosecute defaulters in the Basin	A lumpsum of USD 1000 per annum	A lumpsum of USD 1000 per annum	A lumpsum of USD 1000 per annum	4	6	6	BWB					1	1	1			
	to conduct conflict resolution in the Basin	A lumpsum of USD 5000 per annum	A lumpsum of USD 5000 per annum	A lumpsum of USD 5000 per annum	40	67	67	BWB					5	5	5			
Objective 4: An effective advisory and coordination mechanism at sub-basin level																		
	CWCs formation and running	Establishment and running	Running	Running	6,400	10,120	11,890	BWB		1,084			890	1,012	1,189			
	Technical and Management Training	10 days training per annum for 5 staff for each sub-basin	11 days training per annum for 5 staff for each sub-basin	12 days training per annum for 5 staff for each sub-basin	3,000	5,000	5,000	BWB and CWC					500	500	500			
	Intersectoral coordination meeting	Establishment and running	Running	Running	60	100	100	CWC					10	10	10			
Objective 5: IWRM Plan implementation monitoring, auditing and reviewing																		
	Monitoring, auditing and reviewing (once in five years)	once in 2020	twice before 2030	twice before 2040	500	1,000	1,000	BWB	for each sub-basin separately				100	100	100			
Objective 6: water resources monitoring network																		
	Automatic weather stations	new stations establishment, maintenance and data collection	maintenance and data collection	maintenance and data collection	364	423	423	BWB	maintenance and data collection by CWCs	138			42	42	42			
	rainfall station	new stations establishment, maintenance and data collection	maintenance and data collection	maintenance and data collection	93	117	117	BWB	maintenance and data collection by CWCs	26			13	13	13			
	Surface water resources monitoring	new stations establishment, maintenance and data collection	maintenance and data collection	maintenance and data collection	460	724	724	BWB	maintenance and data collection by CWCs	25			76	76	76			
	Groundwater resources monitoring	new stations establishment, maintenance and data collection	maintenance and data collection	maintenance and data collection	638	31	31	BWB	maintenance and data collection by CWCs	620			3	3	3			

	Water quality monitoring	new stations establishment, maintenance and data collection	Sample collection	Sample collection	135	225	225	BWB	BWB lab with the support from CWCs				23	23	23
	Lab establishment	Establishment cost			33			BWB		33			-		
	Other monitoring establishment cost	Establishment cost			413			BWB		413			-		
	Reporting on water resources monitoring	consultancy for first one year	then produced by RSCBWB staff	then produced by RSCBWB staff	220			BWB	Employing consultants	220			-		
	Database costs	Database establishment, data management and reporting			122					122			-		
Objective 7: Comprehensive water resources database in plan															
	Sector level database establishment, management and reporting	Database establishment, data management and reporting	Data management and reporting	Data management and reporting	550	100	100	BWB and respective Ministries		550			10	10	10
	Updating of water permit system database and control	Software development and running	Running database	Running database	110	20	20	BWB		110			2	2	2
	Updating of wastewater discharge permit system database	Software development and running	Running database	Running database	110	20	20	BWB		110			2	2	2
	Updating the decision support system	Updating of the DSS developed in this Project			100			BWB		100					
Sub-Total					19,004	26,957	28,727			4,001	-	-	2,578	2,699	2,876
TOTAL							74,687					4,001			8,152
TOTAL					200,415	259,552	312,815			180,601	215,714	264,524	3,513	4,207	4,676
TOTAL							772,782					660,839			12,396

Table 3-3: Summary of costs

Sub-Basin		Upper Ruvuma	Likonde	Upper Middle Ruvuma	Lower Middle Ruvuma	Lower Ruvuma	Mambi	Lukuledi	Mbwem-kuru	Mavuji	Matandu	RSCB Total
Key Area -1: Water for domestic purposes	Short term (to 2020)	8,363	741	8,351	1,326	7,883	4,777	4,345	2,650	1,415	1,744	41,798
	Medium term (2021-2030)	4,394	1,290	1,711	2,429	7,898	915	3,322	2,612	615	1,174	26,410
	Long term (2031-2040)	3,704	1,387	1,711	2,629	5,314	813	3,005	2,367	573	1,075	22,628
	Total	16,461	3,418	11,773	6,384	21,095	6,505	10,672	7,629	2,603	3,993	90,836
Key Area -2: Water for development	Short term (to 2020)	9,444	6,915	6,226	4,433	14,427	10,459	25,905	5,900	2,685	3,872	90,316
	Medium term (2021-2030)	34,295	11,167	8,305	3,760	50,795	13,397	27,161	5,570	2,000	2,100	158,550
	Long term (2031-2040)	22,565	9,625	8,615	3,208	113,075	10,030	32,002	10,205	2,155	2,345	213,825
	Total	66,304	27,707	23,146	11,401	178,297	33,886	85,068	21,675	6,840	8,317	462,690
Key Area -3: Water for environment	Short term (to 2020)	2,345	1,245	1,395	1,490	3,800	1,490	2,125	2,515	1,690	1,725	21,820
	Medium term (2021-2030)	180	160	150	180	180	150	180	180	180	180	2,520
	Long term (2031-2040)	180	160	150	180	180	150	180	180	180	180	2,520
	Total	2,705	1,565	1,695	1,850	4,160	1,790	2,485	2,875	2,050	2,085	26,860
Key Area -4: Community participation	Short term (to 2020)	2,692	2,692	2,692	2,692	2,692	2,692	2,692	2,692	2,692	2,692	27,477
	Medium term (2021-2030)	4,487	4,487	4,487	4,487	4,487	4,487	4,487	4,487	4,487	4,487	45,115
	Long term (2031-2040)	4,487	4,487	4,487	4,487	4,487	4,487	4,487	4,487	4,487	4,487	45,115
	Total	11,665	11,665	11,665	11,665	11,665	11,665	11,665	11,665	11,665	11,665	117,708
Key Area -5: Institutional capacity building	Short term (to 2020)	1,191	1,036	1,125	1,129	1,277	1,152	1,259	1,188	1,106	1,188	19,004
	Medium term (2021-2030)	1,806	1,649	1,793	1,771	1,841	1,739	1,813	1,795	1,704	1,830	26,957
	Long term (2031-2040)	1,983	1,826	1,970	1,948	2,018	1,916	1,990	1,972	1,881	2,007	28,727
	Total	4,980	4,510	4,888	4,848	5,136	4,807	5,061	4,955	4,690	5,024	74,687
Total	Short term (to 2020)	24,035	12,628	19,789	11,070	30,079	20,570	36,326	14,945	9,587	11,220	200,415
	Medium term (2021-2030)	45,162	18,752	16,446	12,627	65,201	20,688	36,962	14,644	8,985	9,770	259,552
	Long term (2031-2040)	32,919	17,484	16,933	12,451	125,074	17,396	41,663	19,211	9,275	10,093	312,815
	Total	102,115	48,865	53,167	36,148	220,353	58,653	114,951	48,799	27,847	31,084	772,782

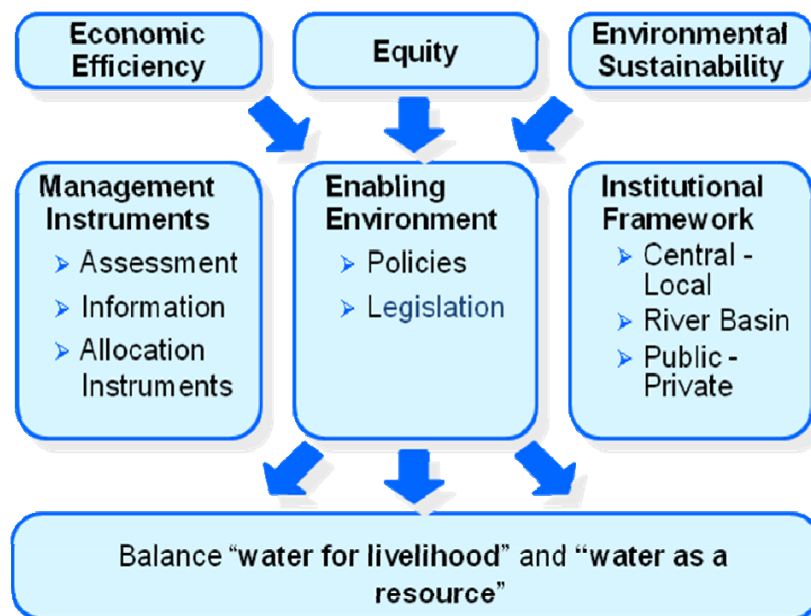
3.3 Prioritisation

Integrated water resources management is based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilisation. When considering how water should be managed or utilised in the future, the various options for change available to the planners, three aspects may be considered. The three aspects are explained below.

- **Economic efficiency in water use:** Because of the increasing scarcity of water and financial resources, the finite and vulnerable nature of water as a resource, and the increasing demands upon it, water must be used with maximum possible efficiency. This becomes manifest in Principle No 4 of the Dublin Principles, adopted at the International Conference on Water and Environment (Winkler¹). This stresses that the water is an economic good and water should be allocated optimally and at the same time based on highest economic return, which is as expected to be in conflict with the basic human water needs. The Agenda 21 explicitly states that ‘priority has to be given to the satisfaction of basic needs’. Hence, this factor leads to the next aspect of equity.
- **Equity:** The basic right for all people to have access to water of adequate quantity and quality for the sustenance of human well-being must be universally recognised. Though equity considers water should be prioritised as basic human needs, it is difficult to provide clear guidelines on how to enable it to happen within the context of economic efficiency. It needs a support from the policies and legislation to deliver equity. Normally water supply regulations set a minimum standard for basic water supply, for example a minimum quantity of potable water of 25 litres per person per day should be made available for all households.
- **Environmental and ecological sustainability:** "The present use of the resource should be managed in a way that does not undermine the life-support system thereby compromising use by future generations of the same resource." (GWP 2008)

This approach seeks to achieve a balance among the three pillars of sustainable development. These are the three pillars of the Enabling Environment; the Institutional Framework and the Management Instruments (Fig. below), as suggested by the GWP.

Figure 3-1: Three Pillars of IWRM



Source: Cap-Net. IWRM Plans, Training Module, March 2005

¹ Winkler, Inga T (2012), The Human Right to Water: Significance, Legal Status and Implications for Water Allocation, Hart Publishing Ltd

The interventions should normally be subjected to these three Es before establishing an enabling environment. This will provide an insight into the importance of the projects to be taken up for implementation. The interventions within the major Key Areas are prioritised and presented in order. The top priorities are given first and less priorities later.

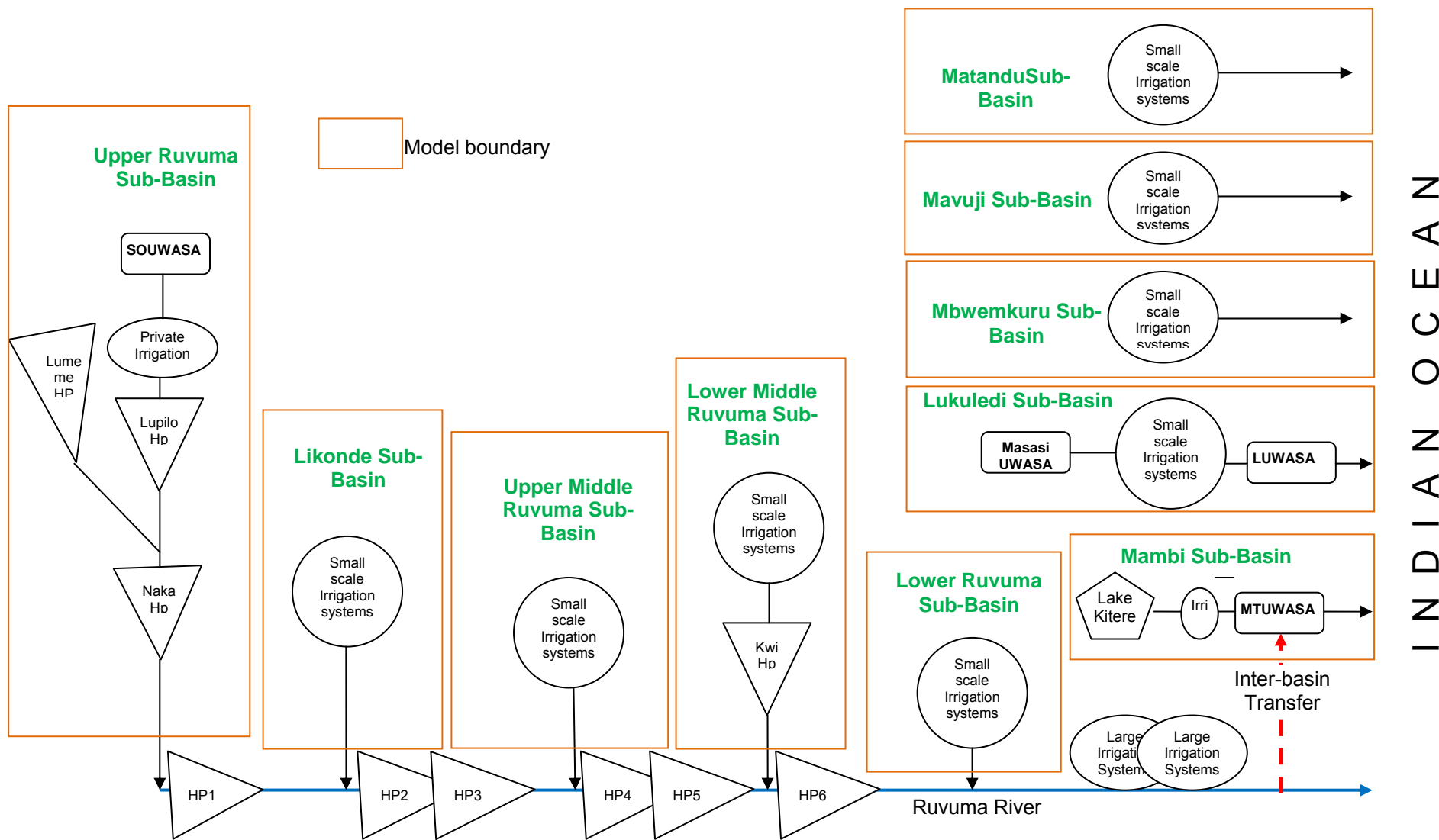
- (1) The water supply and sanitation projects
 - a. Provision of basic water supply to all the urban and rural inhabitants –individual village level borehole schemes
 - b. ECOSAN initiative pilot study and expansion
 - c. Urban sanitation projects
 - d. Comprehensive water supply schemes, which will provide safe water supply after treatment. This will be taken up after (a), (b) and (c) above
- (2) Environmental management
 - a. Chidiya lake supply channel restoration
 - b. Pollution control at mining sites
 - c. Determination of the reserve and allocation of reserves for the future
 - d. Implementation of climate change adaptation plan
 - e. Watershed development plans and best management practices
 - f. Forest and wildlife water management plan preparation and implementation
 - g. Solid waste management plan preparation and implementation
 - h. Landslide risk management
 - i. Estuary management
 - j. Environmental flow management. It may be delayed as it will be easy once the proposed reservoirs are constructed.
- (3) Economic development projects
 - a. Livestock water supply – charco dams
 - b. Irrigation projects
 - c. Fishing development activities
 - d. Mini-hydropower schemes
 - e. New reservoir developments
 - f. International multi-purpose hydropower schemes
- (4) Community awareness
 - a. RSCB awareness kit
 - b. Ruvuma awareness kit
 - c. Awareness programmes for WUGs
- (5) Institutional Development
 - a. CWC formation
 - b. Filling up all the positions in BWB
 - c. WUG formation and formalisation
 - d. Establishment of water resources monitoring network
 - e. Comprehensive water resources database development
 - f. Awareness programmes

It is advised to discuss this list again in a BWB board meeting, and if necessary in another stakeholder meeting to prioritise these works.

4. PROJECT/INTERVENTIONS

Detailed action plans for some of the proposed interventions are presented in this section. Some interventions are related to the whole RSCB and some are specific to this sub-basin. For example irrigation development programmes are sub-basin specific whereas water resources monitoring relates is to the whole basin. The number of interventions and the costs required for the RSCB is presented below. The plans for ongoing projects are not included as they are in an advanced stage. For example the Aviv irrigation project (3,000 ha) in the Ruvuma region is not described as feasibility is underway. The major interventions are presented in the diagram (Figure 4.1) below.

Figure 4-1: Schematic diagram of the major interventions



Key Areas 1: Water for Domestic

Intervention 1.1: Transboundary water supply to Songea

Items	Description
Title Description	Improve access to water supply for the Songea town
Location	Upper Ruvuma Sub-Basin
Objectives	To have water supply coverage of 100% by 2035
Key Areas to be addressed	The existing plans to develop new water resources for the years 2015 – 2025 are to improve Upper Ruhila water sources by constructing and impounding a reservoir dam and to carry out a long term investigation of the water quantity and quality of the Ruhimba/Lumecha rivers, both being future potential sources of water. These two rivers are located outside of the Ruvuma basin (in the Lake Nyasa basin). It is an interbasin transfer project
Implementation components	Phase 1: Detailed engineering design – first year Phase 2: Preparation of ESIA and ESMP – first year Phase 3: Preparation of tender documents – second year Phase 4: Construction and supervision – second and third years
Estimated cost	Feasibility study: USD 300,000 Construction: USD 2,400,000 Operation and Maintenance: USD 50,000 per annum
Project Period	Feasibility study by 2017 Construction by 2020 Operation and Maintenance from 2020 onwards
Executing agencies	SOUWASA
Rationale	The strategic plan 2011/12 to 2015/16 reported that <i>“Water supply coverage is 84% out of 113,543 population of the Songea urban is served by SOUWASA (where water supply connection distribution systems reach). Songea Urban Water Supply Authority (SOUWASA) is a Commercial water supply and sewerage division with the obligations of formulation, co-ordination and regulation of urban water supply and sewerage system, while 23% of Songea peri- urban population depends on other sources including boreholes, traditional springs, traditional wells and also some protected wells. Water demand of Songea urban population is 8,389,000 litres per day but water supply from SOUWASA to communities is only 4,374,633 litres per day which</i>

	<p><i>is equal to 52% of the water supply.</i></p> <p><i>The main type of source of water is from spring water found at Ruhila, Msamala and Matogoro. At the Council level, the Council is responsible for supplying water service where SOUWASA did not reach (no master plan from SOUWASA for water supplying)."</i></p> <p>To meet the MDG targets, this proposal is necessary.</p>
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Intervention 1.2: Transboundary water supply to Mbinga

Items	Description
Title Description	Improve access to water supply for the Mbinga town
Location	Upper Ruvuma Sub-Basin
Objectives	To have water supply coverage of 100% by 2035
Key Areas to be addressed	The existing plans to develop new water resources for the years 2015 – 2025 are to improve Ruhu river by constructing and impounding a reservoir dam and this is located outside of the Ruvuma basin (in the Lake Nyasa basin). It is an inter-basin transfer project. And it could be used as a comprehensive water supply scheme to meet the demands of adjacent villages
Implementation components	Phase 1: Detailed engineering design – first year Phase 2: Preparation of ESIA and ESMP – second year Phase 3: Preparation of tender documents – second year Phase 4: Construction and supervision – four years
Estimated cost	Feasibility study – 200,000 USD Construction - 1,500,000 USD Operation and Maintenance: 50,000 per annum
Project Period	Feasibility study by 2017 Construction to 2020 Operation and Maintenance beyond 2020
Executing agencies	Mbinga DC
Rationale	As 2011 Economic profile, about 56% of Mbinga town population get safe and clean drinking water. To meet the MDG targets

Intervention 1.3: Makonde water supply scheme rehabilitation

Items	Description
Title Description	Rehabilitation of extension of Makonde water supply scheme (MWSS)
Location	Lower Ruvuma Sub-Basin (Newala and Tandahimba districts)
Objectives	To meet the water demand for the population and also to restore the

	water supply to meet its capacity
Key Areas to be addressed	Feasibility study, construction and effective operation and maintenance
Implementation components	Feasibility study is over Phase 1: Implementation of them – 4 years from 2015 Phase 2: Operation and maintenance (continuous)
Estimated cost	USD 1.7 million
Project Period	5 Years (to 2020)
Executing agencies	DCs
Rationale	To meet the MDG targets

Intervention 1.4: Masasi and Mangaka water supply project

Items	Description
Title Description	Water supply to Masasi and Mangaka towns in 2015 and beyond
Location	Lower Ruvuma Sub-Basin (Masasi and Nanyumbu districts)
Objectives	To meet the water demand in 2030 and beyond
Key Areas to be addressed	Feasibility study, construction and effective operation and maintenance
Implementation components	Phase 1: Pre-feasibility and feasibility study Phase 2: Implementation of them – 4 years from 2015 Phase 3: Operation and maintenance (continuous)
Estimated cost	USD 800,000 – only for feasibility studies
Project Period	2 Years (to 2016)
Executing agencies	Masasi and Nanyumbu DCs
Rationale	To meet the MDG targets

Intervention 1.5: Mtwanya and Mikindani Well fields development

Items	Description
Title Description	Development and management of Mtwanya and Mikindani well fields to improve water supply to Mtwara-Mikindani
Location	Mtwara-Mikindani MC and Mambi sub-basin
Objectives	To meet the water demand in 2030 and beyond
Key Areas to be addressed	Feasibility study, construction and effective operation and maintenance
Implementation components	Phase 1: feasibility study and detailed estimate preparation (2015)

	Phase 2: Implementation of them – 4 years from 2015 Phase 3: Operation and maintenance (continuous)
Estimated cost	See the costs in the Annexure 2
Project Period	4 Years (to 2020)
Executing agencies	MTUWASA
Rationale	To meet the MDG targets

Intervention 1.6: Sewerage master plan and implementation to Songea

Items	Description
Title Description	Improve sewerage facilities to the Songea town
Location	Upper Ruvuma Sub-Basin
Objectives	To have sewerage coverage of 100% by 2035
Key Areas to be addressed	The sewerage master plan preparation and sewerage connections to all the households
Implementation components	Phase 1: Sewerage master plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 3: Preparation of tender documents – third year Phase 4: Construction and supervision – fourth to eighth years
Estimated cost	Master Plan 500,000 USD Detailed Designs and ESIA and ESMP 400,000 USD Construction 2,400,000 USD Operation and Maintenance: 50,000 per annum by 2022 onwards
Project Period	Master Plan 2016 Detailed designs and ESMP – 2018 Construction by 2022 Operation and Maintenance – after 2022
Executing agencies	SOUWASA
Rationale	Only about 30% of the Municipal Central business areas have been linked to the main sewerage system. The remaining parts have a variety of disposal systems including septic tanks, soak away and pit latrines. Waste from these systems is collected by cesspit empties and deposited in the main sewerage system for final disposal. It is necessary to have a sewerage master plan to link all the areas into main sewerage system

Intervention 1.7: Sewerage master plan and implementation to Masasi, Tandahimba and Newala towns

Items	Description
Title Description	Provide sewerage facilities to Masasi, Tandahimba and Newala
Location	Lower Ruvuma Sub-Basin
Objectives	To have sewerage coverage of 100% by 2035
Key Areas to be addressed	The sewerage master plan preparation and sewerage connections to all the households
Implementation components	Phase 1: Sewerage master plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	1,200,000 USD for Phase 1-4
Project Period	To 2018 for Phase 1-4
Executing agencies	Respective DCs and MC
Rationale	There is no sewerage system in these towns. The normally have a variety of disposal systems including septic tanks, soakaways and pit latrines. Waste from these systems is collected by cesspit empties and deposited in the final disposal site. A sewerage master plan should be developed to bring all areas onto main sewerage system both for Masasi, Newala and Tandahimba towns

Intervention 1.8: Sewerage master plan and implementation to Mtwara-Mikindani MC

Items	Description
Title Description	Provide sewerage facilities to Mtwara and Mikindani MC
Location	Mambi Sub-Basin
Objectives	To have sewerage coverage of 100% by 2035
Key Areas to be addressed	The sewerage master plan preparation and sewerage connections to all the households
Implementation components	Phase 1: Sewerage master plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	1,200,000 USD for Phase 1-4 (only for feasibility study)
Project Period	To 2018 for Phase 1-4

Executing agencies	Respective MC
Rationale	There is no sewerage system in these towns. The normally have a variety of disposal systems including septic tanks, soakaways and pit latrines. Waste from these systems is collected by cesspit empties and deposited in the final disposal site. A sewerage master plan should be developed to bring all areas onto main sewerage system for Mtwara-Mikindani MC

Intervention 1.9: Sewerage master plan and implementation to Lindi MC

Items	Description
Title Description	Provide sewerage facilities to Lindi MC
Location	Lukuledi Sub-Basin
Objectives	To have sewerage coverage of 100% by 2035
Key Areas to be addressed	The sewerage master plan preparation and sewerage connections to all the households
Implementation components	Phase 1: Sewerage master plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	800,000 USD for Phase 1-4 (only for feasibility study)
Project Period	To 2018 for Phase 1-4
Executing agencies	Lindi MC
Rationale	There is no sewerage system in these towns. The normally have a variety of disposal systems including septic tanks, soakaways and pit latrines. Waste from these systems is collected by cesspit empties and deposited in the final disposal site. A sewerage master plan should be developed to bring all areas onto main sewerage system for Lindi MC

Intervention 1.10: Water supplies to towns and villages in the RSCB

Items	Description
Title Description	Provision of water supply facilities to towns and villages to meet MKUKUTA targets
Location	Please see Appendix Volume 1 to 10 sub-basin plans

Objectives	To have water supply coverage of 100% by 2035
Key Areas to be addressed	Construction of water supply to villages and towns
Implementation components	Phase 1: feasibility study – 6 months Phase 2: Implementation – Stage 1 (5 years to 2020), Stage 2 (5 years to 2025 and Stage 3 (5 years to 2030)
Estimated cost	Please see sub-basin plans for detailed cost estimate
Project Period	To 2035
Executing agencies	DCs
Rationale	To meet the MDG targets

Intervention 1.11: Rural sanitation investments (including ECOSAN)

Items	Description
Title Description	Provision of sanitation facilities to meet MKUKUTA targets
Location	RSCB – Please see the sub-basin plans for the locations
Objectives	To have sanitation coverage of 100% by 2035
Key Areas to be addressed	<ul style="list-style-type: none"> • Construction of latrines at schools • Construction of demonstration latrines (ECOSAN) and the promotion of the uptake and retrofitting of improved household sanitation technologies • Promotion of hygiene behaviours
Implementation components	Phase 1: Pilot study at the selected locations Phase 2: Survey of potential areas – 6 months Phase 3: include them in the Government funding schemes – 6 months Phase 4: Implementation of them – 2 years Phase 5: Promotion of household sanitation technologies and hygiene behaviours (5 years)
Estimated cost	Per sub-basin USD 20,000 for Phase 1 USD 200,000 for Phase 2 and 5 (to 2020) USD 10,000 for Phase 5 every year
Project Period	6 Years (to 2020)
Executing agencies	DCs
Rationale	To meet the MDG targets

Intervention 1.12: Groundwater modelling and management plans for the vulnerable areas

Items	Description
Title Description	Groundwater modelling for the entire sub-basin and development of management plans for vulnerable areas
Location	RSCB
Objectives	<ul style="list-style-type: none"> Establishment of conceptual groundwater model for the aquifers of this sub-basin Development of groundwater management plans for vulnerable areas
Key Areas to be addressed	Groundwater modelling, identify vulnerable groundwater areas, accurate groundwater resources assessment, groundwater management plan
Implementation components	<ol style="list-style-type: none"> Conduct detailed groundwater modelling of this sub-basin Simulate the groundwater flow, abstraction and recharge Simulate the groundwater quality movements Predict the groundwater quantity and quality at the current rates and forecast the impacts Identify the vulnerable areas Develop a groundwater management plan for the vulnerable areas including sustainable groundwater utilisation, conjunctive water use, resources allocation and demand management, water quality management, recharge plans to improve the quality <p>Established by 2020, but running and updating regularly</p>
Estimated cost	<p>MODFLOW software : USD 2500</p> <p>Model development for the sub-basin: USD 100,000</p> <p>Groundwater quality modelling: USD 70,000</p> <p>Groundwater Management Plan development: USD 30,000</p> <p>Monitoring and Management (including model update, maintenance and support): USD 5,000 per annum</p> <p>Total: USD: USD 202,500</p>
Project Period	<p>Development Phase – 18 months (before 2016)</p> <p>Implementation and Monitoring Phase – 42 months (till 2020)</p>
Executing agencies	Ministry of Water / RSCBWB
Rationale	The groundwater, at present, is being used for most of the rural water supply and an effective groundwater resources allocation, utilisation and management needs an accurate groundwater resources quantity and quality. Such accuracy is possible only if the groundwater is studied at local level or by aquifer.

Intervention 1.13: Rainwater harvesting

Items	Description
Title Description	Development of rainwater harvesting potentials in the RSCB
Location	RSCB
Objectives	Implementation of rainwater harvesting systems
Key Areas to be addressed	<ul style="list-style-type: none"> • Prepare a rainwater harvesting plan with all possible techniques within the RSCB (a) for the non-potable domestic use, (b) groundwater recharge and (c) reduce overland flow • Implement the plan as appropriate at village / towns private and common lands
Implementation components	<p>Phase 1: Rainwater harvesting management plan preparation – 3 months</p> <p>Phase 2: Identification of locations and options for implementation – 9 months</p> <p>Phase 3: Implementation of the plan – 2 years</p> <p>Phase 4: follow up activities including monitoring – 2 years</p> <p>Enforcement of rules for new buildings – continuously</p>
Estimated cost	<p>Per sub-basin</p> <p>Phase 1 and 2 – 50,000</p> <p>Phase 3 Implementation – USD 75,000</p> <p>Phase 4 Monitoring and follow up – USD 10,000 per annum</p>
Project Period	5 Years (to 2020)
Executing agencies	BWB / DCs
Rationale	Rain water harvesting systems at the buildings would be useful to meet the part of domestic water needs, which will reduce the water supply needs. The recharging of rainwater into the ground would increase the groundwater and reduce the overland flow and thus reducing flooding to some extent.

Intervention 1.14: Urban water supply asset management plans

Items	Description
Title Description	Prepare and implement asset management plans for all water related infrastructure in the Basin
Location	Songea, Mtwara-Mikindani, Masasi and Lindi MCs

Objectives	To have the water infrastructures operating at design capacity
Key Areas to be addressed	<ul style="list-style-type: none"> • Undertake a survey of all water infrastructures and other water related assets to determine the current status of these, and prepare an asset management plan based on the results of the survey. • Prepare asset management manuals for each category of asset • Rank the assets in terms of priority for maintenance and rehabilitation and starting with the highest priority implement the asset management plan • Require all owner/operators of water control infrastructures and other water related assets to follow the agreed asset management procedures, as set out in the manuals, on an ongoing basis
Implementation components	<p>Phase 1: Survey of infrastructures – 6 months</p> <p>Phase 2: Development of asset management manuals – 6 months</p> <p>Phase 3: Implementation of the plan – 2 years</p> <p>Phase 4: follow up activities including monitoring and enforcement of asset management procedures – 2 years</p>
Estimated cost	USD 650,000
Project Period	5 Years (to 2020)
Executing agencies	BWB / Owners of structures such as UWASAs and MCs
Rationale	At present, asset management is not effective in some cases, with important water control infrastructure falling into disrepair and in some cases becoming non-operational

Intervention 1.15: Rural water supply asset management plans

Items	Description
Title Description	Prepare and implement asset management plans for all water related infrastructure in the Basin – mainly rural water supply infrastructures within the RSCB boundary
Location	RSCB
Objectives	To have the water infrastructures operating at design capacity
Key Areas to be addressed	<ul style="list-style-type: none"> • Undertake a survey of all water infrastructures and other water related assets to determine the current status of these, and prepare an asset management plan based on the results of the survey. • Prepare asset management manuals for each category of asset • Rank the assets in terms of priority for maintenance and rehabilitation and starting with the highest priority implement the asset management plan • Require all owner/operators of water control infrastructures and other

	water related assets to follow the agreed asset management procedures, as set out in the manuals, on an ongoing basis
Implementation components	Phase 1: Survey of infrastructures – 6 months Phase 2: Development of asset management manuals – 6 months Phase 3: Implementation of the plan – 2 years Phase 4: follow up activities including monitoring and enforcement of asset management procedures – 2 years
Estimated cost	USD 50,000 per sub-basin
Project Period	2 Years (to 2020)
Executing agencies	BWB / Owners of structures
Rationale	At present, asset management is not effective in some cases, with important water control infrastructure falling into disrepair and in some cases becoming non-operational

Key Areas 2: Water for Development

Intervention 2.1: Irrigation schemes development to 2020

Items	Description
Title Description	Development of Irrigation schemes listed in Annexure 1 of Component 4 Volume 1 Irrigated Area = 10,273 ha
Location	RSCB
Objectives	<ul style="list-style-type: none"> • Increase the agricultural production and thus enhancing the food security of the Mtwara, Lindi and Ruvuma regions and Tanzania
Key Areas to be addressed	<ul style="list-style-type: none"> • To conduct feasibility study to develop the identified irrigation schemes to increase the agricultural production, • Irrigation schemes construction
Implementation components	Feasibility Phase (one year) – conducting feasibility study and detailed designs for all the potential schemes Implementation Phase (two years) – implementation of the schemes
Estimated cost	Feasibility phase – USD 514,000 Implementation phase – USD 71.397 Million
Project Period	Feasibility Phase – 6 months Implementation Phase – 24 months per scheme (to 2020)
Executing agencies	MAFSC / DCs
Rationale	There is a potential to increase the agricultural production within the Mtwara, Lindi and Ruvuma Regions as there are suitable sites for development.

Intervention 2.2: Irrigation schemes development to 2030

Items	Description
Title Description	Development of Irrigation schemes listed in Annexure 1 of Component 4 Volume 1 Irrigated Area = 20,765 ha
Location	RSCB
Objectives	<ul style="list-style-type: none"> • Increase the agricultural production and thus enhancing the food security of the Mtwara, Lindi and Ruvuma regions and Tanzania
Key Areas to be addressed	<ul style="list-style-type: none"> • To conduct feasibility study to develop the identified irrigation schemes to increase the agricultural production, • Irrigation schemes construction

Implementation components	Feasibility Phase (one year) – conducting feasibility study and detailed designs for all the potential schemes Implementation Phase (two years) – implementation of the schemes
Estimated cost	Feasibility phase – USD 1,038,000 Implementation phase – USD 144.317 million
Project Period	Feasibility Phase – 6 months Implementation Phase – 24 months per scheme (between 2021 and 2030)
Executing agencies	MAFSC / DCs
Rationale	There is a potential to increase the agricultural production within the Mtwara, Lindi and Ruvuma Regions as there are suitable sites for development.

Intervention 2.3: Irrigation schemes development to 2040

Items	Description
Title Description	Development of Irrigation schemes listed in Annexure 1 of Component 4 Volume 1 Irrigated Area = 27,606 ha
Location	RSCB
Objectives	<ul style="list-style-type: none"> • Increase the agricultural production and thus enhancing the food security of the Mtwara, Lindi and Ruvuma regions and Tanzania
Key Areas to be addressed	<ul style="list-style-type: none"> • To conduct feasibility study to develop the identified irrigation schemes to increase the agricultural production, • Irrigation schemes construction
Implementation components	Feasibility Phase (one year) – conducting feasibility study and detailed designs for all the potential schemes Implementation Phase (two years) – implementation of the schemes
Estimated cost	Feasibility phase – USD 1,380,000 Implementation phase – USD 191.862 million
Project Period	Feasibility Phase – 6 months Implementation Phase – 24 months per scheme (between 2031 and 2040)
Executing agencies	MAFSC / DCs
Rationale	There is a potential to increase the agricultural production within the Mtwara, Lindi and Ruvuma Regions as there are suitable sites for development.

Intervention 2.4: Improved agricultural and irrigation practices including increasing water use efficiency

Items	Description
Title Description	Develop improved agricultural and water best management strategies and implementation of them
Location	RSCB
Objectives	<ul style="list-style-type: none"> To have improved agricultural and water management best management practices To increase the income from the agricultural activity in the irrigated areas To reduce the adverse impacts of irrigation in the environment
Key Areas to be addressed	<ul style="list-style-type: none"> Best agricultural management practices development Irrigation water use efficiency improvement Best water management practices such as System of Rice Intensification methods
Implementation components	<p>Develop locally suitable best management practices for agriculture, water management – 12 months</p> <p>Conduct feasibility study and install equipments for volumetric measurements of irrigation water supply – 24 months</p> <p>Train the farmers on the best management practices – 24 months</p> <p>Follow up activities such as monitoring and suggest alternative means to improve the yields (24 months)</p>
Estimated cost	<p>Development of best management practices and disseminating procedures - USD 50,000</p> <p>Volumetric measurements installation – USD 10,000 per 100 ha for irrigation schemes</p> <p>Follow up activity (maintenance and monitoring) – USD 1,000 per 100 ha per annum</p> <p>Exact costs are presented in Table 4.2</p>
Project Period	Continuous.
Executing agencies	BWB / MAFSC / District councils
Rationale	Currently the yield of rice is less than 4 t/ha in most of the irrigated areas. It is due to multiple challenges such as poor agricultural practices, water management and varieties selection. The potential of best management practices (such as SRI) have already been experienced in Tanzania, which could be disseminated to all the irrigation schemes.

Intervention 2.5: Livestock development

Items	Description
Title Description	Water resources development for the livestock sector in the RSCB and imparting training to livestock sector to adopt safe and appropriate environmental management and encouraging communities to go for environmental friendly livestock development.
Location	RSCB
Objectives	To have sufficient livestock production to meet the local demand and also for exporting of milk and meat.
Key Areas to be addressed	<ul style="list-style-type: none"> • Water resources development for livestock rearing in the RSCB. • Encouraging communities to go for environmental friendly livestock rearing. • Training to livestock developers to adopt safe and appropriate techniques
Implementation components	<p>Water resources development site identification, for charco dams, across the Upper Ruvuma sub-basin – 6 months</p> <p>Implementation of pilot dams (one per district) – 6 months</p> <p>Provide exposure to the communities and private entrepreneurs to implement the charco dams in the identified locations – one training per year</p> <p>Training to livestock developers – one training per year</p>
Estimated cost	<p>USD 1,650,000 (110 farms to 2020)</p> <p>USD 2,655,000 (177 livestock water structures) by 2030</p> <p>USD 5,280,000 (352 livestock water structures) by 2040</p> <p>Training cost = 20,000 USD per annum to 2040</p>
Project Period	To 2040
Executing agencies	BWB / MLFD / District councils
Rationale	Already DCs are taking steps to construct charco dams at certain locations in their districts but it needs to be extended to other areas to encourage villagers to go for livestock development and at the same time with careful consideration of environmental needs.

Intervention 2.6: Aquaculture development

Items	Description
Title Description	Fish pond development in the RSCB, imparting training to river fishermen to adopt safe and appropriate fishing techniques and encouraging communities to go for fish ponds.
Location	RSCB
Objectives	To have sufficient fish production to meet the local demand and also for exporting.
Key Areas to be addressed	<ul style="list-style-type: none"> • Fish pond development in the RSCB. • Encouraging communities to go for fish ponds. • Training to river fishermen to adopt safe and appropriate fishing techniques
Implementation components	<p>Fish pond development site identification across the Upper Ruvuma sub-basin – 6 months</p> <p>Implementation of pilot ponds (one per district) – 6 months</p> <p>Provide exposure to the communities and private entrepreneurs to implement the fish ponds in the identified locations – one training per year</p> <p>Training to river fishermen – one training per year</p>
Estimated cost	<p>USD 465,000 (31 fish ponds) to 2020</p> <p>USD 1,635,000 (109 fish ponds) by 2030</p> <p>USD 3,285,000 (219 fish ponds) by 2040</p> <p>Training cost = 20,000 USD per annum to 2040</p>
Project Period	To 2040
Executing agencies	BWB / MLFD / District councils
Rationale	Already the communities of the Ruvuma region are exposed to fish ponds. It requires a concentrated effort by the DCs to further develop the aquaculture potential.

Intervention 2.7: Small and medium size dams Strategy

Items	Description
Title Description	Formulation of a strategy to develop additional small and medium size dams in the basin
Location	RSCB
Objectives	<ul style="list-style-type: none"> • To formulate a strategy to develop additional small and medium size dams in the basin • To carry out a pre-feasibility / feasibility study for each one of the

	identified dams in the small and medium size dam strategy for the RSCB basin
Key Areas to be addressed	<ul style="list-style-type: none"> • Small and medium size dam strategy
Implementation components	<p>Strategy Phase</p> <ul style="list-style-type: none"> • Assess the need for new water storage in the basin • Identify potential small and medium sized dam sites • Screen the most important ones • Assess the impact of such infrastructures development by sub-basin <p>Feasibility Phase</p> <ul style="list-style-type: none"> • Undertake pre-feasibility and feasibility for the selected infrastructures • Undertake EIAs and propose mitigation measures • Analyse the financing and implementation options for the most relevant dams projects <p>Possible sites for the basin is presented in the Annexure 5 of Component 4 Volume 1</p>
Estimated cost	<p>Strategy phase – USD 50,000</p> <p>Feasibility phase – USD 6,730,000 for two years</p>
Project Period	<p>Strategy Phase – 6 months</p> <p>Feasibility Phase – 18 months (before 2020)</p>
Executing agencies	BWB / MoW
Rationale	As per DSS water allocation model water storage is required for drought management. The dam will also permit improved EFR management.

Intervention 2.8: Hydropower development

Items	Description
Title Description	Implementation of small hydropower schemes in Lupilo, Combined Nakatuta, Lumeme, Tulila and Kwitanda
Location	RSCB
Objectives	Feasibility study for Lupilo, Lumeme and Kwitanda schemes and implementation of the Nakatuta and Tulila HP schemes.
Key Areas to be addressed	<ul style="list-style-type: none"> • Tulila hydropower scheme (7.5 MW) is under implementation by St. Agnes Sisters Mission, Chipole • Nakatuta (9.2 MW) is under implementation by Tangulf private limited • Feasibility studies for Lupilo, Lumeme and Kwitanda are to be undertaken
Implementation components	Feasibility study for Lupilo, Lumeme and Kwitanda potential sites – 1 year

Estimated cost	USD 600,000 The cost of construction of Nakatuta and Tulila are not included as they are taken up for implementation
Project Period	1 Year (before 2020)
Executing agencies	BWB / TANESCO / MEM
Rationale	There is a potential to construct two hydropower schemes: Lupilo, Lumeme and Kwitanda. They need to be explored further.

Intervention 2.9: Pre-feasibility of the Joint Ruvuma multipurpose project

Items	Description
Title Description	Study the potential and feasibility of the HP1 to 6
Location	RSCB
Objectives	Study the potential and feasibility of including these projects in national and SADC energy sector plans
Key Areas to be addressed	<ul style="list-style-type: none"> Analyse the viability of the identified joint multi-purpose project and make recommendation for a feasibility study Identify new funding mechanism and facilitate the institutionalisation of these through pilot projects (included in the Basinwide IWRM Plan)
Implementation components	Pre-feasibility study – 1 year Feasibility – 2 years
Estimated cost	USD 3,200,000
Project Period	one year pre-feasibility and two years feasibility (before 2020)
Executing agencies	BWB / RJWC
Rationale	There is a potential to construct a multipurpose dam across the main Ruvuma river along the boundary between Tanzania and Mozambique

Intervention 2.10: Asset management plans for all other water related infrastructures

Items	Description
Title Description	Prepare and implement asset management plans for all water related infrastructure in the Basin – mainly irrigation infrastructures and hydropower dams
Location	RSCB
Objectives	To have the water infrastructures operating at design capacity
Key Areas to be addressed	<ul style="list-style-type: none"> Undertake a survey of all water infrastructures and other water related assets to determine the current status of these, and prepare

	<p>an asset management plan based on the results of the survey.</p> <ul style="list-style-type: none"> • Prepare asset management manuals for each category of asset • Rank the assets in terms of priority for maintenance and rehabilitation and starting with the highest priority implement the asset management plan • Require all owner/operators of water control infrastructures and other water related assets to follow the agreed asset management procedures, as set out in the manuals, on an ongoing basis
Implementation components	<p>Phase 1: Survey of infrastructures – 6 months</p> <p>Phase 2: Development of asset management manuals – 6 months</p> <p>Phase 3: Implementation of the plan – 2 years</p> <p>Phase 4: follow up activities including monitoring and enforcement of asset management procedures – 2 years</p>
Estimated cost	USD 100,000
Project Period	5 Years (to 2020)
Executing agencies	BWB / Owners of structures
Rationale	At present, asset management is not effective in some cases, with important water control infrastructure falling into disrepair and in some cases becoming non-operational

Key Areas 3: Water for Environment

Intervention 3.1: Community based watershed development programme

Items	Description
Title Description	Control of the erosion and involvement of the community to protect the watershed from degradation
Location	See individual sub-basin plans for the locations
Objectives	Prepare and implement watershed development programme for the degraded areas
Key Areas to be addressed	Watershed delineation, erosion control, rural livelihood development
Implementation components	<p>Phase 1: Identify and prioritise the areas for watershed development. It is inclusive of mapping of erosion and degraded areas – 3 months</p> <p>Phase 2: Development of participatory integrated watershed development plans – 9 months</p> <p>Phase 3: Implementation of the plan – 2 years</p> <p>Phase 4: follow up activities including monitoring and enforcement of erosion controlling measures – 2 years</p>
Estimated cost	USD 3,200,000 for all the sub-basins
Project Period	5 Years (to 2020)
Executing agencies	BWB / District Councils
Rationale	Erosion is widespread in the RSCB due to the deforestation and shifting cultivation. Erosion leads to river sedimentation and eventually affecting the river ecosystem. Hence the degraded area needs to be brought back into wooded lands to avoid further erosion. The communities have to be trained to control the deforestation activity and also providing an alternative and sustainable livelihood practices.

Intervention 3.2: Restoration and maintenance of forest reserves in RSCB

Items	Description
Title Description	Restoration of degraded forest sites in the RSCB
Location	See individual sub-basin plans for locations
Objectives	<p>To increase woodland/forest cover within the basin</p> <p>To conserve the forest/woodland ecosystem</p>
Key Areas to be addressed	Degraded forests, forest conservation
Implementation	Phase 1: Identify critical locations of degraded forests – 3 months

components	Phase 2: Development of plans for restoration – 3 months Phase 3: Implementation of the plan – 2.5 years
Estimated cost	USD 7,200,000 for forest restoration USD 870,000 for water troughs at game reserves, WMAs, SNWC and forest reserves.
Project Period	36 months
Executing agencies	MNRT / District Councils
Rationale	The periphery of the many of the forest and game reserves have been encroached by the villagers for cultivations purposes. The farming system around the game reserve is characterised by the system of shifting cultivation, which leaves its traces of burned forests and unprotected soil on steep slopes. As this practice is approaching in several villages almost the boundaries of the reserve little room is left for the establishment of buffer-zones.

Intervention 3.3: River health assessment and restoration of riparian ecosystems

Items	Description
Title Description	Assessment of the river health at various points to address the needs of riparian ecosystems and make recommendations to implement environmental flow requirement and also to maintain water quality and ecosystem biodiversity.
Location	It is applicable to whole RSCB
Objectives	Assess the river health to restore riparian ecosystem needs
Key Areas to be addressed	River health assessment, riparian ecosystem biodiversity, environmental flow management and water quality management.
Implementation components	Phase 1: Identify critical locations and conduct river health assessment at these locations (twice in a year) – 12 months Phase 2: Assessment of restoration needs, preparation of implementation guidelines for updated environmental flow management, water quality management and restoration plans for specific areas. – 12 months
Estimated cost	USD 400,000 for every five years
Project Period	24 months initially and 12 months for every five years
Executing agencies	Ministry of Water / RSCBWB /CWCs – involving national / regional and international research institutions
Rationale	Though the river health assessments have been carried out as part of this assignment at various locations, there is a need for detailed study to assess the status of the riparian ecosystems in the basin, which would

	<p>help restoration and maintenance of the integrity of them.</p> <p>This study will provide updated environmental flow management, water quality management and a detailed riparian ecosystem restoration plan. The issue which needs to be included are the socio-economic roles of these ecosystems, which should be taken into account while preparing the plans.</p>
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Intervention 3.4: Pollution prevention

Items	Description
Title Description	<p>Pollution, at present, mainly in the</p> <ul style="list-style-type: none"> (a) artisanal mining areas (b) Agricultural pollution (c) Industrial pollution for example from coffee industry
Location	Mining areas, industries and intensive agricultural areas of RSCB
Objectives	<p>To pilot pollution control measures related to artisanal and small scale mining, urban and industries. These actions, considered informal and sometimes illegal, make it to difficult to plan and develop mitigation measures</p> <p>To assess the possibilities of constructing small siltation dams in the tributaries with extensive gold mining activities. If possible provision of siltation dams would rapidly improve water quality</p> <p>To assess the urban pollution (mainly from drainage)</p>
Key Areas to be addressed	Artisanal mining areas, siltation dams, awareness creation and enforcement of environmental management plans, urban pollution prevention
Implementation components	<p>Phase 1: Identify and prioritise (a) the areas for artisanal mining areas. It is inclusive of mapping of areas (b) the areas of urban and industrial pollution – 3 months</p> <p>Phase 2: Development of possible solutions, including tailing dam, and participatory plan to reduce the pollution – 9 months</p> <p>Phase 3: Implementation of the plan – 2 years</p> <p>Phase 4: follow up activities including monitoring and enforcement of pollution control measures – 2 years</p>
Estimated cost	USD 200,000 per sub-basin
Project Period	5 Years (to 2020)
Executing agencies	BWB / MEM / DCs and MCs
Rationale	Artisanal mining is widespread throughout the sub-basin but mainly concentrated in the south of the sub-basin. People involved in gold and gem mining do not follow any environmental clean up during and after

	<p>mining activities, which led to degradation of land and increased erosion and sedimentation downstream.</p> <p>The urban drainage system should be improved to reduce the urban pollution</p>
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Intervention 3.5: Solid waste management plan and implementation to Songea MC and Mbinga town

Items	Description
Title Description	Provide solid waste management facilities to the Songea MC and Mbinga town
Location	Upper Ruvuma Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation components	<p>Phase 1: solid waste management plan preparation – first year</p> <p>Phase 2: Detailed engineering design – second year</p> <p>Phase 3: Preparation of ESIA and ESMP – third year</p> <p>Phase 4: Preparation of tender documents – third year</p> <p>Phase 5: Construction and supervision – fourth to eighth years</p>
Estimated cost	700,000 USD (only for feasibility study)
Project Period	To 2020 for feasibility and 2025 for implementation
Executing agencies	Songea MC and Mbinga DC
Rationale	There is no solid waste collection system in Mtwara-Mikindani MC. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.6: Solid waste management plan and implementation to Tunduru town

Items	Description
Title Description	Provide solid waste management facilities to the Tunduru town
Location	Upper and Lower Middle Ruvuma Sub-Basins
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation components	<p>Phase 1: solid waste management plan preparation – first year</p> <p>Phase 2: Detailed engineering design – second year</p> <p>Phase 3: Preparation of ESIA and ESMP – third year</p> <p>Phase 4: Preparation of tender documents – third year</p>

	Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	250,000 USD (only for feasibility study)
Project Period	To 2020 for Tunduru town
Executing agencies	Tunduru DC
Rationale	There is no solid waste collection system in Tunduru town. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.7: Solid waste management plan and implementation to Masasi, Tandahimba and Newala towns

Items	Description
Title Description	Provide solid waste management facilities to the towns of Masasi, Tandahimba and Newala
Location	Lower Ruvuma Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation components	Phase 1: solid waste management plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	800,000 USD (only for feasibility study)
Project Period	To 2020 for Masasi MC and 2025 for Newala and Tandahimba towns
Executing agencies	Respective DCs and MC
Rationale	There is no solid waste collection system in these towns. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.8: Solid waste management plan and implementation to Mtwara-Mikindani MC

Items	Description
Title Description	Provide solid waste management facilities to the Mtwara-Mikindani MC
Location	Mambi Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation	Phase 1: solid waste management plan preparation – first year

components	Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	400,000 USD (only for feasibility study)
Project Period	To 2020 for feasibility and 2025 for implementation
Executing agencies	Respective MC
Rationale	There is no solid waste collection system in Mtwara-Mikindani MC. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.9: Solid waste management plan and implementation to Lindi MC

Items	Description
Title Description	Provide solid waste management facilities to the Lindi MC
Location	Lukuledi Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation components	Phase 1: solid waste management plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	300,000 USD (only for feasibility study)
Project Period	To 2020 for Lindi MC
Executing agencies	Lindi MC
Rationale	There is no solid waste collection system in Lindi MC. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.10: Solid waste management plan and implementation to Nachingwea town

Items	Description
Title Description	Provide solid waste management facilities to the Nachingwea town
Location	Lukuledi Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban

addressed	and semi-urban areas
Implementation components	Phase 1: solid waste management plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	200,000 USD (only for feasibility study)
Project Period	To 2020 for Nachingwea town
Executing agencies	Nachingwea DC
Rationale	There is no solid waste collection system in Nachingwea town. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.11: Solid waste management plan and implementation to Ruangua town

Items	Description
Title Description	Provide solid waste management facilities to the Ruangua town
Location	Mbwemkuru Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation components	Phase 1: solid waste management plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	200,000 USD (only for feasibility study)
Project Period	To 2020 for Ruangua town
Executing agencies	Ruangua DC
Rationale	There is no solid waste collection system in Ruangua town. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.12: Solid waste management plan and implementation to Kilwa town

Items	Description
Title Description	Provide solid waste management facilities to the Kilwa town
Location	Mavuji Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation components	Phase 1: solid waste management plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	200,000 USD (only for feasibility study)
Project Period	To 2020 for Kilwa town
Executing agencies	Kilwa DC
Rationale	There is no solid waste collection system in Kilwa town. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.13: Solid waste management plan and implementation to Liwale town

Items	Description
Title Description	Provide solid waste management facilities to the Liwale town
Location	Matandu Sub-Basin
Objectives	To have solid waste management coverage of 100% by 2035
Key Areas to be addressed	The solid waste management plan preparation and covering all the urban and semi-urban areas
Implementation components	Phase 1: solid waste management plan preparation – first year Phase 2: Detailed engineering design – second year Phase 3: Preparation of ESIA and ESMP – third year Phase 4: Preparation of tender documents – third year Phase 5: Construction and supervision – fourth to eighth years
Estimated cost	250,000 USD (only for feasibility study)
Project Period	To 2020 for Liwale town
Executing agencies	Liwale DC
Rationale	There is no solid waste collection system in Liwale town. A solid waste management plan would be useful to develop safe and clean towns

Intervention 3.14: Water source protection (Example one for Upper Ruvuma Sub-Basin and the rest could be found in sub-basin plans)

Items	Description
Title Description	Protection of water supply sources
Location	Both urban (Songea) and rural water supply sources in Upper Ruvuma Sub-Basin
Objectives	Demarcation and management of water source protection areas
Key Areas to be addressed	Surface and groundwater sources, demarcation for protection, management of the area
Implementation components	Phase 1: Demarcation of water sources protection areas i.e map out, delineate and provide legal protection of important groundwater recharge areas and wetlands – 9 months Phase 2: Development of protection plans – 3 months Phase 3: Implementation of the plan – 2 years Phase 4: follow up activities – 2 years
Estimated cost	USD 100,000
Project Period	5 Years (to 2020)
Executing agencies	BWB / District Councils / Water Supply Authorities
Rationale	Water treatment is a costly option and so the protection of the sources is the best option to supply potable water to the communities.

Intervention 3.15: Development of disaster management plans and response systems

Items	Description				
Title Description	Development of flood and drought management plans and implementation framework				
Location	It is applicable to whole RSCB				
Objectives	Development and implementation of flood and drought management plans				
Key Areas to be addressed	Floodplain mapping, flood and drought risk assessment, flood management and response system establishment, drought management and response system establishment				
Implementation components	<p>Flood Management</p> <table border="1"> <thead> <tr> <th>Task</th> <th>Examples of Components</th> </tr> </thead> <tbody> <tr> <td>Flood risk assessment</td> <td>LiDAR flights; regional rainfall depth-duration and flood frequency analyses; development of flood chronologies giving at least the date, locations, coordinates and impacts of each event; hydrological and hydraulic modelling of flood extent; mapping of the locations, properties and infrastructure at risk;</td> </tr> </tbody> </table>	Task	Examples of Components	Flood risk assessment	LiDAR flights; regional rainfall depth-duration and flood frequency analyses; development of flood chronologies giving at least the date, locations, coordinates and impacts of each event; hydrological and hydraulic modelling of flood extent; mapping of the locations, properties and infrastructure at risk;
Task	Examples of Components				
Flood risk assessment	LiDAR flights; regional rainfall depth-duration and flood frequency analyses; development of flood chronologies giving at least the date, locations, coordinates and impacts of each event; hydrological and hydraulic modelling of flood extent; mapping of the locations, properties and infrastructure at risk;				

	economic impact assessments (buildings, businesses, infrastructure, crops, livestock etc.).
Structural Interventions	Flood defences/dykes, river bank stabilisation works, culverts, pumping/drainage improvements, dredging, debris check dams, community shelters, floodplain improvements (wetlands etc.). Both labour-intensive and mechanised approaches could be used, following national best practice guidelines and standards. Priorities are often decided on the basis of risk given the available budgets and the findings from stakeholder consultations.
Non-structural interventions	Development control (discouraging or prohibiting building in flood-prone areas), insurance incentives, flood warning (see below). A range of measures could be envisaged, consistent with policy and legislation defined at a national level
Flood Warning Systems / Flood Preparedness	Defining flood warning areas and procedures for contacting those at risk; setting the criteria (thresholds) for issuing flood warnings; developing flood response plans in collaboration with communities at risk; public awareness campaigns; establishing community-based warning schemes; staff training; emergency response exercises; improving flood risk maps; upgrading of computer equipment and telecommunication networks (cell phone, hand-held radios, internet etc.), media involvement (radio/TV etc.); upgrading monitoring and forecasting equipment (see below); search and rescue training/equipment, performance monitoring and evaluation etc. Many of these items are typically performed at local/basin level; however there are many benefits in a national approach for some aspects such as flood forecasting, telemetry and telecommunications systems
Monitoring and forecasting	Targetting of real-time instrumentation improvements to the areas of highest flood risk, taking the risk of loss of life into account, and associated needs for development of flood forecasting models (e.g. correlations, hydrological/hydraulic models, flash flood guidance approaches); improvements to the accuracy and delivery of rainfall and other meteorological forecasts; use of a combination of manual reporting (e.g. observer + radio or cell phone) and telemetry, depending on budgets and the typical times over which floods develop.

Drought Management

Task	Examples of Components
Drought risk assessment	Vulnerability mapping, impact assessments, inventory/database of past events and impacts, routine post-event reporting
Drought resilience measures	Identification, prioritisation and implementation of measures to improve resilience to future droughts such as additional stock dams and boreholes, drought tolerant seed varieties, rainwater harvesting, improved farm-scale/sub-

	<p>basin/watershed management, grain storage facilities, strategic warehouses, irrigation schemes, water conservation/efficiency measures, demand management measures, water recycling, animal health programmes, destocking, abstraction management etc. etc..., and possibly larger scale reservoirs and bulk water transfer systems</p>
Emergency response planning	Identification of priority locations and definition of roles, responsibilities and budgets for emergency interventions such as drilling emergency tube wells, distributing food, fodder, medical supplies and seeds, contingency arrangements for the use of water tankers etc.
Drought early warning	Additional and/or improved meteorological, water resources (surface water, groundwater etc.) and water quality monitoring, data management, reporting and interpretation of measurements, improved development and distribution of situation reports, bulletins etc., wider use and interpretation of the monthly and seasonal outlooks from the Tanzania Meteorological Agency and other organisations such FEWS-Net, and from the Ministry of Agriculture's Early Warning Unit
Early warning dissemination	Improved dissemination of information on drought onset and progression both within government and to communities; for example, more accurate and timely television/radio reports, routine reporting at local, regional and national level
	<p>Disaster management related to accidental pollution are</p> <ul style="list-style-type: none"> • Mapping of pollution sources, risks and potential impact • Set-up effective and rapid notification and communication systems, including for accidental pollution • Prepare emergency action plans for accidental pollution
Estimated cost	<p>USD 800,000 (flood management)</p> <p>USD 300,000 (drought management)</p> <p>USD 200,000 (Accidental pollution management)</p>
Project Period	Development Phase: 24 months (to 2020)
Executing agencies	BWB with input from DCs and RCs
Rationale	<p>Impacts of flood are typically expressed in terms of factors such as the numbers of people or properties at risk and the potential economic damages across a range of sectors (residential, business, industry, agriculture, tourism etc.). Interventions are then prioritised on the basis of risk and can include both structural measures (e.g. flood defences/dykes) and non-structural measures (e.g. flood warning/development control). The risk management cycle is often considered to consist of measurements, assessments, evaluation and management. Hence a complete plan is necessary to face the flood and mitigate the impacts</p> <p>Similar management plan is necessary for the drought situations and also</p>

	accidental pollutions. Accidental pollutions are possible on the roads where the dangerous liquids and fuels are transported from one place to another and industries where they are used and stored.
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Intervention 3.16: Salt water intrusion study

Items	Description
Title Description	Salt water intrusion study in the coastal areas of RSCB
Location	Coastal areas of RSCB
Objectives	Conduct a detailed salt water intrusion study with three main objectives (a) Salt water intrusion mapping (b) Developing monitoring system for salt water intrusion (c) Preparing a management procedure to arrest the salt water intrusion
Key Areas to be addressed	Groundwater, coastal areas, salt water intrusion, monitoring
Implementation components	Study period 1 year (to 2016) Monitoring – Continuous from 2016
Estimated cost	USD 200,000 (for details please see page 88 in the Annexure 1 below)
Project Period	1 Year (to 2016)
Executing agencies	BWB / MTUWASA for Mtawanya-Mikindani Aquifer
Rationale	The sea water intrusion has been noticed in some of the Mtawanya well fields. We have also suggested a continuous monitoring of water quality in all the wells of Mtawanya and Mikindani well fields. In addition to our observation, it has been suggested that a detailed salt water intrusion study along the coast and a monitoring procedure needs to be set up for salt-water intrusion.

Key Areas 4: Community Awareness Creation and Participation

Intervention 4.1: WUA Establishment

Items	Description
Title Description	Establishment of WUAs in the basin
Location	RSCB
Objectives	Establish and provide support to the WUAs in the basin
Key Areas to be addressed	WUA formation, office establishment, office running support and training
Implementation components	<ul style="list-style-type: none"> • Formation of WUAs for all the water supply points (10 WUAs per year per sub-basin) • Provide training to WUAs on operation and maintenance of schemes, and on organisational management
Estimated cost	Establishment Phase: USD 25.531 million to 2020, USD 42.551 million to 2030 and USD 42,551 million to 2040. Details in Annexure 3
Project Period	Establishment Phase – 12 months Running Phase – continuous
Executing agencies	Ministry of Water / RSCBWB / DCs / participation from community
Rationale	WUAs needs to be formed to develop they are the lower units of water resources management structure in Tanzania.

Intervention 4.2: Community awareness and participation enhancement

Items	Description
Title Description	Development of community awareness programmes to reach all the people within the basin
Location	RSCB
Objectives	Development of communication plan and implementation of the plan to create awareness among the community
Key Areas to be addressed	<p>Use of media to create awareness programmes. The areas should include</p> <ol style="list-style-type: none"> 1. Technical areas such as (a) appropriate use of chemical fertilisers, (b) water resources protection and management, (c) environmental management, etc... 2. Participation in the committees and management meetings and implementation and monitoring activities

Implementation components	<ol style="list-style-type: none"> 1. Development of communication plan to disseminate the importance of above key areas. It includes use of local media – television, radio, newspapers, pamphlets, stalls in the village festivals, etc.. 2. Implementation of the plan
Estimated cost	Costs could be found in Annexure 3
Project Period	Development Phase – 12 months Implementation Phase – till 2035
Executing agencies	Ministry of Water / RSCBWB
Rationale	Communities normally receive their news through radio, newspapers, television and local festivals. The RSCBWB should utilise these communication tools to reach the communities. The available radio stations are Radio Tanzania, Radio Maria, Radio Jogoo, Radio Free Africa and Radio One.

Intervention 4.3: River Basin Awareness Kits

Items	Description
Title Description	Web-based awareness kits to support dissemination of information to various types of stakeholders
Location	Ruvuma Basin Awareness Kit is applicable to the whole Ruvuma Basin including Mozambique side, Whereas the RSCB Kit is applicable to the RSCB only
Objectives	The web-based River Awareness Kit would be established to support dissemination of information to various stakeholders including researcher, investors and NGOs. The River Awareness Kit would be dynamic tool, convenient for providing information, and also for participation from the general public
Key Areas to be addressed	River details, mapping
Implementation components	<ol style="list-style-type: none"> 1. The creation of a map tool summarising all the knowledge on the river basin 2. The running of a website for rising awareness, information exchange and promotion of investment opportunities for the general public <p>Established by 2015, but running and updating regularly</p>
Estimated cost	USD 100,000 for establishment per kit (two kits are proposed) USD 1,000 per annum per kit for updating and maintenance
Project Period	Establishment Phase – 12 months

Executing agencies	SADC / RJWC / Ministry of Water / RSCBWB
Rationale	There should be a common place where the information is stored and displayed to the public for easy access. The website would present the key characteristics and main features of the outcomes of this Project and the Ruvuma River Monograph study.

Intervention 4.4: Women and vulnerable group participation in the decision making

Items	Description
Title Description	Active participation is sought from the women and people from the vulnerable group. This intervention ensures their participation
Location	It is applicable to whole RSCB
Objectives	Active Participation of women and vulnerable group in the committees and in the decision making process
Key Areas to be addressed	Women, vulnerable group, participation, training, meetings
Implementation components	<ol style="list-style-type: none"> 1. Development of inclusive participatory plan – Plan is inclusive of understanding the challenges faced by those groups and various measures to bring them into the active participation such as training, workshops, exposure visits and use of media services 2. Implementation of the plan
Estimated cost	Development of the plan: USD 50,000 Plan implementation: USD 150,000 (3 years). It will be included in the regular training after three years
Project Period	Development Phase – 6 months (2015) Plan implementation – 36 months (to 2018)
Executing agencies	Ministry of Water / RSCBWB
Rationale	Women and vulnerable groups are often neglected or under-represented in most of the institutions related to water resources management. Their participation would bring in a useful contribution for developing implementation strategies at local level. The success of this intervention lies in their participation in the sub-basin water committees, water user groups and other local water related organisations.

Key Areas 5: Institutional Development

Intervention 5.1: Operationalisation of JWC

Items	Description
Title Description	Establishment of a common legal framework at basin level and the composition of a Charter on Water
Location	RSCBWB
Objectives	Effective functioning of Ruvuma JWC and the transboundary and multipurpose projects are taken up and solving conflicts between the countries
Key Areas to be addressed	<ul style="list-style-type: none"> • Establishment of the Ruvuma Water Charter (Comprehensive bilateral agreement) including information workshops and negotiation activities • Establishment of JWC Permanent Secretariat and Technical Committee • Technical Support to operationalisation of JWC Permanent Secretariat and Technical Committee including annual meetings of JWC, consultancies, compliance review activities and periodical M&E of (i) Implementation progress of Ruvuma Joint Integrated Water Resources Management Strategy and (ii) IWRM outcome and institutional performance indicators
Implementation components	<ol style="list-style-type: none"> 1. Establishment 2. Charter development including legal formalities 3. Staffing 4. Technical training
Estimated cost	Establishment: USD 450,000 Support Phase: USD 100,000 per annum continuously
Project Period	Establishment Phase: 2 years (2014-15) Support Phase : Continuously
Executing agencies	Ministry of Water / RSCBWB
Rationale	JWC has been formed and yet to function normally. The meetings are held occasionally and there is no specific Secretariat. Hence it is advisable to formalise the JWC by establishing an office and provide technical and management support on regular basis.

Intervention 5.2: Support to Ruvuma and Southern Coast Basin Water Board

Items	Description
Title Description	Supporting the Ruvuma and Southern Coast Basin Water Board
Location	RSCBWB

Objectives	Make the RSCBWB fully operational
Key Areas to be addressed	<ul style="list-style-type: none"> • Fill vacant positions • Establish technical sub-departments and/or prepare detailed ToR for each staff/technical function • Providing training of high and medium level staff with short and oriented courses in the key water management functions and basin issues, notably hydrology, hydrogeology, water quality and environmental management. Training could be implemented in collaboration with research institutions, NGOs and universities • Vehicles
Implementation components	<ol style="list-style-type: none"> 1. Staffing 2. Technical training
Estimated cost	<p>Salaries for basin employees – USD 923,000 per annum</p> <p>Minor repairs, rehabilitation works for BWB – USD 50,000 per annum</p> <p>Operating costs for BWB – USD 90,000 per annum</p> <p>(taken from RSCBWB five year business plan (2010/11 – 2014/15))</p>
Project Period	Continuous
Executing agencies	Ministry of Water / RSCBWB
Rationale	Currently BWB is lacking of technical staff to deal with the basin requirements once the CWCs have been established. Hence the staff vacancies should be fulfilled

Intervention 5.3: Institutional strengthening for IWRM planning and implementation

Items	Description
Title Description	Strengthening of all the institutions involved in IWRM activities
Location	RSCB
Objectives	Strengthening of the institutions by providing sufficient infrastructures and capacity building for IWRM
Key Areas to be addressed	<ul style="list-style-type: none"> • Establish Upper Ruvuma Sub-Basin CWC after getting an agreement signed between MoW and RSCBWB • Establishment and strengthening of water user groups • Ensure that the CWC has enough legal back up and it has specific mandate, operational procedure, appointment procedures and fund • The fund should be made available for all its infrastructure needs, staff remuneration, technical know-how and software development • Ensure it supports and be part of all the stakeholders at sub-basin level, especially gender responsiveness and participation of vulnerable section of people • Ensure that the staff appointed have appropriate skills, water resources management knowledge and experience and it is without any gender bias.

	<ul style="list-style-type: none"> • Ensure that CWC meets regularly and report it to the BWB • Ensure CWCs and RSCBWB meet regularly on IWRMD issues • Ensure that it implements some of the IWRMD Plan projects.
Implementation components	<ol style="list-style-type: none"> 1. Formation of CWCs 2. Formation of water user groups 3. Provision of Enough Infrastructure for CWC offices 4. Provision of training to both CWCs and WUGs 5. Provision of funding for the meetings, knowledge transfer <p>Established by 2015</p>
Estimated cost	<p>Please check Annexure 3</p> <p>Technical and Management Training: USD 150,000 per annum for three years</p>
Project Period	<p>CWC establishment by 2015 and WUGs as and when necessary (2015)</p> <p>Support to these institutions : 3 years (2016-2018)</p>
Executing agencies	Ministry of Water / RSCBWB
Rationale	Sub-basin water committee (CWC) plays an important role at sub-basin or sub-basin level to bring all the stakeholders together and be an intermediary organisation between the BWB and water user groups.

Intervention 5.4: Support on Inter-ministerial coordination

Items	Description
Title Description	Integrated and coordinated planning between the various ministries within the country
Location	Ruvuma and Southern Coast Basin
Objectives	Integrated and coordinated planning
Key Areas to be addressed	Coordination, working groups, procedures for cooperation
Implementation components	<ol style="list-style-type: none"> 1. Creation of inter-ministerial working groups 2. Elaboration of procedures for cooperation (identification of priority areas for cross-sectoral activities, e.g. EIA, clarification of responsibilities, elaboration of procedures for exchange of data 3. Support coordinated planning and enforcement activities <p>Established by 2016, but running and updating regularly</p>
Estimated cost	USD 1,000 per annum for meetings
Project Period	Establishment Phase – 24 months
Executing agencies	Ministry of Water / RSCBWB
Rationale	There should be a common place where the information is stored and

	displayed to the public for easy access. The website would present the key characteristics and main features of the outcomes of this Project and the Ruvuma River Monograph study.
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Intervention 5.5: Weather monitoring

Items	Description
Title Description	Establishment of meteorological stations in the sub-basin
Location	RSCB
Objectives	Establishment of weather monitoring stations and continuous monitoring of them
Key Areas to be addressed	Rainfall, automatic weather stations, database management, reporting
Implementation components	<ol style="list-style-type: none"> 1. Establish the five automatic weather stations at Milomoni, Nanyumbu, Tunduru, Ruangua and Zinga 2. Establish 44 new rain gauges 3. Monitor the quantity data and enter into the database 4. Develop a database for the monitoring and reporting 5. Prepare quarterly and annual report on groundwater in the sub-basin <p>Established by 2016, but running and updating regularly</p>
Estimated cost	<p>Establishment cost:</p> <p>Automatic weather station: 23,000 USD per station</p> <p>Rain gauges: USD 600 per station for five new stations</p> <p>Continuous monitoring cost: USD 260 per annum pre station for rain gauges and USD 4,700 for the automatic weather stations. The high cost for automatic weather station is to replace the stations if there is any problem.</p>
Project Period	<p>Establishment Phase – 6 months (before 2016)</p> <p>Monitoring Phase – continuous</p>
Executing agencies	Ministry of Water / RSCBWB
Rationale	Weather stations are important for better water allocation. Continuous monitoring of water quantity would be useful take mitigation measures and establish sufficient water resources for all the requirements.

Intervention 5.6: Surface water resources monitoring

Items	Description
Title Description	Establishment of surface water monitoring stations in the sub-basin
Location	RSCB
Objectives	Establishment of surface water monitoring stations and continuous monitoring of them
Key Areas to be addressed	Surface water monitoring, database management, reporting
Implementation components	<ol style="list-style-type: none"> 1. Establish the surface water monitoring stations as suggested below <ol style="list-style-type: none"> a. 10 new river monitoring stations b. 10 new lake monitoring stations 2. Monitor the quantity data and enter into the database 3. Develop a database for the monitoring and reporting 4. Prepare quarterly and annual report on groundwater in the sub-basin <p>Established by 2016, but running and updating regularly</p>
Estimated cost	<p>Establishment cost: USD 25,000</p> <p>Continuous monitoring cost : USD 2,400 per annum for river stations and USD 1,000 per annum for lake monitoring.</p>
Project Period	<p>Establishment Phase – 6 months (before 2016)</p> <p>Monitoring Phase – continuous</p>
Executing agencies	Ministry of Water / RSCBWB
Rationale	Surface water quantity measurement is important for better water allocation. Continuous monitoring of water quantity would be useful take mitigation measures and establish sufficient water resources for all the requirements.

Intervention 5.7: Groundwater resources monitoring

Items	Description
Title Description	Establishment of groundwater monitoring stations in the sub-basin
Location	RSCB
Objectives	Establishment of groundwater monitoring stations and continuous monitoring of them
Key Areas to be addressed	Groundwater monitoring, database management, reporting

Implementation components	<ol style="list-style-type: none"> 1. Establish the groundwater monitoring stations (31 numbers) 2. Monitor the quantity data and enter into the database 3. Develop a database for the monitoring and reporting 4. Prepare quarterly and annual report on groundwater in the sub-basin <p>Established by 2016, but running and updating regularly</p>
Estimated cost	<p>Establishment cost: 620,000 USD</p> <p>Continuous monitoring cost :3,100 per annum</p>
Project Period	<p>Establishment Phase – 6 months (before 2016)</p> <p>Monitoring Phase – continuous</p>
Executing agencies	Ministry of Water / RSCBWB / MTUWASA / LUWASA / SOUWASA
Rationale	groundwater quantity is important for mainly urban and rural water supply. Continuous monitoring of water quantity would be useful take mitigation measures and establish sufficient water resources for all the requirements dependent on groundwater.

Intervention 5.8: Water quality monitoring

Items	Description
Title Description	Establishment of water quality monitoring stations in the sub-basin
Location	RSCB
Objectives	Establishment of water quality monitoring stations and continuous monitoring of them
Key Areas to be addressed	Water quality monitoring, database management, reporting
Implementation components	<ol style="list-style-type: none"> 1. Establish the water quality monitoring stations (50 numbers) 2. Monitor the quality data and enter into the database 3. Develop a database for the WQ monitoring 4. Prepare quarterly and annual report on water quality in the sub-basin <p>Established by 2015, but running and updating regularly</p>
Estimated cost	<p>Establishment cost: None</p> <p>Continuous monitoring cost : USD 1,000 for sample collection and testing twice in a year (45 locations by BWB and the rest by the users such as MTUWASA, LUWASA, MANAWASA and SOUWASA)</p>
Project Period	<p>Establishment Phase – 6 months (before 2016)</p> <p>Monitoring Phase – continuous</p>

Executing agencies	Ministry of Water / RSCBWB
Rationale	Surface and groundwater quality is important for all the purposes such as domestic water supply, livestock, irrigation, fishing, industries and aquatic ecosystem protection. Continuous monitoring of water quality would be useful take mitigation measures and establish a better quality of water resources.

Intervention 5.9: Water resources monitoring database establishment and reporting support

Items	Description
Title Description	Water resources monitoring database establishment and reporting support
Location	Ruvuma and Southern Coast Basin
Objectives	Strengthening of report preparation from the water resources monitoring system
Key Areas to be addressed	Water resources monitoring, database, reporting system
Implementation components	<ol style="list-style-type: none"> 1. Employment of consultant to support BWB on <ol style="list-style-type: none"> a. Water resources database establishment b. Water resources monitoring report preparation Established by 2016, but running and updating regularly
Estimated cost	USD 122,000 for establishment of water resources monitoring database USD 220,000 for the consultancy service for one year to prepare water resources monitoring report and to train the BWB staff.
Project Period	Establishment Phase – 6 months (before 2016)
Executing agencies	Ministry of Water / RSCBWB
Rationale	Water resources monitoring database needs to be established once the monitoring network is established. At the same time the monitoring data needs to be reported properly for the understanding of the hydrologic system of RSCB. Hence a consultant is required to support BWB in preparation of monitoring report.

Intervention 5.10: Updating of water permit system database and control

Items	Description
Title Description	Updating of the water permit system established under this Project
Location	Ruvuma and Southern Coast Basin
Objectives	Water use managed through a permit system

Key Areas to be addressed	Water use management, database, permit application and approval system
Implementation components	<ol style="list-style-type: none"> 2. Update the inventory of all the users, inventory of abstraction points for different uses (drinking water, irrigation, industrial water, wetlands, flood retreat cropping and pasture land) 3. Undertake a basin related tariff study and develop a legally recognised document and a system for updating of tariff 4. Provide information packages and resources for stakeholder consultations and negotiations with major users 5. Institutionalise the use of DSS 6. Devise a plan for compliance monitoring and revenue collection <p>Established by 2016, but running and updating regularly</p>
Estimated cost	USD 100,000
Project Period	Establishment Phase – 6 months (before 2016)
Executing agencies	Ministry of Water / RSCBWB
Rationale	The water use must be monitored closely for various reasons such as water allocation during drought periods, drought management, water use conflict resolution, environmental flow monitoring and management and riparian water allocation. Though there is a water permit system established in the BWB and the recently developed database format, there is a need for updating of database and ensure that the permit holders are compliant with understanding of importance of water allocation procedures.

Intervention 5.11: Updating of water discharge permit system database and control

Items	Description
Title Description	Updating of the water discharge permit system established under this Project and establishment of control and participatory monitoring mechanism
Location	Ruvuma and Southern Coast Basin
Objectives	Pollution management through a permit system
Key Areas to be addressed	Pollution management, database, permit application and approval system, participatory monitoring, automotive water quality monitoring
Implementation components	<ol style="list-style-type: none"> 1. Improve effluent discharge database 2. Undertake a basin related tariff study and develop a legally recognised document and a system for updating of tariff 3. Provide information packages and resources for stakeholder consultations and negotiations with major users

	<ol style="list-style-type: none"> 4. Enforce water quality standards 5. Develop participatory pollution watching mechanisms 6. Devise a plan for compliance monitoring 7. Promote self-monitoring through ensuring that measuring devices are installed by key pollution permit holders <p>Established by 2016, but running and updating regularly</p>
Estimated cost	USD 100,000
Project Period	Establishment Phase – 6 months (before 2016)
Executing agencies	Ministry of Water / RSCBWB
Rationale	<p>The pollution management is key for the water quality and aquatic ecosystem, and sometimes terrestrial ecosystem, management and hence monitoring and control mechanism should be established at the RSCBWB. Though they have discharge permit system established in the BWB and the recently developed database format, there is a need for updating of database and ensure that the permit holders are compliant with the water quality standards. The monitoring system should also be a participatory system, where the community should have a stake in the pollution monitoring and management.</p>

Intervention 5.12: Updating of water permit system database and control

Items	Description
Title Description	Updating of the water permit system established under this Project
Location	Ruvuma and Southern Coast Basin
Objectives	Water use managed through a permit system
Key Areas to be addressed	Water use management, database, permit application and approval system
Implementation components	<ol style="list-style-type: none"> 1. Update the inventory of all the users, inventory of abstraction points for different uses (drinking water, irrigation, industrial water, wetlands, flood retreat cropping and pasture land) 2. Undertake a basin related tariff study and develop a legally recognised document and a system for updating of tariff 3. Provide information packages and resources for stakeholder consultations and negotiations with major users 4. Institutionalise the use of DSS 5. Devise a plan for compliance monitoring and revenue collection <p>Established by 2016, but running and updating regularly</p>
Estimated cost	USD 100,000
Project Period	Establishment Phase – 6 months (before 2016)

	USD 2,000 per annum is earmarked for the maintenance and updating of the database.
Executing agencies	Ministry of Water / RSCBWB
Rationale	The water use must be monitored closely for various reasons such as water allocation during drought periods, drought management, water use conflict resolution, environmental flow monitoring and management and riparian water allocation. Though there is a water permit system established in the BWB and the recently developed database format, there is a need for updating of database and ensure that the permit holders are compliant with understanding of importance of water allocation procedures.

Intervention 5.13: Updating of water discharge permit system database and control

Items	Description
Title Description	Updating of the water discharge permit system established under this Project and establishment of control and participatory monitoring mechanism
Location	Ruvuma and Southern Coast Basin
Objectives	Pollution management through a permit system
Key Areas to be addressed	Pollution management, database, permit application and approval system, participatory monitoring, automotive water quality monitoring
Implementation components	<ol style="list-style-type: none"> 1. Improve effluent discharge database 2. Undertake a basin related tariff study and develop a legally recognised document and a system for updating of tariff 3. Provide information packages and resources for stakeholder consultations and negotiations with major users 4. Enforce water quality standards 5. Develop participatory pollution watching mechanisms 6. Devise a plan for compliance monitoring 7. Promote self-monitoring through ensuring that measuring devices are installed by key pollution permit holders <p>Established by 2016, but running and updating regularly</p>
Estimated cost	USD 100,000
Project Period	Establishment Phase – 6 months (before 2016) USD 2,000 per annum is earmarked for the maintenance and updating of the database.
Executing agencies	Ministry of Water / RSCBWB

Rationale	The pollution management is key for the water quality and aquatic ecosystem, and sometimes terrestrial ecosystem, management and hence monitoring and control mechanism should be established at the RSCBWB. Though they have discharge permit system established in the BWB and the recently developed database format, there is a need for updating of database and ensure that the permit holders are compliant with the water quality standards. The monitoring system should also be a participatory system, where the community should have a stake in the pollution monitoring and management.
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Intervention 5.14: Sector level joint database development and management

Items	Description
Title Description	Sector level database establishment, management and reporting
Location	Ruvuma and Southern Coast Basin
Objectives	Development of database for the sectors of irrigation, livestock, fisheries, tourism and mining
Key Areas to be addressed	Water use management, database,
Implementation components	<ul style="list-style-type: none"> • Develop a database for the sectors below in association the relevant ministries <ul style="list-style-type: none"> ○ Irrigation sector – Monitoring irrigated area, irrigation volume consumed and crop yields ○ Fisheries sector – Monitoring the quantity of water used to produce fishes, fish yield and the quality of water drained from the fish ponds ○ Livestock sector – Monitoring the prime livestock locations on water usage, pollution and associated environmental degradation such as overgrazing, erosion hazards and drainage of wastes into natural water resources ○ Tourism sector – Monitoring the usage of water and discharges of polluted/treated water ○ Mining sector – Monitoring the quantity of water consumed and discharges of polluted/treated water and level of awareness created among the artisanal mining agencies, etc. • Train all the staff related to these databases –data collection, analysis and reporting <p>Established by 2016, but running and updating regularly</p>
Estimated cost	USD 500,000
Project Period	Establishment Phase – 6 months (before 2016)

	USD 10,000 per annum is earmarked for the maintenance and updating of the database.
Executing agencies	Ministry of Water / RSCBWB
Rationale	This database will be helpful to monitor the quantity of water used, water use efficiency by various sectors. It is useful to develop awareness programmes for various sectors.

ANNEXURES

Annexure 1: Cost Calculations CWC Establishment Cost

Exchange rate 1 USD = 1650 TSH

5%

Staff Salary		Month	Monthly Salary (TSH)	Annual Salary (TSH)	Total Capital Cost per CWC	Annual Running Cost per CWC	Costs Per Year (TSH)	Costs Per Year (USD)	
1	CWC Chairman	12	1,650,000	19,800,000			2015	321,505,000	194,852
2	Environmental Specialist	12	1,237,500	14,850,000			2016	142,645,000	86,452
3	Water Engineer	12	1,237,500	14,850,000			2017	142,645,000	86,452
4	Sociologist	12	1,237,500	14,850,000			2018	149,777,250	90,774
5	One Office Assistant cum Accountant	12	990,000	11,880,000			2019	149,777,250	90,774
6	Two Drivers	24	660,000	15,840,000			2020	149,777,250	90,774
Sub-Total						92,070,000	2021	157,266,113	95,313
Sub-Total							2022	157,266,113	95,313
Sub-Total							2023	157,266,113	95,313
Sub-Total							2024	165,129,418	100,078
Sub-Total							2025	165,129,418	100,078
Sub-Total							2026	165,129,418	100,078
Sub-Total							2027	173,385,889	105,082
Sub-Total							2028	173,385,889	105,082
Sub-Total							2029	173,385,889	105,082
Sub-Total							2030	182,055,183	110,336
Sub-Total							2031	182,055,183	110,336
Sub-Total							2032	182,055,183	110,336
Sub-Total							2033	191,157,943	115,853
Sub-Total							2034	191,157,943	115,853
Sub-Total							2035	191,157,943	115,853
Sub-Total							2036	200,715,840	121,646
Sub-Total							2037	200,715,840	121,646
Sub-Total							2038	200,715,840	121,646
Sub-Total							2039	210,751,632	127,728
Sub-Total							2040	210,751,632	127,728
Sub-Total									1,188,627
Sub-Total									1,011,757
Sub-Total									640,077
Sub-Total									18,400,000
Sub-Total									178,860,000
Sub-Total									178,860,000
Sub-Total									142,645,000
Sub-Total									86,452
Sub-Total									32,175,000
Sub-Total									108,400
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WQ Lab Rehabilitation Cost

S/N	Equipment needed	Qty	Cost per equipment (TSH)	Total Cost (TSH)	Total Cost (USD)
1	Incubator (37± 0.5°C incubator and 44± 0.5°C incubator)	2	8,000,000	16,000,000	9,697
2	Fridge	2	1,000,000	2,000,000	1,212
3	Sampling Bottle (Bacteriology)	20	40,000	800,000	485
4	Petri Dish	50	2,000	100,000	61
5	Autoclave	2	2,000,000	4,000,000	2,424
6	Mask (with air cartridge) (in pieces)	10	500,000	5,000,000	3,030
7	Lab Coat	10	50,000	500,000	303
8	Gloves (boxes)	50	20,000	1,000,000	606
9	Cotton Wool (rolls)	20	10,000	200,000	121
10	Laptop	3	1,000,000	3,000,000	1,818
11	Coloured Printer	2	500,000	1,000,000	606
12	Scanner	2	500,000	1,000,000	606
13	Life Jacket	5	500,000	2,500,000	1,515
14	Water Sampler	5	300,000	1,500,000	909
15	Calibration Weight Unit (0.001g, 0.01g, 0.1g, 1g, 5g, 10g, 50g, 100g, 150g, 200g, 500g, 1000g)	1	2,000,000	2,000,000	1,212
16	GPS	3	1,500,000	4,500,000	2,727
17	Camera	3	1,000,000	3,000,000	1,818
18	Filtration Unit (vacuum pump, waste flask, manifold)	2	1,500,000	3,000,000	1,818
19	Sampling Booty (pairs)	3	300,000	900,000	545
20	Sucker or Pippet	5	50,000	250,000	152
21	Lamina Air Flow	1	2,000,000	2,000,000	1,212
22	Photocopier	1	500,000	500,000	303
	TOTAL			54,750,000	33,182

Water Resources Monitoring – other costs

Item	Unit cost (USD)	Number required	Total cost	Comments
Other Equipments				
TT Qliner 2 – Doppler technology for mobile discharge measurement in rivers and channels. Or similar	12,000	10	120,000	For carrying out spot gaugings to develop level to flow relationships (ratings). This allows the level records at the monitoring sites to be converted to flow.
Boat mounted ADCP	50,000	5	250,000	For carrying out gaugings to develop level to flow relationships (ratings). This allows the level records at the monitoring sites to be converted to flow. 1 unit shared between two CWCs
Dip meter (1 × 100m, 1 × 50m)	800	10	8,000	One per CWC
Low flow sample pump and tubing	1,000	5	5,000	A pump such as a peristaltic pump for sampling from observation wells is recommended. This can be attached to a car battery. 1 unit shared between two CWCs
Rugged laptop for downloading data-loggers, all monitoring and analysis	3,000	10	30,000	One per CWC. Panasonic "toughbook" used as an example allocated between agencies for field use. Cost includes \$500 per unit for misc items
Database for Groundwater Monitoring and Water Quality Monitoring				
Database software: base Hydstra licence	15,000	1	15,000	Hydstra used as an example
Database software: groundwater module	4,000	5	20,000	Hydstra used as an example
Database software: water quality module	4,500	5	22,500	Hydstra used as an example
On-going support to database and training: database establishment and administration	10,000	1	10,000	One week course from Kisters (including travel) plus on-going support
Database establishment	9,000	6	54,000	Programmer - six months assumed to be needed to establish database and transfer / enter existing data
Total			534,500	

1 USD = 1650 TSH

Establishing and Strengthening of WUAs

	No. of WUAs	Cost per WUA per year		Total		Per WUA
		TSH	USD	TSH	USD	First Year
WUA Establishment and strengthening with knowledge	12	40,833,333	24,747	490,000,000	296,970	24,747
WUA office construction and furnishing	12	27,500,000	16,667	330,000,000	200,000	16,667
WUA office motorbike and cycles	12	1,875,000	1,136	22,500,000	13,636	1,136
TOTAL		70,208,333	42550.505	842,500,000	510,606	42,551

Source: RSCBWB Business Plan 2010/11 to 2014/15

Awareness for Water Users on WRMA No. 11 of 2009 and EMA 2004

6 trainings x 2 days per year per sub-basin x 20 participants from 10 WUAs

1. environmental management issues
2. WUA organisational management
3. IWRM principles
4. Water use efficiency and water resources protection
5. Stakeholder workshops
6. Dialogue meetings with pollutants

	Unit cost	Training	days per training	sub-basins	Participants per training	Nos./ year	Cost per year (TSH)	Cost per year (USD)
Perdiem for Participants	65,000	6	2	10	20	2,400	156,000,000	94,545
Technical staff perdiem (2 consultants + 2 BWB staff)	80,000	6	2	10	4	480	38,400,000	23,273
Food & refreshments	8,000	6	2	10	26	3,120	24,960,000	15,127
Venue cost	100,000	6	2	10		120	12,000,000	7,273
Fuel approximately	50,000	6	2	10		120	6,000,000	3,636
Stationaries	100,000	6		10		60	6,000,000	3,636
Consultant Allowance	300,000	6	2	10	2	240	72,000,000	43,636
Facilitation allowance	200,000	6	2	10		120	24,000,000	14,545
Facilitators perdiem	65,000	6	2	10	2	120	7,800,000	4,727
TOTAL PER YEAR							347,160,000	210,400
Contingency @10%							34,716,000	21,040
TOTAL PER YEAR							381,876,000	231,440

Awareness for BWB on good governance, performance and sensitization on HIV/AIDS awareness

1. Gender Issues	2 days	twice a year
2. Corruption Issues	1 day	twice a year
3. Good Governance & HRM	3 days	twice a year
4. HIV/AIDS awareness	1 day	twice a year
5. Writing Proposals	8 days	twice a year
Total	15 days	30 days

	Unit cost	Training	days per training	Basin	Participants per training	Nos./ year	Cost per year (TSH)	Cost per year (USD)
Perdiem for Participants	65,000	10	3	1	20	600	39,000,000	23,636
Technical staff perdiem (2 consultants)	80,000	10	3	1	2	60	4,800,000	2,909
Food & refreshments	8,000	10	3	1	22	660	5,280,000	3,200
Venue cost	100,000	10	3	1		30	3,000,000	1,818
Fuel approximately	50,000	10	3	1		30	1,500,000	909
Stationaries	100,000	10	3	1		10	1,000,000	606
Consultant Allowance	300,000	10	3	1	2	60	18,000,000	10,909
Facilitation allowance	200,000	10	3	1		30	6,000,000	3,636
Facilitators perdiem	65,000	10	3	1	2	30	1,950,000	1,182
TOTAL PER YEAR							80,530,000	48,806
Contingency @10%							8,053,000	4,881
TOTAL PER YEAR							88,583,000	53,687

Research and Study Activities

Reporting on water resources monitoring

	USD	Duration	Trips	Total Cost
Water Resources Consultant	9000	10	4	90,000
Water Quality Consultant	9000	4	2	36,000
International travel	2000		6	12,000
Local travel (within Tanzania)	400		6	2,400
Travel within the Project by BWB				
Perdiem for the Experts at Project	150		360	54,000
All other costs like equipments and office space will be provided by BWB				
Total Cost				194,400
Contingency 10%				19,440
TOTAL COST including contingency				213,840
			or	220,000

Other Activities

	USD per year
To facilitate information dissemination in the basin (leaflets, video, etc..)	13,939
To prosecute defaulters in the Basin	606
To conduct conflict resolutions in the basin	6,667
To facilitate operating costs for RSCBWB	54,451
To conduct minor repairs and office rehabilitation	30,303
To pay salaries for Basin Employee and Consultant	559,242

Source: RSCBWB Business Plan (2010/11 - 2014/15)

Saltwater Intrusion Study				
	USD	Duration	Trips	Total Cost
Water Quality Consultant	9000	5	4	45,000
National WQ Consultant	7000	10	2	70,000
International travel	2000		3	6,000
Local travel (within Tanzania)	400		12	4,800
Travel within the Project by BWB				
Perdiem for the Experts at Project	150		360	54,000
All other costs like equipments and office space will be provided by BWB				
Total Cost				179,800
Contingency 10%				17,980
TOTAL COST including contingency				197,780
			or	200,000

Annexure 2: Mlawanya and Mikindani Aquifer Development and Management

Items	Cost in Tsh
<p>Action 1: Establishment of new wells</p> <p>At the moment, the Mlawanya well field can supply 14,328 m³/day, and Mikindani can supply 600m³/day.</p> <p>If more supply is needed than this, then four more boreholes can be drilled (although the capacity of the Mangamba water treatment works needs to be considered in this).</p> <p>New boreholes should supply a maximum of 100m³/hour (2.4MI/day), and total abstraction for Mlawanya should not exceed 24.5MI/d, and for Mikindani 18.5MI/d</p> <p>For Mikindani, there should not be an increase in the abstraction quantity at the existing borehole, and ideally if further abstraction is required, this source should be abandoned and replaced by another borehole further away from the coastline, south of the Mchuchu spring along the valley floor towards the Rwela village well. Based on a maximum SGA of 18.5MI/d we can have 7 new boreholes each producing 2.4MI/d.</p>	-
<p>Action 2: The costs required for water quantity and quality monitoring</p> <p>Water quality monitoring: A routine monitoring regime must be implemented, with water quality samples collected and analysed for microbiological parameters every month and physical and chemical parameters every three months for all water supply boreholes. The sampling should occur at the same time every year to assess the impact of the wet and dry seasons in order to allow for a robust analysis of water quality trends. Any additional water supply boreholes should be added to this programme.</p> <p>Mlawanya production wells: MT12/78 MT05/86* MT63/81 MT14/86* MT31/86* MT18/86* MT67/86* MT20/86* 4 new boreholes</p> <p>Mlawanya observation wells: MT50/86 MT76/87</p> <p>Mikindani Mikindani borehole 7 new water supply boreholes 1 observation well</p> <p>Total: Mlawanya: 14 boreholes. 168 annual microbiological analysis. 56 physical and chemical parameters. Mikindani: 7 boreholes. 84 annual microbiological analysis. 28 physical and chemical parameters.</p> <p>Physical and Chemical Parameters (quarterly):</p> <ul style="list-style-type: none"> • Temperature; • Salinity (total dissolved solids mg/l and electro-conductivity µS/cm at 	<p>Water quality laboratory analysis, materials and labour: Mlawanya (14 boreholes): 40million/year Mikindani (7 boreholes): 20million/year</p>

<ul style="list-style-type: none"> • 20°C); • Fluoride; • Nitrate; • Sodium; • Potassium; • Chloride; • Magnesium; • Hardness (as CaCO₃); • Calcium; • Carbonate and bicarbonate; • pH; • Turbidity; • Iron; • Manganese; and • Sulphate. <p>Microbiological Parameters;</p> <ul style="list-style-type: none"> • Total coliforms (monthly); • Faecal coliforms (monthly); <p>Costs include labour (sampling), materials and laboratory analysis based at the Mtwara Water Basin Office.</p> <p>Water quantity monitoring: Abstraction quantities and groundwater levels should also be recorded. It is understood that this is planned for the 6 recently refurbished boreholes in the Mtawanya catchment using pressure transducers (with data loggers) and flow meters. These six boreholes have not been included in this programme. The programme should be extended to the new water supply boreholes at Mtawanya and Mikindani:</p> <p>Mtawanya water supply boreholes: MT12/78 MT63/81 4 new water supply boreholes</p> <p>Mtawanya observation wells: MT50/86 MT76/87</p> <p>Mikindani: 7 new water supply boreholes 1 Observation well</p> <p>Quarterly dipping of groundwater levels of these boreholes should be conducted in conjunction with the monitoring of physical and chemical water quality parameters.</p>	<p>Mtawanya: Flow meter: 15million each (6 required) Pressure transducers (6 PWS, 1 observation) and download equipment: 15 million total</p> <p>Mikindani: Flow meter: 15million each (7 required) Pressure transducers (8 required) and download equipment: 15 million total</p> <p>Total (excluding installation labour): 225 million</p>
<p>Action 3: EIA update Complete EIA and update the costing</p>	<p>20 million</p>
<p>Action 4: Resettlement and Relocation Resettlement and relocation compensation costs</p> <p>Note: If resettlement and relocation of the entire Mtawanya and Mikindani aquifers are not going to occur, then individual compensation for loss of farming land or houses nearby to MT20/86 will be required.</p>	<p>874 million</p>

<p>Action 5: Boundary marking and fencing of boreholes</p> <p>All water supply boreholes need to be protected by a 100m radius.</p> <p>Mtawanya production wells: MT12/78 MT05/86 MT63/81 MT14/86 MT31/86 MT18/86 MT67/86 MT20/86</p> <p>4 new water supply boreholes</p> <p>Mikindani: 6 new water supply boreholes</p> <p>At Mtawanya, borehole MT20/86 is located close to the village of Namayanga. In order to fence this borehole some relocation will be required. Any further water supply boreholes will also need to be fenced.</p>	80 million
<p>Action 6: Afforestation and tree planting</p> <p>Afforestation and tree planting in the degraded areas –mainly current cultivated areas, sand mining areas and other exposed areas –approximately 200 ha (248 acre in Mtawanya and 250 acre in Mikindani)</p>	200 million
<p>Action 7: Community awareness programmes</p> <p>Community awareness programmes, mainly by providing warning boards on the boundaries, leaflets to issue to the community on what and what not to do and importance source protection, especially at the Mikindani colonial and Mchuchu springs.</p>	50 million
<p>TOTAL</p>	1,350 million

Annexure 3: Basin Revenue and Tariff Analysis

The revenue collections in the last four years are as follows.

Table A3-1: Revenue collection from 2010/11 to 2013/14

Year	Revenue Collected	
	TSH	USD
Fiscal Year 2010/2011	103,842,204.00	62,935
Fiscal Year 2011/2012	76,241,098.00	46,207
Fiscal Year 2012/2013	85,073,800.00	51,560
Fiscal Year 2013/2014	84,355,231.00	51,124

However as per water permit database, the potential amount to be collected is TSH 1.9 billion or USD 1.16 million. The collection is too low compared to the potential. The reasons are as follows.

- (a) Insufficient staff
- (b) There is no specific drive to collect the revenues
- (c) There are no measurements at some of the sites, for example irrigation sites
- (d) Poor awareness among the public on the importance of the payment of water use fees.

Water tariff

Existing tariffs as shown below are in Regulations schedule in the Government Notice No. 256 published on 21/06/2002 in relations to The Water Utilization (Control and Regulations) Act of 2009.

- (a) Application fees :- 40,000/= for domestic and small scale uses and 150,000/= for commercial uses
- (b) Water user fees: – 35,000/= per year for rural areas and ranges from 90/= to 120/= per 100 m³ for UWSAs. Large irrigations schemes are charged 70/= per 1000 m³ for abstraction above 1598.4 m³ per day.
- (c) Laboratory service charges: – only lab our is charged
- (d) Hydro geological investigation charges: – only lab our is charged

The RSCBWB proposed the following fee revision in their Business Plan (2010/11 – 2014/15)

- (a) Application fees (domestic) – 100,000/=
- (b) Application fees (commercial) 300,000/=
- (c) Water user fees for UWSAs – 5% of revenue collected from water sales.
- (d) Discharge fees for UWSA's -400,000/=
- (e) Water user fees for rural schemes – flat rate 100,000/=
- (f) Water user fees for large scale irrigation :
 - All abstraction less than 18.5 l/s (1598.4 m³/day) – flat rate 200,000/=

- All abstraction equal or above 18.5 l/s for every 1000m³ – 200/=
- (g) Water user fees for small scale irrigation:
- All abstraction less than 3.7 l/s (319.7 m³/day) – flat rate 150,000/=
 - All abstraction equal or above 3.7 l/s for every 1000 m³ - 150/=
- (h) Water bottling companies
- All abstraction less than 22,700 l per day – flat rate 300,000/= per month
 - All abstraction equal or above 22,700 l/day for every 10m³ = 52,865/=

It is also proposed to introduce new tariffs as follows:

- Data sales – 200,000/= per station
- Borehole property fees – 50,000/= per year
- Charcoal dam property fees – 100,000/= per year
- Canal property fees – 50,000/= per year
- Penalties – 1% of the bill

