THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF WATER

BENEFITS AND CHALLENGES OF TRANSBOUNDARY WATER COOPERATION FOR TANZANIA (2008/2009 – 2018/2019)

Water Resources Division,
May 2019
Dodoma

Global Water Partnership Southern Africa
Tanzania Water Partnership

WWF

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FOREWORD

The world has more than 286 internationally shared watercourses, which contribute to the economic, social, and environmental well-being of more than 70 percent of the world's population. Ensuring that the benefits of transboundary water resources are shared equitably among nations is a major challenge for the respective riparian states. Competing claims and opposing interests can quickly bring nations into conflict, especially over shared fresh water, which is essential, limited, and unevenly distributed.

The procedure and process of managing water resources, including transboundary water resources in Tanzania, is enshrined in the Water Resources Management Act (WRMA) No. 11 of 2009, Part XII Article 98 - 100 as well as the National Water Policy (NAWAPO) of 2002. These two frameworks are anchored on principles of integrated water resources management of which the latter provides safeguards and mechanisms on managing transboundary water resources. Tanzania shares more than 77% of all of its river and lake basins with neighbouring countries, and hence transboundary water cooperation is one of the key areas in management of water resources. This report, therefore, is a showcase of our cooperation efforts in managing transboundary water resources in collaboration with our neighbouring riparian countries, and in a bigger picture, with member states of river/lake basin commissions/Authorities such as Zambezi Watercourse Commission (ZAMCOM); Nile Basin Initiative (NBI); Lake Tanganyika Authority (LTA), Lake Victoria Basin Commission (LVBC), Ruvuma River Joint Water Commission and Songwe River Commission launched on 11th March, 2019.

Generally, issues pertaining to management of transboundary water resources are not given due attention even in national public discussions as desired. There are many past and on-going transboundary processes and initiatives which the public need to be informed for the benefit of being aware as well as being primed for potential opportunities that arise from such efforts. Despite the challenges that often emerge in managing transboundary water resources, there are numerous opportunities that riparian states could leverage on. Such opportunities are a result of existence of sound cooperation endeavors of which serve to attract progressive ideas and investments with the objective to improve livelihoods of riparian citizens. The benefits that are generated as results of transboundary water cooperation should serve as an incentive to invest more efforts in nurturing, developing and sustaining collaboration efforts. This report serves to document some of the benefits and challenges of our continued cooperation efforts with other riparian countries in managing transboundary water resources and hence the need to devote more time and resources in our cooperation endeavors.

This report is a culmination of collaborative efforts between the Ministry of Water and Tanzania Water Partnership. The Ministry of Water has continued to work closely and collaboratively with Tanzania Water Partnership within the precincts of a Memorandum of Understanding that was signed between the two parties in August 2016. The Ministry of Water welcomes other partners to support similar efforts in future.

Prof. Kitila Mkumbo

Permanent Secretary

Ministry of Water

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ACRONYMS

ADWR (TR)	Assistant Director of Water Resources (Transboundary Waters)
AMSL	Above Mean Sea Level
BWO	Basin Water Officer
BWB	Basin Water Board
DAWASA	Dar es Salaam Water and Sanitation Authority
DWR	Director of Water Resources
DGIS	Netherlands Directorate General of International Cooperation
EAC	East African Community
EWURA	Energy and Water Utilities Regulatory Authority
GEF	Global Environment Facility
IDB	Internal Drainage Basin
IDBWB	Internal Drainage Basin Water Board
IHP	International Hydrological Programme
IWMI	International Water Management Institute
IWRM	Integrated water resources management
LNBWB	Lake Nyasa Basin Water Board
LRBWB	Lake Rukwa Basin Water Board
LTBWB	Lake Tanganyika Basin Water Board
LTA	Lake Tanganyika Authority
LVBC	Lake Victoria Basin Commission
LVBWB	Lake Victoria Basin Water Board
LVBWO	Lake Victoria Basin Water Officer
LVEMP	Lake Victoria Environmental Management Project
MoW	Ministry of Water
MoU	Memorandum of Understanding
NAWAPO	National Water Policy

NBI	Nile Basin Initiative
NBTF	Nile Basin Trust Fund
NHS	National Hydrological Services
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
PBWB	Pangani Basin Water Board
PREPARED	Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development
SADC	Southern African Development Community
TECCONILE	Technical Cooperation Committee for the Promotion of Development and Environmental Protection of the Nile Basin
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNECE	United Nations Economic Commission for Europe
URT	United Republic of Tanzania
USD	United States Dollar
WRM	Water Resources Management
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

Tanzania is riparian to several trans-boundary water bodies with neighbouring countries. These water bodies include Lakes Victoria, Tanganyika, Nyasa, Natron, Chala and Jipe. Others are Rivers Kagera, Mara, Malagarasi, Momba, Mwiruzi, Ruvuma, Songwe and Umba. Sustainable development and management of such transboundary water resources require cooperation, understanding and agreement among the riparian states. Such cooperation could be in the form of information and data sharing, joint coordination and collaboration in planning as well as joint soliciting of funds for targeted interventions in riparian areas.

Coordination of transboundary waters' activities in Tanzania is vested under Transboundary Section under the Water Resources Division - Ministry of Water. Since enactment of Water Resources Management Act No. 11 of 2009, which also established a new management structure for water resources in Tanzania, the Transboundary Section has been actively coordinating all issues of transboundary water cooperation to ensure participation of Tanzania and the Ministry at relevant regional and international fora.

There are numerous transboundary initiatives that have been implemented in Tanzania and tangible benefits have been realized. Some of the transboundary initiatives include Lake Victoria Environmental Management Project phase two (LVEMP II), Lake Victoria Basin Commission projects; Zambezi Watercourse Commission Projects, the Nile Basin Initiative projects, Songwe River Basin Development Programme; Lake Tanganyika Environmental Management Project; and SADC Water Resources Management Projects. A lot has been achieved in Tanzania as a result of dedicated efforts towards initiating and or nurturing cooperation with other riparian states. Nevertheless, little is known among key stakeholders in the country regarding the nature, benefits and challenges associated with transboundary water resources management. This report attempts to present how the transboundary water resources are managed in Tanzania and how country and other riparian countries are benefiting from such resources.

This narrative is in line with the aspiration of sustainable Development Goal 6, which focuses on water and sanitation management. Sub-goal 6.5 calls for improving integrated water resources management, including transboundary cooperation (6.5.2).

Sustainable Development Goal 6	
Ensure availability and sustainable management of water and sanitation for all	
6.1	*By 2030, achieve universal and equitable access to safe and affordable drinking water for all*
6.2	*By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations*
6.3	*By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally*
6.4	*By 2030, substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water security*
6.5	*By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate*

Sustainable Development Goal 6	
6.6	*By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes*
6a	*By 2030, expand international cooperation and capacity building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies*
6b	*Support and strengthen the participation of local communities in improving water and sanitation management*

Tanzania is riparian to 14 water bodies, including six lakes and eight rivers. The management of these transboundary resources is done through cooperative frameworks (Agreements, Conventions, Protocols and Memoranda). Some of those cooperative legal frameworks that Tanzania is a party to are listed below:

- **Agreements, Conventions and Protocols**

i. Convention between the Government of the Republic of Malawi and the Government of the United Republic of Tanzania on the Establishment of a Joint Songwe River Basin Commission, 2017 (now inforce as from 1st July, 2018)

ii. The Nile Cooperative Framework Agreement, 2010 (not yet in force)

iii. Agreement between the Republic of Tanzania and the Republic of Mozambique on (the Establishment of a Joint Water Commission (JWC), 2006 (inforce)

iv. Agreement for the Establishment of Zambezi Watercourse Commission (ZAMCOM) , 2004 (inforce)

v. The Convention on the Sustainable Management of Lake Tanganyika, 2003 (inforce)

vi. Protocol for the Sustainable Development of Lake Victoria Basin, 2003 (inforce)

vii. Revised Protocol on Shared Watercourse Systems, 2000 (inforce)

viii. General Co-operation Agreement between Tanzania and Malawi 1991(inforce).

- **Memorandum of Understanding**

i. Memorandum of Understanding between Tanzania and Malawi for the Implementation of Phase III of Songwe River Basin Development Programme (SRBDP), 2017

ii. Memorandum of Understanding between Tanzania and Kenya for the Management of Transboundary Water Resources of Mara River Basin, 2015

iii. Memorandum of Understanding between Tanzania and DRC for the Construction of Lukuga Barr age, 2015

iv. Memorandum of Understanding between Tanzania and Kenya for the Management of Lake Chala-Jipe and River Umba Ecosystem, 2011

v. Memorandum of Understanding on Kagera River Basin Transboundary Integrated Water Resources Management and Development between Tanzania, Burundi, Rwanda Uganda and Nile Equatorial

Lakes Subsidiary Action Plan – Coordination Unit - NELSAP- CU

Through these legal cooperative frameworks, Tanzania has benefited in many ways including:-

i. Establishment and implementation of water and environmental projects;

ii. Water resources management and development projects;

iii. Capacity building programmes;

iv. Employment in transboundary organizations;

v. Financial attraction in different projects and programmes; and

vi. Peace and harmony with neighbouring countries.

It is useful to note that there is no universal agreed framework for assessing benefits of transboundary cooperation. However, cognisant is made to the fact that there have been efforts to develop protocols for quantifying benefits of transboundary water cooperation. One of such efforts is by the United Nations Economic Commission for Europe (UNECE) where a typology of the benefits of transboundary water cooperation is documented. In this report, the UNECE typology was customised to fit the local settings.

Tanzania is aligned to two regional development blocks of the East African Community (EAC) and the Southern African Development Community (SADC). Lake Victoria is a shared water resource in East Africa. However, it is also part of the larger Nile Basin of which the latter is shared by eleven countries. Lake Victoria Basin is managed under the East African Community through the Lake Victoria Basin Commission (LVBC) while the Nile Basin is managed through the Nile Basin Initiative (NBI). In this context, there are benefits that the country has continued to enjoy as a result of being part of LVBC or NBI. Such double benefits have been documented accordingly in this report. Other main water bodies that Tanzania is riparian to in the East African region, include Lake Natron, Lake Chala, Lake Jipe, Rivers Kagera, Mara and Umba. There are several compelling reasons for cooperation in managing transboundary water resources. Some of these reasons are:

(i) It is much easier for riparian countries to jointly solicit funding for joint projects in a shared water resource than each country undertaking lone endeavours. For example, Tanzania has managed to secure grants, soft loans and capacity development support as a result of cooperating with other riparian countries.

(ii) Formalization of cooperation through legal frameworks highlights the level of commitment to a common understanding and shared vision in management of transboundary water resources. Such legal agreements are useful in the context of negotiations especially when resolving conflicts between transboundary member states.

(iii) Governance of transboundary water resources requires expertise in both technical and social fronts. Establishment of relevant committees in a cooperative framework highlights the level of proficiency in governance of the shared water resources.

(iv) Sharing of data and information between riparian states is requisite for effective cooperation. Such an exchange of data and or sharing information leads to building confidence, trust and establishment of joint research endeavours for the benefits of generating knowledge and scientific discoveries in managing the shared water resources.

(v) Any cooperation between countries is usually anchored on a motivation of which could be inspired internally

or externally. The existence or sustenance of such motivational prompts and willingness to cooperate is a benefit to the riparian countries and especially the shared waters for sustenance of hydrological and environmental integrity of the shared water resources. The willingness to cooperate also has the benefit of creating a platform for other cooperation endeavours in social, economic, environmental and political fronts.

(vi) Most of the cooperation frameworks are sustained through capacity development initiatives to benchmark and increase the management, adaptive and development capacity of the riparian states. Such initiatives have the benefit of building trust, confidence and partnerships in the various institutions in the member countries.

The aim of this report is mainly to highlight what the Ministry of Water, notably the Division of Water Resources - Transboundary Section, has achieved in realizing the cumulative benefits of transboundary water cooperation in Tanzania since 2009 to the first quarter of 2019. The report enumerates some of the main projects that have been implemented or are being planned for implementation in Tanzania as a derivative of transboundary water cooperation efforts. For example, the projects that are aligned to Lake Victoria Basin Commission or Nile Basin Initiative are:

(i) Regional Rusumo Falls Hydroelectric Project;

(ii) Kenya-Tanzania Electrical Power Inter-connection Project;

(iii) 400KV Iringa - Mbeya Power Transmission Line Project;

(iv) Regional Agricultural Trade and Productivity Project;

(v) Kagera River Basin Management Project;

(vi) Mara River Basin Management Project;

(vii) Nile Basin Decision Support System Project (Nile Basin - DSS);

(viii) Applied Training Project (ATP);

(ix) Lake Victoria Environmental Management Project (LVEMP I & II and III);

(x) Lakes Chala and Jipe and Umba River Ecosystems Transboundary Integrated Water and Wildlife Resources Management Programme; and

(xi) Transboundary Water for Biodiversity and Human Health in Mara River Basin Project.

Some of the transboundary projects that are aligned to SADC region are:

(i) SADC Hydrological Cycle Observing (HYCOS) Project;

(ii) Zambezi Action Plan Project (ZACPRO);

(iii) Ruvuma Shared Watercourses Support Project;

(iv) SADC Hydro-geological Mapping Project;

(v) Songwe River Basin Development Programme (SRBDP);

(vi) WaterNet Capacity Building Network for East and Southern Africa; and

(vii) Lake Tanganyika Integrated Regional Development Programme.

There is no doubt that Tanzania has benefited significantly from its cooperation efforts with other riparian states as documented in this report. However, quantification of such benefits should be a continuous stock taking process of which is expected to improve over time. One aspect that could be factored in the future endeavors is engagement of relevant stakeholders residing in riparian basins in the stock taking processes with the view of nurturing local ownership as well as preserving the spirit of cooperation at the lowest level of intervention.

1.0 INTRODUCTION

Transboundary waters are aquifers, lakes and river basins that are shared by two or more countries or riparian states (UNESCO, 2015). The world's transboundary river basins span 151 countries, covering an area of about 62 million km^2 (50 % of the total land area of the Earth) and benefit more than 2.8 billion people (around 42 % of the world's population), and produce around 22,000 km^3 of river discharge each year (roughly 54 % of the global river discharge) (UNEP-DHI and UNEP, 2016). Transboundary waters are therefore a critical resource that needs to be managed jointly and equitably since it has the potential to spark conflicts between riparian states if mismanaged.

Efficient and effective management of trans-boundary water resources is critical for social, political and economic stability, as well as for sustainable development of all countries sharing the resource. Management of such water resources is a complex process due to inherent dynamics in relationships between the riparian states as well as differentiation in capacity, existing institutional frameworks and perceptions in each respective country. For example, there may be differences in opinion between riparian states regarding economic development pathways, political orientation, cultural values or institutional capacities. Such complexities are more inclined towards human perceptions and orientation of governance systems in each country. However, there are additional complexities emanating from biophysical orientation of the transboundary water resource. Such biophysical complexities arise from demand for water use, population dynamics, land use change, rainfall variability, and climate change among others.

Tanzania is a multi-riparian country sharing seven out of its nine river basins with neighbouring countries as indicated in Table 1. The shared water resources in the seven basins include Lakes Victoria, Tanganyika, Nyasa, Natron, Chala and Jipe, as well as Rivers Kagera, Mara, Malagarasi, Mwiruzi, Ruvuma, Songwe, Mombaand Umba.

Table 1: Neighbouring countries sharing water resources with Tanzania

SN	Country	No.of Shared Water Basins	Basin	Shared Water Source
1	Kenya	3	Lake Victoria	Lake Victoria and Mara River
			Pangani	Lake Chala and Jipe, River Lumi and Umba
			Internal Drainage	Lake Natron
2	Uganda	1	Lake Victoria	River Kagera, and Lake Victoria
3	Rwanda	1	Lake Victoria	River Kagera
4	Burundi	2	Lake Victoria	River Kagera
			Lake Tanganyika	River Malagarasi and Mwiruzi
5	Malawi	2	Lake Nyasa	Lake Nyasa, and Songwe River
6	Mozambique	1	Ruvuma	Ruvuma River
7	Zambia	2	Lake Tanganyika	Lake Tanganyika
			Lake Rukwa	Momba River
8	DRC	1	Lake Tanganyika	Lake Tanganyika

Large abstractions and extensive use of trans-boundary water resources require mutual understanding and consensual agreement among the riparian states. Such reciprocal management approach is centred on entrenching aspects of good neighbourhood as enshrined in norms of International Water Law. Tanzania, which shares more than 77% of all of its river and lake basins with neighbouring countries, has been engaging and cooperating with all relevant neighbouring countries in managing and developing transboundary water resources. This includes implementation of joint initiatives or projects in utilization, development and/or conservation of transboundary waters (URT, 2002).

It is worth noting that the process, challenges and benefits of engaging in managing transboundary water resources is often not given priority in national public discussions as desired. Most of the time, the focus of media and public discussions has been on national projects and initiatives. However, there is a need to balance on both national water initiatives and transboundary processes especially for a multi-riparian state like Tanzania where the country has more transboundary water bodies than any other country in Africa.

Documentation of pertinent transboundary engagement processes and activities is critical in informing the public at all levels on benefits and challenges of transboundary water cooperation. This helps to identify gaps and challenges as well as proposing some measures that will make the communities living around those resources enjoy the related benefits.

This report examines the achievements and benefit of cooperation in sharing transboundary water resources of which most of the documented cases are detailed under respective Programmes, Projects and Initiatives. This report is also an outcome of an internal consultation process with key partners as well as review of relevant information from Water Basin Offices, regional institutions, key implementers of water projects and programs in respective of transboundary water basins.

1.1 Objective of the Report

The objective of this report is to document and highlight the benefits of transboundary water cooperation for Tanzania. It will also highlight the participation of Tanzania at bilateral, regional and international fora in the management of transboundary water resources.

1.2 Structure of Report

This report consists of seven chapters; starting with introduction. Chapter two describes in general the water resources features in Tanzania where as in the third Chapter; transboundary water resources management in Tanzania focusing on transboundary basins has been outlined. Further details of regional and international institutions and organisations dealing with water related issues in the basins are highlighted. The fourth Chapter covers water resources development initiatives and crosscutting issues at the national transboundary basins. More discussion on regional and international agreements and protocols, that Tanzania has signed and ratified with other states are elaborated. Case studies on projects that our country has benefited as a result of cooperation in managing transboundary water resources are covered in Chapter five. In addition, Chapter six underscores challenges of transboundary water cooperation and management. Finally, Chapter seven presents conclusions and recommendations on possible future pathways on improving the process of quantifying benefits of transboundary cooperation in the country.

2.0 THE WATER SECTOR IN TANZANIA

2.1 Introduction

Quantifying benefits of cooperation in managing transboundary waters calls for a broad understanding of the water sector in the country. This chapter highlights the water sector in Tanzania in its broadest sense, including the various governance tools and principles, as the underlying premise for quantifying benefits of trans-boundary water cooperation. In this Chapter, water perspectives in terms of water resources availability and management are discussed. More insights on enabling environment (water governance) and the Water Sector Development Programme (WSDP) as the implementation arrangements towards the grounding of National Water Policy (NAWAPO - 2002) are highlighted.

2.2 Water Resources Availability

Tanzania is endowed with numerous and diverse water resources in the form of rivers, lakes, groundwater aquifers, ponds, reservoirs, and wetlands. The country is riparian to some of Africa's largest trans-boundary freshwater lakes; including Lake Victoria, Lake Tanganyika and Lake Nyasa (URT, 2006). Each of these water bodies exhibits unique characteristics and a complex range of water resources management and development issues and challenges. With its numerous water bodies, Tanzania is perceived to have adequate surface and groundwater resources compared to other countries in Africa for meeting its present consumptive and non-consumptive needs. Moreover, Tanzania shares nine international rivers and five international Lakes with other surrounding states.

Severe and widespread water shortages exist in many areas of the country. This is due to a number of reasons, including climate variability, uneven distribution of water resources in time and space, uncoordinated sectoral development plans, inadequate water security infrastructures, diminishing water resources, population growth coupled with increasing social-economic activities, catchment degradation, climate change and water use conflicts.

The assessment of water resources in the country that has recently been conducted during the establishment of Integrated Water Resources Management and Development Plan (IWRMDP) in Water Basins has indicated that, Tanzania's annual renewable surface water resource is **105** cubic kilometers (105km^3) and the groundwater reserve is **21** cubic kilometers (21km^3). This makes the annual average available water per capita to be **2330** cubic meters per person per year. *Figure 1* depicts the national water resources availability estimates and status for surface and groundwater and across river basins (URT, 2019).

2.2.1 Surface Water Resources

Tanzania has nine major hydrological drainage basins that also profile water governance of the country into the nine Basin Water Boards. Surface water resources in Tanzania include rivers, lakes, springs and dams. Approximately, 7% of the land surface area of the country is covered by three of the country's major Lakes that are also transboundary in nature i.e. the Lake Victoria, Lake Tanganyika and Lake Nyasa. There are also other inland lakes such as Natron and Duluti. In Tanzania, all lakes and swamps cover 5,439,000 hectares and comprise 5.8 percent of the country's surface area (SEI, 2007). There are 633 dams in the country (URT, 2009) and the total capacity of large dams is almost 104,200 million m^3. Major dams in the country include the Mtera, Nyumba ya Mungu, Kihansi and Kidatu dams.

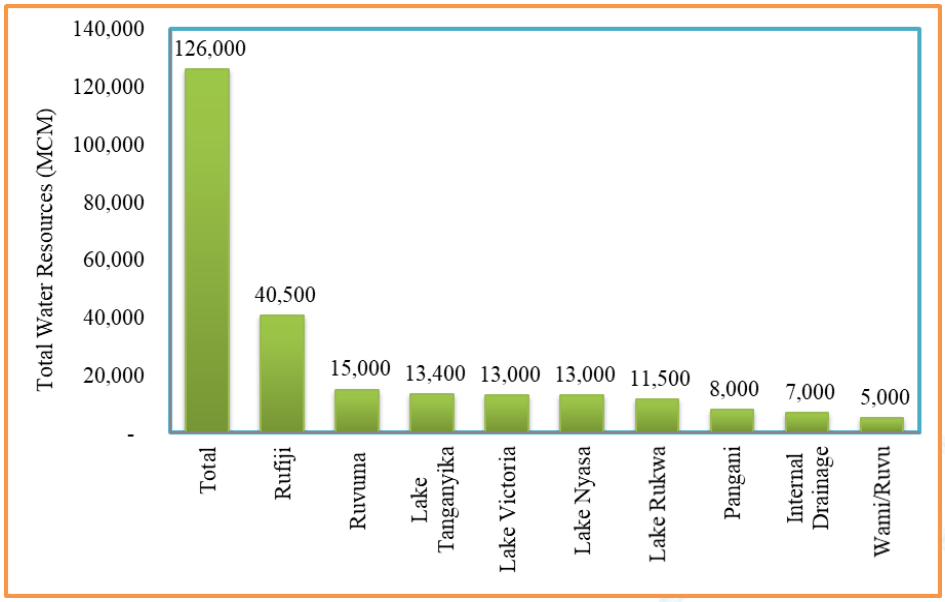


Figure 1: Total Renewable Water Resources in Tanzania

Source: (URT, 2019)

The surface water levels and availability varies greatly across the country depending on a number of factors including seasons and location. The variation is mainly driven by climate and the areal distribution of rainfall pattern. Tanzania has two major rainfall modals within its borders. One is uni-modal (Dec-April) experienced in southern, southwest central, southern west and western part of the country and the other is bimodal (Oct-Dec and March –May) which is found in the north, north eastern and northern coast. Most parts of the country receives rainfall less than 1000mm per annum except highlands and parts of the extreme South and West where 1400 - 2000mm can be experienced (URT, 2011). The current surface water availability in the country is an average of 105 billion cubic meters per year (Figure 2).

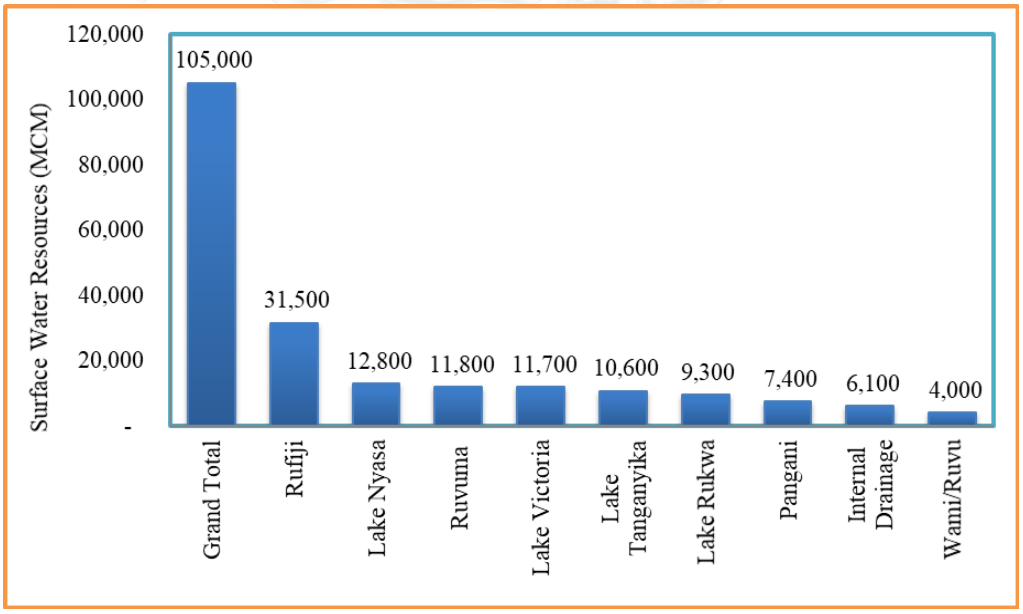


Figure 2: Renewable Surface Water Resources in Tanzania

Source: (URT, 2019)

2.2.2 Ground Water Resources

Ground water availability is mainly controlled by geology and climate, and is unevenly distributed across the country. The groundwater has huge potential for complementing the surface water sources. The main challenge, which has persistently remained to be the major hindrance, to groundwater utilization and development is paucity of data. The current information indicated that the available annual renewable groundwater resources is 21 billion cubic meters (Figure 3).

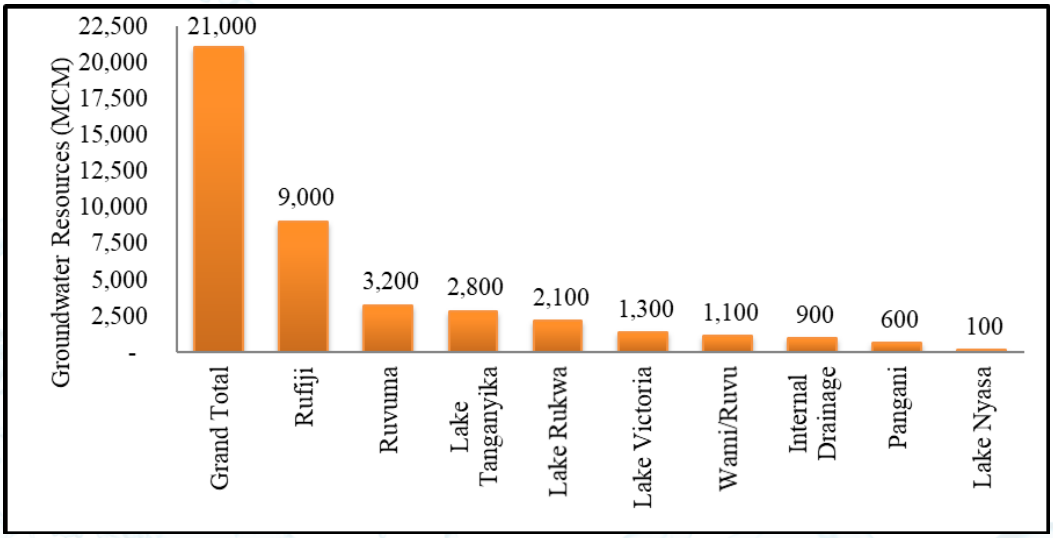


Figure 3: Renewable Groundwater Resources in Tanzania

Source: (URT, 2019)

2.3 Major Uses of Water Resources

Water demand in the county is around 40 million cubic meters (40 MCM) per year. The increase of population and socio-economic activities is expected to increase the water demand to 57 million cubic meters (57 MCM) per year in 2035. The current water demand indicates that there is high potential of development of socio-economic activities that require water such irrigation, hydropower and industry. Although this is 45% of the total renewable water resources in the country, substantial measures of conservation of water sources, demand management and efficient water use are required now.

2.4 Water Quality Status

Water quality varies significantly in the country depending on a number of factors including nature of parent rocks and human activities. Some of the urban surface water sources are contaminated due to effluents from domestic and industrial wastes and storm water. It has in recent times been observed that as the results of intensive catchment degradation caused by rapid change of land use, non-point sources of pollution is on the rise. Few cases of water-borne diseases have been reported in connection with effluent contamination from poor domestic waste management in urban and peri-urban areas.

For rural areas, the quality of groundwater is generally good and acceptable for most uses. Major problems that some parts of country are facing are to do with salinity (especially the coastal and central parts of the country) and high fluoride concentrations. Water quality monitoring has revealed high levels of fluoride, chloride, iron

nitrate and manganese in boreholes and shallow wells. Likewise, high fluoride concentrations are associated with volcanic terrains and crystalline basement rocks in the central plateau and northern regions of the country especially in Pangani and Internal Drainage Basins (URT2015). In some parts of the country, concentration of fluoride is more than 14 mg/l. Most of the shallow wells are found to be prone to bacteriological contamination. Nitrate and bacteriological contamination are linked to pollution from sewerage effluents (URT 2014).

2.5 Water Resources Management

2.5.1 Governance of Water Resources

Tanzania manages its water resources according to the Water Resources Management Act of 2009 (WRMA) at five levels, from national to local: (i) National Water Board (ii) Basin Water Boards (iii) Catchment Water Committees (iv) Local Government Authorities (LGAs) and (v) Water Users Associations (WUA).

Tanzania endorsed Integrated Water Resources Management (IWRM) approach and adheres to the Dublin principles which concisely state the main issues and thrust of water management which are: (i) Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment (ii) Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels (iii) Women play a central part in the provision, management and safeguarding of water and (iv) Water has an economic value in all its competing uses and should be recognized as an economic good (GWP, 1992).

Prior to the 1992 Dublin Principles, being in line with the IWRM approach; in 1980s, River Basin Management approach that divides the country into nine hydrological basins was introduced through Act No.10 of 1981 which amended the Water Utilization (Control and Regulation) Act, No. 42 of 1974, the principal legislation governing the management of water resources at that time. In 2009, the Water Resources Management Act No. 11 which repealed and replaced Act No. 42 of 1974, retained that approach. With this approach, the nine Basin Water Boards are fully responsible for regulating and planning water resources and uses within the basin borders. The nine river basins are described in chapter 3 of this report.

In addition to the Water Act; Tanzania has the National Water Sector Development Strategy (NWSDS) as per National Water Policy (NAWAPO) (2002) and implements the Water Sector Development Programme (WSDP). It therefore follows that, Tanzania governs its water resources in accordance to three major frameworks; The National Water Policy (2002), National Water Sector Development Strategy (2006) and the Water Resources Management Act No 11 of 2009. The Act gives the institutional and legal framework for water governance (URT, 2014b).

2.5.2 Policy Framework

The National Water Policy (NAWAPO) 2002 is in line with the IWRM Principles and it advocates devolution of responsibility for water resources to River/Lake Basins and catchments management entities with active participation of local government and community based organizations (URT, 2002). The Policy also guides on how to cooperate with other countries in managing transboundary waters.

2.5.3 Legislative Framework

The legal framework under which the management of water resources in the country operates is contained on two pieces of water legislation i.e. Water Resources Management Act (WARMA) and Water Supply and Sanitation Act (WASSA) which were enacted in 2009. These two Acts of parliament repealed all previous water laws except the laws that established DAWASA and EWURA. The legislation provides mandates for both Policy and Programme implementation including establishment of various institutions. The following sub-sections provide snap shots of these two pieces of legislature for water resources management.

2.5.3.1 Water Resources Management Act (WRMA), 2009

This piece of legislation was enacted to provide for institutional and legal framework for sustainable management and development of water resources. Further, it was meant to outline principles for water resources management, to provide for prevention and control of water pollution. Moreover, it was for providing for the participation of stakeholders and the general public in implementation of the National Water Policy, repeal of the Water Utilization (Control and Regulation) Act and to provide for the related matters (URT, 2009a).

Part XII of the Water Resources Management Act No 11, 2009, provides for management of trans-boundary waters. It gives the direction on recognition and formulation of policies, strategies and legislation in respect to trans-boundary waters. That part gives the Minister responsible for Water the power to develop policies and strategies for the purpose of ensuring sustainable, equitable utilization and management of trans-boundary waters. It also imposes to the Director of Water Resources the responsibility of keeping a register of all International and Regional Agreements concerning the utilization and management of trans-boundary water to which the United Republic of Tanzania is a party (URT, 2009a).

2.5.3.2 Water Supply and Sanitation Act No 12 (WSSA), 2009

The Water supply and Sanitation Act (WASSA) of 2009 was enacted to provide for sustainable management and adequate operation and transparent regulation of water supply and sanitation services with a view to give effect to the National Water Policy, 2002. It was further meant to provide for the establishment of water supply and sanitation authorities as well as community owned water supply organisations (COWSO's). Moreover it provides for service providers, repeal of the Waterworks Act and to provide for related matter. Though the Act doesn't explicitly highlight the issues of water supply and sanitation for trans-boundary waters, any water supply and sanitation project or cross boarder water supply that can be of trans-boundary in nature, will have to abide to the Act (URT, 2009b).

2.5.4 Institutional Arrangement

With respect to institutional framework for water resources management in Tanzania, the role of the Ministry responsible for Water is that of co-ordination, policy and guideline formulation, and regulation. New institutions have been created comprising of the National Water Board, Basin Water Boards, Catchment Water Committees, and Water Users Associations (WUA) and District Facilitation Teams. Figure 4 below presents Institutional Structure of the Basin Water Boards.

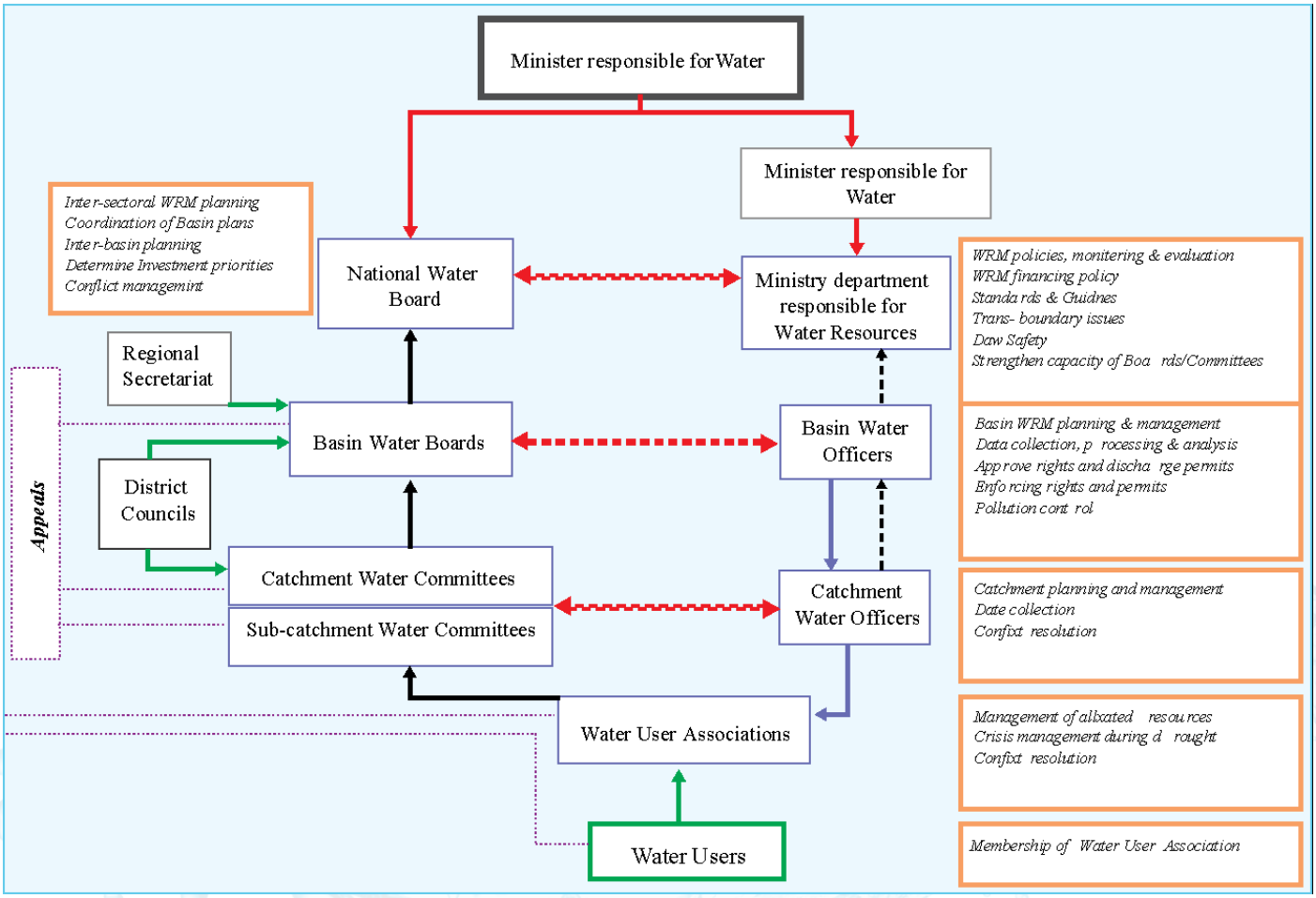


Figure 4: Institutional Structure of Water Resources Management

Source: (URT, 2006b)

2.5.5 Water Sector Development Programme (WSDP)

In realizing the objectives enshrined in NAWAPO, the Government of Tanzania (GoT) has been implementing the Water Sector Development Programme (WSDP) phase one for the period of 2006 – 2015. WSDP is one of the largest programmes in Sub-Saharan Africa implemented under a Sector Wide Approach to Planning (SWAP) arrangement covering all activities in the entire water sector country-wide. The second phase of WSDP II started in 2016, and will run until 2020. The WSDP Programme Development Objective (PDO) is to "*strengthen sector institutional arrangements for integrated water resources management and improve access to water supply and sanitation services*".

The specific objectives of WSDP II is that by the end of the programme, the Government of Tanzania (GoT) should meet the National Development Vision (2025) and sector targets within the five years development plan II of 2016/2021 and be on track to meet the Sustainable Development Goal (SDG6) for improved water supply and sanitation coverage across the segments of population. WSDP II comprises of five components namely; (a) Water Resources Management, (b) Rural Water Supply and Sanitation, (c) Urban Water Supply and Sanitation, (d) Sanitation and Hygiene and (e) Programme Delivery Support.

However, after the mid-term review of WSDP II in 2018, the dialogue mechanism has confined the components into four themes, namely:-

(i) Financing and Planning, Institutional Capacity Building and Performance Monitoring;

(ii) Water Resources Management;

(iii) Water Service Delivery (Rural and Urban Water Supply); and

(iv) Sanitation and Hygiene.

The NAWAPO has continued to provide the general direction of the sector in the course of attaining the aspirations of National Development Vision by 2025, through implementation of Water Sector Development Programme (WSDP). The WSDP has continued to prioritize activities and budgets in a three-phased timeline of five years each (first phase 2007-2014; second phase 2014-2019 and third phase 2019-2025). WSDP is in its second phase with five components, namely Water Resources Management in which all transboundary water issues are dealt with. Other components include; Rural Water Supply and Sanitation, Urban Water Supply and Sewerage, Programme Delivery Support and Sanitation and Hygiene (URT, 2014a). The trans-boundary water interventions that are highlighted in WSDP II are stated below (URT, 2014a);

(i) To prepare needs assessment and strategy for utilization of transboundary water resources at national level;

(ii) Establish joint management mechanisms for each shared water body to deal with integrated water resources management including promotion of joint inter-state catchment management and protection;

(iii) Implement IWRMD plans as identified for each Basin Water Board (BWB) and promote regional cooperation and integration with riparian states;

(iv) Prepare and implement training to relevant basin and Ministry staff, and provide support to Ministry of Water (MoW) towards maintaining international agreements; monitoring trans-boundary water resources; negotiations and conflict management between users of trans boundary waters;

(v) In collaboration with riparian countries collect data, information and carry out research on trans boundary waters to promote technical collaboration; and

(vi) Establish a register of all international and regional agreements concerning the utilization and management of transboundary waters to which Tanzania is a party. Thus, the exercise of quantifying benefit of transboundary water cooperation is in line with WSDP (both phase I and II). In other words, the benefits of transboundary cooperation are viewed in the context of success stories of WSDP within the realms of transboundary water resources management.

3.0 OVERVIEW OF TRANSBOUNDARY WATER RESOURCES IN TANZANIA

3.1 Introduction

Bilateral and regional cooperation on transboundary waters is a catalyst towards realization of benefits to all parties and can open new opportunities for riparian states to sustainably develop water resources. The potential costs of tensions between riparian nations over transboundary waters are very high. They can limit prospects for regional integration, trade and stability. On the other hand, if transboundary waters are appropriately managed they can serve as a focal point for cooperation, thereby reducing tensions between countries while promoting regional integration and development, both within a basin and in a wider region. In contrast, human security and development can be made vulnerable by ignoring transboundary waters, since conflict or improper management may lead to a lack of regional preparedness or capacity to address challenges such as pollution, floods and droughts. These vulnerabilities are further exposed by the absence of adequate systems or mechanisms for cooperation.

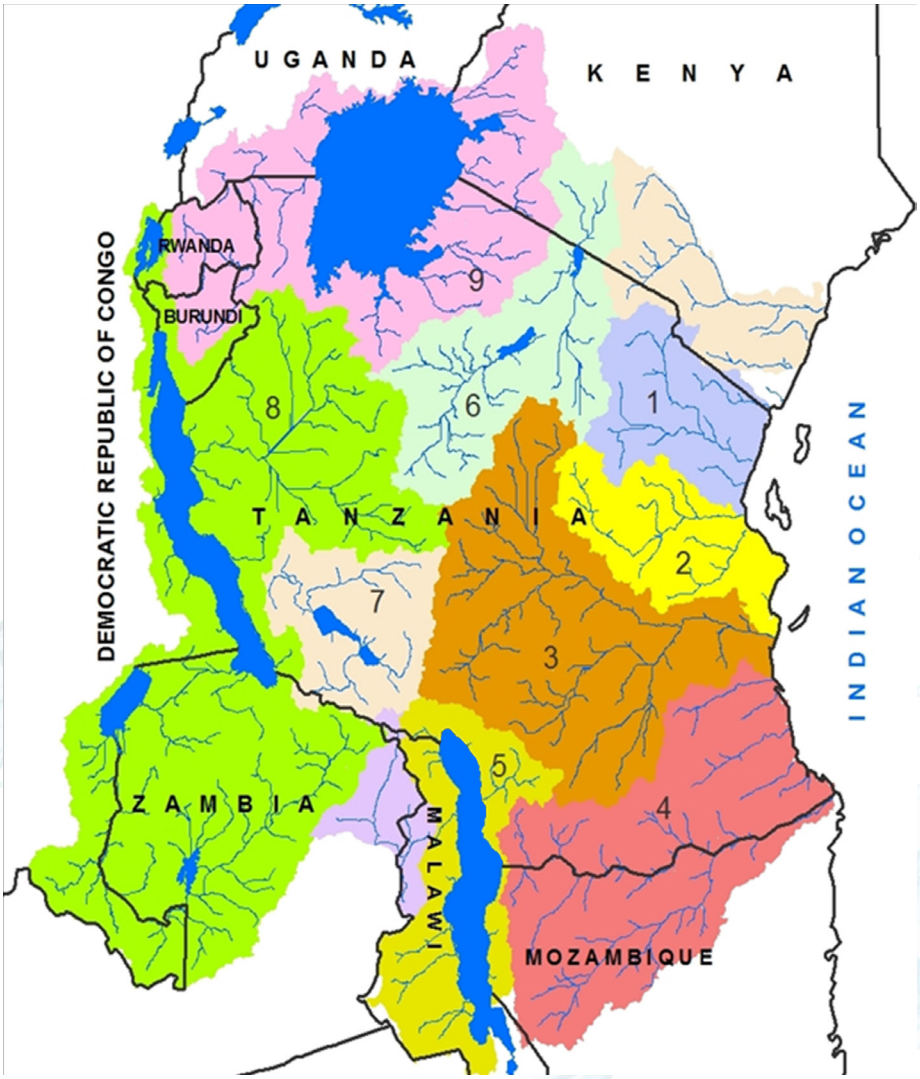
3.2 International Water Law

Tanzania is a party to various international legal frameworks including the International water law, which provides the rules that govern the use of transboundary water resources and facilitate cooperation. Central to these rules is the duty to cooperate – one of the main normative pillars of international law. International agreements and rules of customary international law can help sovereign states to reconcile competing claims. The United Nations (UN) has produced three key instruments which provide guidance for states on how they should approach the beneficial exploitation of their transboundary water resources. These instruments are i) the 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses (UNWC); (ii) the 1992 UN Economic Commission for Europe (UNECE) Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes (UNECE TWC); and iii) the 2011 UN Resolution on the Human Right to Water and Sanitation. When transboundary waters are not governed by treaty or any cooperative framework, then customary international law guides states actions. Each state is entitled to, and obliged to ensure equitable and reasonable use of shared waters, which includes a due-diligence obligation not to cause significant harm to the resources and other states.

3.3 Transboundary Surface Water Basins

Tanzania is one of the few countries in Africa that has many transboundary water resources. A total of 14 transboundary water bodies exist in Tanzania, including Rivers Songwe, Kagera, Mara, Malagarasi, Momba, Mwiruzi, Umba, and Ruvuma, and transboundary Lakes such as; Nyasa, Victoria, Chala, Jipe, Tanganyika and Natron. Each of these transboundary water sources are part of the nine available lakes/river basins in the country. Seven out of the nine water basins are transboundary as indicated in Figure 5. These are: i) Lake Victoria Basin ii) Lake Tanganyika Basin iii) Lake Nyasa Basin iv) Pangani Basin v) Ruvuma and Southern Coast Basin vi) Internal Drainage Basin and vii) Lake Rukwa Basin (URT, 2006a). Only Rufiji and Wami-Ruvu Basins are not transboundary as indicated in Figure 5.

Each of the transboundary water bodies/basins has distinctive properties and complex issues and challenges with regards to water resources management and development. In order to foster regional cooperation and integration, and to seek opportunities to maximize benefits from the shared water sources, a transboundary Section was established in 2009 under the Department of Water Resources in the Ministry of Water.



Legend:

1 – Pangani Basin
2 – Wami/ Ruvu Basin
3 – Rufiji Basin
4 – Ruvuma Basin
5 – Lake Nyasa Basin
6 – Internal Drainage Basin
7 – Lake Rukwa Basin
8 – Lake Tanganyika Basin
9 – Lake Victoria Basin

Figure 5: Transboundary River and Lake Basins in Tanzania

This departmental Section, with the guidance of National Water Policy, 2002 and Water Resources Management Act No. 11 of 2009 and the Ministry of Water functions and organization structure, has been coordinating all projects and programmes of transboundary in nature. The policy recognizes Tanzania as a riparian state sharing several of its transboundary water resources with neighbouring countries (URT, 2002).

3.3.1 Lake Victoria Basin

(i) Overview

The Lake Victoria Basin (LVB) is situated between the Eastern and Western Branches of the East African Rift System (EARS). The Lake Victoria Basin (LVB) has a size of 194 000 km^2, with the Lake surface covering an area of 68,800 km^2. The Basin area is shared between riparian states of Tanzania (44 %), Kenya (22 %), Uganda (16 %), Burundi (7%) and Rwanda (11 %). The Lake itself is shared between Kenya (6 %), Tanzania (51 %) and Uganda (43 %) (URT 2009c) as indicated in Figure 6.

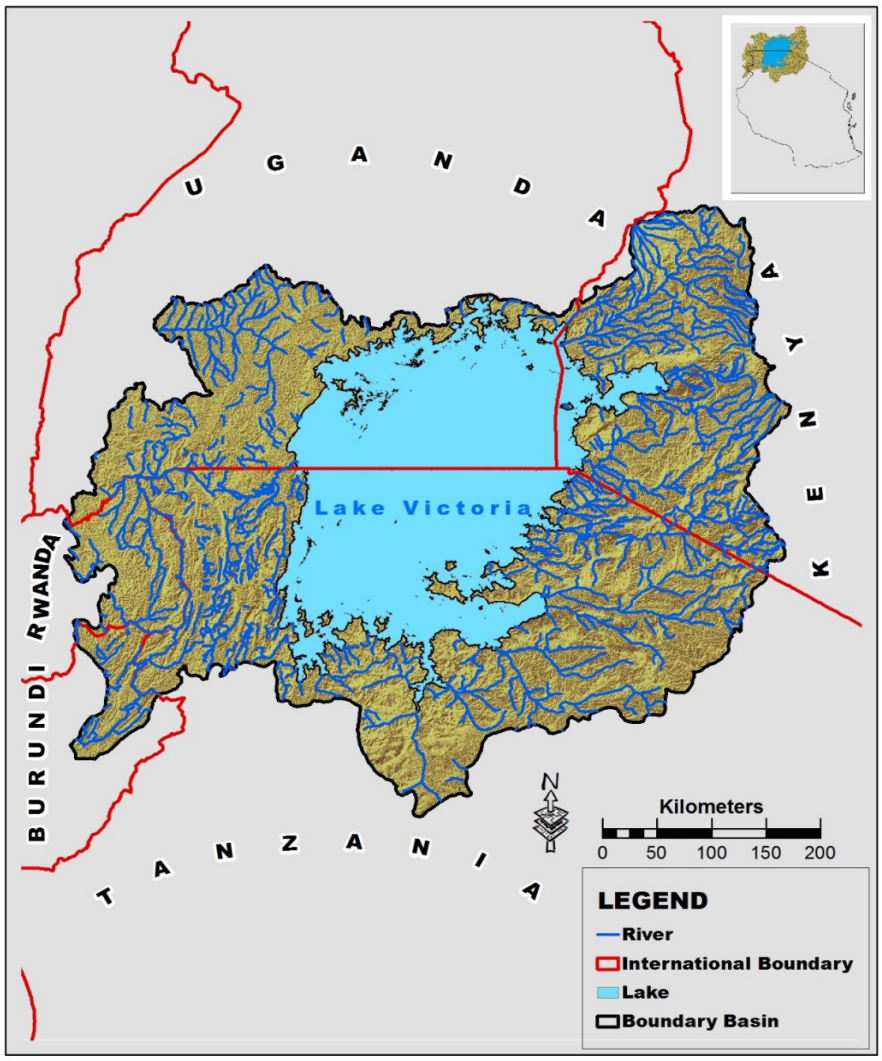


Figure 6: Lake Victoria Basin

The Lake Victoria Basin holds world leading status for freshwater lake size, elaborate vertebrate species diversity, species extinctions, exotic species invasions, and freshwater fishery production. Lake Victoria Basin has been persistently erratic in evolutionary timescale, varying in size and ecosystem structure, and has recently displayed a massive ecosystem change in a relatively short (three decade) period. The changes have been induced by natural factors coupled with human activities mainly associated with increasing population, economic growth and governance. The Lake is high in elevation, mostly enclosed by highlands and mountain ranges at the center of the tropics (EAC, 2007a).

The LVB is endowed with natural resources, including freshwater, fish and other biological resources, which provide unique opportunities for socio-economic development. Despite the various services/functions LVB provides, the Lake and other ecosystems are experiencing threats that are negatively impacting the socio-economic development and the natural resource base (EAC, 2007a).

(ii) Basin Characteristics

Lake Victoria Basin falls under the equatorial hot and humid climate with a bi-annual rainfall pattern, where the long rains are experienced from March to May and short rains from October to December. The month of July is the coolest month of the year and the warmest month is variable and fluctuates in the period from

October to February. Rainfall varies considerably from one part of the Basin to another. The highest rainfall in Uganda is received in the Ssese Islands and is about 2,400 mm annually, while Tanzania and Kenya receive between 1,350 mm - 2,447 mm annually (EAC, 2007b).

On the other hand, Burundi and Rwanda get an average rainfall of 1800 mm annually. On the Northern and Western shores, the effects of rainfall do not extend more than 40 km inland. Rainfall amount increases from east to west, ranging between 600 to 2,800 mm annually (EAC, 2007b). The temperature in the Basin countries reaches maximum in February, just before the March equinox and reaches its lowest records in July after the June equinox maximum and range from 28.6° C – 28.7° C. The minimum temperature varies from 14.7° C to 18.2° C. The hydraulic process of the Basin is influenced by seasonal winds. In the months of January-February and June-September, the wind pattern is predominantly East-West, parallel to the equator, with origins from the western parts of Kenya and Tanzania. These, fairly dry winds pick moisture while crossing the lake subsequently depositing it to the Western catchments especially Bukora catchment, Uganda. During March-May and October-December, the wind pattern changes towards the northern parts of the Lake (EAC, 2007b).

The drainage pattern of Lake Victoria Basin consists of rivers, streams and wetlands. The main rivers draining into the Lake from Tanzania include Kagera, Simiyu, Mbalageti, Grumet, Mara and Mori Rivers. The most important feature of this basin is the Lake Victoria which is the largest in Africa and source of the White Nile. Lake Victoria lies across the equator between latitudes 0 31N and 3 54S, longitudes 31 18E to 34 54E with an average depth of 80m. The other major rivers are Bukora and Katonga which originate in Uganda; the Nzoia, Sio, Mara, Yala, Awach, Gucha, Migori and Sondu which originate from Kenya. Economic activities of the people around the Basin include agriculture, livestock keeping, Mining, Industries, and Fishing (EAC, 2007b).

(iii) **Alignment to Regional Institutions and Protocols**

Lake Victoria Basin is shared among five East African countries and is jointly managed under jurisdiction of East African Community (EAC) through the Lake Victoria Basin Commission (LVBC). The East African Community, which was established through a Treaty, has designated Lake Victoria and its Basin as an area of common economic interest and a regional economic growth zone to be developed jointly by the Partner States.

The East African Community Treaty was signed in November 30, 1999 in Arusha, Tanzania by three countries; Kenya, Uganda and The United Republic of Tanzania. The EAC Treaty was amended in 2006 to include Rwanda and Burundi; and again in 2016 to include the Republic of South Sudan. Protocol for Sustainable Development of Lake Victoria Basin was established and signed on 29th November 2003 and its ratification in December 2004, which in effect cleared the way for the establishment of Lake Victoria Basin Commission (LVBC). The Commission is a mechanism for coordinating the various interventions in the Lake and its Basin and serves as a center for promotion of investments and information sharing among the various stakeholders. The objectives and broad functions of the Secretariat of the commission is to promote, coordinate and facilitate development initiatives within the Lake Victoria basin. The Secretariat headquarters of the Commission is based in Kisumu – Kenya, after being relocated from Arusha in January 2007 (EAC, 2003).

Within the precincts of LVBC, a memorandum of understanding between the Government of the Republic of Kenya and the United Republic of Tanzania on sustainable water resources management of the Mara River Basin was prepared and signed on 15th September, 2015. The objective of the Memorandum of Understanding is to put an institutional arrangement for the joint management of projects, programmes, and initiatives related to water resources management and Development in the Mara River Basin (RK and URT, 2015).

3.3.2 Ruvuma River Basin

(i) Overview

Ruvuma River forms the border between Tanzania and Mozambique (in Mozambique known as Rio Rovuma). The River is 800 kilometres long, with a drainage basin of 155,500 square kilometres in size of which 65.39% is in Mozambique, 34.30% is in Tanzania, and 0.31% is in Malawi (URT, 2015b). The river is perennial rising from the headwaters of its chief tributaries of Lucheringo, Likonde and Lugenda rivers in Mozambique, and from the Matogoro Mountains in south eastern Tanzania as indicated in Figure 7.

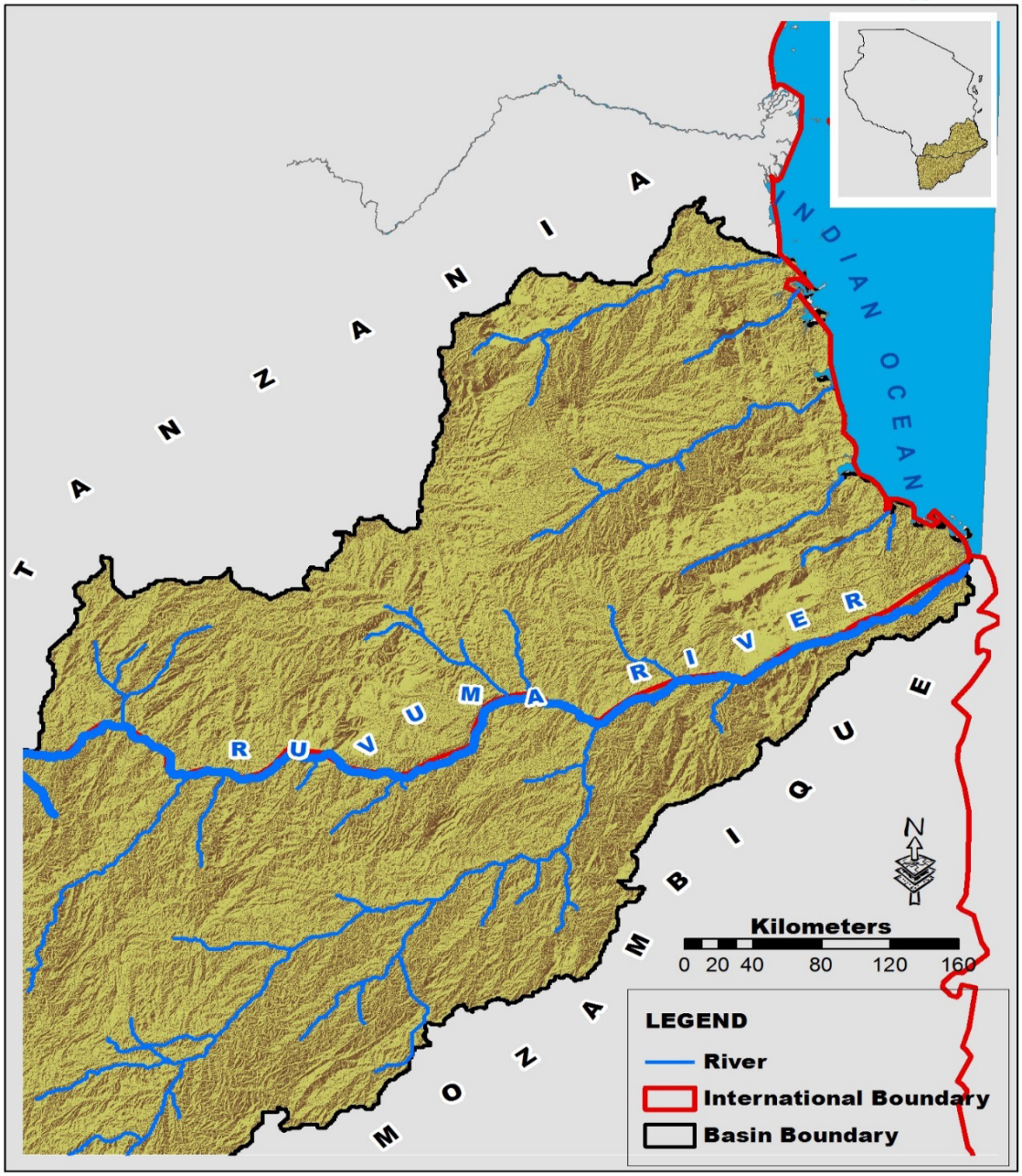


Figure 7: Ruvuma River Basin

The lower Ruvuma river is formed by the junction at 11° 25' S., 38° 31' E. of two branches of nearly equal importance, the longer of which, the Lugenda, comes from the south-west, the other, which still bears the name Ruvuma, from the west. Its source lies on an undulating plateau, 1,000 m (3,300 ft) high, immediately to the east of Lake Nyasa, at 10° 45' S., 35° 40' E., the head-stream flowing first due west before turning south and east (URT, 2015b).

(ii) Basin Characteristics

In its eastward course, the Ruvuma flows near the base of the escarpment of an arid sand stone plateau to the north, from which direction the streamshave cut themselves deep channels in the plateau edge, have almost all short courses. Its mean annual discharge is 475 m^3/s at its mouth as reported in the Integrated Water resources Management and Development Plan for the Ruvuma Basin (URT 2015b).

On the opposite bank, the Ruvuma receives, besides the Lugenda, the Msinje River and Lucheringo River, flowing in broad valleys running from south to north. The Lujenda rises in proximity to Lake Chirwa, in the small Lake Chiuta (570m), the swamps to the south of this being separated from Chirwa only by a narrow wooded ridge. The stream which issues from Chiuta passes by a swampy valley into the narrow Lake Amaramba, from which the Lugenda River finally issues as a stream 27 m wide.

The location of the River outlet is approximately 10° 28' S., 40° 30' E, the boundary near the coast being formed along the latitudinal parallel of 10° 40'.The mean temperature in the coastal area is 26°C and that of the hinterland is 24°C (URT 2015b). Annual and daily variations in temperature are small. The main parts of the river basin are on an altitude between 305 – 710 m above mean sea level and drops almost gradually before entering the coastal plains. Economic activities of the people in the Ruvuma Basin include Agriculture, livestock keeping, fishing and industries.

(iii) Alignment to Regional Institutions and Protocols

The Ruvuma River is aligned to the SADC Region, where the Ruvuma Joint Water Commission (Ruvuma JWC) was officially established in 2011 between Tanzania, and Mozambique. On 11th October 2006 in Pemba – Mozambique, the Agreement between the United Republic of Tanzania and the Republic of Mozambique on the Establishment a Joint Water Commission Agreement (JWC) was signed by the two Governments. Tanzania ratified the Agreement on 6th November 2009. The commission was formed under the Joint Ruvuma River Basin Initiative (JRRBI).

3.3.3 Lake Tanganyika Basin

(i) Overview

The Basin is located on the western part of the country between latitudes 2^0 45' and 8^0 45' and longitudes 29° 35' and 34° 00'. The Basin is shared by five countries namely Tanzania, Burundi, Democratic Republic of Congo, Rwanda and Zambia. Lake Tanganyika itself covers 32,600km^2 making it the second largest Lake in Africa by surface area after Lake Victoria. With a maximum depth of 1,470m, it is the second deepest Lake in the world after Lake Baikal in Russia. It is the longest lake in the world with a length of 650km and an average width of 50km. The Lake volume is close to 19,000km^3 making it the largest lake in Africa by volume and second largest freshwater lake in the world by volume. Tanzania occupies approximately 41% of the total surface area of the Lake (URT 2015c) as indicated in Figure 8.

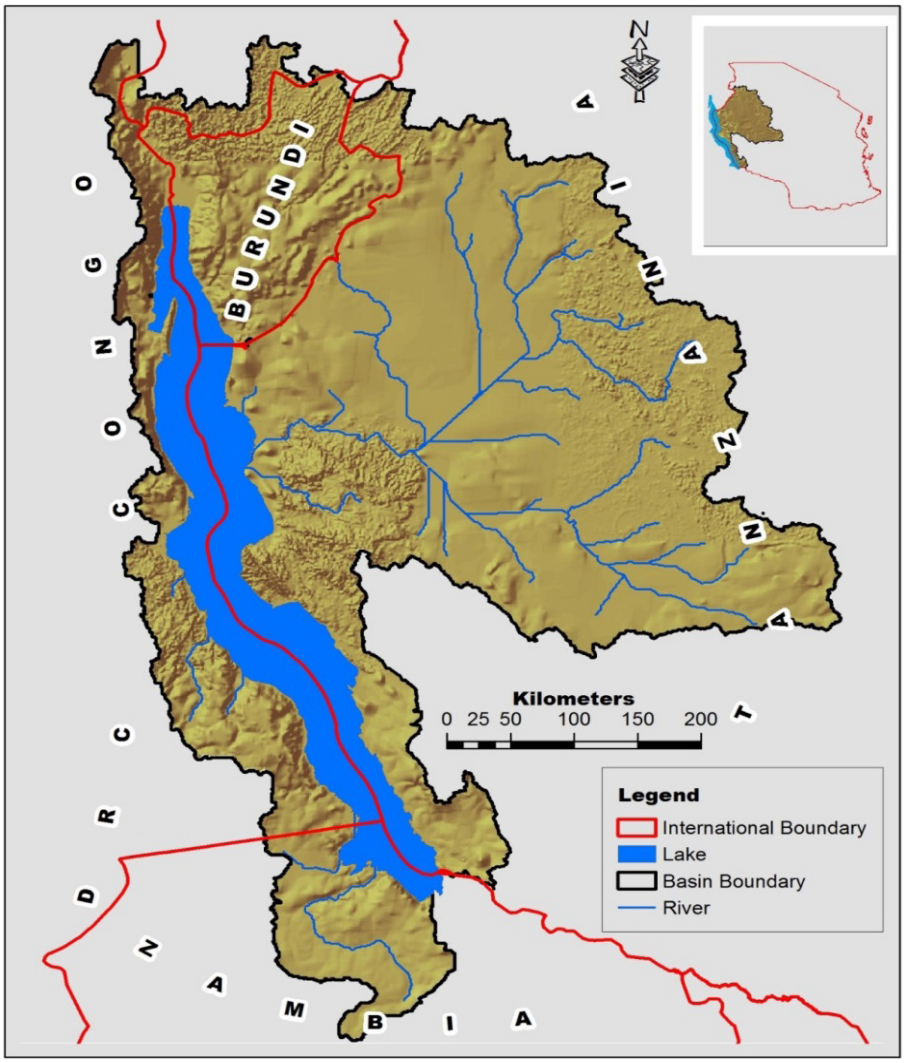


Figure 8: Lake Tanganyika Basin

The Basin covers six administrative regions in Tanzania including Kagera, Kigoma, Katavi, Tabora, Geita and Shinyanga and covers a total of 21 Districts - wholly or partially located within the Basin. The main urban areas are Kigoma and Tabora with estimated population of 2,127,930 and 2,291,623 respectively (URT, 2012). Natural reservoirs in the basin include Lake Tanganyika, Sagara and Nyamagoma.

(ii) Basin Characteristics

The Basin area on the Tanzanian side is around 137,000 Km^2 and contributes almost 60% of the total runoff to the Lake. The basin is dominated by Malagarasi, Ugalla and Ruchugi River systems, with a total drainage area of 124,300 Km^2 (URT 2015c). The Ruchugi River drains the hilly landscape North of Kasulu, running in a southern direction through a low, partly swampy, undulating landscape, before it enters the Malagarasi River which originates at an altitude of 1750 a.m.s.l at Uvinza. The main tributaries of Malagarasi River are Moyowesi and Igombe Rivers that meet the Malagarasi in the seasonal Lake Nyamagoma.

The Basin has a total of 35 manmade reservoirs whose total storage volume is about 50,300,000 m^3. Igombe and Kazima are the major reservoirs and were built in 1959 and 1949 respectively. These two reservoirs had design capacities of 47,000,000 m3 and 2,600,000 m3 respectively. Their present actual capacities are

considered to be lower due to long time siltation. These two dams serve as the main water supply sources for Tabora Municipality and its suburbs (URT, 2015c).

(iii) Alignment to Regional Institutions and Protocols

Lake Tanganyika Basin is aligned to SADC Region. The Lake Tanganyika Authority (LTA) is an Institution established by the Governments of Burundi, Democratic Republic of Congo, Tanzania, and Zambia. The Lake Tanganyika Authority (LTA) was launched in December, 2008 with the mandate to safeguard the Lake and its natural resources. On 20th June, 2003 in Dar es Salaam Tanzania, the Convention on the Sustainable Management of Lake Tanganyika was signed between Tanzania, Burundi, DRC, and Zambia. The objective of the Convention is to ensure the protection and conservation of the biological diversity and the sustainable use of the natural resources of Lake Tanganyika and its Basin by the Contracting States on the basis of integrated and co-operative management (GRB et al., 2003).

3.3.4 Lake Nyasa Basin

(i) Overview

Lake Nyasa, also known as Lake Malawi in Malawi and Lago Niassa in Mozambique, is an African Great Lake and the southernmost lake in the East African Rift Valley system, located between Malawi, Mozambique and Tanzania as indicated in Figure 9. It is the eighth largest fresh water lake in the world and the third largest and second deepest lake in Africa with an average volume of 7,775 km^3. It is home to more species of fish than any other lake, including at least 700 species of cichlids. The lake catchment area (land area) is reported to be 3,9140 Km^2 on Tanzania side, 89,745 km^2 in Malawi and 2,767 km^2 in Mozambique. The Lake is 560 Km long on average, has a maximum width of 75 km, an average depth of 706 Km (URT, 2015d).

The Lake drains via the Shire River in Malawi to the Zambezi River which discharges into the Indian Ocean. The Lake supports fisheries, livestock, agriculture, tourism, and wildlife in all the counties.

A fresh southeasterly wind (the *mwera*) prevails from May to August, causing short gales and restless waters with the coastline offering little shelter. The Lake is fed by 14 perennial rivers, the largest being the Ruhuhu in Tanzania and the transboundary River Songwe shared between Tanzania and Malawi. Other rivers discharging into the Lake from Tanzania are Kiwira, Lufilyo and Mbaka. The total contribution of water to the Lake from Tanzania is 60%. The only outlet from the Lake is Shire River at its southern end, which is a tributary of the Zambezi River. The Lake has shorelines on western Mozambique, eastern Malawi, and southern Tanzania. The Lake's water is alkaline (pH 7.7-8.6) and warm with a surface temperature between 24°C and 29 °C while deep sections typically are about 22 °C (URT 2015d).

The population of the basin, in 2012, was estimated to be around 1,294,500 persons and is projected to increase to 2,254,600 by 2035 (URT 2015d). The greatest population concentration is at the northern end of the basin along the districts of Kyela and Tukuyu, on the south-eastern side around Mbeya region and Mbamba Bay.

ii) Basin Characteristics

The climate in the basin, according to the Koeppen classification, is a warm temperature - with winters and warm to hot summers. It is strongly controlled by the topography with elevation allowing relatively cool average temperature and orographic rainfall effects. The wet and dry seasons are affected by the location of the inter-tropical convention zone (ITCZ). During December to February this zone is located south of the basin

and the dry and warm north – east monsoon dominates. From March the zone moves northwards and is located over the basin and results in the heaviest rainfall of the year. By June the zone moves to the north of the basin and the colder but dry south-east air dominates. The basin has highest rainfall in Tanzania ranging from less than 1000mm/year in the Ruhuhu area to more than 2600mm/year in Kyela area (URT, 2015d).

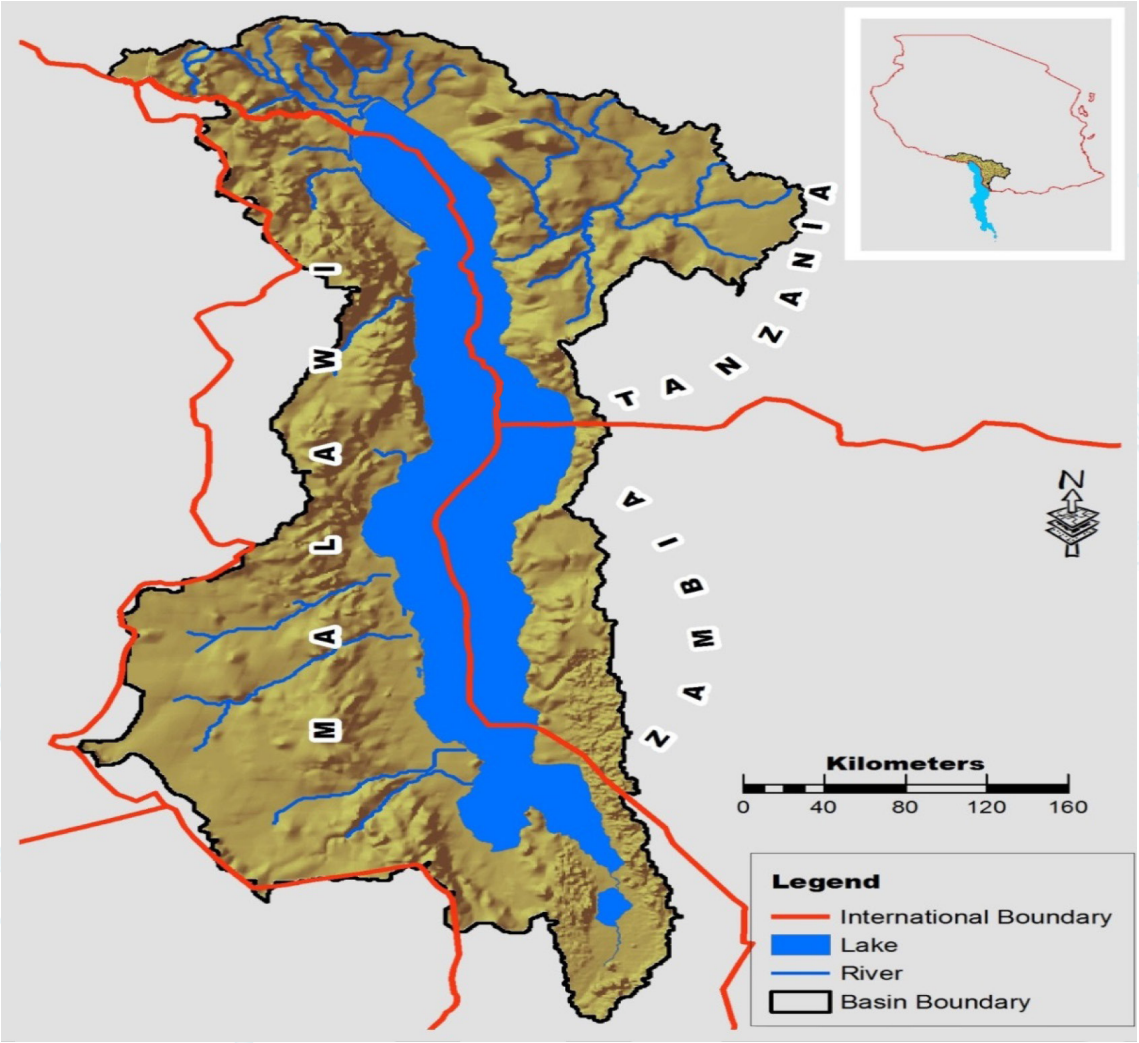


Figure 9: Lake Nyasa Basin

(iii) Alignment to Regional Institutions and Protocols

Lake Nyasa Basin is aligned to SADC region and is part of the larger Zambezi Watercourse Commission (ZAMCOM) - a river basin organization which was established by riparian countries of Zambezi River Basin. The Riparian states to the Zambezi basin include (i) the Republic of Angola (ii) the Republic of Botswana (iii) the Republic of Malawi (iv) the Republic of Mozambique, (v) the Republic of Namibia (vi) the Republic of Tanzania (vii) the Republic of Zambia and (viii) the Republic of Zimbabwe. The agreement to establish ZAMCOM was signed by parties on 13th October 2004. After ratification by parties, of which Tanzania ratified on 2010; the agreement came into force in 2011. The headquarters of ZAMCOM Secretariat is in Harare – Zimbabwe. The objective of ZAMCOM is to promote the equitable and reasonable utilization of the

water resources of the Zambezi Watercourse as well as the efficient management and sustainable development (RA et al., 2004).

The general Cooperation Agreement between Tanzania and Malawi, which include water sector notably on the use and utilization of Lake Nyasa, was signed on 6 October 1991 in Dar es Salaam. Recently, Tanzania and Malawi signed a Convention on 18th May, 2017 for the establishment of the Songwe Water Commission and also Memorandum of Understanding for implementation of Phase III of the Songwe River Basin Development Programme. Both countries have ratified the Songwe Convention and inaugurated the Songwe Commission early on 11th March, 2019.

3.3.5 Pangani River Basin

(i) Overview

Pangani Basin is shared by Tanzania and Kenya covering 56,300 Km^2 where 5% of the area is in Kenya as indicated in Figure 8. The 95% on the Tanzanian side covers 18 Districts that are in administrative Regions of Manyara, Arusha, Kilimanjaro and Tanga. It includes two cities and one municipality of Arusha, Tanga and Moshi respectively.

(ii) Basin Characteristics

The Basin is comprised of five sub-basins namely Pangani River (43,650 Km^2), Umba River (8,070 Km^2), Msangazi River (5,030 Km^2), Zigi and Coastal Rivers including Mkulumuzi (2,080 Km^2) which all independently drain to the Indian Ocean (PBWB, 2017). The Pangani River sub basin has two main tributaries namely Kikuletwa and Ruvu Rivers which drain into Nyumba ya Mungu dam (Figure 10). Mount Kilimanjaro (5,985 m.a.s.l) and Mount Meru (4,566 m.a.s.l) are the source of Kikuletwa River while Ruvu, Mkomazi and Luengera Rivers drain part of Kilimanjaro, Pare and Usambara mountains and the springs that emerge on the Kenyan side. There are two unique lakes in the Basin namely Jipe and Chala which are transboundary water bodies shared with Kenya. The Basin is also endowed with high potential for groundwater. However, only 5% of all the water used in the Basin is derived from groundwater sources (PBWB, 2017). The main economic activities in the basin are small scale fishing, tourism, hydropower generation, mining, industry, rain-fed and irrigated agriculture.

The Basin also has several national parks, game reserve and controlled areas for wildlife as well as tourism like Kilimanjaro, Arusha and Mkomazi National Parks and Amani nature reserve. The Basin is rich in minerals and is home to the rare and unique gemstone called Tanzanite (PBWB, 2017).

iii) Alignment to Regional Institutions and Protocols

Pangani Basin is aligned to the East Africa Community. The Memorandum of Understanding between the Government of the Republic of Kenya and the United Republic of Tanzania on Sustainable Management of the Chala/Jipe and Umba Ecosystem was signed on 14th February, 2013. This is the only transboundary framework available in the basin (URT, 2014a).

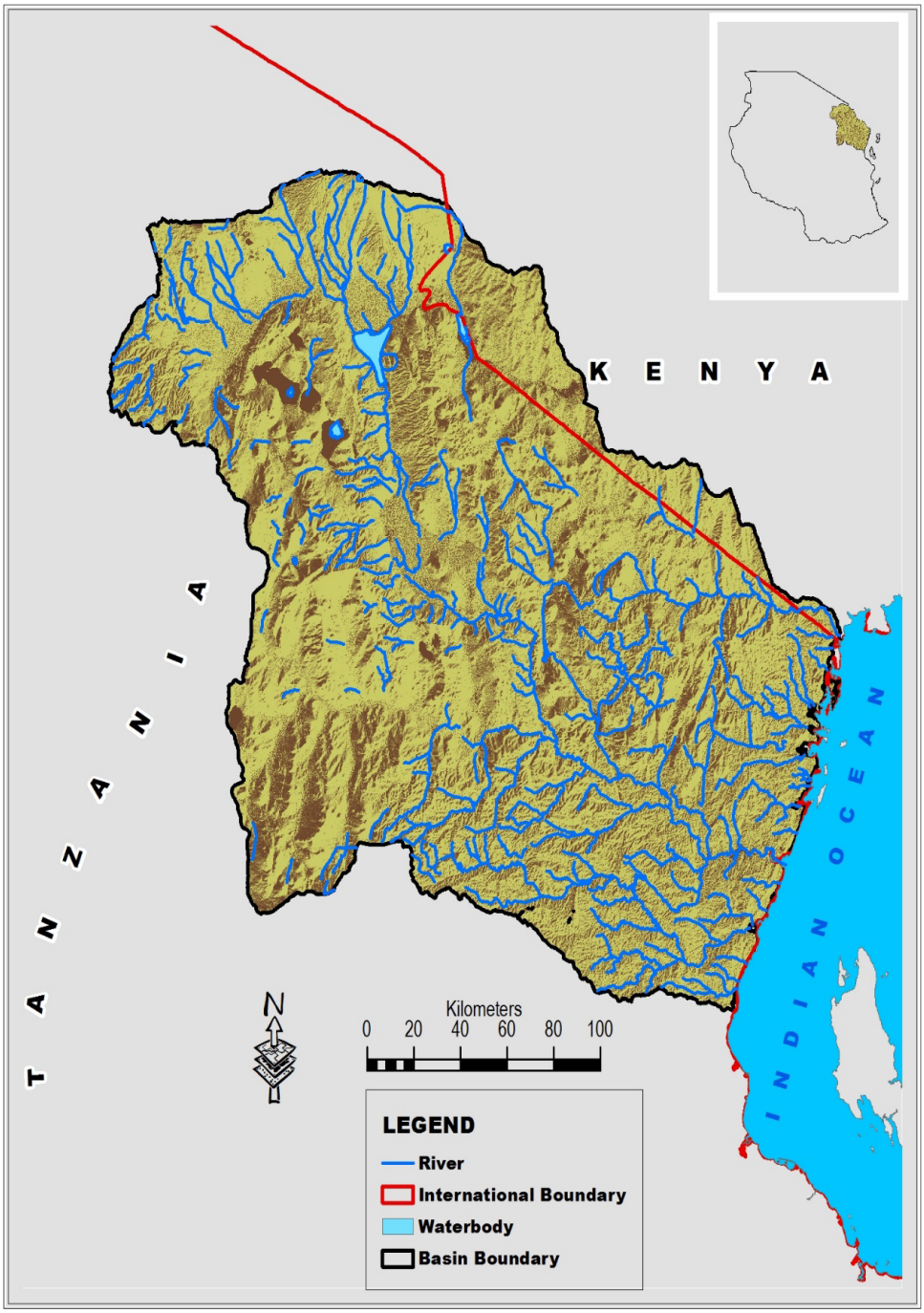


Figure 10: Pangani River Basin

3.3.6 Internal Drainage Basin

(i) **Overview**

The Internal Drainage Basin (IDB) is located in the central and extends to north-eastern part of the country covering parts of Arusha, Manyara, Dodoma, Singida, Tabora, Shinyanga, Simiyu and Kilimanjaro Regions as indicated in Figure 11.

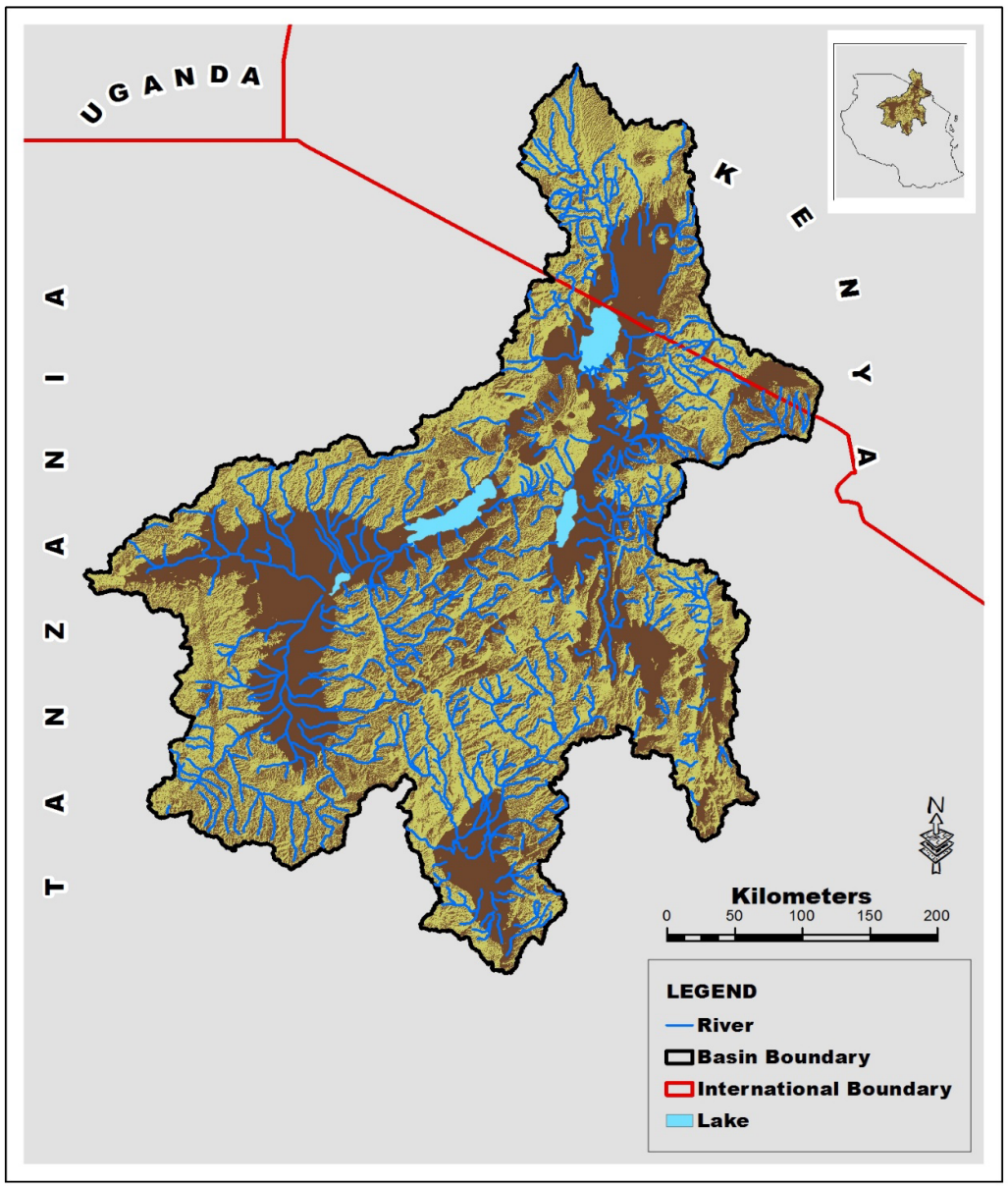


Figure 11: Internal Drainage Basin

It also stretches to the southern parts of the Republic of Kenya. It is the second largest basin in the country after Rufiji River Basin with an area of about 143,100 km² (16.4 percentage of the country). About 11.5% of the whole IDB is located in Kenya which forms about 67% of Lake Natron Sub-basin and some parts of the Namanga Sub-basin (URT, 2015e).

(ii) Basin Characteristics

The IDB is hydrologically subdivided into nine sub-basins, namely, Lake Eyasi , Monduli A, Monduli B , Lake Manyara, Lake Natron , Olduvai , Bahi (Manyoni), Masai Steppe and Namanga . Most of the rivers in the basin are seasonal, few permanent rivers and springs are found in north and northeast of the basin. The basin has both saline and fresh water lakes. Lakes Natron, Eyasi, Kitangiri, Kindai, Singidani and Manyara are saline while Lakes Babati, Basotu, Burunge and Tlawi have fresh water. The major uses of water resource in the basin are domestic, livestock, irrigation, fishing and mining (URT, 2015e).

The IDB has a population of 4,462,555, which comprises 12.5% of the country's entire inhabitants (URT, 2015e). This population, as a human resource and workforce, plays a significant role in contributing to the relational socio-economic development. The basin has numerous socio-economic activities like in other basins in Tanzania. The major economic activities in the Basin include agriculture, mining, tourism and livestock keeping.

(iii) Alignment to Regional Institutions and Protocols

The IDB basin is aligned to the East Africa Community. Currently there is no specific formal agreement between the riparian states on management and development of water resources. However, plans are underway to develop a Memorandum of Understanding between Tanzania and Kenya on the management of water resources of Lake Natron Basin.

3.3.7 Lake Rukwa Basin

i) Overview

Lake Rukwa Basin is located in the south-western part of Tanzania and is part of the East African Rift Valley with Lake Tanganyika on the northwest and Lake Nyasa on the southwest. The area of Lake Rukwa strides the regions of Mbeya, Katavi and Rukwa. Lake Rukwa Basin is found approximately between latitude 6.5 S and 9.10 S; and longitude 30E 25 and 34 E. The Basin has an internal drainage system which is described by all catchments of rivers flowing into the lake with no outlet. Lake Rukwa Basin has six catchments with a total area of 88,000 square kilometre . Rivers that are flowing in are Rungwa, Wuku, Lukwate, Kikamba, Luika, Luiche, Kavuu, Chambua, Momba, Lupa and Songwe. The Lupa, Chambua, and Songwe Rivers drain the Mbeya Range and flow into the lake from the south, the Rungwa feeds the lake in the north, and the Momba River flows in from the west. In addition, there are several ephemeral rivers that flow into the lake during the wet season.

ii) Basin characteristics

It is drained by four main rivers namely Momba, Mtembwa, Saesi and Nkana. River Mtembwa originates from the Ufipa plateau and drains in the north western part of the sub-basin as indicated in Figure 12. It flows southwards through several vast swamps where it is joined by other smaller rivers before discharging into the Iyunga Samyva swamp. The river then exits the swamp and flows south-eastwards before joining River Saesi which originates from the Nthumbe Hills. River Saesi drains the western part of the sub-basin and discharges into Tesa swamp where it is joined by several smaller rivers that drain the southern part of the sub-basin. From the swamp, Saesi River flows north-eastwards, is joined by rivers Kipanda and Matonto, originating from Izombo plateau, and crosses the Lyambalyamfipa escarpment into the Rukwa Valley. In the valley, Saesi River is joined by Nkana River to form the Momba River. Nkana River originates from the southern highlands in Mbozi District and drains the southeastern part of the sub-basin. It is fed by several rivers including Mpemba and Mko from the Chingambo Ranges. Momba River flows north-eastwards across the Rukwa Valley and finally flows into the western shores of Lake Rukwa.

The basin has a little drainage area of 88,000km2 in which the Rungwa River with catchments of 20,000 Km2, mainly in Chunya district is the largest covering about 25% of the total basin area. Other river systems in the basin are the Songwe from the Poroto mountains, Momba, Mtembwa and other small numerous rivers both in the east and west of the lake. Others are Muze, Katuma and Luiche originating from the Ufipa plateau. Most or almost all the Rivers have variable flows which rise and fall with the rains in between the months of November and May.

iii) Alignment to Regional Institutions and Protocols

Lake Rukwa Basin is shared between Tanzania and Zambia and hence aligned to SADC region. The correspondence Momba sub-basins occupies the south western part of Lake Rukwa Basin and extends over an area of about 9,750 km^2 covering parts of Sumbawanga, Momba, Kalambo and Mbozi districts. A small portion of the Momba River watershed (in the southwest) extends into Zambia. Thus, Momba is a transboundary (shared) river, and its integrated planning and management requires the development of mutually agreed plans with Zambia. Currently there is no specific formal agreement or protocols between the two riparian countries.

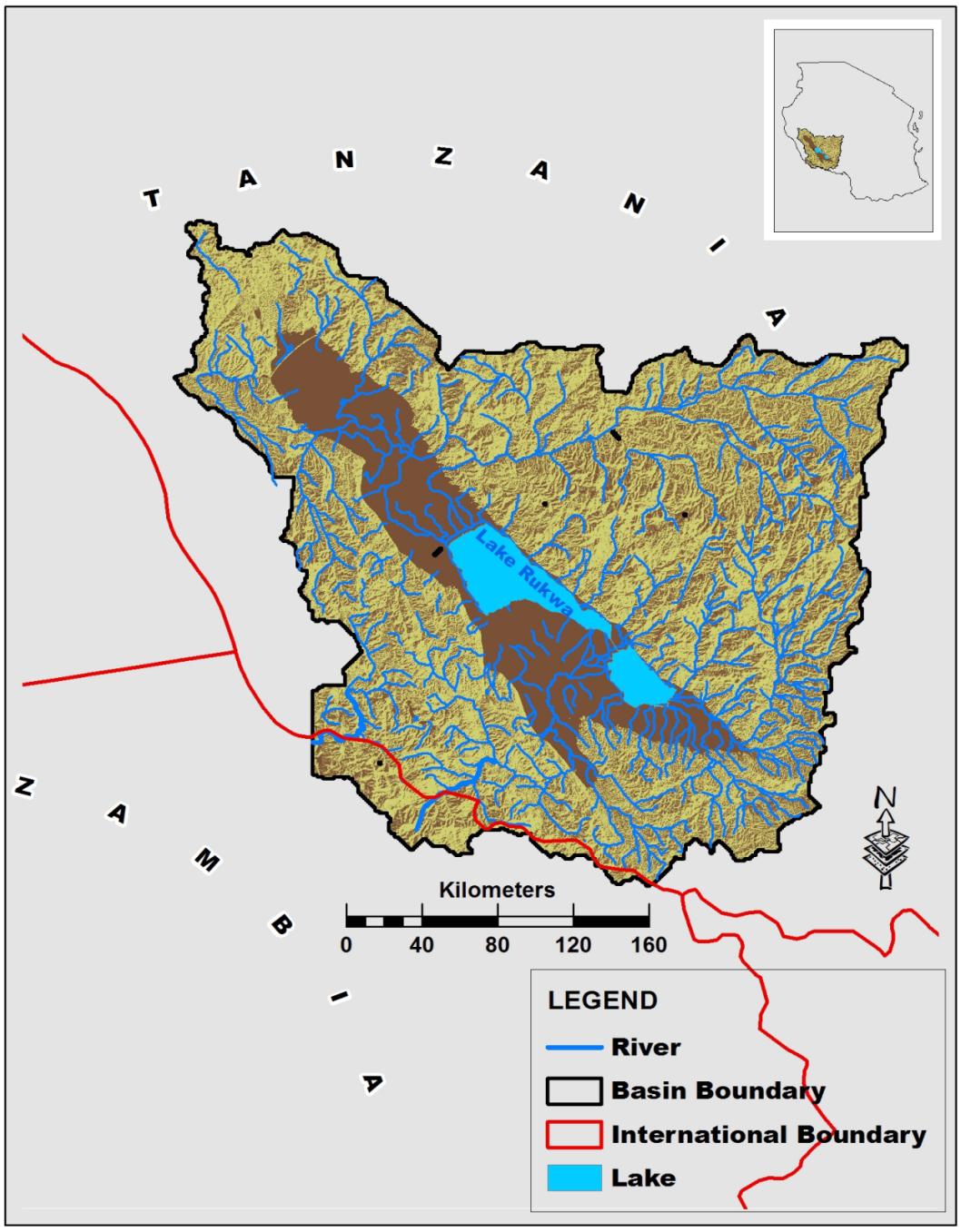


Figure 12: Lake Rukwa Basin

4.0 FRAMEWORK FOR ASSESSING BENEFITS OF TRANSBOUNDARY COOPERATION IN TANZANIA

4.1 Attributes of the Assessment Framework

Transboundary cooperation is a relationship building process with diversity in benefits and responsibilities. Thus, assessment of benefits accruing from transboundary cooperation needs to be based on a pragmatic framework that considers social, environmental and economic benefits. Despite the transcending nature of international water law on governing transboundary water resources, each country has indispensable sovereignty over land and other resources therein and hence respective countries could consider different attributes when assessing benefits of transboundary cooperation.

Table 2 highlights some of the key attributes that were considered in assessing the benefits of transboundary cooperation in Tanzania. These attributes were then aligned to the UN Economic Commission for Europe (UNECE) conceptual framework (UNECE, 2015) for assessing benefits of transboundary water cooperation as indicated in Table 3.

Table 2: Attributes of the Framework to Assess Benefits of Transboundary Cooperation

SN	Attributes	Indicators	Hypothesis
1	Development initiatives and potential of transboundary cooperation to attract funding from various external agencies	Number of on-going or proposed projects and programmes in the transboundary lake or river basin.	It is much easier for riparian countries to jointly solicit funding for joint projects in a shared water resource than each country undertaking lone endeavours.
2	Existence of formal agreements and protocols	Number of agreements, conventions, protocols/ MoU signed between the riparian states.	Formalization of cooperation through legal frameworks highlights the level of commitment to a common understanding and shared vision in management of transboundary water resources. Such legal agreements are useful in the context of negotiations especially when resolving conflicts between transboundary member states, as well as enforcing obligation to cooperate among member states.
3	Improving governance	Number of established national and joint institutions, commissions and committees.	Governance of transboundary water resources requires expertise in both technical and social fronts. Establishment of relevant commissions and committees in a cooperative framework highlights the level of proficiency in governance of the shared water resources.

SN	Attributes	Indicators	Hypothesis
4	Information/data sharing and management	Existence of common database, communication strategy, joint research findings/reports.	Sharing of data and information between riparian states is requisite for effective cooperation. Such an exchange of data and or sharing information leads to building confidence, trust and establishment of joint research endeavours for the benefits of generating knowledge and scientific discoveries in managing the shared water resource.
5	Willingness and motivation to manage the shared water resources	Number or existence of strategic meetings conducted by decision makers or community meetings e.g. Beach Management Units), existence of high-level political dialogues e.g. East Africa Sectoral Council of Ministers, LVBC, SADC, Council of Ministers of AMCOW, ZAMCOM, NILE and NELSAP.	Any cooperation between countries is usually anchored on a motivation of which could be inspired internally or externally. The existence or sustenance of such motivational prompts and willingness to cooperate is a benefit to the riparian countries and especially the shared water resources for sustenance of hydrological and environmental integrity of the shared water resources. The willingness to cooperate also has the benefit of creating a platform for other cooperation endeavours in social, economic, environmental and political fronts.
6	Capacity building	Existence of joint capacity development training programmes building trainings such as WaterNet, Nile Basin Capacity Building Network (NBCBN), negotiations skills, short term training sessions for SADC, AMCOW, ZAMCOM etc.	Most of the cooperation frameworks are sustained through capacity development initiatives to benchmark and increase the management, adaptive and development capacity of the riparian states. Such initiatives have the benefit of building trust, confidence and partnerships in the various institutions in the member states.

Generally, the benefits of transboundary water cooperation can broadly be categorised in four broad groups including:

(i) Benefits from the water resource;

(ii) Benefits because of the shared water resource;

(iii) Benefits to the shared water resource; and

(iv) Benefits beyond the shared water resource.

However, the UN Economic Commission for Europe (UNECE) framework (UNECE, 2015) aligns benefits of transboundary cooperation into four thematic areas i.e. economic, social and environmental, regional economic cooperation and peace and security benefits. In this report, the UNECE framework was adapted

and customised to align the benefits in Tanzania into four thematic areas i.e. socio economic, health and environment, regional economic cooperation and capacity building as indicated in Table 3.

Table 3: Adapted UNECE Conceptual Framework

Origin of benefits	Benefits for economic activities	Benefits beyond economic activities
Improved water management	Socio economic benefits	Health and environmental benefits
Enhanced trust and capacity	Regional economic cooperation benefits	Capacity building

Adapted from UNECE, 2015

5.0 SELECTED CASE STUDIES

This section highlights case studies, in form of projects and programmes, which have been documented showcasing benefits that have been realised in Tanzania. The case studies have been aligned to the two main regional blocks, i.e. projects that are located within the East Africa Community (EAC) and Southern African Development Community (SADC) respectively.

5.1 Benefits Aligned to the East African Community

The East African Community (EAC) is an inter-governmental organization mandated by the governments' of Burundi, Kenya, Rwanda, Uganda, Tanzania and recently joined by the Republic of South Sudan to spearhead the East African economic, social and political integration agenda. The EAC region is endowed with various natural resources such as forests, water, wildlife, mountains, minerals and energy resources. The main water body that is of great importance in EAC is Lake Victoria, Africa's largest lake and the world's second-largest freshwater lake (EAC, 2016). Lake Victoria is also one of the sources of River Nile, the longest river in the world of which drains the Nile Basin. Tanzania is part of Lake Victoria Basin and by extension the Nile Basin; and hence, some of the benefits that are highlighted in this section are also aligned to the Nile Basin as well.

The Nile Basin Initiative (NBI) is an interim regional intergovernmental partnership that seeks to develop the River Nile in a cooperative manner, share substantial socio-economic benefits and promote regional peace and security. It was launched on 22nd February, 1999 in Dar es Salaam by Ministers in charge of Water Affairs in the riparian countries namely Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, South Sudan, Tanzania and Uganda. Eritrea participates as an observer (NBI, 2014C). The Government of the Republic of Tanzania signed the Cooperative Framework Agreement (CFA) on 14th May, 2010 to begin the process of establishing a permanent river basin commission that can help to ensure the sustainable development and equitable utilization of the common water resources of the Nile basin (NBI, 2012a). Subsequently, through the National Assembly, Tanzania ratified the CFA on 26th March, 2015.

Under the Nile Equatorial Lakes Subsidiary Action Program Coordination Unit (NELSAP-CU) which is one the two Investment Programmes of the Nile Basin Initiative (NBI) has rendered support to national initiatives and focuses on two investment areas of power development and trade; and natural resources management and development. Apart from completed projects, the NELSAP pipeline water resources projects within a period of 2016-2019 with feasibility studies and detailed designs that will benefit Tanzania are worth of USD 382.6 million out of USD 746.90 million required for the regional member countries. Also, Tanzania will benefit power projects with feasibility studies and detailed design worth USD 1,014 million (power generation projects and interconnection projects) out of regional investment of USD 1,179 million as elaborated in the table below. Transboundary cooperation in the Nile Basin, and notably within riparian countries of Lake Victoria basin, has resulted into various projects in Tanzania through framework of either NBI or EAC as highlighted in table 4.

Table 4: NELSAP Pipeline Projects for Implementation Funds

NELSAP PIPELINE PROJECTS FOR IMPLEMENTATION FUNDS								
NELSAP PROJECTS PIPELINE 2016 -2019								
WATER RESOURCES PROJECTS WITH FEASIBILITY STUDIES AND DETAIL DESIGNS								
Strategic Area	No	Countries	Project name	Project Area	Status/Level Where Project is	Next Required Action to move project forward	Pre-investment, US$ Million	Investment US$ Million

NATURAL RESOURCES MANAGEMENT PROJECTS	1	South Sudan/ Uganda	Nyimur Multipurpose Water Resources Development Project (6,000Ha)	Aswa Basin	Feasibility and ESIA Studies and detailed design to be completed by March, 2017	Project Implementation		100
	2	Uganda	Kabuyanda Multipurpose Water Resources Development Project (5,000Ha)	Isingiro District	Feasibility and ESIA Studies and detailed design to be completed by March, 2017	Project Implementation		55
	3	Tanzania	Ngono Multipurpose Water Resources Development Project (13,000Ha)	Bukoba and Missenyi	Feasibility and ESIA Studies and detailed design to be completed by March, 2017	Project Implementation		80
	4	Tanzania	Mara Valley Multipurpose Water Resources Development Project (19,000 Ha)	Lower Mara Sub Basin	Feasibility and ESIA Studies and detailed design to be completed by March, 2017	Project Implementation		60
	5	Kenya	Sio-Sango Multipurpose Water Resources Development Project (1,790 Ha)	Sio-Sango Village, Kabula Sub Location, Bungoma County	Feasibility, detailed design and ESIA Studies to be completed by March, 2017	Project Implementation		39.5
	6	Kenya	Maira Dam Project/ Lower Sio Irrigation Scheme	Maira Village Bukhayo location in Busia County	Feasibility study and design completed December, 2012	Project Implementation		14
	7	Tanzania	Borenga Multipurpose Storage Reservoir Development Project (18,340 Ha)	Mara River near North Mara Goldmines, Nyamongo	Detailed design studies done	Project Implementation		180
	8	Uganda	Bigasha Multipurpose Water Resources Development Project (500Ha, water supply 118,000people)		Project preparation completed	Project Implementation		64.8
	9	Tanzania	Karazi Multipurpose Water Resources Development Project (500Ha; water supply 120,500 people)		Project preparation completed	Project Implementation		62.6
	10	Burundi	Buyongwe Multipurpose Water resources Development Project (1,000Ha; water supply 370,000 people)		Project preparation completed	Project Implementation		23.4
	11	Rwanda	Taba Gakomeye Multipurpose water resources development project (122 Ha; water supply 35,000 people)		Project preparation completed	Project Implementation		67.6
TOTAL MONEY REQUIRED FOR WATER PROJECTS IMPLEMENTATION								746.90

Strategic Area	No	Countries	Project Name	Project Area	Status/ Level Where Project is	Next Required Action to move project forward	Pre-investment, US$ Million	Investment, US$ Million
POWER GENERATION PROJECTS	1	Tanzania	Kakono Hydropower Project (87 MW)	Kagera River	FS and ESIA RAP completed	Project Implementation		96
	2	Tanzania	Malagarasi Hydropower Project (41 MW)	Malagarasi River, Kigoma Region	FS and ESIA RAP completed	Project Implementation		153
INTERCONNECTED PROJECTS	3	Uganda, DRC	Uganda-DRC (Nkenda-Beni-Butembo-Bunia) transmission line. 220KV of 396Km		FS and ESIA RAP completed	Project Implementation		165
	4	Tanzania	Iringa-Mbeya transmission line 400KV of 292Km		FS and ESIA RAP completed	Project Implementation		191
	5	Tanzania, Zambia	Tanzania-Zambia (Mbeya-Kasama-Kabwe) power transmission line, 400KV of 1,260Km	EAPP & SAPP inter connector	Feasibility, detailed design, ESIA RAP ongoing	Feasibility, detailed design, ESIA RAP continue up to Dec 2016 (est)		574
TOTAL MONEY REQUIRED FOR POWER PROJECTS IMPLEMENTATION								1,179
GRAND TOTALS REQUIRED FOR WATER AND POWER PROJECTS IMPLEMENTATION								1,925.9

5.1.1 Regional Rusumo Falls Hydroelectric Project

(i) Project Overview

The Regional Rusumo Falls Hydroelectric Project (RRFP) is a hydropower project under joint development by the Governments of Republic of Burundi, Republic of Rwanda and United Republic of Tanzania through a commonly owned Rusumo Power Company (RPCL). The joint development was entered by the three governments through a Tripartite Agreement signed on 16th February, 2012. The project is located at Rusumo Falls, at the common border of Rwanda and Tanzania on River Kagera. The power production facilities are located entirely on the south side of the bank of the Kagera River in Tanzania, while the substation is located on the northern side of the bank of the river in Rwanda (NBI, 2012a).

The power generation infrastructure is located at Rusumo Falls on the border between Tanzania and Rwanda. For Tanzania, the transmission line will be extended all the way up to Nyakanazi. The transmission lines extend from the power generation plant to Gitega in Burundi and Kigali in Rwanda. Total planned investment is worth USD 430 million (NBI, 2012). One of the key factors that attracted development partners including the World Bank to fund the project is the transboundary nature of the project.

(ii) Project objectives

The project is currently under implementation to meet the following objectives;

- To increase additional generating capacity of 80 MW for meeting the ever rising demand of electricity in Burundi, Rwanda and Tanzania.
- To interconnect the national grids of Burundi, Rwanda and Tanzania.
- To facilitate power trading in the region. Before NBI came into being, there was no regional Hydroelectric Project among Burundi, Rwanda and Tanzania.

Apart from the objective of unlocking power deficiencies in the region, Rusumo Falls Hydroelectric Project support modernizing and improving the quality of key infrastructure (water supply, health care, social utilities and livelihoods of the citizens). Table 5 below highlights some of the benefits that Tanzania is to benefit from the Rusumo Project.

Table 5: Potential Benefits from Rusumo Falls Hydroelectric Project

SN	Description of Benefits	Quantity and/ or Beneficiaries
A. Socio-Economic Benefits		
1	Reduction in current power shortage	Generation of an additional 27 MW of electricity in Ngara district
2	Reliability and assurance of power supply	Residents along the transmission lines
3	Strengthened national power grids	Beneficiaries estimated to 450,000 in Ngara and Karagwe Districts in Biharamulo
4	Improved livelihoods and increased socio-economic activities in the districts of Ngara and Biharamulo.	Close to 100,000 and 323,000 people in Ngara and Biharamulo Districts
5	Enhanced power trading within the region allowing Tanzania to sell surplus power within the region and also import power when in deficit	
6	Promotion of economic development in the Tanzania-Small Medium Enterprises (SMEs)	20 SMEs are to be established
B. Health and Environmental Benefits		
1	Reduction in green-house-gas (GHG) emissions from diesel and other related power generation sources	
2	Promotion of water supply, health and sanitation	At least 50,000 people to benefit
C. Capacity Building and Development Benefits		

SN	Description of Benefits	Quantity and/ or Beneficiaries
1	Rural electrification by TANESCO as more power capacity will be available	More rural population will get access to electrical power in Ngara and Biharamulo
2	Establishment of environmental and social monitoring guidelines for the project during and after implementation	One Environmental and Social monitoring guideline established
3	Training personnel from Tanzania with practical 'on-the-job' emphasis during the construction phase	At least 10 personnel will be trained and hence a job creation endeavor for Tanzanians.

Source: (NBI, 20 year report, February, 2019)

Overall, the benefits from this project can be described as an additional 26.6 MW of electricity to Tanzania out of the 80MW generated by the project. This has ultimate benefit of contributing to reduction in the current power shortage in the country.

5.1.2 Kenya-Tanzania Electrical Power Interconnection Project

(i) Project Overview

The Kenya-Tanzania interconnection project involved the construction of a total of 507.5 km of 400Kv high voltage alternative current (HVAC) transmission line in double circuit from Isinya Substation in Kenya to Singida Substation in Tanzania. 93.1 km of the line is in Kenya and 414.5 km in Tanzania. The transfer capacity of the interconnector is designed for 2,400 MW. The associated substation works include upgrading and extending of the existing Isinya (Kenya) and Iringa (Tanzania) substations to include 400 kV transformers, and the construction of a new 400kV substation in Arusha (Tanzania) (Larson et al, 2015).

The project, that will cost USD 271.43 million, constitutes part of the regional electrical power transmission backbone needed to create a regional electrical power market. This project combined with the Regional Transmission Interconnection Project will result in the six upstream countries of Burundi, Democratic Republic of Congo, Rwanda, Uganda, Kenya and Tanzania being interconnected.

(ii) Project objectives

The project is designed to:

a) Improve access to electricity in Nile Basin Initiative (NBI) Member states through increased cross-border sharing of power between Kenya and Tanzania as well as within the region.

b) Connect the Southern Africa Power Pool (SAPP) through the Zambia-Tanzania Interconnection to the Eastern Africa Power Pool (EAPP) / Nile Basin Region.

c) Increase reliability and security of power energy supply as well as the livelihood of the population living along the transmission line since the project includes a rural electrification component.

Table 6 highlights some of the benefits accrued from the Kenya-Tanzania Electrical Power Interconnection Project.

Table 6: Potential Benefits from Kenya-Tanzania Electrical Power Interconnection Project

SN	Description of benefits	Quantity and/ or beneficiaries
A: Socio-Economic Benefits		
1	Contribute to industrial growth, revenue gains, economic growth and reduction of transmission losses	People along the transmission line
2	Provision of electricity to communities	Rural communities along transmission lines
3	Development in the agricultural related sector (irrigation pumps, poultry, animal husbandry, preservation of products)	10 projects identified
4	Promotion of small and medium scale industries (flour mills, tanneries, and coffee processing plants)	5 enterprises earmarked
5	Increased reliability and security of power energy supply as well as improved livelihoods of the population living along the transmission line since the project includes a rural electrification component notably.	A reduction of power shortage by 10%
B: Health and Environmental Benefits		
1	Reduced and slowed down deforestation and soil erosion as people will stop collecting firewood in forests	Anticipated increase in acreage of afforestation
2	Electricity supply to rural towns replacing/reducing the consumption of woody biomass and petroleum products used for cooking and lighting	Increase in wood biomass by 20%
3	Promotion of rural water supply installations	The project to benefit 100,000 beneficiaries
C: Capacity Building/Development Benefits		
1	Assist Tanzania to mobilize funds for implementing the project as well as training and transferring technology for future operation of the project	One funding mobilization strategy in place. Substantial amount was used to prepare the project.
2	Information and awareness creation and cooperation on implementation of the project among the communities residing in the project implementation area	50 awareness creation materials to be disseminated to increase visibility of NBI/ NELSAP-CU at national level and justify importance of cooperation
3	Providing a platform for dialogue between Kenya and Tanzania.	A joint project team will be in place

Source: (NBI, 2007)

Overall, the benefits from this project can be described as the construction of 507.5 km of 400kV high voltage alternative current (HVAC) transmission line in double circuit from Isinya sub-station in Kenya to Singida sub-station in Tanzania.

5.1.3 400 KV Iringa - Mbeya Power Transmission Line Project

(i) Overview of the Project

The two interconnections form part of the eastern power corridor connecting Eastern Africa countries to the southern Africa countries. The 352 km long 400 KV Iringa - Mbeya Power Transmission Line is part of the main 400 kV Interconnecting Kenya, Tanzania and Zambia. This line offers interconnection possibility to Southern Africa Power Pool through Zambia. The Project which have a magnitude of USD 180.0 million was conceived under NBI and coordinated under NELSAP-CU (NBI, 2012c).

(ii) Project Objectives

a) To improve access to electricity in NBI countries through increased cross-border sharing of power within the region.

b) To facilitate smooth power transfer to the northern part of the country and neighboring countries such as Zambia in the south and Kenya, Uganda in the North.

c) To link NBI/Eastern Africa Power Pool (EAPP) countries to Southern Africa Power Pool (SAPP).

d) Increase reliability and security of power energy supply as well as improve livelihoods of the population living along the transmission line since the project includes a rural electrification component.

The tabulation of potential benefits of this project is as highlighted in Table 7.

Table 7: Potential Benefits from 400 KV Iringa - Mbeya Power Transmission Line Project

SN	Description of benefits	Quantity and/ or beneficiaries
A: Socio-Economic Benefits		
1	Contribute to industrial growth, revenue gains, economic growth and reduction of transmission losses	Communities along the transmission line
2	Provision of electricity to communities	Rural electrification in communities along the transmission lines
3	Promotion of small and medium scale industries (flour mills, tanneries, and coffee processing plants).	Communities along the transmission lines to benefit
4	Increased reliability and security of power energy supply as well as improved livelihoods of the population living along the transmission line since the project includes a rural electrification component.	Reduction in power shortage
B: Health and Environmental Benefits		

SN	Description of benefits	Quantity and/ or beneficiaries
1	Reduced/slowing down afforestation and soil erosion as women stop collecting firewood and water.	Anticipated increase in acreage under afforestation
2	Electricity supply to rural towns replacing/reducing the consumption of woody biomass and petroleum products used for cooking, lighting, and motive power.	Increased reduction of wood biomass consumption within the communities
3	Promotion of rural water supply installations	The project to benefit beneficiaries along the transmission lines
C: Capacity Building/Development Benefits		
1	Assist Tanzania to mobilize funds for implementing the project as well as training and transferring technology for future operation of the project	Substantial amount was used to prepare the project
2	Information and awareness creation and cooperation surrounding implementation of the project among the communities residing in the project area	Increase visibility of NBI, NELSAP-CU at National Level and justify the importance of cooperation
3	Providing a platform for dialogue between Kenya, Tanzania and Zambia	A joint platform will be established

Source: (NBI, 2012b)

Overall, the benefits from this project are the construction of 400 KV Iringa - Mbeya Power Transmission Line which will contribute to industrial growth, revenue gains, economic growth and reduction of transmission losses.

5.1.4 Regional Agricultural Trade and Productivity Project

(i) Overview of the Project

This project have involved conducting studies that highlighted potential agriculture and agricultural trade opportunities in the Nile Basin countries and beyond. The project was implemented from 2008 to 2012 and has increased knowledge in agriculture in NBI institutions and promoted more efficient and sustainable use of water resources and economically viable investment in agriculture. The Project was conceived and negotiated under NBI and was coordinated under NELSAP-CU. The Project Management Unit was located in Bujumbura, Burundi. The Project preparation cost was USD 7.0 million (Phase 1 & 2) (NBI 2009).

(ii) Project objectives

a) To define NBI future agricultural functions

b) To support efficient water-use in agriculture within the basin

c) To incorporate agriculture trade into basin water resource planning

The main benefits of this project were in form of capacity building as highlighted in Table 8.

Table 8: Potential Benefits from Regional Agricultural Trade and Productivity Project

Capacity Building/Development Benefits		
SN	**Description of Benefits**	**Quantity and/ or Beneficiaries**
1	Informed decision making in agricultural policies and investments	Water and irrigation sectors benefited through recommendations to guide decision making
2	Pre-feasibility studies for irrigation schemes prepared in Tanzania for resource mobilization	Five pre-feasibility studies prepared Biharamulo, Geita Plains, Katunguru, Simiyu Duma Valley and Suguti Valley
3	Trained people and prepared materials on best practices in rain water harvesting and small-scale irrigation	Communities were imparted with knowledge on increasing agricultural productivity
4	Policies and investment profiles available to Tanzania to improve regional trade	Support to Tanzania in preparation of economic and investment framework
5	Nile Basin Decision Support System (Nile-DSS) customized to accommodate agricultural decision support tools and by integrating agricultural data and information into the Nile-DSS	A customized decision support tool available
6	Policy options on virtual water/ water footprint developed and used in investment decision making by Nile Basin countries	Availability of decision support tool
7	Disseminating training materials on best practices in Rain water harvesting and small-scale irrigation prepared	Knowledge base to communities made available

Source: (NBI, 2009)

5.1.5 Kagera River Basin Management Project

(i) Project Overview

The Kagera River Basin Management Project was aimed at developing tools and permanent cooperative mechanisms for the joint management of the water resources in the Kagera River Basin and to protect the environment. The project was a collaborative venture between Tanzania, Rwanda and Uganda and was conceived under NBI. In Tanzania, the project was implemented in the districts of Ngara and Kyaka. Total investment was USD 500 million to implement the project from 2013 to 2017.

(ii) Project Objectives

The main project objectives were to;

a) Establish a sustainable cooperative framework for joint management of the shared water resources of the Kagera River Basin.

b) Develop an investment strategy and conclude pre-feasibility studies.

c) Build capacity at all levels for sustainable management and development of the Kagera River Basin.

d) Implement small scale investment projects that provide early tangible benefits to the population and promote confidence in the cooperation on the Nile.

e) Facilitate Lake Victoria Environmental Management Project II (LVEMP II) preparatory activities for Rwanda and Burundi.

Table 9 highlights some of the potential benefits of the Kagera River Basin project

Table 9: Potential Benefits from Kagera River Basin Management Project

A: Capacity Building/Development Benefits		
SN	**Benefit**	**Quantity and/ or beneficiaries**
1	Establishment of a framework for joint planning and management of the Kagera River water resources for improved socio-economic development of the basin	A platform for joint planning in place
2	Sharing of data and information for basin-wide planning and development	Framework for collaboration available
3	Provision of IWRM basin wide plan that will facilitate water resources planning for sustainable management of the Kagera Basin	Joint planning mechanism well-coordinated
4	Rehabilitation of hydrometric network that will allow better water resources monitoring and planning	Credible data available to inform decision making
5	Increased capacity in water resources planning and development in the Kagera region at the local, district and national levels	Stakeholder participation achieved at all levels
6	Feasibility studies for multipurpose dams e.g Karazi dam prepared	Base for fund mobilization
7	Kayanga town in Kagera provided with clean water following construction of Kayanga water supply system	At least 10,000 residents benefited
B: Health and Environmental Benefits		
1	Better environmental protection of the Lake Victoria Basin through LVEMP II that allowed joint planning and management of the basin	A joint planning platform established
2	Safe drinking water supplied to communities in Ngara, through small scale projects	Communities in Ngara accessing drinking water
3	Afforestation carried out in Ngara	Increased forest cover in Ngara
4	Reduced soil erosion and loss of vegetation cover through community environmental projects	Well managed landscapes
5	Increased climate change adaptation preparedness through appropriate adaptive mechanisms	Communities were equipped with knowledge on climate change

The four main benefits of the project include; (i) Feasibility study for Karazi dam has been prepared. Development of the dam will provide electricity to rural towns (ii) Safe drinking water supplied to communities in Ngara, through small scale projects and (iii) Afforestation carried out in Ngara areas affected by soil erosion. (iv) Kayanga water supply system providing 10,000 residents of Kayanga town in Kagera with clean and safe water.

5.1.6 Mara River Basin Management Project

(i) Project Overview

The Mara River Basin Management Project was aimed at facilitating Kenya and Tanzania to develop a sustainable cooperative framework. It was meant to jointly identify, prepare, develop and manage water infrastructure projects and watershed restoration and build the capacity of staff with a view of ensuring water security, food security and poverty reduction and thus improved standards of living of the riparian communities. The project was conceived and negotiated under NBI with a total potential investment of USD 200.0 million.

The Project was coordinated under NBI's Nile Equatorial Lakes Subsidiary Action Program Coordination Unit, based in Kigali, Rwanda. The Project Management Unit was located in Musoma, Tanzania. The project was implemented in four districts of Tarime, Serengeti, Musoma and Rorya.

(ii) Project objectives

- Establish a sustainable cooperative framework for the joint management of the shared water resources of the Mara River Basin.
- Develop an investment strategy and conduct pre-feasibility and feasibility studies.
- Build capacity at all levels for sustainable management and development of Mara River Basin.
- Implement small-scale investment projects to build early confidence among the Mara River Basin communities.

Some of the benefits of the project are as highlighted in Table 10.

Table 10: Potential Benefits from Mara River Basin Management Project

SN	Description of Benefit	Quantity and/ or Beneficiaries
A: Socio-Economic Benefits		
1	Water for irrigation, livestock, and domestic purposes as a result of construction of Bisarwi small holder irrigation dam provided	More than 5,000 residents have benefited
2	Borenga medium dam will provide water for irrigation, domestic water supply, fisheries and flood control.	Increased food security and improved livelihood
3	Increased power production, accessibility and reliability, leading to economic growth and better quality of life.	Increased energy security

SN	Description of Benefit	Quantity and/ or Beneficiaries
4	Enhanced management and income from tourism and wildlife.	Improved livelihood
5	Enhanced and sustainable utilization of wetland products for improved livelihoods.	Improved livelihood
6	Expansion of irrigated agriculture, improved productivity of existing small and large-scale agriculture through efficient water use	Improved food security
B: Health and Environmental Benefits		
1	Enhanced watershed management leading to increased land productivity, food security, water conservation as well as increased and good quality flows.	Improved water security
2	Better positioning to adapt to climate change through water infrastructure projects.	Improved knowledge on climate change adaptation in the communities
C: Capacity Building/Development Benefits		
1	Hydro meteorological monitoring stations installed along Mara River	Increased capacity to monitor river flows
2	Trans-boundary policy frameworks, policies, guidelines, data and information base for water resources management developed	Enhanced transboundary engagement and cooperation
3	Framework for trans-boundary sustainable joint management of the Mara River sub-basin will enhance cooperation with Kenya	Strengthened neighbourlihood among communities
4	Large scale development investment opportunities in the basin identified	Enhanced socio-economic development
5	Training staff at national and basin levels.	Increased capacity building efforts, joint planning and management
6	Sensitizing the community about environmental management issues and development options	Improved awareness creation

Source: (NBI, 2012b)

5.1.7 Transboundary Water for Biodiversity and Human Health in Mara River Basin Project

(i) Project Overview

Transboundary Water for Biodiversity and Human Health in the Mara River Basin (TWBHH-MRB) Project was funded by USAID-EA and coordinated by Lake Victoria Basin Commission. The project was implemented by Republic of Kenya and United Republic of Tanzania through their respective Water Resources Institutions i.e

Lake Victoria South Catchment Authority (LVSCA) in Kenya and Lake Victoria Basin Water Board (LVBWB) in Tanzania. The project was developed through a consultative process which involved key institutions working in Mara River Basin addressing Biodiversity and water resources management. These institutions included LVSCA, LVBWB, WWF, Serengeti National Park, Maasai Mara National Reserve, Ministry of Water and Irrigation Tanzania and Kenya and Florida International University (FIU). The project began in October, 2005 and extended through September, 2012. The overall project goal was to support sustainable water supply, sanitation, and hygiene services to improve health and increase economic resiliency of the rural poor while also conserving biodiversity within a trans-boundary integrated water resource management framework (USAID, 2012).

Objectives

- To facilitate harmonization and operationalization of policy options, regulations and institutional framework in MRB.
- To facilitate the development and implementation of integrated natural resources management strategies and plans for Mara River Basin.
- To promote equity and benefit sharing in the Mara River Basin for improved livelihoods and ecosystem health.
- To promote research, information sharing and uptake in the Mara River Basin.
- To improve water resources management by establishing and strengthening water related management information systems in LVB.
- To support institutional Capacity Building of the Lake Victoria Basin Commission to undertake its regional mandate.

Table 11: Benefits of Transboundary Water from Biodiversity and Human Health in Mara River Basin Project

SN	Benefit	Quantity and/ or Beneficiaries
A: Capacity Building Benefits		
1	Transboundary Mau/Mara Riverine forests management Strategy developed and adopted by LVB Sectoral Council.	Enhanced water resources management
2	Management plan for Trans-Mara forest block was developed and adopted by key stakeholders;	Improved environmental protection and conservation of the ecosystem
3	IWRM strategy was developed, adopted and project supported its implementation through Transboundary water Forum members; and	Improved environmental protection and conservation of the ecosystem
4	Mara River Basin Transboundary Water Users Forum members were trained and empowered to support implementation of Mara Riverine forests management Strategy.	Improved environmental protection and conservation of the ecosystem
5	Training was conducted on Environmental Flows of Mara River and enabled key stakeholders to understand the need of conserving Mara river for not only socio-economic development but also for the ecological and biodiversity developments; and	Improved environmental protection and conservation of the ecosystem

SN	Benefit	Quantity and/ or Beneficiaries
6	Communication strategy and data sharing protocol was developed and adopted by both key stakeholders for MRB and LVB SECOM;	Clear guidance to the public on Water Resources Management information and data sharing
B: Social and Economic Benefits		
1	Cost reduction through establishment of Transboundary Mau/ Mara Riverine forests management Strategy and establishment of IWRM strategy	Effective implementation of the strategies
2	Cost reduction through supporting training initiatives to the Water Users forum in Mara	Strengthened Water User Forum
3	Cost reduction through establishment and development of Communication strategy and data sharing protocol	Strengthened Cooperative Framework

Source: (USAID, 2012)

5.1.8 Nile Basin Decision Support System Project (Nile Basin - DSS)

One notable benefit that Tanzania has continued to enjoy as a result of cooperating with other countries in the Nile Basin is the Nile Basin Decision Support System (Nile Basin-DSS). This is a state-of-the-art tool providing Member States with a common analytic platform and knowledge base to support the cooperative development of the Nile Basin water resources. NBI, in collaboration with Member States, has piloted the tool to answer questions relating to the physical system of the Nile including river flow patterns, past and present trends in climatic variables versus stream flows, and the water balance in different parts of the system. More importantly, the Nile Basin-DSS is being used to answer questions about expected benefits and potential impacts of planned development interventions. Tanzania has so far used the tool to conduct a pilot case study on multipurpose reservoir in Ndembera River catchment in the larger Rufiji River Basin.

5.1.9 Nile Basin Capacity Building Network Programme (NBCBN)

The Nile Basin Capacity Building Network in River Engineering (NBCBN-RE) is a regional network (https://www.nbcbn.net) for capacity building of water professionals in the Nile Basin. The network emerged in 1996 during the first Regional Training Centre on River Engineering in Cairo and its kick off declaration was signed in 2002. By then, the participating countries were Egypt, Sudan, Ethiopia, Tanzania, Uganda, Kenya, Rwanda, Burundi and D. R. Congo. The network focused on six research clusters working on different research themes namely: Hydropower, Environmental Aspects, GIS and Modelling, River Morphology, Flood Management, and River structures. In 2007 its second phase was launched with specialized training courses and new collaborative research activities were initiated. The different new research modalities adopted by the network in its second phase include; (i) regional cluster research, (ii) integrated research, (iii) local action research and (iv) multi-disciplinary research.

Benefits

Tanzania and other Nile Basin countries succeeded to create a solid passage from potential conflict to co-operation potential and confidence building between riparian states. More than 500 water professionals from the basin representing different disciplines of the water sector; and coming from various governmental and non-governmental sector institutions were selected to join NBCBN. The main objective of setting up the

network was to enhance and build capacities of the water professionals in order to be linked to available career opportunities in the region. The main courses that have continued to be offered at the NBCBN Secretariat in Cairo include both certificate and post-graduate diploma courses in river engineering, environmental engineering, flood management, climate change among others.

More than 60 Tanzanians have benefited from the short-term professional courses. Other benefits includes enhancing capacity of researchers in partner Universities through targeted projects as well as increasing partnerships and collaborative efforts among partners in the basin. Such an approach has increased confidence among researchers in the Nile Basin to share information, expertise as well as building teamwork in research endevours at both national and regional level.

5.1.10 Applied Training Project (ATP)

(i) Project Overview

The Applied Training Project (ATP) was one of the eight basin-wide projects under the Shared Vision Program (SVP) of the Nile Basin Initiative (NBI). The project was established to build capacity in Integrated Water Resources Management (IWRM) in Nile River Basin. Country assessments made at the time of ATP project preparation period revealed the following three key gaps in terms of IWRM capacity in the Nile basin.

a) Most of the Nile Basin countries had weak human and institutional capacity to manage water resources in an integrated manner.

b) There was uneven distribution of capacity within the basin.

c) There was little interaction among water professionals in the basin which is an obstacle for joint management and development of the Nile water resources.

The magnitude of the project in terms of investment was in the tune of US $ 19.68 million (through a Trust Fund US$ 18.61 million and country contribution in kind was $1.07million).

(ii) Project Objectives

The ATP was designed to improve water planning and management cooperatively in the basin by assisting in the development of human resources and building institutional capacity through:

- Strengthening capacity in selected subject areas of integrated water resources planning and management within the region in the medium term.
- Strengthening centers with the capacity to develop and deliver training programs in Integrated Water Resources Management (IWRM).
- Expanding frequency and scope of basin interchange among water professionals involved in capacity building activities.

The ATP project was a capacity building endevour and hence its benefits are mainly constrained on capacity development. Table 12 highlights some of the benefits of the ATP project.

Table 12: Benefits From Applied Training Project (ATP)

SN	Description of Benefit	Quantity and/ or Beneficiaries
	A: Capacity Development Benefits	
1	Appreciation courses to policy makers conducted	8 policy makers trained
2	Post graduate students trained	1 PhD and 9 MSc trained and graduated
3	Postgraduate diploma students trained	5 students graduated
4	Short-term training in various IWRM related areas	More than 100 practitioners trained
5	IWRM MSc curriculum and teaching materials developed	1 IWRM MSc curriculum developed
6	Professional exchange programs involving university professors, water professionals and students facilitated	4 staff exchange programs facilitated

The main benefit of this project was strengthening capacity in selected subject areas of integrated water resources planning and management such as post graduate trainings, short-term training in various IWRM related areas, as well as professional exchange programs.

5.1.11 Lake Victoria Environmental Management Project Phase II (LVEMP II) (2009 – 2017)

(i) Project Overview

The Lake Victoria Environmental Management Project phase two (LVEMP II) was an East Africa Community's regional project that was developed to enhance environmental management of the Lake Victoria Basin and to contribute in meeting the EAC's Vision and Strategy Framework for Management and Development of the Basin (URT 2009c). The Phase II of the project is now complete and has contributed to a broad-based poverty alleviation and improvement of livelihoods of people, by supporting sustainable management of shared natural resources of the Lake Victoria Basin which many communities depend upon. The project which is now in Phase III is coordinated at regional level by the Lake Victoria Basin Commission which is based in Kisumu – Kenya.

The project first started in Kenya, Tanzania and Uganda in the year 2009 through IDA support under Adaptable Program Landing 1 (APL1) for four years from financial year 2009 to 2013 and later extended to December, 2017 during the restructuring of the project. The project was then rolled over to Burundi and Rwanda through the same IDA support under APL2 from FY 2010 to FY 2017 (World Bank, 2009). On Tanzania side, we have received a credit worth USD 42.5 million.

(ii) Project Goal and Objectives

The objectives of the LVEMP Project are to contribute to:

- Improvement of collaborative management of the trans-boundary natural resources of the Lake Victoria Basin (LVB) among the Partner States.
- Improvement of environmental management of targeted pollution hotspots and selected degraded sub-catchments for the benefit of communities who depend on the natural resources of LVB.

Table 13 highlights some of the benefits and beneficiaries of the LVEMP II project in Tanzania.

Table 13: Benefits from Lake Victoria Environmental Management Project Phase Two (LVEMP II)

SN	Description of Benefit	Quantity and/ or Beneficiaries
A: Social-Economic Benefits		
1	Improvement of Community livelihood through implementation of community demand driven subprojects	19 Districts, 308 Villages in 5 regions have benefited
2	Reduced cost of treatment of various types of diseases through implementation of constructed sanitation facilities	4 Districts, 39 Villages in two regions in the Lake zone i.e Mwanza and Kagera have benefited
3	Sustained fish production and market due to reduced level of pollution through implementation of sub-projects related to removal of water hyacinth and improvements of industrial and municipal effluents	3 Regions of Kagera, Mwanza and Mara have benefited
4	Reduced future cost or need for cleaning the Lake due to reduction of water hyacinth	All the 5 Lake regions have benefited
5	Reduced cost of waste disposal due to use of constructed waste disposal facilities	Two Districts of Magu and Bukoba Municipal in two Regions have benefited
B: Health and Environmental Benefits		
1	Improvement in quality of industrial and municipal effluents, and assessing the contribution of urban runoff to Lake pollution	5 regions in the Lake Zone have benefited
2	Reduction of water hyacinth coverage by 70% from 2000 Square hectares in 2009 to 200 Square hectors in 2016	5 regions in the Lake Zone have benefited
3	Tree planting and establishment of tree nursery	8 Districts, and 20 Villages in 4 regions in the Lake Zone have benefited
4	Improved sanitation in public places and primary schools (USD 619,883.21)	Construction of more than 47 public toilets and bio-toilets in the Lake zone. Buzuruga, Nyambiti and Isenga Primary schools in Mwanza City have benefited
5	Rehabilitation of Mwanza City abattoir and Construction of artificial wetland for treatment of abattoir wastewater (USD 814,474.92)	The facility serves the Mandu area in Mwanza City
6	Support house hold connection to Sewerage system (USD 473,727.03)	Kirumba and Kitangiri, areas in Mwanza City have benefited

SN	Description of Benefit	Quantity and/ or Beneficiaries
9	Construction of Sludge Disposal Facility (USD 1,067,140.95)	At Nyanga, in Bukoba Municipality
10	Implementation of Community Demand Driven subprojects (CDD)	19 Districts, 308 Villages in the 5 Regions in Lake Zone have benefited
C: Capacity Building Benefits		
1	Strengthening of Marine Rescue Coordination Centre (MRCC)	Communication equipment (Radio System (2) VHF/DSC and two (2) MF/HF) and other office equipment installed at the coordination centre (SUMATRA) in Mwanza city
2	Strengthening fisheries surveillance in Lake Victoria	Three surveillance boats bought for Mwanza, Geita and Musoma
3	Rehabilitation of water laboratories buildings (USD 1,136,482.49)	Rehabilitation of water laboratories in Mwanza, Musoma and Bukoba done
4	Environmental Management Trainings inside and outside the country	About 40 Tanzania nationals attended short courses outside the country while 1020 attended short course inside the country
6	Improved transport for field work and monitoring	Procurement of motor vehicles and motor cycles for Local and Central Governments in the Lake Zone.
8	Establishment of water quality monitoring networks throughout the catchments	Improved water quality in Lake Victoria
11	Existence of harmonized Water and Fisheries Policies	Enhanced legal frameworks for IWRM in the basins
12	Increased awareness of people on issues related to Environmental management through Implementation of Lake Victoria Day and Mara Day celebrations	5 regions in the Lake Zone have benefited

Source: (URT, 2014d, 2015g, and 2016)

The main benefit of this project is the improvement of Community Livelihood through implementation of community demand driven sub-projects, capacity development as well as improvements of industrial and municipal effluents discharge, and assessing the contribution of urban runoff to pollution of the lake.

5.1.12 Lakes Chala and Jipe; and Umba River Ecosystems Programme

(i) Project Overview

Lakes Chala, Jipe and Umba River forms one management Basin shared by Kenya and Tanzania. Cooperation in this Basin emerged and developed over the years and is overseen by the Ministry of Water through the

Pangani Basin Water Board in Tanzania and the Coastal Development Authority in Kenya. This Basin is important to the local communities who use it for fisheries, domestic water supply, and livestock and for wildlife management of Tsavo West National Park in Kenya and Mkomazi National Park in Tanzania. The Basin also contributes water to Nyumba ya Mungu and Pangani Hydropower stations in Tanzania (URT, 2010).

The two countries, through the two lead institutions, and the Lake Victoria Basin Commission started joint negotiation meetings to put in place a joint transboundary mechanism for management of Lake Chala, Jipe and Umba river Basin. One of the main outcomes of those meetings was a directive from Lake Victoria Basin Commission Sectoral Council of Ministers (SECOM), EAC/CM 10/Decision 08 of 2005 to the Lake Victoria Basin Commission secretariat to support the two countries in the management of the shared resource (EAC, 2011). It is in this context that the LVBC helped the two countries to develop a proposal for the Lake Challa, Jipe and Umba River development programme. The proposed transboundary programme has been prepared. Meetings between the two countries have taken place to discuss mechanisms for implementation (EAC, 2011).

(ii) Project Objectives

The overall objective of the Joint Transboundary Management of Lakes Chala and Jipe and Umba River Ecosystems Programme is to promote transboundary sustainable management of Lakes Chala and Jipe; and Umba River Ecosystems.

The specific objectives of the programme are:

- To facilitate harmonization and operationalization of policy options, regulations and institutional frameworks.
- To facilitate the development and implementation of integrated natural resources management strategies and plans for the ecosystems.
- To promote equity and benefit sharing in the Lakes Chala, Jipe and Umba River Ecosystems for improved livelihoods and ecosystems health.
- To promote research, information sharing, and uptake of innovations in Lakes Chala, Jipe and Umba River Ecosystems.
- To build capacity of the lead implementing institutions to undertake their mandate in IWRM.

Some of the potential benefits of transboundary integrated water and wildlife management programme are highlighted in Table 14.

Table 14: Potential Benefits from Lakes Chala and Jipe and Umba River Ecosystems Programme

SN	Description of Benefit	Quantity and/ or Beneficiary
A: Social - Economic Benefits		
1	Support from LVBC to actualise the cooperation framework.	The cost associated with joint meetings between the two countries is partly managed by LVBC
B: Capacity Building Benefits		
1	Ability for the two countries to jointly solicit for funds	Availability of signed MoU between the two countries

2	Mechanisms to manage technical issues within the collaborative framework	Availability of Technical committees

Source: (EAC, 2013)

In general, the benefits from this programme is to facilitate the development and implementation of integrated natural resources management strategies and plans for sustainable development of Lake Chala, Lake Jipe and River Umba ecosystem taking into consideration that Lake Jipe is covered by *Typha* water weeds, of which close to 75% is on the Tanzanian side.

5.2 Benefits Aligned to the Southern African Development Community (SADC)

The Southern African Development Community (SADC) comprised of fifteen countries including the Republic of Angola, the Republic of Botswana, the Democratic Republic of Congo, the Kingdom of Lesotho, the Republic of Malawi, the Republic of Mozambique, the Republic of Namibia, the Republic of South Africa, the Kingdom of Swaziland, the United Republic of Tanzania, the Republic of Zambia, and the Republic of Zimbabwe. The other two are the island countries of the Republic of Mauritius and the Republic of Seychelles (WMO, 2004).

The continental SADC region has a total land area of nearly 6.8 million sq. km at an average altitude of 1,000 meters above sea level, with 15 main river basins distributed among the continental countries. These river basins are Maputo, Umbeluzi, Incomati, Limpopo, Save, Buzi, Zambezi, Ruvuma, Okavango, Orange, Cunene, Etoshi, Cuvelei and Congo as shown in table 16 (SADC 2010). Hence the projects discussed in this section include all projects implemented in river basins which Tanzania shares with other countries i.e. Ruvuma, Congo and Zambezi Basins.

5.2.1 SADC Hydrological Cycle Observing (HYCOS) Project

(i) Project Overview

The World Hydrological Cycle Observing System (WHYCOS) was developed by World Meteorological Organization in response to the recommendations of Agenda 21, Chapter 18. This programme was launched in 1993 with financial support from the World Bank, the European Commission and other donor agencies. It has been implemented through sub-regional components (projects) aiming at fostering the development of hydrological activities in the countries.

The Southern Africa Development Community Hydrological Cycle Observing System (SADC-HYCOS) is the second HYCOS component (projects) to be implemented in the framework of WMO-HYCOS Programme. Eleven countries of the Southern African Development Community participated in the project (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Zimbabwe and South Africa). The first phase of the project started in 1998 up to 2001 with a total budget of US$ 2.40 million financed by European Commission (WMO 2004).

(ii) Objectives

The general objective of the project, as endorsed by the SADC summit in 1994, was to contribute to regional socio-economic development through the provision of management tools necessary for sustainable and cost-effective water resources development and management and for environmental protection. The

second phase of the project started in 2002 with the following specific objectives:

- To include the new SADC Member States that did not participate in or benefited from Phase 1 of the Project.
- To undertake a comprehensive review of the hydrological observation network throughout the SADC region and propose appropriate improvements to meet the water resources management needs.
- To expand the observational network with METEOSAT Data Collection Points or other types of hydrological stations as required, according to the identified needs.
- To expand the water resources information system and to ensure its easy accessibility to all NHSs (SADC, WMO 2002).

Table 15 highlights some of the benefits of the SADC-HYCOS project in Tanzania

Table 15: Potential Benefits from SADC HYCOS Project

SN	Benefit	Quantity and/ or Beneficiary
Capacity Building Benefits		
1	Installation of Hydro-meteorological stations for planning and forecasting purposes. This was meant to provide a sound technical basis for joint decision making	11 hydromet stations were installed in the country
2	Installation of computer based database using the HYDATA and HYDSTRA software at the Ministry of Water and Irrigation	1 database was installed
3	Training of staff on Data Collection Points installation, operation and maintenance, satellite data transmission, internet and World Wide Web data quality checking and data processing	More than 60 people from the participating countries, including Tanzania were trained
4	The project has improved regional cooperation between Tanzania and other SADC countries through sharing verified information and shared tools through the use of platforms like National Hydrological Services (NHSs).	Reliable information available at regional level for decision making
5	A Regional Data Bank has been created, and made accessible through Internet	One Regional data bank used by all countries in place was established in the Republic of South Africa
6	Established platform for sharing of data and information for sustainable management of SADC water resources	SADC Central Server in place

Source: (SADC, WMO, 2002)

Generally, the main benefits from this project were on capacity development i.e. supporting monitoring and data management initiatives for sustainable water resources management.

5.2.2 The ZACPRO Project

(i) Project Overview

The Zambezi River Action Plan (ZACPLAN) was an initiative of the Southern African Development Community (SADC) aimed at achieving environmentally sound planning and management of water and related resources in the Zambezi Basin. The riparian countries of Zambezi river basin are Angola, Botswana, Namibia, Malawi, Mozambique, Tanzania, Zambia and Zimbabwe. This initiative was originally adopted by the Southern African Development Co-ordination Conference in 1987. The Zambezi River Action Plan (ZACPLAN) Project 6 Phase 2 (ZACPRO 6.2) was conceptualized on the vision that the eight riparian states of the Zambezi River Basin would achieve an elevated and sustainable socio-economic development for all, through equitable and sustainable utilization of the shared water resources of the Zambezi River Basin (SADC 2008).

Phase 1 was concerned with the Development of a knowledge base of water and related information to provide a sound basis for the planning and development of water resources of the Zambezi River Basin and implemented over the period 1995 to 1999. Phase II, started in 2001 to build further upon the results of Phase I, which was to develop an integrated water resources management strategy and to establish a river basin institution i.e. ZAMCOM (SADC, 1999).

(ii) Project Objectives

Development and management of water resources of the Zambezi River Basin to achieve sustainable socio-economic development and environmental sustainability through;

- Formulation of the integrated water resources management (IWRM) strategy for the Zambezi Basin that provides the basin states with a vital management tool for effective management of the shared water resources of the basin.
- Development of Zambezi Water Information System (ZAMWIS) - a database of hydro meteorological data integrated with a GIS platform as a decision support and planning tool
- Establish a river basin institution i.e. ZAMCOM.

Some of the benefits from this project are as listed in Table 16.

Table 16: Potential Benefits from the ZACPRO Project

SN	Benefit	Quantity and/ or beneficiary
A: Capacity Building and Cooperation Benefits		
1	Production of Zambezi Environment Outlook 2015 report that provides an integrated assessment of the state and trends of key environmental resources	One report was prepared outlining key environmental resources including water resources
2	Mapping of main changes that are taking place in the Basin and documenting in an atlas –the Zambezi River Basin Atlas of the Changing Environment has already been accomplished. The Atlas provides scientific evidence about changes that are taking place in the natural resources and the environment	One atlas already prepared

SN	Benefit	Quantity and/ or beneficiary
3	Training on IWRM Zambezi Programme modules where many representatives from Tanzania have attended the Course in Sweden and Southern Africa. Good projects have been generated by the attendants and quality materials and superb knowledge uptake have been accomplished.	Experts from Tanzania benefited from the training
4	A framework already in place for cooperation and planning among the countries sharing Zambezi through the establishment of a stakeholder's forum and the Zambezi Water Commission (ZAMCOM)	A ZAMCOM cooperation agreement already signed and ratified by all countries. ZAMCOM secretariat already established.
5	ZAMWIS decision support system and Strategic Plan for the Zambezi Watercourse already prepared and in place	Enhancement of database at the Ministry of Water and Irrigation
6	An Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin already in place that facilitates water resources planning for the Basin	Improved management of water resources in the basin
B: Social and Economic Benefits		
1	Several irrigation projects have been proposed for implementation of which will include Tanzania	Enhanced food security and improved livelihoods

2015 report, the Zambezi River Basin Atlas, establishment and operationalize the Basin Stakeholders platform, as well as formulation of the integrated water resources management (IWRM) strategy for the Zambezi Basin.

Source: ZAMCOM, 2008

5.2.3 Ruvuma Shared Watercourses Support Project

(i) Project Overview

The Ruvuma Shared Watercourses Support Project was a joint Project between the three Governments of Tanzania, Zimbabwe and Mozambique. The project consisted of three Basins of Buzi, Save and the Ruvuma. On the Tanzania part, the project was implemented in the Ruvuma Basin which Tanzania shares with Mozambique. Implementing Agencies of the Ruvuma Basin Project was Ruvuma Basin Water Board (RBWB) in Tanzania and ARA Notre of Mozambique in the Ruvuma Basin. The Project was funded by ADF Grant of 9.38 Unit of Account Million which was implemented between 2009 and 2014, (SADC, 2015). The total cost of all projects in Tanzania is **USD 800,000.** The project consisted of five components such as:

a) Development of river basin monographs and strategies.

b) Enhanced knowledge and information support system.

c) Community basin management.

d) Project management.

e) Capacity building.

(ii) **Project Objective**

The Project goal was to ensure the development of integrated water resources management and related physical infrastructure development that contributes to regional integration and poverty reduction and to ensure a sustainable framework for an integrated planning and management of shared water resources in Ruvuma river basin for development and support of improved livelihoods of the local communities.

Some of the benefits of this project are as listed in Table 17.

Table 17: Potential Benefits for Ruvuma Shared Watercourses Support Project

SN	Benefit	Quantity and /or Beneficiaries
A: Social and economic Benefit		
1	New Namatuhi Irrigation Scheme at Songea Rural District was established where 1 Weir intake, 1400m long secondary canal were constructed for improved productivity of existing small holder irrigation for improved livelihoods of the local communities.	One irrigation scheme already established
B: Health and Environmental Benefits		
1	Safe drinking water supplied to communities in Mangaka, Mihambwe and Mahande villages	5000 residents were supplied with safe drinking water
2	Water supply schemes were constructed	Four boreholes with production capacity of more than 4000lts/hr were installed. 4 Water tanks and approximately 40 domestic water points were established over a 60 km distribution pipeline
3	Tree seedlings have been planted in the Villages of Daraja Mbili, Nandembo, Lelolelo and Majimaji in Tunduru Districts for enhanced water sources protection, reduced soil erosion and environmental conservation	Over 5000 tree seedlings were planted
C: Capacity Building Benefits		
1	Ruvuma Basin Monograph was established - which presents the baseline data on the current state of available water resources, socio-economic characteristics, environmental conditions, water demand, legal and institutional settings in the Ruvuma River basin	Enhanced tool for joint basin planning and management
2	Ruvuma Basin IWRM strategy was developed. This is a sustainable framework for an integrated planning and management of the shared water resources in the Ruvuma Basin and physical infrastructure development that contributes to regional integration and poverty reduction	Enhanced cooperation between Tanzania and Mozambique

SN	Benefit	Quantity and /or Beneficiaries
3	Catchment monitoring networks have been established including Meteorological stations, River flow gauging stations and observation boreholes.	Three Meteorological stations, four River flow gauging stations were installed and six observation boreholes have been constructed
4	Water quality monitoring equipment/tools and Computing facilities have been provided to the Ruvuma Basin Water Board	One pick-up vehicle, several office accessories including computers have been handed over to the Basin Water Board.
5	A number of trainings have been provided to communities, stakeholders, local governments staff and water resources officers	Several beneficiaries of the project were trained
6	A River Basin Dialogue (RBD)/ Ruvuma Basin Wide Stakeholder Forum was established to enable basin wide stakeholders to deliberate and achieve joint planning of the Ruvuma Basin resources	Bilateral cooperation between Tanzania and Mozambique enhanced
7	The Ruvuma Basin Agreement has been signed and ratified. This is a framework for cooperation and joint management of the Ruvuma River. This framework enabled the strengthening of the key river basin management institutions i.e the Ruvuma Basin Water Board (RBWB) in Mtwara, Tanzania (2005) and the Regional Water Administration for northern Mozambique (ARA-Norte) in Pemba, Mozambique (2006).	Bilateral cooperation between Tanzania and Mozambique enhanced
8	The Ruvuma Joint Water Commission (JWC) has been established where joint identification development and management of investments in water resources between Tanzania and Mozambique are done	Joint institutional mechanisms for cooperation established and operational

Source: SADC, 2005

Overall, the benefits from this project is the construction of new Namatuhi Irrigation Scheme in Songea Rural District where 1 Weir intake, 1400m long secondary canal were constructed for small holder irrigation as well as provision of safe drinking water to communities in Mangaka, Mihambwe and Mahande villages and soil and environmental conservation by planting 5,000 seedlings. All projects costed USD 800.

5.2.4 SADC Hydrogeological Mapping Project

(i) Project Overview

In response to a growing need for transboundary groundwater information, SADC, with support from International Cooperating Partners, has developed a SADC Hydrogeological Map. The map was developed as part of the Regional Groundwater Management Programme in the Regional Strategic Action Plan for Integrated Water Resources Development and Management (RSAP-IWRM) (SADC, 2009a).

(ii) **Project Objective**

The objective of the project was to provide an overview of the groundwater of the SADC region in the form of an interactive web-based regional map and atlas. The map is a first and vital step in supporting groundwater resource planning at international level and transboundary scale. The SADC hydrogeology map is a general hydrogeological map providing information on the extent and geometry of regional aquifer systems. The map was intended to serve as a base map for hydro-geologists and water resource planners, whilst at the same time presenting information to non-specialists (SADC 2009b). Some of the benefits of this project are as listed in Table 18.

Table 18: Potential Benefits from SADC Hydrogeological Mapping Project

Capacity Building Benefits		
SN	**Benefit**	**Quantity and/ or Beneficiaries**
1	The Regional hydrogeological map has been produced. The map is designed to be an interactive tool for hydro-geologists and water resource planners, non-specialists and the general public.	One map was prepared
Generally, the benefit from this project is to provide information on generalized hydrogeological characteristics for the entire SADC region, focusing on the extent and geometry of regional aquifer systems.		

5.2.5 Songwe River Basin Development Programme (SRBDP)

(i) Project Overview

The SRBDP is an international, transboundary river basin development programme in the territories of Tanzania and Malawi. The aim of the programme is to promote the coordinated development and management of water, land and related resources within the Songwe River Basin in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems in the Basin.The programme is part of the SADC Regional Strategic Action Plan for IWRM aimed at fostering cooperation and equitable sharing of benefits of the shared watercourses. One of the projects to be implemented in the Programme is the Lower Songwe Irrigation development project. The Lower Songwe Irrigation development project is located in the lower catchment of the Songwe River in the border of Tanzania and Malawi . It involves the construction of a dam and hydropower station in Kyela district in Tanzania. The dam will generate 180.2 MW to be shared equally between the two countries . The project involves also the design of gravity fed irrigation scheme on both banks of the lower basin of the River Songwe in Tanzania and Tanzania (AfDB, 2010). The total planned investment is USD 829 million.

(ii) Project Objective

The objective of the SRBDP is to:

(a) Contribute to economic growth and development of the basin.
(b) Reduce poverty of the people in the basin.
(c) Improve health and livelihood of the people residing in the river basin.
(d) Reduce the socio-economic impacts of the meandering river on the communities living within

the flood plain.

(e) Ensure enhanced food and energy security for the people within the entire Basin in the context of the overall sustainable and climate resilient interventions for socio-economic development of the two countries.

Some of the benefits of this project are as listed in Table 19.

Table 19: Potential Benefits from the planned Songwe River Basin Development Programme (SRBDP)

SN	Benefit	Quantity and/ or Beneficiaries
A: Social and Economic Benefits		
1	Lower Songwe Dam and Hydropower Plant with capacity to generate 180.2 MW to be constructed. Detailed designs for Lower Songwe Dam and Hydropower Plant already in place	USD 550,000,000 has been earmarked for the project
2	Lower Songwe irrigation schemes to be established	3150 hectares of irrigation to be established
3	Various water supply projects already planned. Detailed designs for water supply project for Kasumulu (Tanzania) and Songwe (Malawi) small towns and Lower Songwe River communities already in place	22,000 people to benefit
	Management strategies for the Lower Songwe River Floodplain already established. Detailed designs for the Lower Songwe River Floodplain already in place	Flood management and mitigation will be realized
	Priority social infrastructure (roads, schools & Health Centers) planned to be constructed	Improved livelihood of the riparian residents
B: Capacity Building Benefits		
1	Preparation of the Shared Vision 2050 for the Songwe River Basin	Availability of policy guidance
2	Preparation of Ten Years SRBDP Strategy	Availability of policy guidance

Source: (SRBDP, 2017)

Generally, the benefits from this project will be the construction of Lower Songwe Dam and Hydropower Plant, Irrigation Schemes, Water Supply Projects, as well as Priority Social Infrastructure such as roads, schools and health centers. In total there is a package of 26 projects under the programme.

5.2.6 WaterNet Capacity Building Network for East and Southern Africa

(i) Project Overview

WaterNet is a regional network for capacity building in Integrated Water Resources Management in SADC and East Africa (Kenya and Uganda). It is a network of 72 university departments, research and training institutes specialising in water from 15 countries. WaterNet member institutions have expertise in various aspects of water resources management and are based in Southern and East Africa (http://www.waternetonline.org/). WaterNet is currently a SADC subsidiary institution for human capacity development and its major aims are to build institutional and human capacity in Integrated Water Resources Management (IWRM) through training,

education, research and outreach by harnessing the complementary strengths of member institutions in the region and elsewhere (WaterNet 2016).

WaterNet was established in 2000 through a grant from the Netherlands Directorate General of International Cooperation (DGIS) to UNESCO-IHE in Delft. From its formation, WaterNet started sponsoring water related programmes at the Master's Degree level. The Water Resources Engineering (WRE) and Water Resources Engineering and Management (WREM) programmes were offered at the University of Dar es Salaam (UDSM) and University of Zimbabwe (UZ) respectively. In 2002 and 2003 the Masters Programme on Integrated Water Resources Management (IWRM) was introduced at UDSM and UZ respectively of which has continued to sponsor, train and produce graduates from SADC region and East Africa (Kenya and Uganda). However, in effect, the Masters IWRM programme effectively replaced Water Resources Engineering (WRE) and Water Resources Engineering Management (WREM) programmes in terms of funding. In addition, under specific research projects, WaterNet also sponsors targeted Masters and PhD studies (WaterNet, 2017).

(ii) Objectives of the WaterNet

The main objective of the network is to build regional institutional and human capacity in Integrated Water Resources Management (IWRM) through training, education, research and outreach by harnessing the complementary strengths of member institutions in the region and elsewhere. Other specific objectives are:

- To forge a strong, demand driven and sustainable network of universities and research institutions in Southern and East Africa in the field of IWRM.
- To deliver and strengthen the jointly owned regional Master degree programme in IWRM.
- To stimulate, regionalize and strengthen the research in the field of IWRM in Southern and East Africa.
- To raise awareness and understanding of IWRM and its implementation at local, national and transboundary scale.
- To develop and deliver demand-driven training and education for practicing water sector professionals in Southern and East Africa.

Figure 13 shows the pictorial view of how the programme has benefited countries in the SADC region, with Tanzania and Zimbabwe leading.

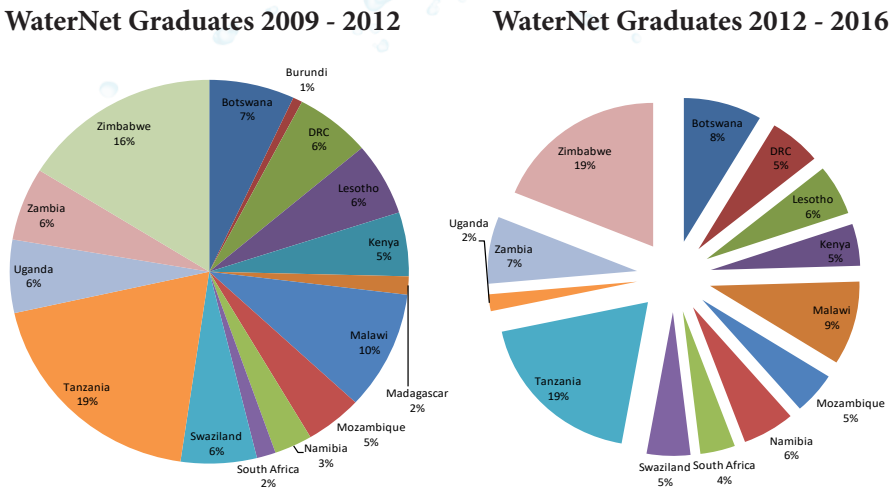


Figure 13: Beneficiaries of WaterNet Programme in SADC and EA countries (WaterNet Graduates 2009 - 2016)

Some of the benefits of WaterNet are as listed in Table 20.

Table 20: Potential Benefits from WATERNET Capacity Building Network in Tanzania

SN	Benefit	Quantity and/ or beneficiaries
Capacity Building Benefits		
1	Establishment of a unique regional IWRM Masters degree programme hosted by seven member institutions, strengthening the water sector	47 (28 Male and 19 Female) participants from Tanzania have been sponsored and graduated with Masters degree in Integrated Water Resources Management.

Source: (WaterNet, 2017)

Generally, the benefits from this programme are to build regional institutional and human capacity in Integrated Water Resources Management (IWRM) through training, education, research and outreach programmes. 47 Tanzanians have been sponsored and graduated with Masters degree in Integrated Water Resources Management.

5.2.7 Lake Tanganyika Integrated Regional Development Programme

(i) Project Overview

The government of the United Republic of Tanzania and the Government of the Democratic Republic of Congo concluded bilateral cooperation on the management of Lake Tanganyika basin and construction of a barrage on Lukuga River to regulate water levels of the lake.

After an extensive research and consultation process, the Lake Tanganyika Regional Integrated Management Programme (LTRIMP) started its first implementation phase in 2008. The project was aimed at rationalizing the exploitation of fisheries resources protecting the Lake Environment in sustainable manner, reducing poverty of the Lake Basin communities. Further, the project focussed on diversification of sources of income and creation of jobs. Improvement of Regional consultation and cooperation and reduction of potential sources of conflicts in the region was also considered within the project framework (URT, 2014c).

(ii) Project Objectives

The major goals of the project were to contribute to reducing poverty in the Lake Tanganyika basin. Specific objectives include:

- To achieve sustainable management of the natural resources of Lake Tanganyika through implementation of activities prioritized in the Strategic Action Plan.
- To improve livelihoods through physical and social infrastructure development

Some of the benefits from this project are as listed in Table 21.

Table 21: Potential Benefit from Lake Tanganyika Integrated Regional Development Programme

SN	Benefit	Quantity
A: Social and Economic Benefit		
1	Reconstitution of fisheries stocks in a sustainable manner in the currently overexploited areas	Increase number of improved fisheries activities
2	The sustainable management of fisheries resources	Production of 51,500 tonnes and add 25% value to the processed fish
3	Improving income of target population groups and enhancing food security	Income generation have improved from 22% to 77% especial to women
4	Rehabilitation of feeder roads	725 km of feeder roads were rehabilitated to improve movement of people and goods
B: Health and Environmental Benefits		
1	Increase catchment protections	More than 150,000 Ha where protected
2	Improvement of social and health conditions	Construction of 200 pit latrines, 60 health centres, 70 schools and 300 potable water points.
C: Capacity Building and Cooperation Benefits		
1	A bilateral agreement and an MoU has been established between DRC and Tanzania which spells out the various articles of cooperation	Availability of bilateral cooperative framework
3	A convention on sustainable management of Lake Tanganyika has already been established	Availability of policy guidance

Source: (URT, 2014c.)

6.0 CHALLENGES OF TRANSBOUNDARY WATER MANAGEMENT AND COOPERATION

One of the critical challenges of humanity in the future is how to ensure availability of the necessary quantity and quality of water that man and nature need under any climatic conditions, including climate change and extreme events of droughts and floods (Ganoulis and Fried, 2001). That situation is referred to as water security. This makes management of water resources challenging. At the scale of trans-boundary water resources, its management is even complex with many challenges (Koeppel, 2008). The associated challenges differ in spatial and temporal scales, and in sensitivity. This chapter underscores challenges of management of water resources and cooperation in transboundary waters that Tanzania and other countries sharing water resources have experienced.

6.1 Inadequacy Capacity of Trans-boundary Institutions

Effective management of transboundary water resources requires organizations that are equipped with necessary capacity; human and financial resources. Notwithstanding with that, some Transboundary organizations that Tanzania is party to do not meet the limited running costs. Financial constrain is one of the major challenges which in turn influence others (Koeppel, 2008). Availability of financial resources is mainly in the umbrella of projects which are donor funded and time specific. Although the practice has been growing, it might not be sustainable for better management of Transboundary waters and may twist the cooperation. On the other hand, financial resources from country contributions which are not disbursed in time are limited for operational costs. As a result, transboundary water resources are not fully explored, managed and developed.

6.2 Un-harmonized Legal Frameworks of Riparian/Members States

Lack of equivalence in scope and dimensions in National Water Laws among Riparian States hinders implementation of some functions of transboundary organizations. Despite availability of conventions, agreements and protocols among other instruments of trans-boundary cooperation, the discrepancy in national water laws and policy hinder commonness in planning for a water secure future. Most states have water laws that are yet to be brought into line with more recent trends in the development of international and regional legal frameworks, and the principles that underpin the same (ZAMCOM, 2018). For instance, in the same Transboundary River Basin, there might be Member States that have ratified international conventions such as the 1997 United Nations Convention on the Law of Non-Navigational Uses of International Watercourses while others are not.

Therefore, laws and policies of Member States need to be aligned with a reasonable degree of compatibility, and importantly, are not at odds with one another, nor with the greater aim of promoting water security. One clear example; is the Environmental Law in different states that defines projects which are subjected to environmental impact assessment. They are not all the same though they use the same watercourse but in different political boundaries. This may not comply with the precautionary principle in the same degree of magnitude across riparian countries. Harmonization of national regulatory frameworks in line with trends in international water law helps to overdue and necessary across transboundary water organizations to ensure policy enforceability. However, it is worth noting that not all laws need to be harmonized, and not all gaps need to be addressed in the same way in each country.

6.3 Differences Between Member States

Differences in economy and economic priorities, peace and stability, political heritages, priorities, size of a watercourse that lies within a country and its significance, culture and education, religion and relation with external allies may have a stake in making trans-boundary water governance difficult and complex (Ganoulis and Fried, 2001). The situation complicates cooperation and leads to loss of trust among member states and affect discussions towards reaching consensus in making common decisions. For example, the current level of cooperation in the Nile Basin is still fragile; taking into consideration that the regional aspiration is to have a Nile River Basin Agreement that establishes a permanent Nile River Basin Commission acceptable to all the member states but we are yet to reach there after 20 years of cooperation. Similarly, it affects negotiations and originality of ideas and projects and their implementation. The more the diversity sometime leads to higher complexity. Politics and trans-boundary water activities influence and affect each other.

6.4 Differences in Country Commitment in Meeting Obligations

Commitments of Member States in fulfilling individual obligations differ from country to country and are influenced by interests, benefits and magnitude of a calculated loss if a country does not collaborate. The condition influences delays in reaching agreements due to prolonged negotiations. As a result, some significant activities and decisions keep pending which affect management of water resources and trans-boundary cooperation.

6.5 Competition Over Water Allocations

One of the rationales of transboundary water cooperation is to ensure each Member State gets its water share equitably and sustainably. Equitable water allocation, however; is not easy and straight forward. As water demand increases among riparian countries, so is the complexity in water allocation and its management. In unexpected circumstance, some members with either already a lion share or a desire for more water may initiate complains which are not good signal to cooperation. It is in-line with these circumstances that water use conflicts erupt. In addition, the population growth and changing climate and environmental degradation exacerbate the complexity in water allocation.

6.6 Prolonged Discussions that Delay Decisions

Experience has shown that discussions and negotiations between Member States take many years to arrive at assented agreements. In the negative side of it, while riparian states keep on negotiating, some delayed technically; water issues such environment degradation prevails. In addition, significant projects may cease and opportunities disappear as a result of shortcomings of unconcluded agreements. In each single discussion that delays to reach consensus could have significant impact in water resources management and development. This situation is evidenced in the Nile River Basin where by, within 20 years of cooperation among Member States, a permanent Water Commission is yet to be established. Also it took 42 years to establish a joint Water Commision between Tanzania and Malawi for the management of Songwe River Basin just to mention a few.

7.0 CONCLUSION

This report has highlighted some of the actual and potential benefits, as well as challenges, associated with transboundary cooperation for Tanzania, as a result of its cooperation endeavours with other riparian states. Cognisant is made to the fact that this is an initial effort to be undertaken in the country. Previous efforts have dwelt on assessing benefits of transboundary cooperation at regional level e.g Nile Basin Initiative.

The process of assessing benefits of transboundary cooperation can either be based on qualitative or quantitative charters. The latter provides numerical profiling of benefits of which can easily be perceived. However, qualitative benefits transcend across all domains of livelihoods and their impacts could be realised at a later time, but their impacts are sustained for a much longer time after the end of a project. Quantification of benefits of transboundary water cooperation is emerging as an important process in many riparian countries as a way of appreciating the importance of cooperation as well as building and establishing better mechanisms of managing transboundary water resources. Such a process increases the state of ownership, inclusiveness and relevancy by various stakeholders of which is useful in realizing meaningful cooperation in managing transboundary water resources. Such a process aligns well with SGD 6.5 where it is expected that, by 2030, implementation of integrated water resources management will have been achieved including through transboundary cooperation. This report provides an opportunity to measure progress in achieving one area of SDG 6 in Tanzania i.e cooperation on transboundary water management.

Given the fact that benefits of transboundary cooperation cuts across various thematic areas and livelihoods, and given the inherent local interpretation of such benefits, there is no universally accepted framework for quantifying benefits of transboundary cooperation. What is of interest and value is the local elucidation and profiling of which is influenced by prevailing socioeconomic as well as geopolitical alignments.

The approach that was used in quantifying benefits of transboundary cooperation in this report was mainly a desktop exercise where various and relevant reports were analysed. However, the process, and potentially the report, would have been improved if a stakeholder consultation process was encompassed as well. Given the fact that quantification of benefits of transboundary water cooperation is a continuous stock taking process, it is envisaged that future endeavours will take into account possibilities of consulting key stakeholders residing in riparian basins.

Acknowledgement is given to the fact that there are always national efforts, initiatives and processes geared towards transboundary water cooperation. These efforts need to be documented on a yearly basis and thereafter amalgamated into a five-year report. The benefit of institutionalising an annual status report on transboundary water cooperation is the ability to coherently and vividly capture all details within a short time frame while all the relevant events are fresh in memory.

This initial exercise of documenting benefits of transboundary water cooperation is a derivative of cordial working relationship between Ministry of Water and the Tanzania Water Partnership. The Ministry of Water welcomes other partners to support similar efforts in future.

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