

TECHNICAL FOCUS PAPER

# Integrated water resources management in Eastern Africa:

Coping with 'complex' hydrology

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The **Global Water Partnership's** vision is for a water secure world.

Our mission is to advance governance and management of water resources for sustainable and equitable development.

Global Water Partnership (GWP) is an international network, created in 1996 to foster an integrated approach to water resources management (IWRM). IWRM is a process which promotes the coordinated development and management of water, land, and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

The Network is open to all organisations that recognise the principles of an integrated approach to water resources management endorsed by the Network. It includes states, government institutions (national, regional, and local), intergovernmental organisations, international and national non-governmental organisations, academic and research institutions, private sector companies, and service providers in the public sector.

GWP's Technical Committee is a group of internationally recognised professionals and scientists skilled in the different aspects of water management. This committee provides technical support and advice to the Partnership as a whole. The Technical Committee has been charged with developing an analytical framework of the water sector and proposing actions that will promote sustainable water resources management.

A **Technical Focus Paper** is a publication of the GWP Technical Committee aimed at harnessing and sharing knowledge and experiences generated by knowledge partners and Regional and Country Water Partnerships.

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## Acronyms

AWF . . . . .	Africa Water Facility
CMC . . . . .	Catchment Management Committee
CMO . . . . .	Catchment Management Organisation
CTC . . . . .	Catchment Technical Committees
DWRM . . . . .	Directorate of Water Resource Management
EAC . . . . .	East African Community
EKN . . . . .	Embassy of the Kingdom of the Netherlands
FAO . . . . .	Food and Agriculture Organization of the United Nations
GIZ . . . . .	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German International Cooperation)
GoK . . . . .	Government of Kenya
GoR . . . . .	Government of Rwanda
GSE . . . . .	Government of the State of Eritrea
GTP . . . . .	Growth and Transformation Plan (Ethiopia)
GWP . . . . .	Global Water Partnership
GWP EnA . . . . .	Global Water Partnership Eastern Africa
IGAD . . . . .	Intergovernmental Authority on Development
IWM . . . . .	Integrated watershed management
IWRM . . . . .	Integrated water resources management
LVBC . . . . .	Lake Victoria Basin Commission
MDG . . . . .	Millennium Development Goal
MINIRENA . . . . .	Ministry of Natural Resources (Rwanda)
MoU . . . . .	Memorandum of Understanding
MWE . . . . .	Ministry of Water and Environment (Uganda)
MoWIE . . . . .	Ministry of Water, Irrigation and Energy (Ethiopia)
NBI . . . . .	Nile Basin Initiative
NCEA . . . . .	Netherlands Commission for Environmental Assessment
NDP . . . . .	National development plan
NGO . . . . .	Non-government organisation
NWSC . . . . .	National Water and Sewerage Cooperation (Uganda)
NWSS . . . . .	National Water Sewerage Strategies
PASDEP . . . . .	Plan for Accelerated and Sustained Development to End Poverty
PES . . . . .	Payments for ecosystem schemes
PPP . . . . .	Public–private partnership
RAB . . . . .	Rwanda Agriculture Board
RBA . . . . .	River basin authority
RBO . . . . .	River basin organisation

REMA . . . . .	Rwanda Environment Management Authority
RNRA . . . . .	Rwanda Natural Resources Authority
RWB . . . . .	Regional Water Bureau (Ethiopia)
SWOT . . . . .	Strengths, weaknesses, opportunities and threats
UBoS . . . . .	Uganda Bureau of Statistics
UNDP . . . . .	United Nations Development Programme
WAB . . . . .	Water Appeal Board (Kenya)
WAC . . . . .	Water association committee
WASH . . . . .	Water, sanitation and hygiene
WASREB . . . . .	Water Services Regulatory Board (Kenya)
WMO . . . . .	World Meteorological Organization
WMZ . . . . .	Water management zone
WRMA . . . . .	Water Resources Management Authority (Kenya)
WRUA . . . . .	Water resources users' association (Kenya)
WSP . . . . .	Water Service Provision
WSS . . . . .	Water supply and sanitation
WWD . . . . .	<i>Woreda</i> Water Desk (Ethiopia)

## Foreword

This Technical Focus Paper is part of a series of papers from the GWP regions that provide a critical review of progress made in planning and putting IWRM into practice. The papers synthesise the challenges, the successes, the setbacks, and the direction for further integration. They provide valuable insights from which others can learn lessons and apply them to their particular and often unique circumstances.

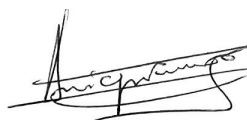
This paper focuses on Eastern Africa. It is a region of contrasts. It includes some of the world's most vulnerable and drought-prone countries and some where water is abundant. But all suffer in varying degrees from water stress and insecurity. They lack both capacity and investment to effectively exploit their available water resources. The authors explore the different challenges facing each country, the significant steps that each is taking to establish an enabling institutional and legal framework for IWRM to flourish, and offer encouraging examples of IWRM in practice. IWRM is in its infancy in the region and this is an encouraging 'work-in-progress' report.

My thanks to the authors for their excellent synthesis of the complex issues facing the region and their review of the steps being taken to improve water management.

We would particularly like to thank the authors Gerd Foerch, Moses Tenywa, and Alex Zizinga (Makerere University, Uganda); Cush Luwesi (Kenyatta University, Kenya); Abebe Mekuriaw (Ethiopian Academy of Sciences); Omar Munyaneza (University of Rwanda); and Nele Foerch (German International Cooperation, Kenya). Others who have supported this work include Joy Obando (Kenyatta University, Kenya); Callist Tindimugaya (Ministry of Water and Environment, Uganda); Patrick Safari (GWP Eastern Africa); and Abel Omanga (German International Cooperation, Kenya). Thanks also to Danka Thalmeinerova and James Kenge Gunya from GWPO Secretariat for reviewing the manuscript. We are also very appreciative of the editing support provided by Melvyn Kay.



**Dr Mohamed Ait Kadi**  
Chair, GWP Technical Committee



**Anicet Nkurikiye**  
Chair, GWP Eastern Africa

## Executive summary

Many sub-Saharan African countries face severe challenges in securing sustainable and sufficient access to quality water to meet the increasing demands of a growing population and socio-economic development, while preserving the essential ecosystems on which water resources depend. Many years of fragmented, unsustainable, and under-financed infrastructure development, water resources management, and governance have led to over-exploitation of limited water resources, and degraded crucial watershed areas. Water resources development has largely ignored the interdependency of the many different uses of water – for domestic and industrial use, for agriculture, for sustaining ecosystems, and also the hydrological services these provide.

Eastern Africa is part of this sub-Saharan Africa story. It comprises countries that make up the Intergovernmental Authority on Development (IGAD) trading bloc in the Horn of Africa (Djibouti, Eritrea, Ethiopia, and Somalia), which is one of the world's most vulnerable drought-prone regions. It also includes more water abundant regions, such as the Nile valley (Sudan and South Sudan), the African Great Lakes Region (parts of Kenya and Uganda), Burundi, and Rwanda.

Most East African countries are characterised by water stress and water scarcity, with some river basins in which water demands and given permits already exceed the available renewable resources. Accelerated urbanisation and expanding industrial and commercial irrigation farming are posing a growing threat to limited resources, mainly the freshwater bodies. The vast majority of the population depends on rainfed agriculture and subsistence farming that use 87 percent of the water resources. Access to drinking water and sanitation services were improving over time, but have started to decline recently as a consequence of rapid urbanisation and environmental degradation.

In the 1990s, governments in the region officially recognised these water challenges and embarked on a process of water sector reforms to adopt an integrated approach to water resources management, which was seen as the means of managing limited resources efficiently, equitably, and sustainably. All adopted the 'Dublin Principles', but each government has taken a different path to adopting integrated water resources management (IWRM), which reflects the unique nature of their available natural resources and stages of socio-economic development. They are now at different stages of reforms targeting policy, and legal and institutional frameworks; developing strategies and action plans; and setting up management and governance instruments. A key promoter of reforms continues to be the Nile Basin Initiative (NBI).

This paper builds on the findings of the 2008–2009 and 2012 IWRM surveys commissioned by the Global Water Partnership (GWP) as part of the global UN-Water status report on IWRM published in 2012. It considers data provided by the UN World Water Development Report 2015 and is complemented with further insights on the progress achieved towards adopting IWRM using four case studies (from Ethiopia, Kenya, Rwanda, and Uganda). These illustrate the different approaches being taken and how each country has interpreted the IWRM principles to meet the unique water resource management challenges it faces.

IWRM is a long-term strategy and is a continuing 'work in progress'. Each case study recognises the importance of stakeholder participation in planning and decision-making for IWRM to be sustainable. However, the studies also identify issues that need to be addressed, including the urgent need to invest in capacity building for both individuals and institutions, ensure

sustainable finance for water management and development, and guarantee high-level influence and political will to ensure that water resources management is included in different sector policies and harmonised with national development strategies.

The most critical challenge identified in all case studies is the lack of systematic and reliable data collection and management to enable information to be shared and disseminated to support evidence-based decision-making and planning. This would also guide the urgently needed investment in water infrastructure both for managing and controlling water resources and enhancing accessibility to water.



## 1 Eastern Africa's water challenge

Most sub-Saharan African countries face severe challenges in securing sustainable access to quality water to meet the increasing demands of a growing population and socio-economic development, while preserving the essential watershed ecosystems on which water resources depend. Many years of fragmented, unsustainable, and under-financed infrastructure development, resources management, and governance have led to over-exploitation of limited water resources and degraded crucial watersheds. Water resources development has largely ignored the interdependency of the many different uses of water – for domestic and industrial use, for agriculture, and for sustaining the ecosystems and hydrological services these provide. A lack of information and data on the status of renewable water resources further complicates water planning and governance.

Across sub-Saharan Africa, agriculture represents 87 percent of water withdrawals, compared to 70 percent worldwide (FAO, 2008). Rainfed agriculture covers 96 percent of all cultivated land (FAO, 2008). The proportion of the cultivated area equipped for irrigation is less than one third of the world average (Svendsen et al., 2009). According to the FAO, “Many intensively exploited river basins in key food producing regions are already operating at the limit of their resource base.” This is a worrying trend as more than two thirds of the population depend on agriculture and related activities for their livelihoods (FAO, 2008). In 2010, in three out of six water management zones in Kenya, water demand exceeded the available renewable water resources (WRMA, 2011).

Climate change, especially in semi-arid zones with their prolonged dry seasons, is expected to increase the risk of crop failure. The FAO predicts that by the 2080s, land unsuitable for rainfed agriculture in the region will increase by 30 to 60 million ha as a result of climate change and soil and terrain constraints (FAO, 2008). Grey and Saddoff (2007) describe regions such as this as having ‘difficult hydrology’ where extreme and unpredictable rainfall patterns, intense floods, and droughts add significantly to the cost of controlling and managing water resources.

Sustainable management and development of the region's water and land resources is crucial to reducing poverty, improving food security, and increasing economic growth. The ‘no regret option’ for climate change adaptation – defined by the UN as “options that increase the resilience of communities, not only to climate change but to any type of shock”, and which includes watershed management – is seen as having the “highest probability of success both in the short and in the long term.” (UN-Water, 2015).

Eastern Africa is part of this sub-Saharan story. It comprises the countries that make up the Intergovernmental Authority on Development (IGAD) trading bloc – Djibouti, Eritrea, Ethiopia, Kenya, Uganda, Sudan, South Sudan, and Somalia. It also includes Burundi and Rwanda (Figure 1).

The region's climate is complex and diverse. It ranges from hot, arid, and semi-arid in most of Djibouti, Eritrea, Somalia, and Sudan and the eastern half of Ethiopia and Kenya, to tropical rains in western Ethiopia and Kenya, South Sudan, and Uganda. Warm temperate rains are also found in the highlands of Ethiopia. Mean annual rainfall varies from over 2,000 mm in parts of southwest Ethiopia to less than 250 mm in the arid areas of Djibouti, Eritrea, Ethiopia, Kenya, Somalia, and Sudan. Kenya, Somalia, Uganda, southern and south-eastern Ethiopia, Rwanda, and Burundi have bimodal rainfall regimes. Sudan, South Sudan, most of Ethiopia, and Eritrea

in contrast have one main rainfall season – from June to September with the peak intensity in July and August.

Socio-economic development is determined by the availability of renewable freshwater resources. Djibouti, Eritrea, Ethiopia, Somalia, and parts of Kenya belong to one of the world's most vulnerable drought-prone regions. Subsistence smallholder agriculture, primarily based on rainfed cultivation, dominates these nations' gross domestic products (GDPs). Vulnerability is evidenced by the strong correlation between national and agricultural GDP and unreliable rainfall. This is compounded by many factors, such as poor infrastructure, pests, disease, conflict, and migration.

In 2000, UNDP estimated the region's annual renewable surface and groundwater resources at 187 km<sup>3</sup>, while annual freshwater withdrawals were a small percentage of the total water available. These ranged from less than 3 percent of total resources available in Burundi to 12 percent in Rwanda (UNDP et al., 2000). In comparison, according to the World Water Development Report 2015 (UN-Water, 2015), annual renewable water resources per capita are now rated between water scarcity (500 to 1,000 m<sup>3</sup>) in Kenya and South Sudan and water vulnerability (i.e. 1,700 to 2,500 m<sup>3</sup>) in Uganda and Tanzania. All other Eastern African countries are defined as water stressed (i.e. 1,000 to 1,700 m<sup>3</sup>). Given this situation, enhancing integrated and reliable water governance systems to make best use of limited resources is crucial.

Irrigation plays an important part in boosting the agricultural performance of cash crops in Ethiopia, Kenya, and particularly in South Sudan. Ethiopia had 3.7 million ha of potentially irrigable land area, but only 160,000 ha were developed by 1998 (Ministry of Water Resources, 1998). Since 2000, Ethiopia has invested heavily in large-scale irrigation schemes both for food crops and biofuels and within 12 years the irrigated area was increased by 160,000 ha. In South Sudan the irrigated area is greater than 100,000 ha, and in Tanzania it is more than 250,000 ha (UN-Water, 2015). Further investments and expansions are planned in all East African countries. Unless a more integrated approach is taken to water resources planning and management, these developments may have profound impacts on downstream communities and potentially disrupt hydrological and aquatic ecosystems.

Pastoralism is a significant livelihood activity across the region and there is a strong export livestock trade with Saudi Arabia and the Gulf States. But overstocking is now depleting traditional water resources and degrading watersheds. In 2001, Uganda's annual livestock freshwater demand was 81 million m<sup>3</sup> and was expected to reach 233 million m<sup>3</sup> by 2010 (NEMA, 2001).

Sub-Saharan Africa's population is growing rapidly and reached 973 million in 2014. Thus the demand for fresh water for domestic use is also rapidly increasing in a region in which water resources are most unevenly distributed compared to other regions worldwide (UN-Water, 2015). In Uganda in 1980, per capita urban water use was 90 L/day. By 2000 this had almost doubled (NEMA, 2001). Increasing population growth also directly affects water quality, which in turn reduces the quantity of available fresh water. Poor management of forests, wetlands, rangelands, and marginal agricultural lands, inappropriate cultivation practices, and high grazing intensities, have led to high levels of soil erosion and siltation in rivers that affect downstream communities. Over the past 20 years, rapidly growing populations, increasing agricultural development, urbanisation, industrialisation, and the lack of domestic and industrial waste treatment has led to a deterioration in water quality in rivers and groundwater which also affects the quantity of water available.

Figure 1. Eastern Africa



Source: Adapted from African Development Bank Group (<http://www.afdb.org/en/countries/east-africa/>).

In the late 1990s, governments across Eastern Africa recognised the need to take action to improve water resources management and embarked on water sector reforms. These included revising and formulating policies, laws, and regulatory frameworks to create an enabling environment for a more integrated approach to water resources management (IWRM). Different countries in the region took different approaches to restructuring their institutions and are at different stages of reforms that target policy and legal and institutional frameworks; development strategies and action plans; and setting up management and governance instruments.

IWRM is defined by the Global Water Partnership (GWP) as “a process, which promotes the coordinated development and management of water, land, and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (GWP, 2000).

All the countries recognised that the reform process should adopt the Dublin Principles (UN, 1992) and emphasise that water is a limited and vulnerable resource; that water resources management should be based on a participatory approach involving stakeholders at all levels; that women play a central part within water resources management; that water is a public good; and that water should be managed equitably, efficiently, and sustainably.

An integrated approach to water resources management in the region aims to spur political action by creating awareness among decision-makers of the need to develop an enabling environment for solving the water challenges. Through this process, there can be improved understanding of the need for inter-sector collaboration to foster integrated planning and develop the water sector to reduce various threats, such as environmental degradation and climate variability and change. To support this process, the Global Water Partnership Eastern Africa (GWP EnA) was launched in 2003 as a multi-stakeholder platform to increase IWRM knowledge sharing, dialogue, networking, and communication as key drivers for strengthening stakeholder engagement in formulating policy and implementing water sector development plans (GWP EnA and GWP Southern Africa, 2009). This platform now has local, national, and transboundary roles and responsibilities to support the adoption of IWRM in all the countries of Eastern Africa.

This paper highlights progress across the region as countries increasingly adopt an IWRM approach. Four case studies (from Ethiopia, Kenya, Rwanda, and Uganda) are used to highlight the different approaches taken and how each has interpreted the IWRM principles to meet the unique water resources management challenges they face.

## 2 IWRM is evolving

In 1998 the water ministers of the Nile Basin countries assembled in Addis Ababa to officially form the Nile Basin Initiative (NBI) and to take the first steps towards adopting IWRM principles. Members included the Eastern African countries, except Djibouti, plus Sudan and Egypt. Their vision stated, “The only effective long-term answer to the conflicts over water is to align national water policies with a shared vision of good water management and defined goals for cross-border cooperation.” (GIZ, 2013). This common understanding resulted from regular annual meetings of water ministers, driven mainly by the ministers of Egypt and Ethiopia who initiated the meetings in the early 1990s following the UN Rio Conference on Environment and Development (UN, 1992).

Two core IWRM principles were adopted:

1. Water resources management would be based on a watershed or river-basin approach
2. Stakeholder participation would be at the heart of water governance at all levels to help resolve conflicts.

All riparian countries in the Nile Basin initiated water legislation revisions.

In 2000, **Ethiopia** passed its Water Resources Management Policy based on IWRM principles that emphasised an integrated framework for water resources development as “a rural-centred, decentralised management underpinned by a participatory approach” that shall ensure “social equity, economic efficiency, system reliability, and sustainability norms.” (Mekuriaw, 2008).

In 2002, **Kenya** passed a Water Act emphasising IWRM principles as the basis of water governance and established the Water Resources Management Authority (WRMA) with the mandate to “manage, regulate and conserve all water resources, to ensure stakeholder participation, to enhance equitable allocation of water and to guarantee environmental sustainability.” (GoK, 2002). In 2010, the new constitution was passed, and the Water Act is now being revised to facilitate devolving functions to newly established county governments, especially for water supply and sanitation.

In 1997, **Uganda** passed a Water Act to “provide for the use, protection and management of water resources and supply; to provide for the constitution of water and sewerage authorities; and to facilitate the devolution of water supply and sewerage undertakings.” (MWE, 1997). In 1999 the National Water Policy was passed which “promotes a new integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people of Uganda.” (MWE, 1999). However, the guidelines on catchment-based water resources management only came into force in 2014 (MWE, 2014; Bamutaze et al., 2014).

In 2004, **Rwanda** formulated its Water and Sanitation Policy in an effort to put a “robust framework for the conservation, protection and management of the country’s water resources” into place. In 2008, Water Law No. 62 was passed and in 2011 the National Policy for Water Resources Management replaced the 2004 policy. The Water Law outlines an institutional framework for coordinating water resources management; devolves water resources management functions to districts and user organisations; and provides for charges to be levied for the use of water (GoR, 2008).

In 2012, **Burundi** established new water legislations based on IWRM principles. However, it did not introduce a catchment-based planning approach to water resources management. As a small country, Burundi opted for a centralised approach (GIZ, 2013).

In 2012, **South Sudan**, as an emerging nation, initiated a draft of new water regulations through the Ministry of Water Resources and Irrigation. The focus is on regulation and water services provision as well as water resources management. The Kenyan Water Act was used as a guideline (GIZ, 2013).

In 2004, **Somalia**, mainly Somaliland (northern Somalia), initiated a National Water Policy and new water regulations. In 2012 it passed a Water Act as part of the state building process. The National Water Policy sets out the objectives, general principles, and guidelines for developing the water sector. The National Water Strategy (approved in 2004) outlines the priorities and detailed measures to permit the policy to be implemented. The Water Act sets the legal framework to support the strategy; defines organisations, mandates, and responsibilities; and procedures, obligations, and interdictions. Water regulations are currently being developed to enforce the Water Act. The Somaliland Ministry of Water Resources also issued a request for support of a 20 year Watershed Management Programme (AWF, 2014).

In 2008, **Eritrea** set out an Action Plan for IWRM based on the water resources policy drafted in 2004 and revised in 2007. The policy recognises “the drainage basin as the basic unit of planning for development of water resources” and calls for “appropriate measures to optimise utilisation of this resource for the benefit of the people living in the basin.” (GSE, 2008). It provides guidelines on management, development, and use of national water resources.

In 2000, **Djibouti** introduced new water legislation, with the National Water Master Plan, which was revised in 2006. The first priority of the government is to enhance the water supply and sanitation sector. In 2004, the National Water Resources Plan was developed, which emphasises an integrated approach to water resources management and stakeholder participation; however, it does not include the basin approach because of size of the country.

Although the process of adopting and putting IWRM into practice varies from country to country and reflects the different approaches to natural resources management and governance, there are some common threads. These include:

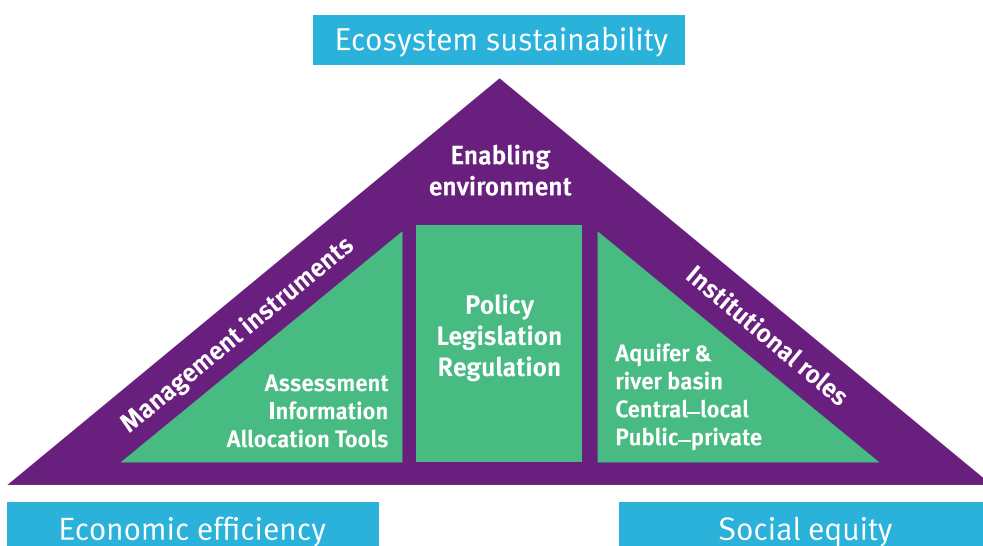
- Enhancing coordination among sectors and, in most countries, adopting a basin management approach
- Establishing a legal framework for IWRM including policies, regulation, resource management, and service provision
- Enabling stakeholders' participation at all levels of management and governance
- Introducing regulations for transboundary water bodies.

## 3 Next steps towards IWRM

Africa's shared Water Vision 2025 – “An Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation and the environment” – requires an enabling environment consisting of a supportive policy framework that allows for diverse stakeholders, often with conflicting interests, to equitably access, use, and share water resources (UN-Water, 2012).

All Eastern African countries are pursuing this vision by putting the principles of IWRM into practice (Figure 2). All are currently engaged in establishing appropriate policies and strategies for water management. But the main focus at present lies in developing water resources for economic growth and domestic water supply, while at the same time meeting the Millennium Development Goals (MDGs) and eradicating poverty through sustainable development, and maintaining ecosystem services. The Government of Kenya (GoK) for example, in its efforts to achieve Vision 2030, is working towards a long-term plan for water infrastructure development to achieve the MDGs.

Figure 2. General framework for IWRM



Source: Adapted from GWP, 2000.

All the countries cited governance (and management) challenges as well as limited public and private financial commitments as major constraints to successfully adopting IWRM. Government budget allocation is not prioritised to resources management and so it is difficult to implement efficient water allocation planning to ensure ecosystem integrity, provide hydrological services, enhance infrastructure development in water services provision, and invest in large-scale agricultural projects such as irrigation (SIWI, 2005; GIZ, 2013; UNDESA, 2013).

Reaching equity of access to clean freshwater resources remains a challenge for water services providers in all countries and at all levels. Investments needed for expanding water services provisions, especially for the urban poor, are mostly expected to come from international donors rather than government budgets. This is in spite of the fact that economic rates of return for infrastructure projects in sub-Saharan Africa are highest for water supply projects as compared to investments in irrigation, power generation, or other infrastructure developments (UN-Water, 2015).

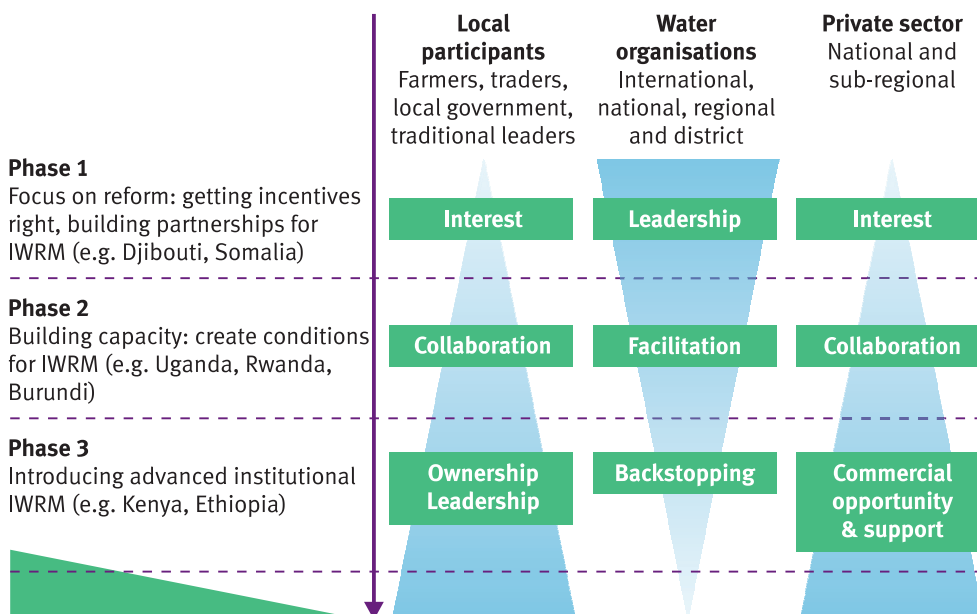
Inefficient and ineffective governance or management procedures directly affect project implementation, and the functioning of different institutions. A World Bank study indicated “unethical practices drain 30 percent of the budgets within the WASH sector in sub-Saharan Africa” (Plummer and Cross, 2006).

Supportive policy frameworks have been set up in most countries, but implementation at all levels remains a challenge. The extent and magnitude of investment and engagement by different stakeholders in different countries provides insights into the progress made. The first steps of policy and regulatory reforms are now under way with support from organisations such as NBI, Lake Victoria Basin Commission (LVBC), GWP, and GIZ.

Most countries are facing serious capacity constraints as there is a dearth of qualified and well-trained technical personnel at all levels, especially for collecting, managing, and analysing data. This already leads to limited monitoring systems and a lack of capacity to develop predictive models and implement sustainable water allocation planning. African universities, technical colleges, and technical and vocational education and training schools themselves do not have the capacity to provide sufficient numbers of qualified graduates and skilled artisans to meet the demands of a growing water resources and services sector.

All the countries recognise the importance of stakeholder participation in water resources planning and management. But countries are at different stages in developing and integrating this approach into decision-making. Progress is reflected in Figure 3. Kenya is already at the stage of introducing advanced institutional IWRM and the ownership and leadership of catchment management processes by longer established water resources users’ associations (WRUAs) is already visible.

Figure 3. Evolutionary protocol to IWRM analysis



Most analysts and professionals would argue that water management has had a limited sector focus for too long and there is a need to better coordinate water management across the various sectors and stakeholders who use water and across administrative boundaries. In this sense, IWRM is widely hailed among those working in water as a welcome aim or vision. But Molle (2008) notes that we cannot pretend that all these different objectives can be maximised simultaneously. The reality is that there will always be trade-offs and, at best, only a balance can be achieved. Thus ‘integrated’ management aims to address these trade-offs and minimise the negative impacts that might be created by the actions of one particular sub-sector or stakeholder. Integration seeks to avoid inefficiencies and conflicts that are a feature of the more traditional ‘silo-based’ approaches to water management. This is also reflected in the IWRM processes introduced in Eastern Africa.

### 3.1 Water services provision

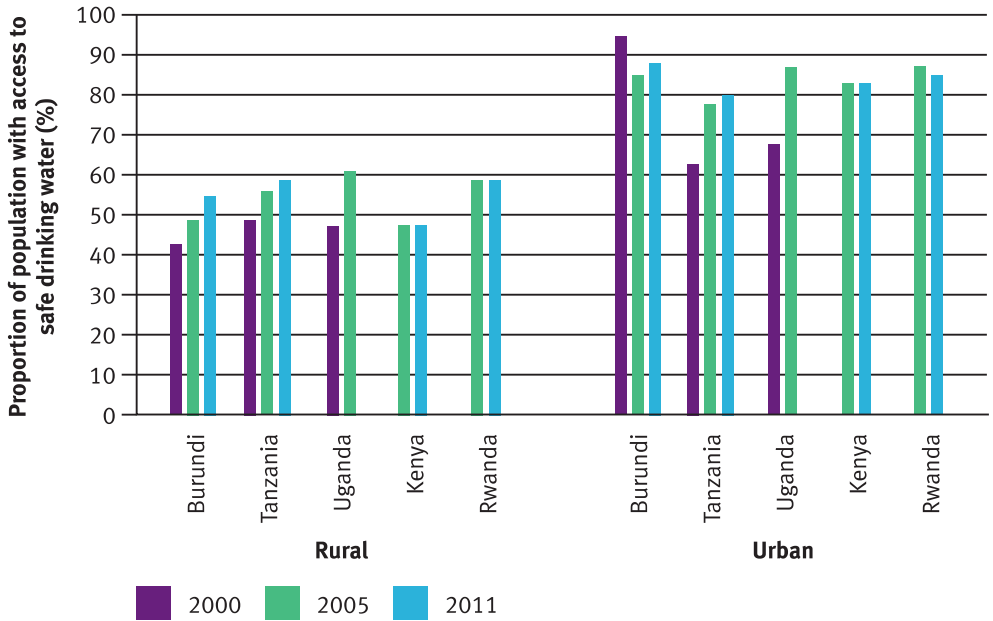
For many years, governments and donors have seen water services provision, such as water supply and sanitation, as the key drivers of water management. However, the investment remains insufficient as the UN-Water Development Report 2015 indicates. In sub-Saharan Africa, because of rapid urbanisation, “the percentage of people who enjoyed piped water on their premises ... has decreased from 42 percent to 34 percent” (UN-Water, 2015).

Moreover, it is increasingly recognised that in order to guarantee urban water security, investing in catchment management and wetland protection can provide the necessary quantity and quality of freshwater resources for sustainable development.



As these initiatives and water allocation planning require long-term strategies, and impacts can often only be monitored after several years, they require long-term political commitment. This often presents a challenge as continuity is highly dependent on political stability as well as on long-term and consistent planning.

Figure 4. Access to safe drinking water in selected countries



Source: East African Community Statistics portal, 2014.

Investment in water resources management is still far lower than investments in physical infrastructure for water allocation and provision of services. Water allocation planning remains a major challenge within the region, as priority is given to enhance infrastructure to meet the demands of a growing population and a growing economic sector. The question whether there is sufficient water available for new investments is often overruled by the sheer needs for initiating economic growth and supporting infrastructure development. Such capital works and public spending may also provide opportunities for malfeasance, which is still a serious problem in the region. Investing in maintaining hydrological services may not be given the same priority as investments with more direct economic benefits to investors. But this is beginning to change with initiatives such as the launch of the Nairobi Water Fund in Kenya, where private companies such as Kenya Power, Nairobi Water Services Company, Kenya Breweries, and Coca-Cola recognised the financial benefits from directly investing in catchment management.

**Box 1. Output-based contracts in the water supplies of small towns in Uganda**

Traditionally, the Directorate of Water Development of the MWE, with little local authority involvement, centrally managed most water sector resources and all formal urban or small town water supply systems. In the late 1990s, a reform programme was launched to separate asset ownership from system operations and service delivery was commercialised through public–private partnerships. Water management was then delegated to local water authorities.

A further innovation piloted in small towns, including informal settlements of Kampala, was a contract, funded by output-based aid, to provide water to low-income communities. Pre-paid meters were installed which eliminated disagreements over water bills, previously based on estimates of water use. The meters enabled people to manage their water better and they reduced water theft. Those people who cannot afford water are now able to collectively buy water credit. Between 2005/06 and 2008/09, the number of connections increased by almost 50 percent and turnover by more than 70 percent.

Separating asset ownership from systems operation in urban areas has resulted in 90 percent access to safe drinking water in urban areas and 67 percent access across the country as a whole.

Source: Adapted from GWP ToolBox case study no. 409 ([www.gwptoolbox.org](http://www.gwptoolbox.org))

## 3.2 Water policies

National water and environment ministries lead the formulation of water-related policies and they are meant to give priority to water and overrule other sector policies. But the reality is somewhat different, as government ministries work within long-established mandates and ignore influences from others. Water ministries, for example may try to block agriculture ministries from introducing water permits and water tariffs for farmers and irrigators, which may impact on their water revenue collections. Health ministries (in charge of sanitation and solid waste management) may block demands for water quality and effluent standards imposed by water ministries. Information may not be shared across ministries, or indeed with the public, in order to better manage limited resources. These are just examples of some of the constraints which must be overcome.

Kenya is well ahead of other countries in the region in setting a legal and policy framework for IWRM. However, putting policies into practice, enforcing the rules, and monitoring still present a challenge in Kenya and across the region. All the countries face budgetary constraints and water resources management is not given the same political priority as water supply and sanitation, which underestimates the need and urgency for promoting a holistic governance and management approach. Comprehensive IWRM planning processes also necessitate efficient and centralised data management, and clear information-sharing strategies at national and regional levels still need to be implemented.

## 3.3 Public participation

Public (or stakeholder) participation in water planning and management is enshrined in all water legislation across the region and is seen as the next step along the pathway to introducing the IWRM approach. It is a key element for integration at local, regional, and national levels. It is also seen as a useful vehicle for engaging large private stakeholders, such as industrial and commercial water users, to invest in catchment management and bring development partners on

board in government plans for economic and social development. Indeed the four case studies presented here focus particularly on this element of IWRM.

In Kenya, the Water Act 2002 stressed the importance of local stakeholder participation in planning, implementing, and decision-making to address key issues of governance and social equity. Their involvement in monitoring and evaluation can enable equitable benefits sharing in terms of water allocation and so minimise the risk of conflict during dry periods through a shared vision of resource ownership and management among key public stakeholders (Waternet, 2014).

Inadequate participation can hinder future water security. Without appropriate involvement in decision-making, many stakeholders may refuse to cooperate with catchment management on water quality assurance and in enforcing regulations. This stakeholder resistance to change often generates unnecessary conflicts and may result in vandalism of water works and other infrastructure (Ngigi and Macharia, 2007; WASREB and WSP, 2011).

### Box 2. In Kenya, a call for stakeholder participation

In Kenya, the government channelled water from the head works located in Murang'a County to Nairobi County without consulting local communities and their county governments (TWSB, 2010). This resulted in mistrust between the national government and the county governments, which led to the Water Services Regulator and Water Resources Management Authority calling for stakeholder consultation in order to solve the conflict. This is just one case among many in the region.

Source: TWSB (2010). Detailed Design and Supervision for Murang'a North and Murang'a South Bulk Water Supply Project – Design Report Part 1: Feasibility Review. Document No. 10330-FR-C-001/1. Consultant: Howard Humphreys (East Africa) Ltd Consulting Engineers. Tana Water Services Board (TWSB), Nyeri.

## 3.4 Transboundary issues

Transboundary, multilateral organisations, such as the NBI and LVBC, play a crucial role in promoting and supporting the implementation of IWRM within the region. Moreover, a framework for transboundary sub-basin river institutions (e.g. Mara River) is being developed, which is guided by a Memorandum of Understanding (MoU) between the NBI and the East African Community (EAC). This places the activities of these institutions under the framework of the EAC treaty, the EAC Protocol for the establishment of Lake Victoria Basin Commission, and EAC legal instruments (LVBC, 2013).

The NBI has 10 riparian member countries and its shared vision programme aims to apply IWRM principles in the water policies of member countries and initiate comprehensive data collection and analysis on water resources and water uses, as a basis for basin planning. Initially, upstream projects (in Uganda and Ethiopia) for water storage, electricity generation, and irrigation were agreed without questioning the significant downstream water needs for food production in Egypt and Sudan. However, in 2015 a treaty was signed by Egypt, Ethiopia, and Sudan to share the Blue Nile water resources.

### Box 3. Transboundary cooperation along the River Nile

The River Nile is one of the world's longest transboundary rivers flowing some 6,700 km from its farthest source in the headwaters of the Kagera Basin in Rwanda and Burundi to the Mediterranean Sea. It is shared by ten riparian countries – Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Eritrea, Kenya, Rwanda, Sudan, Tanzania, and Uganda. The need for collaboration among all riparian countries in the Nile Basin was well recognised by all nine participating countries (Eritrea did not formally join the process) for reducing water conflicts between upstream and downstream water users and enhancing economic growth throughout the basin for the benefit of everyone. In 1999, the Nile Basin Initiative (NBI) was formed to reflect an integrated approach to water resources management. Its Strategic Action Programme represents a deep commitment by the Nile riparian countries to foster cooperation, regional integration, and sustainable development. A recent strengths, weaknesses, opportunities, and threats (SWOT) analysis recommends that in addition to building scientific capacity, local knowledge and management skills should be upgraded to provide a strong foundation for integrated water resource management.

Source: Adapted from GWP ToolBox, case study no. 393 ([www.gwptoolbox.org](http://www.gwptoolbox.org))

Lake Victoria is the main source for the White Nile. In 2003, the LVBC was established to promote IWRM among the riparian countries. It is a specialised institution of the EAC and is responsible for coordinating sustainable development in the basin. The Commission envisages a partnership arrangement among the EAC partner states, development agencies, and local communities. It emphasises harmonising the policies and laws that govern the management of the lake's environment and catchment area; focuses on developing economic activities (e.g. fisheries, agriculture, and tourism); and encourages the development of infrastructure.

### Box 4. Sharing water resources in the Kagera Basin

Four countries share the water resources of the Kagera Basin – Burundi, Rwanda, United Republic of Tanzania, and Uganda. It is home to more than 16.5 million people who depend on farming, herding, and fishing activities. Land use includes extensive and intensive livestock systems; cropping systems – cereals associated with legumes and tubers; mixed farming systems (agro forestry, crop–livestock, and crop–fish); and systems dominated by perennial crops, such as bananas, coffee, and tea.

This transboundary basin is important both economically and environmentally. GWP's Water, Climate, and Development Programme is supporting communities in the Bugesera region, shared by Burundi and Rwanda, to adapt to climate change. A catchment approach is being used to promote IWRM in this transboundary setting. Partnerships and stakeholder capacity are being strengthened to increase water security and climate resilience among communities in the Lake Cyohoha Watershed.

Source: Adapted from Water, Climate and Development Programme in Africa, <http://www.gwp.org/en/WACDEP/>

## 4 Selected case studies

Case studies offer opportunities to see how the principles of IWRM are being put into practice. Four case studies – from Ethiopia, Kenya, Rwanda, and Uganda – show how the principles are being applied in very different water management environments, focusing on stakeholder participation.

- **Ethiopia** is an ‘early adopter’ and followed a top-down approach in the newly established federation of national states. The case study first describes the changes in water governance across the country and then focuses on the Berki Watershed where conflicts over limited water resources are being resolved through joint planning with stakeholders.
- **Kenya’s** case study describes how water resources management institutions were restructured by combining top-down legislation and bottom-up implementation to include strong WRUAs established at the watershed level across the country.
- **Rwanda’s** case study describes how, as a ‘late-comer’ to IWRM, this small country is emerging from internal conflicts and deciding on a strong top-down approach, which balances municipal and agricultural water demands with environmental requirements.
- **Uganda** is well endowed with water resources compared to other countries in the region. But there are growing conflicts over water allocation in some areas, particularly in the extensive River Ruzizi Watershed. The process of reform towards IWRM is just beginning and this case study describes the first steps being taken to introduce stakeholder participation as this is seen as an entry point to future water resources planning.

### 4.1 In Ethiopia

#### 4.1.1 Water sector reforms

Governance and institutional arrangements for water resources development and management are organised at three levels – the federal level which establishes policy and sets standards; the basin level where resources are managed; and the local level where services are managed.

The Ministry of Water, Irrigation, and Energy (MoWIE) is the sole federal government institution with responsibilities for the nation’s water resources. It formulates policy and legal frameworks; establishes relevant institutions; sets standards; commissions studies; plans and develops water supplies and sanitation, irrigation, hydropower, and other energy forms; and administers water resources protection, monitoring, and allocation. The Ministry also deals with transboundary water issues. The Ministry of Agriculture also has responsibility for managing water, but this is mainly water harvested for smallholder farmers who practise rainfed agriculture. The Ministry of Environment and Forest, formerly the Environmental Protection Authority, is now responsible for preparing environmental protection policy, laws, and directives.

River basin organisations (RBOs) comprising a Basin High Council and river basin authorities (RBAs) are being established to ensure an integrated approach to water resources management at the basin level. The Basin High Council is the highest decision-making body and is chaired by the Deputy Prime Minister. It comprises ministers of seven federal ministries, presidents of relevant regional states, and the Ministry of Environment and Forest. The Council invites selected

regional bureaux, major water users, and specific civil society groups as observers. To date (2015), three RBAs have been established – Abbay (Blue Nile), Awash, and the Rift Valley Lake Basins.

Ethiopia's nine regional states, plus Dire Dawa City Administration have a Regional Water Bureau (RWB) responsible for small-scale irrigation and rural water supply. It develops water resources for domestic water supply, either directly through large borehole drilling programmes, or indirectly through funding local *Woreda*<sup>1</sup> governments and their water offices that are tasked with planning, implementing, and/or backstopping spring development, lower-cost wells, and sanitation. RWBs also plan, finance, and implement small-scale (< 200 ha) irrigation projects. They have subsidiary structures extending to lower levels in the form of Zonal Water Offices, *Woreda* Water Desks, and within *Kebeles*<sup>2</sup>. RWBs also provide technical and financial (for capital investment) support for local water resources management and WASH projects.

Regional states have significant mandates to manage fishing, aquaculture, environmental protection, cooperation over transboundary and trans-regional fisheries resources, and the promulgation of implementing laws. In many cases, regional states have set up institutions responsible for irrigation development including irrigation construction work. Regional Environmental Protection Agencies are responsible for evaluating and approving Environmental Impact Assessment reports on projects licensed, executed, or supervised by regional states.

Managing and delivering water and sanitation services (including watershed management) is the major responsibility of regional and local institutions, with most functions concentrated at the *Woreda* level. The *Woreda* Water Desk (WWD) is generally responsible for planning and managing programmes; managing finance and procurement; and for contracting and supervising local service providers at the district and community levels. In most cases, WWDs also initiate, facilitate, and motivate communities to manage rural water services. They apply cost recovery principles and monitor and evaluate developments. Town Water and Sewerage Boards are responsible for planning and managing town water supplies and sewerage services. They also contract-out operation and maintenance services to Town Water Utility Operators under performance or service contracts. Their duties and responsibilities include providing urban residents with sufficient clean drinking water, operating and maintaining infrastructure, and collecting revenues for water supply, sewage, and other services.

The Plan for Accelerated and Sustained Development to End Poverty (PASDEP), implemented during 2005–2006 and 2010–2011, stressed that untapped water resources could play a significant role in reducing poverty and accelerating growth. The PASDEP also identified six growth corridors. The first of these is the water-centred Tana Beles growth corridor, which is managed by the MoWIE. Water resources development is a key focus alongside other growth-accelerating sectors, such as education, health, roads, and agriculture.

The current Growth and Transformation Plan (GTP) (2010/11–2014/15) gives highest priority to water development as the catalyst to transform the country's economic development from 'agricultural development-led industrialisation', to 'industrial development-led agriculture'. Huge investment is being channelled into the water sector to bring about economic transformation. The GTP aims to increase irrigation from the current 2.5 percent of the potentially irrigable area to 15.4 percent (from 127,300 ha to 785,600 ha). To achieve this, up to 10 dams are either under construction or in the planning phase (Negash, 2013).

<sup>1</sup> A *Woreda* is equivalent to a District.

<sup>2</sup> A *Kebele* is equivalent to a town quarter.

Hydropower development is another investment priority. All energy generated in the country is connected to the central grid. The MoWIE is responsible for all aspects of hydropower development while the Ethiopian Electric Power Corporation is the sole government company in charge of generating, transmitting, distributing, and selling electricity.

The demand for large multipurpose water storage facilities for power generation and irrigation is growing. The MoWIE is responsible for medium and large-scale irrigation schemes while the Ministry of Agriculture and regional bureaux of agriculture are involved in supporting and developing small-scale irrigation schemes for use by communities. There are clear lines of possibility for ministries at federal and regional levels, but there is limited coordination of activities and water uses. However, establishing RBAs and Basin High Councils, whose mandate includes ensuring integration of water resources management, should address the problem. Table 1 summarises the SWOT analysis of the IWRM processes in Ethiopia.

**Table 1. SWOT analysis for Ethiopia's IWRM process**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ Principles and instruments of IWRM adopted in the national water resources management policy and legal framework.</li> <li>■ Strategies and laws for IWRM implementation are in place.</li> <li>■ Political commitment of the government towards IWRM is high.</li> <li>■ Water resource based development growth corridors identified.</li> <li>■ Devolution of water resources management and hydropower development to local governments (<i>Woredas</i>).</li> <li>■ RBOs being established phase by phase for IWRM at basin level.</li> </ul>	<ul style="list-style-type: none"> <li>■ Inadequate coordination among stakeholders and sectors.</li> <li>■ Adequate technical knowledge and skills not available at the regional and <i>Woreda</i> levels to plan and implement IWRM.</li> <li>■ Absence of a strong water information system.</li> <li>■ Low institutional capacities to enforce water laws.</li> <li>■ Inadequate financial capacity for water infrastructure development.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>■ Sustained economic growth of the country over a period of more than 10 years.</li> <li>■ Donors and development partners ready to support water resource development programmes.</li> <li>■ Expansion of tertiary education in the country.</li> <li>■ Adoption of a Climate Resilient Green Economy Strategy.</li> <li>■ Several programmes being implemented in land and water conservation at watersheds.</li> <li>■ NBI process and framework.</li> </ul>	<ul style="list-style-type: none"> <li>■ Rapid growth of population and demand for water.</li> <li>■ Temporal and spatial variability of water availability and climate change impacts.</li> <li>■ Transboundary nature of the majority of the river basins.</li> <li>■ Inadequate financing for water infrastructure development.</li> </ul>

#### 4.1.2 Berki Watershed

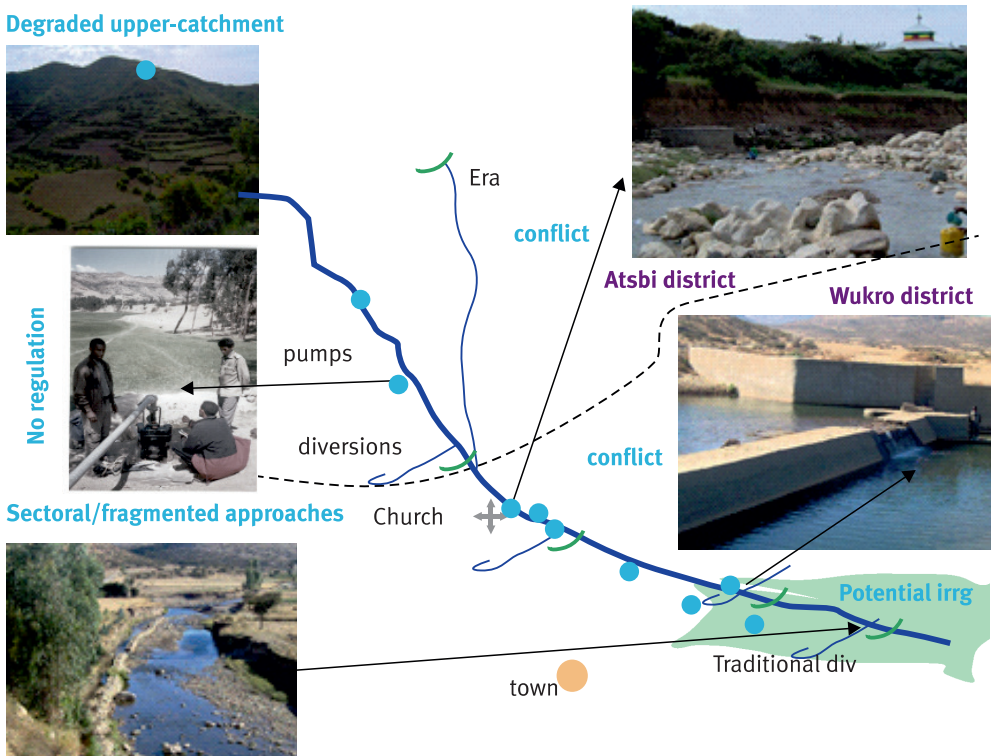
To complement the government's efforts to address a number of constraints to implementing its new water strategy, GWP Ethiopia, with support from the US government, implemented a project to promote IWRM. The project sought to establish a framework for broad stakeholder participation and networking to put IWRM into practice at the grassroots level. Two watersheds were selected – Berki in Tigray region (northern Ethiopia) and Messena in Amhara region (north-east Ethiopia).

This case study focuses on the Berki Watershed in the highlands of Tigray, which flows to join the Giba River, a tributary of the River Tekeze, which ultimately joins the Nile (Jambere, 2009). Three districts (*Woredas*) share the Berki Watershed – Atsbi, Wukro, and Enderta – which covers about

410 km<sup>2</sup>. The main economic activities include agriculture, fuel wood collection, and animal grazing, and together these threaten both the hydrology and the natural ecosystems within the catchment (Figure 5).

Water resources were being over-exploited beyond their natural limits and local capacity was not capable of regulating and exercising control. There was no land use plan or water regulations and this led to the uncontrolled introduction of private pumps and changes in cropping patterns and land use. There were no data available on river flows and so there was no scientific basis for allocating water. Poor communication among various users and stakeholders and a low level of awareness also contributed to this problem. The biggest challenge was to establish a system of sustainable water management that was fair and equitable for all users.

Figure 5. Challenges in Berki catchment



Source: Presentation at IWRM writeshop by Patrick Safari, 8 December 2014, Entebbe.



Water is the main source of conflict in this watershed. It lacks an institutional framework and there is little understanding of an IWRM approach. This means that individuals and groups pursue their own water interests with little consideration for the needs of others.

Farmers in the upper Berki Watershed use pumps to take water from the river for irrigation and want to introduce an additional 100 pumps with little thought about the impacts this would have on downstream irrigators who rely on this same water resource to irrigate over 150 ha.

There is also a spring near Berki diversion used by the Church for spiritual purposes (holy water). The Church planned to develop this diversion to supply water to Agula town, but this resulted in conflict with the Bureau of Water Resources of Tigray Regional State. There was also conflict with downstream irrigators who objected to the diversion and, as a result, they destroyed the diversion weir. Thus, various individuals and groups were in conflict as each sought to make maximum use of this limited resource.

Realising these problems and the potential solutions provided by an IWRM approach, GWP Ethiopia established a pilot activity in the Berki Watershed with the potential for further scaling up. The process involved multi-stakeholder participatory planning within the watershed.

### Approach taken

GWP Ethiopia reviewed the existing policies, laws, strategies, and programmes in order to identify policy gaps and constraints for implementing IWRM. The process was highly consultative and a range of stakeholders at various levels participated. The gaps identified included lack of integrating water and land resource management; decentralisation without building local level capacity; lack of a holistic approach; low level of awareness; lack of regulations for managing demands and conflicts; and limited private sector involvement. The findings led to identifying key IWRM change areas for Ethiopia, such as managing water demands, managing water conflicts, and identifying the best regulatory and institutional arrangements for sustainable water resources management.

### Outcomes

Communities now have better awareness of water resource ownership and understand how the actions of some users can affect others. People speak about equitable water allocation, conflict resolution, and integration of different water uses. One clear indication of increased awareness is the interest shown by the downstream *Woreda* to contribute to conservation programmes upstream. *Atsbi Woreda's* plan to introduce about 100 more water pumps was revisited because of the raised awareness of the local authorities. Moreover, water efficient technologies, like drip systems, are being introduced and a plan is being prepared for artificial groundwater recharge.

### Lessons learned

The IWRM change process needs to support people's livelihoods. It is only when people understand that their livelihoods depend on the sustainable management of water and land resources that they can own and meaningfully participate in the change process. The challenge faced by GWP Ethiopia in piloting IWRM was the long planning process that made it difficult for local communities to understand how this linked to their livelihoods. There was a high level of expectation around a quick physical infrastructure fix that would address their practical problems.

## 4.2 In Kenya

### 4.2.1 Water sector reforms

Kenya is currently going through a process to decentralise government structures and responsibilities to county governments. This has a direct impact on the water services sector as well as the already decentralised (based on river basins and watersheds) system. New (regional or local) demands from the county governments have a direct impact on implementation at basin and catchment levels. Whereas the responsibility of catchment management will become a county government one, water allocation planning and regulation are foreseen to remain with the national government.

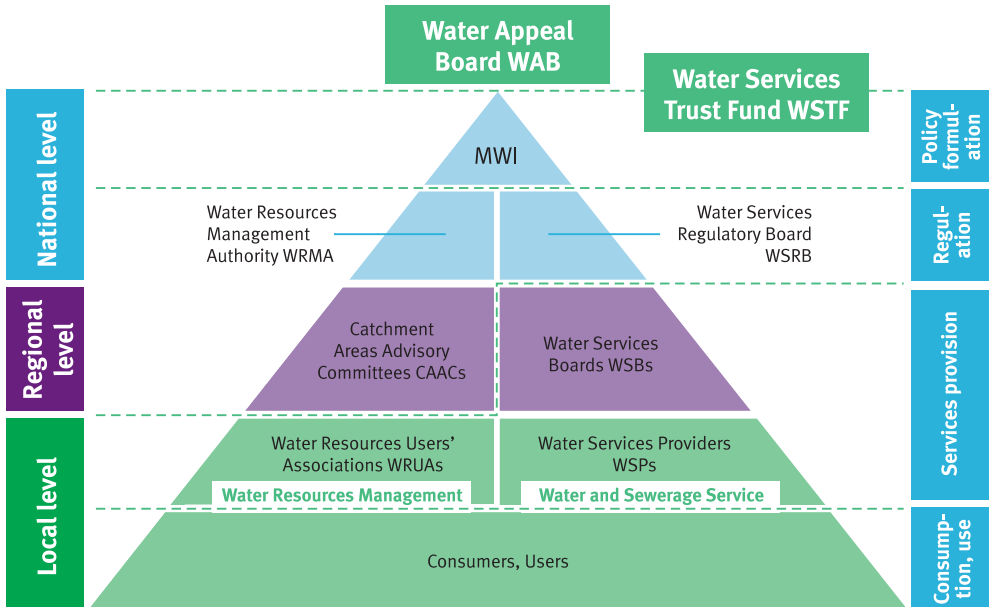
The Kenyan water sector reforms enacted in 2002 provide a good example of putting the principles of IWRM into practice. IWRM represents a move away from the traditional ministerial top-down approach to water management towards a holistic management approach of both water resources management and water services provision using participatory approaches. Prior to this, Kenya was facing increasing problems of unreliable and unpredictable rainfall. Most watersheds were experiencing water stress resulting in conflicts among users. In the main cities of Machakos, Nairobi, and Mombasa water supplies were unreliable and limited in coverage. Also the high water demands for drinking and domestic use, effluent discharge, irrigation, and industrial use were in most cases satisfied to the detriment of the environment, including swamps, rivers, lakes, and aquifers.

These concerns provided the drivers for inter-sector coordination and rational use with a more holistic approach. The 2002 Water Act established a clear separation between water resources management and water service provision. According to the new law, the GoK would take responsibility for water regulation and enforcement at the national level and community-based organisations and private corporations would deliver water resources management and Water Service Provision (WSP) at the grassroots level using participatory approaches. But how would these institutions be formed? What would be their mandates? What enforcement strategies need to be put in place? These issues needed clarifying. Figure 6 provides a framework of action for this process.

Water resources management moved away from supplying water and sewage services, while water policy-making was separated from daily administration and from administrative boundary management to hydrological watershed based management.

The Water Services Regulatory Board (WASREB) was created, which established five Water Services Boards that could provide permits to dozens of WSPs in major towns and cities. Alongside this, the Water Resources Management Authority (WRMA) set out clear guidance on the government's role in the water sector. It recognised hundreds of WRUAs. A Water Appeal Board (WAB) was set up to boost water justice through dispute arbitration and a Water Services Trust Fund was established to provide investment in water infrastructure in areas that were not well served by governmental agencies.

Figure 6. Institutional framework under the Water Act 2002



Source: GoK, 2002.

In 2005, a National Water Resources Management Strategy (NWRMS) was developed to support and catalyse the implementation of the 2002 Water Act. This focused on public empowerment and participation in water resource management. The German cooperation organisations DAAD (German Academic Exchange Service) and GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit GmbH – now absorbed into GIZ) supported activities to strengthen the capacity of local stakeholders. The University of Siegen and Kenyatta University were designated to form and provide training in two pilot WRUAs in key sub-watersheds in the Tana River Basin – in the Bwathonaro Watershed in 2006 and the Ngaciuma-Kinyaritha Watershed in 2007. Three DAAD Alumni Summer Schools were held in Meru to provide training and this led to the Capacity Building in Integrated Watershed Management in East Africa (IWMNet) – a 4-year project funded by the EU Water Facility (2008–2012). Following this, IWMNet became a strong network for capacity building in integrated watershed management (IWM) with partnerships among universities and water ministries in eastern and southern Africa, particularly in Kenya, Tanzania, Uganda, and Zambia. The Centre for International Capacity Development of the Universität Siegen in Germany led the network.

#### 4.2.2 Developing capacity

By 2009, following the success of the pilot projects, 292 WRUAs had formed and had had staff trained in IWM. Among the WRUAs, 30 percent developed plans for managing their water resources, including well-planned activities with priority targets on awareness creation, water allocation, conflict resolution, pollution control, watershed rehabilitation, conservation, and WRUA financing, monitoring, and evaluation.

Different WRUAs had different demand profiles and priorities. The Ngaciuma-Kinyaritha WRUA registered 351 water abstractors, mainly using springs that fed the Ngaciuma and Kinyaritha streams. These included farmers (79 percent), householders (16 percent), and institutions and industrialists (5 percent). In rural WRUAs, irrigation needs dominated demand whereas in urban WRUAs domestic demand was greater.

In Bwathonaro WRUA, priority was given to watershed conservation and protection and by 2010, springs were protected in Gitwe, Kathithi, Makutano Nkanga, and Matiandui. This led to water recharge and improvements in springs that had previously dried up. Fencing was introduced in the Athindi wetland which enabled vegetation to regenerate. An awareness of the need to pay water charges was also created. These actions led to an increase in the water revenues collected and reduced illegal water abstractions and over-abstractions.

In 2010, WRMA activities were evaluated in six large basins – Athi River Basin, Ewaso-Ngiro Basin, Lake Victoria North, Lake Victoria South, Rift Valley Basin, and Tana River Basin. During dry periods, water use conflicts escalated owing to water shortages. To minimise this tension, WRMA, with support from the WRUAs, successfully enforced water rules to ensure that every water user was catered for within the limits of the resources available. Illegal water abstractions were reduced by 30 percent in the upper parts of watersheds and by 70 percent in the middle and lower parts.

In 2009, WRMA raised USD 1.34 million (KES 126,104,300) from water users. In Lake Naivasha Basin, introducing payments for watershed services provided increased recognition of the economic value of water among water users. Moreover, 22 percent of large-scale water users and 78 percent of small-scale users complied with the new regulations. Only seven cases of gross offences were filed with WABs. Paying fees generated interest among stakeholders to see that their money was reinvested in watershed conservation to enhance water flows and improve water quality.

#### 4.2.3 Some lessons

Lessons were learned from the Kenyan experience.

- Decentralising water resource management and water services can work more effectively and sustainably than a system of centralised management
- Stakeholder participation is an essential and important starting point for a progressive change of attitudes towards reforms. Participation adds value to good governance and sustainable development. Sensitising stakeholders is the main entry point for changing attitudes. This is best done through community-based organisations, such as WRUAs, which have developed or are developing strong relationships with their communities over time.

Since the Water Act 2002 was enacted and the government began the process of reform, several other developments have taken place. Chapter 5 of the *Constitution of Kenya* (GoK, 2010) stresses the need for watershed area conservation encompassing biodiversity and land, soil, forest, and water resources. The *National Water Master Plan* (JICA and GoK, 2013) and the *Master Plan for the Conservation and Sustainable Management of Water and Watershed Areas* (GoK, 2012) were informed by participatory planning for sub-watersheds. In 2007, in the Kenya Vision 2030 (GoK, 2007) it was recognised that this can only be achieved by implementing effective water resources planning in the face of increasing demands while conserving sustainable watersheds.

Table 2 summarises a SWOT analysis undertaken to raise key issues that needed to be addressed. In water governance there is still insufficient coordination across different water users. This is particularly so in the crucial area of data collection, management, and quality assurance, and limited institutional capacity building for enforcing water rules.

**Table 2. SWOT analysis of key areas of water sector reform**

Strengths	Weaknesses	Opportunities	Threats
<b>Water governance and social equity</b>			
<ul style="list-style-type: none"> <li>■ Separation of water resources management and WSP, IWRM regulation and implementation.</li> <li>■ National policies and strategic plans based on bottom-up approaches.</li> <li>■ Participatory legal frameworks and devolved institutions in place.</li> <li>■ WRMA plays a significant role in water allocation planning.</li> <li>■ WRUAs create awareness of the new water rules.</li> <li>■ WASREB effectively regulates WSS provision.</li> </ul>	<ul style="list-style-type: none"> <li>■ Insufficient coordination and cooperation across diverse sectors.</li> <li>■ Weak data management systems and quality assurance.</li> <li>■ New institutions have insufficient capacity for managing and implementing the WSRs.</li> <li>■ Low capacity for writing proposals and initiating public-private partnerships (PPPs) at county and community levels.</li> </ul>	<ul style="list-style-type: none"> <li>■ Shared vision among private, public and external stakeholders.</li> <li>■ Change of attitude regarding the participation of women and youth in IWRM.</li> <li>■ Development of new curricula on IWRM by universities.</li> <li>■ Technical support by international development agencies.</li> </ul>	<ul style="list-style-type: none"> <li>■ Lack of awareness and resulting resistance of some communities to change.</li> <li>■ Conflicting interests among upstream and downstream users.</li> <li>■ Political interference.</li> <li>■ Growing water deficits threaten the realisation of the Kenya Vision 2030 targets in major basins.</li> </ul>
<b>Economic efficiency and financial sustainability for water sector</b>			
<ul style="list-style-type: none"> <li>■ User-pays and polluter-pays principles smoothly enforced.</li> <li>■ Promotion of rainwater harvesting and storage at the household level.</li> <li>■ Increasing levels of revenue collection for water resources management and WSS provision.</li> <li>■ Promotion of efficient agronomic technologies (zero-grazing, mulching, tillage, greenhouses, crop selection, drought resistant plants, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>■ Low enforcement of water measuring and storage devices in water resources management.</li> <li>■ Insufficient financial capacity for investments in water resources management and WSS provision.</li> <li>■ Insufficient cost recovery through tariffs and taxes.</li> </ul>	<ul style="list-style-type: none"> <li>■ Progressive change of attitudes on water scarcity and its economic value.</li> <li>■ Big corporations engaged in water sector PPPs.</li> <li>■ New markets financing options (grants, lending, microfinance, BOL, BOS, BOT).</li> <li>■ Financial support from international development agencies.</li> </ul>	<ul style="list-style-type: none"> <li>■ Counties threatening to decentralise water resources management.</li> <li>■ Tremendous increase of WRUAs for leveraging donor money.</li> <li>■ Over-reliance on donor financial support for WSS investments.</li> </ul>
<b>Ecosystem sustainability and water disaster mitigation</b>			
<ul style="list-style-type: none"> <li>■ Capacity building on water catchment conservation/local climate change mitigation.</li> <li>■ Existing regulation and monitoring of wastewater/effluent discharge points.</li> <li>■ WRMA to map/demarcate all protected wetlands, forests and other public lands from settlements.</li> </ul>	<ul style="list-style-type: none"> <li>■ Weak capacity on disaster monitoring and prevention.</li> <li>■ Degraded hydro-meteorological stations/equipment.</li> <li>■ Slow pace of enforcement of water resources management rules.</li> <li>■ Inefficient irrigation systems/technologies widespread.</li> <li>■ Ineffective soil and water conservation measures widespread.</li> </ul>	<ul style="list-style-type: none"> <li>■ Anthropogenic climate change/natural disasters recognised.</li> <li>■ Increased investments in off-farm sectors.</li> <li>■ Promotion of green economy, efficient agronomic technologies (greenhouses, crop selection, drought resistant plants, etc.). Green water credits and other PES.</li> </ul>	<ul style="list-style-type: none"> <li>■ Decreasing trend of rainfall under threat of climate change.</li> <li>■ Tremendous increase in water demand by 2050.</li> <li>■ Inadequate early warning systems.</li> <li>■ Non-integration of disaster risk reduction plans in IWRM.</li> </ul>

BOL – build-operate-lease; BOS – build-operate-sell; BOT – build-operate-transfer

Financially, ‘user-pays’ and ‘polluter-pays’ principles are enforced at the household level and for raising revenue, but financial capacity for further investment through cost recovery is still wanting. There is still over-reliance on donor money for water and sanitation infrastructure development. To make progress, WSPs and WRUAs will need to embrace public–private partnerships (PPPs) for water resources management and new market financing options for WSP (e.g. microfinance, build-operate-transfer, build-operate-own, and build-operate-lease schemes) in addition to borrowing from banks and applying for grants from international development agencies.

The analysis also suggested strategies for mitigating water disasters (droughts and floods) and maintaining aquatic ecosystems. These include capacity building for monitoring and preventing disasters, upgrading hydro-meteorological stations and equipment, enforcing water resources management rules, introducing innovative water-saving technologies in all sectors, and widespread effective soil and water conservation measures, green water credits and other payments for ecosystem schemes (PES).

## 4.3 In Rwanda

### 4.3.1 Political support for IWRM

Water availability is currently less of an issue than access to water, water distribution, and sharing issues, which may become critical in future as the population grows and economic development increases (NCEA, 2013). For this reason, the Government of Rwanda (GoR), represented by the Ministry of Natural Resources, adopted an IWRM approach. In 2010 a new authority – the Rwanda Natural Resources Authority – was established with a Directorate for IWRM whose role is to coordinate water resources management and to integrate this with Rwanda’s development agenda. This is supported by a Water Law, approved in 2008, and the 2011 Policy and Strategic Plan. This demonstrates the government’s determination to address the fragility of water as a resource in a sustainable social and economic development and is reflected in the Vision 2020, Economic Development and Poverty Reduction Strategy Paper I (2008-2012), and Economic Development and Poverty Reduction Strategy Paper II (2013-2017).

The GoR intends to achieve the following policy objectives (NCEA, 2013):

- Reduce water-related disaster risks and climate impacts like droughts and floods to protect the economy and society
- Protect and conserve water resources in order to enhance their availability for the present and future generations
- Allocate water resources to the various socio-economic needs on the basis of principles that incorporate efficiency of use, equity of access, and sustainability
- Put in place an effective governance framework and develop human and technical capacities for sustainable management of the country’s water resources, including transboundary waters.

The findings of the SWOT analysis (Table 3) show that there is evidence of no proper coordination mechanism in place for planning and utilisation of water resources. The main reason being the lack of skilled human capacities.

Table 3. SWOT analysis for an IWRM approach in Rwanda

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ Institutional framework is available.</li> <li>■ Water resources management laws, strategy, and regulation in place.</li> <li>■ At ministerial level, sector-wide approaches have been recently initiated to ensure cross-sector collaboration and information sharing (e.g. IWRM thematic working groups).</li> <li>■ Watershed management committees put in place by Rwanda Environment Authority (REMA).</li> <li>■ Political commitment to the proper management and sustainable use of the water resources.</li> </ul>	<ul style="list-style-type: none"> <li>■ Current organisational structure is mainly operating at the national level with a gap at the local one.</li> <li>■ Lack of skills (human resources) and knowledge in water resources management.</li> <li>■ Management institutions are still very weak and do not have enough technical capacity to implement the policy and legal framework.</li> <li>■ Participation of stakeholders at basin level is still limited.</li> <li>■ Inadequate communication/cooperation between stakeholders.</li> <li>■ Inadequate creation of public awareness of the policy and strategy.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>■ Existence of National Water Resources Master Plan (2014) where the GoR is planning to streamline water management use through this master plan.</li> <li>■ Good enabling environment for IWRM promotion through water resources policy, strategy, and water law approved in 2008.</li> <li>■ Water resources management instruments are provided for in the water resources management policy and law.</li> <li>■ The GoR has devolved water supply management functions to private operators (water users' associations).</li> <li>■ Well defined sector specific policies and overall sector strategic plan for environment and natural resources management, agriculture development, energy, water supply, and sanitation.</li> <li>■ Water supply and sanitation facilities are well managed in a participatory way using PPPs.</li> <li>■ The establishment by law of an institution with a mandate to coordinate natural resources management activities across the sub-sectors of land, forests, mines and water.</li> <li>■ Growing synergies and partnerships between government agencies and other stakeholders, including water users, non-governmental organizations and development partners.</li> <li>■ An evolving regional cooperative framework for the management of shared water resources based on common interest and shared values.</li> <li>■ There is still some donor support for implementing IWRM (e.g. support of EKN approved for four main watersheds and IWRM; implementation starts in 2015 for four years).</li> </ul>	<ul style="list-style-type: none"> <li>■ Fast land use and land cover changes affecting water resources.</li> <li>■ Degradation of soils, wetlands, water and other natural resources.</li> <li>■ Water resources depletion arising from sedimentation.</li> <li>■ Insufficient funding for water supply infrastructure development.</li> <li>■ Increased negative impact of climate change that quantitatively and qualitatively affects water resources.</li> <li>■ Resource conflicts between lower and upper users.</li> <li>■ Lack of human and institutional capacity for water resources management.</li> <li>■ Inadequate enforcement of water management instruments to ensure effective and sustainable water resources management.</li> <li>■ Water resources are protected from an environmental protection perspective, but not from a hydrological point of view.</li> <li>■ Water resources management is still managed in a fragmented way by sectors or individual users and this results in a lack of cross-sector coordination.</li> <li>■ Lack of water data information sharing (exchange) mechanisms between regional river-basin riparian countries.</li> </ul>

Fostering and accelerating the adoption of IWRM principles was undertaken by the Rwanda Natural Resources Authority in a co-opted strategic partnerships with the Embassy of the Kingdom of the Netherlands (EKN) in Rwanda, Africa Water Facility, and the University of Rwanda.

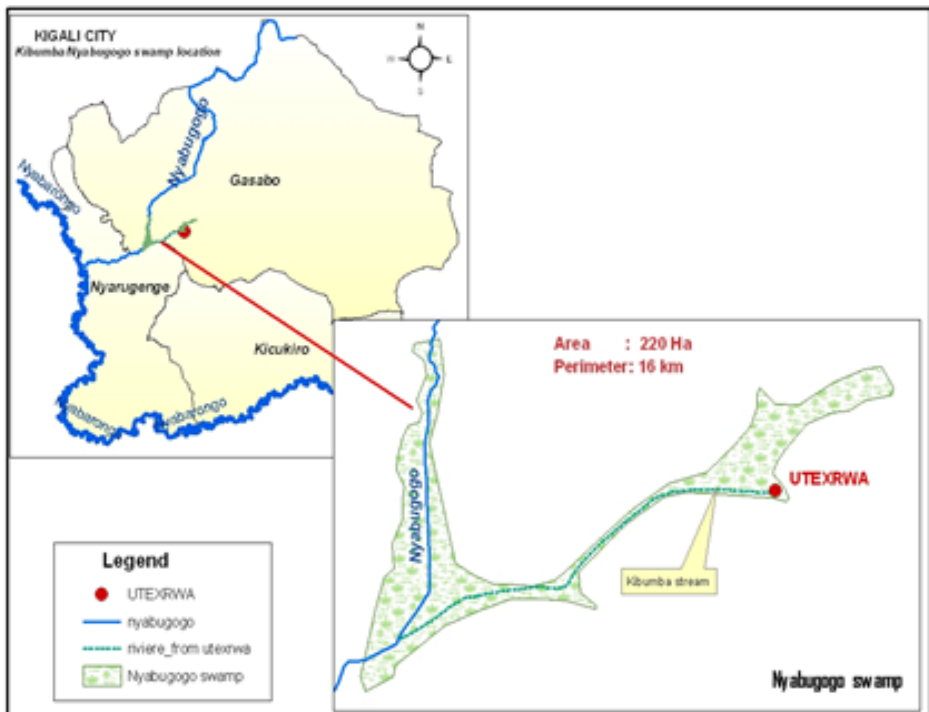
This new approach is being piloted in the Nyabugogo wetlands catchment. The objective is to assess alternative means of increasing the productivity of water through better management of multiple water uses for effective long-term social and economic development. Other watersheds are also targeted as pilots including Sebeya, Muvumba, and Mwogo.

### 4.3.2 Nyabugogo wetland

The Nyabugogo natural wetland covers 220 ha and is located within the Kigali City, Rwanda's capital (Figure 7). It drains an area of 1,647 km<sup>2</sup> within the Nyabugogo catchment and it covers both rural and urban areas, including Kigali (Munyaneza et al., 2013). It includes two districts – Nyarugenge and Gasabo – with a population of 825,767 inhabitants (NISR, 2012). Agriculture is the main economic activity which occupies about 897 km<sup>2</sup> (about 54 percent) of the wetland area. Agriculture faces many challenges over the use of fallows, re-forestation, aquaculture, and human settlements. This has led to increasing land degradation, sedimentation, erosion, and pronounced flooding despite the government's strict legal regime imposed to protect the wetland.

At the lower end of the wetland is a large 60 ha swamp close to Kigali. The viability of this area is threatened by population growth and the associated economic expansion around the city as untreated domestic and industrial effluents containing heavy metals, are discharged directly into it. Colour and taste have helped to prevent people from using this water for cooking and drinking, but it is still widely used for washing and irrigation, and for fish capture (Sekomo et al., 2010).

Figure 7. Location of the Nyabugogo wetland within Kigali City



Source: Munyaneza et al., In press.



### Climate, hydrology, and environment

The Nyabugogo River traverses Kigali City and has many tributaries which flow into it, such as the Mwange River, Rusine River, and Marengye River. Other rivers flow in from urban areas, including the Rwanzekuma River, Ruganwa River, Mpazi River, and Yanze River.

The regional climate is mostly temperate and equatorial with an average temperature of 19°C to 21°C. Annual average rainfall varies from 800 mm to 1,600 mm. There are four natural seasons. The first is a long dry season from June to September, followed by a short rainy season from October to December when the region receives 30 to 40 percent of the annual rainfall. The peak usually occurs in November. The third season is a short dry one in December and January. The fourth is the main rainy season from February to May and accounts for 60 percent of the annual rainfall. Monthly evaporation rates vary from 98 mm in April to 173 mm in August.

The steep topography of the watersheds together with the intense rainfall means that the wetland is prone to flash floods. These may only last a few hours, but they can do immense damage, particularly in urban areas (Munyaneza et al., 2013).

Nyabugogo wetland is well drained and is well endowed with water resources. The availability of water can encourage ‘water loving’ crops, such as rice, to be grown. These would benefit from the natural wetland conditions. But studies are needed to provide evidence that can ensure there is a balance between economic development and wetland protection. A major concern is the industries within Nyabugogo Watershed that need to clean up their effluents before discharging them into the wetlands. A clear and comprehensive strategy is needed which covers both rural, urban, and industrial development and which ensures cooperation and coordination among all the different water users. A particular effort is needed to re-settle populations living near the wetlands so that they comply with environmental laws. A strong system of monitoring and evaluation needs to be put in place.

### Need for public awareness

The GoR recognises the importance of an integrated approach to water management and has adopted a number of strategies in order to ensure that natural resources are more profitably used and that the public is more aware. However, this initiative in the Nyabugogo wetland is top-down in approach and, as such, the various stakeholders are not well acquainted with the issues of water management, environment, and biodiversity. The GoR needs a more coherent strategy to raise awareness which engages key partners and all potential stakeholders.

Institutions, such as the Rwanda Natural Resources Authority, Rwanda Environment Management Authority, Rwanda Utilities Regulatory Agency, and Rwanda Bureau of Standards are in place to support change, but need strengthening and equipping to overcome different threats encountered in water resource management. This is particularly critical in the Nyabugogo Wetland since it includes Kigali, which produces a lot of untreated effluent.

A number of policy documents have been introduced by the Ministry of Natural Resources (MINIRENA) to support the development and management of water resources including a new water policy (MINIRENA, 2011a), *National Policy for Water Resources Management* (MINIRENA, 2011b) and *National Water Resources Master Plan* (RNRA, 2014). It will be important for all government and non-government institutions to be aware of these documents. Good coordination among all stakeholders, from the central government to individual water users, will be essential. Water abstraction permits issued by MINIRENA will need to take full account of all

other water demands, including agriculture, drinking water, domestic use, urban activities, commerce, and recreation.

The IWRM pilot watershed studies, funded by the Netherlands Government, are at an early stage of development, with consultants commencing their work in 2015.

## 4.4 In Uganda

### 4.4.1 Water sector reforms

The government, represented by the Ministry of Water and Environment (MWE), financially supports water and environmental developments identified in the National Development Plan 2010–2015. Its theme is *'Growth, Employment and Socio-Economic Transformation for Prosperity'* and represents a shift towards economic growth, which is a priority reflected in all water development plans.

**Table 4. SWOT analysis for IWRM in Uganda**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ Strong stakeholder participation at levels of the Water Management Zones.</li> <li>■ Availability of watershed based water resources management guidelines with first Watershed Management Plans to guide IWRM implementation.</li> </ul>	<ul style="list-style-type: none"> <li>■ De-concentration (instead of decentralisation) of water resources management from the central government to Water Management Zones.</li> <li>■ No decentralisation and weak cross-sector coordination.</li> <li>■ The central government still dominates both regulation and implementation.</li> <li>■ Private sector corporations act at the watershed level without moving towards sub-watersheds.</li> <li>■ Inconsistent rules and responsibilities for issuing water use permits resulting in illegal water abstraction and deficits in basin water balances.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>■ There is growing empowerment of regional and local government structures.</li> <li>■ The first sub-watershed management plans based on IWRM are in place.</li> <li>■ There is still sufficient donor support for implementing IWRM concentrating on water services provision.</li> </ul>	<ul style="list-style-type: none"> <li>■ Increasing population pressure, expansion of commercial farming, and industrialisation.</li> <li>■ Climate change impacts.</li> <li>■ Increasing pressure on watershed resources (land, soils, water, and biomass), increased pollution.</li> <li>■ Encroachment into wetlands, riparian land, and forests.</li> <li>■ Donor driven projects undermine sustainability.</li> </ul>

To implement this plan the MWE co-opted strategic partnerships with various institutions including the International Union for Conservation of Nature, World Wildlife Fund, and Makerere University, to foster and accelerate the adoption of IWRM principles in watershed management. Uganda has sufficient freshwater resources available for sustainable economic and social development. But there is growing pressure on arable land, forest reserves, and wetlands, and increasing freshwater pollution from urban centres and agriculture, which threaten resource availability. Planners and decision-makers are increasingly aware that a more sustainable and holistic approach to water resources management is needed.

It is anticipated that putting IWRM into practice will enable Uganda to provide 70 percent of the population with access to clean water and improved sanitation by 2015 (MWE, 2014). These targets are for both urban and rural areas. Uganda's national target is to eventually provide safe water to 77 percent of the rural population and to everyone in urban areas. Similarly, national targets for improved sanitation are for 80 percent of the rural population and everyone in urban areas.

#### 4.4.2 River Rwizi Watershed

In 2013, a pilot project was established in the River Rwizi Watershed to gain experience in putting IWRM into practice. The overall objective was to improve the sustainable use of natural resources and water services among local communities, private corporations, and local government. Stakeholders were involved to achieve a balance of available water resources with demands in this intensively used watershed. The watershed assessment was based on secondary information from a range of academic and technical studies as well as on interviews with key stakeholders in the catchment. The Rwizi Catchment Management Organisation was established at the start of the planning process. Both local and international professionals were involved with support from the International Water Stewardship Programme and funding from the UK's Department for International Development and GIZ.

The River Rwizi Watershed is located in western Uganda under the Lake Victoria Water Management Zone. It covers an area of 8,000 km<sup>2</sup>, and stretches across 10 districts from Buhweju/Bushenyi/Ntungamo down to Rakai District and Lake Victoria (MWE, 2014). The upper and lower sub-watersheds are covered by wetlands (3.5 percent of the area); forests make up approximately 2.5 percent; open water 1 percent; and the rest is open vegetation, grassland, and shrubs (MWE, 2014).

The Rwizi Watershed receives a mean annual rainfall of 987 mm, but there is significant variation across the basin. The highest rainfall of 1,200–1,300 mm occurs at the extreme ends of the watershed and is largely influenced by the topography and wetlands to the west and east of Lake Victoria. The temperatures ranges from an average minimum of 13.7°C to a maximum of 26.6°C.

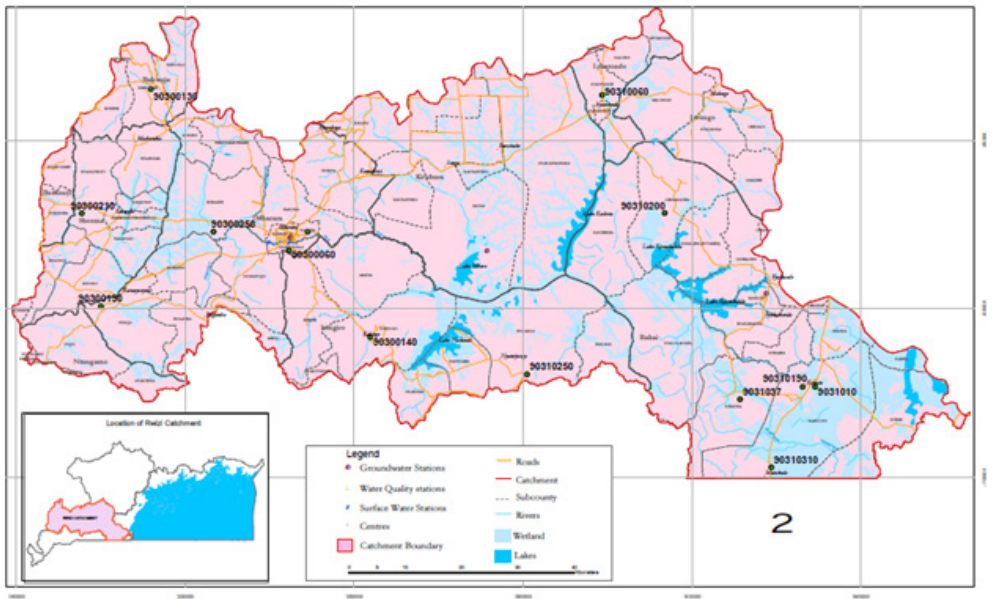
The watershed is facing serious development challenges as the demand for water for domestic, agricultural, industrial, and small-scale economic activities grows. It is the only source of water for Mbarara Municipality, the second largest urban centre in Uganda with an estimated population of 85,000 (UBoS, 2012). Mbarara hosts a significant number of important industries, secondary schools, tertiary educational institutions, universities, and hospitals that rely on water from the Rwizi River. Tourism also plays an important role in the local economy as Lake Mburo National Park and the Queen Elizabeth National Park fall within the catchment.

The main economic activities include subsistence smallholder farming with limited commercial farming, livestock rearing, fish farming, and tourism. Off-farm income generating activities include brick making; charcoal burning; selling labour; sand mining; motor vehicle and motor cycle repairs and washing; papyrus reeds for making baskets, mats, and art pieces; and widespread planting of eucalyptus trees for fuel wood and timber.

Two private companies, Coca-Cola Bottling Company and Nile Breweries Ltd, are the largest single water users located in Mbarara. They have strong interest in preserving the resources to enable their businesses to be sustainable. However, a watershed management plan showing available resources and water use permits has not yet been drafted.

The wetlands play a significant role in retaining surface runoff, especially that in the upper watershed, which covers up to 3,000 km<sup>2</sup> and was drained over the past decade to support agriculture. Lake Mbuho is linked to Lake Nakivali through a series of wetland systems; both lake systems are then subsequently drained by the River Kibale, which flows via another series of wetlands into Lake Kijanebalola in Rakai district, draining Lake Kachera en route. From Lake Kijanebalola, River Bukora finally flows into Lake Victoria.

Figure 8. River Rwizi catchment



Source: Adapted from MWE, Department of Water Resources Management (2014).

There is a diverse range of existing and potential water users in the watershed who rely on water from the river system, mainly through the naturally occurring wetlands and constructed dams and tanks. A number of small, medium, and large consumers rely on surface waters and groundwater aquifers. In the past 10 years, the river has regularly been in the national news because of frequent concerns over water resource issues, particularly during the mid-year dry season from June to October. The problems stem from a combination of factors, like the emerging water demand for industries that has put more pressure on the river system. For example, Nile Breweries Ltd requires 75 percent of the water supplied by the National Water and Sewerage Cooperation and to take this water they have constructed their own water intake on the river.

### Water demands

In 2011 estimated annual domestic water demand was 8.4 million m<sup>3</sup> (23,000 m<sup>3</sup>/day). This includes a municipal demand of 12,000 m<sup>3</sup>/day (52 percent), of which a proportion is for industry. By 2035 total domestic water demand is expected to reach 29.2 million m<sup>3</sup>.

In 2011, the annual agricultural water demand was 19.6 million m<sup>3</sup> (53,700 m<sup>3</sup>/day). This is projected to increase to 63.4 million m<sup>3</sup> by 2035. Currently aquaculture/fisheries water demand represents about 50 percent of the water use, followed by livestock needs (41 percent) and irrigation (9 percent). By 2035, irrigation is expected to increase to 43 percent of total demand<sup>3</sup> with livestock falling to 17 percent.

Current industrial water use in the Rwizi is summarised in Table 5.

**Table 5. Industrial water use in the Rwizi Watershed**

Industry	Sub-county	Water source	Average annual water demand (m <sup>3</sup> )
Century Bottling Company Ltd, Mbarara	Kakoba	NWSC connection	79,205
Grape Winery And Processing Ltd	Nyakayojo	Katuju Rainwater harvest tank	36,500
Oakwood Investments Limited	Kyebe	Lake Victoria	36,500
Shumuk Factory	Nyamitanga	NWSC connection	18,250
Nile Breweries Limited	Kakiika	Own abstraction permit and bulk raw water supply from NWSC	148,116*

\*Six months operation from July to December 2013 only.

Source: MWE, 2014.

The MWE and the Directorate of Water Resource Management (DWRM) have partnered with GIZ, The Coca-Cola Africa Foundation, and Century Bottling Company in Uganda (The Coca-Cola System) to launch a joint project called *Improved Community Livelihoods and Sustainable Water Management in River Rwizi Watershed* (MWE, 2014). The project plans to support efforts to increase water availability in the River Rwizi Watershed by developing sustainable water resources management and water use practices. The German International Cooperation's African Water Stewardship Initiative and the Water Risk and Sustainability Assessment are also contributing to implementing ongoing global development of water stewardship tools which will facilitate public sector, private sector, and civil society collective action to better understand and address shared water risks in the sector.

A major concern of MWE is to build capacity for IWRM within its structure as well as with partner organisations. Various training and research initiatives are ongoing and organised by MWE, Makerere University, and other NGOs investing in watershed interventions and water quality monitoring. International seminars and workshops within the region focusing on Rwizi have been convened with policy-makers, researchers, and other stakeholders.

### Involving stakeholders

A credible public participation process is fundamental for IWRM. In the River Rwizi Watershed it was essential to get the largest individual users, Coca-Cola Bottling Company and Nile Breweries Ltd, on board. "A catchment management organisation (CMO) is therefore a coordination body that tries to bring all these users to one table to make an efficient allocation of the available

<sup>3</sup> Strategic Sector Investment Plan for the Water and Sanitation Sector in Uganda, Final, July 2009.

water possible. The exact form and composition of such a CMO is however largely dependent on the individual situation in the watershed.” (UWASNET, 2014).

Technical tasks and the corresponding stakeholder engagement activities that correspond to each of the steps are formulated in the Guidelines for Watershed Planning (Atim, 2010; MWE, 2014).

The water management zone (WMZ) planning team now plans to engage with three groups of stakeholders to put IWRM into practice at three levels – national, regional, and watershed:

- The WMZ, including the CMO with their Catchment Management Committee (CMC), Catchment Technical Committee (CTC), and any sub-watershed committees that are formed, including those formed under the Water Source Protection Guidelines (2014)
- The Water association committees (WACs), which bring together regional NGO partners and regional and central representatives of line departments
- The inter-District forum of District local government officials and the broader stakeholder forums, which bring together self-identified representatives of many parts of civil society.

Table 6 is a generalised stakeholder map which will form the basis of IWRM implementation. The next step is to elaborate the River Rwizi Watershed Management Plan including plans for sub-watersheds based on the consultations, which are planned to take place from mid-2015.

**Table 6. Generalised stakeholder mapping for implementation of IWRM in Rwizi Watershed**

	<b>Organisations interested in IWRM outcomes who provide support</b>	<b>Public and private sector organisations including NGOs</b>	<b>Organised groups</b>	<b>Individuals in the watershed</b>
WMZ – National Level.	Development partners. Government departments, agencies. Parastatals (NWSC, Uganda Forestry Authority, etc.). Universities and research centres. Media.	National and international NGOs. Business associations. Private sector including financial institutions.	Associations of common interest and concern (environmental groups).	
Victoria WMZ – regional and watershed levels.	Local government officials and bodies – land boards, councils, and various service departments and their associated committees <sup>4</sup> . Water utilities and community-based water boards or companies. Ministry district and regional officers and their associated committees' zonal officers <sup>5</sup> . NGOs. Agricultural research centres.		Associations of common interest and concern (environmental groups). Community-based organisations – water users, farmers, fisherman, pastoralists, etc. Schools.	Business owners. Land owners. Commercial farmers. Tourism operators. Companies like Coca-Cola and Nile Breweries.

<sup>4</sup> These district officers are under the Ministry of Local Government, thus they don't have a direct 'line' connection to the Ministry of Water and Environment.

<sup>5</sup> The MWE officials are located at the Victoria Water Management Zone in Mbarara.

## 5 Summary of findings

The following summarises the findings of this review.

### 5.1 Policies and laws

Although the principles of IWRM are well embedded in national policies, each country had to set an enabling environment to put IWRM into practice. This included a set of rules and regulations that determine the intentions and actions needed to sufficiently assure the sustainable supply of water resources to enable economic and social development.

Since 2003, the GWP EnA has made efforts to foster the use of the GWP Toolbox in the nine countries – Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Uganda, and Somalia. Seven Country Water Partnerships are now established to “ensure the coordinated development and management of water, land, and related resources in order to maximise economic and social welfare in the East African Region” (GWP EnA and GWP Southern Africa, 2009). The toolbox contains 59 different IWRM tools to support water management at all levels. These are complemented by worldwide case studies to show how the tools have been used in practice – the successes and the challenges.

A survey conducted by UN-Water (2008) reported some progress in East Africa with regards to the stages of planning and implementing the IWRM concept (Table 7) and introducing management instruments (Table 8).

**Table 7. Status of IWRM planning and implementation in Eastern Africa**




Country	Policy and legislation	Infrastructure platform	Sustainable financing	Institutional arrangements	Institutional capacity
Burundi	Some progress, but limited achievements	Little progress achieved	Little progress achieved	Some progress, but limited achievements	Some progress, but limited achievements
Djibouti	Substantial achievements or progress	Little progress achieved	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements
Eritrea	Some progress, but limited achievements	Some progress, but limited achievements	Little progress achieved	Some progress, but limited achievements	Some progress, but limited achievements
Ethiopia	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Substantial achievements or progress	Some progress, but limited achievements
Kenya	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Substantial achievements or progress	Substantial achievements or progress
Rwanda	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements
Somalia	Little progress achieved	Little progress achieved	Little progress achieved	Little progress achieved	Little progress achieved
Sudan	Some progress, but limited achievements	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements
Tanzania	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Substantial achievements or progress	Some progress, but limited achievements
Uganda	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Substantial achievements or progress	Substantial achievements or progress

■ Little progress achieved    
 ■ Some progress, but limited achievements    
 ■ Substantial achievements or progress

Source: UN-Water, 2008; GWP EnA and GWP Southern Africa, 2009.

**Table 8. Implementation of IWRM management instruments in Eastern Africa**

Country	IWRM planning	Water use efficiency	Stakeholder engagement	Allocation mechanisms	Monitoring information	Environmental sustainability
Burundi	Some progress, but limited achievements	Little progress achieved	Some progress, but limited achievements	Little progress achieved	Some progress, but limited achievements	Little progress achieved
Djibouti	Some progress, but limited achievements	Little progress achieved	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements
Eritrea	Substantial achievements or progress	Some progress, but limited achievements	Substantial achievements or progress	Little progress achieved	Some progress, but limited achievements	Some progress, but limited achievements
Ethiopia	Substantial achievements or progress	Substantial achievements or progress	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements
Kenya	Substantial achievements or progress	Substantial achievements or progress	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements
Rwanda	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements	Substantial achievements or progress
Somalia	Little progress achieved	Little progress achieved	Little progress achieved	Some progress, but limited achievements	Little progress achieved	Some progress, but limited achievements
Sudan	Some progress, but limited achievements	Some progress, but limited achievements	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements	Some progress, but limited achievements
Tanzania	Substantial achievements or progress	Substantial achievements or progress	Substantial achievements or progress	Substantial achievements or progress	Some progress, but limited achievements	Some progress, but limited achievements
Uganda	Substantial achievements or progress	Substantial achievements or progress	Substantial achievements or progress	Some progress, but limited achievements	Substantial achievements or progress	Some progress, but limited achievements

 Little progress achieved
  Some progress, but limited achievements
  Substantial achievements or progress

Source: UN-Water, 2008; GWP EnA and GWP Southern Africa, 2009.

The UN survey showed that most countries have developed policies, legislation, and institutional arrangements that incorporate an integrated approach, but in Eastern Africa water infrastructure development is still lagging behind. Substantial progress has been made in Djibouti, Ethiopia, Kenya, Tanzania, and Uganda in introducing policies and legislation for setting an IWRM framework. In Burundi, Eritrea, Rwanda, and Sudan progress is limited. In Somalia, little progress has been made, though this does not reflect developments in Somaliland.

Institutional capacity development shows some progress, but much needs to be done. Challenges remain in providing the water sector with sufficient numbers of qualified professionals at all levels of management and governance.

Although some progress has been made in providing sustainable financing in the water sector, including WSP and water resources management, it remains a major challenge across the region.

Countries like Ethiopia, Kenya, Rwanda, Sudan, and Uganda have developed IWRM strategic and management plans, water use efficiency measures, forums for stakeholder engagement, water allocation plans and approaches, techniques for recording progress, and monitoring information, as well as practical tools for ensuring environmental sustainability. Annex 1 presents some of the legal, institutional, and managerial tools developed by Ethiopia, Kenya, Rwanda, and Uganda.

In November 2007, the African Ministerial Council on Water and GWP formally signed a MoU to underscore the mutual benefits of their collaboration in driving the water infrastructure agenda on the continent. They agreed to incorporate IWRM tools in their policies to promote sustainable and integrated water resources development and management in Eastern Africa.



**Sudan** formulated its first draft of an IWRM plan in 2003, followed by a 25 year Water Resources Strategy (2003–2027) and a National Water Resources Council. The ‘*Mahaleya*’ (local administrative councils) have largely been in charge of water resources management, which is decentralised to the lowest level of state governance.

**Djibouti** enacted its water sector reforms in 1996. The new Water Code sought to overcome earlier human and technical limitations in water management within institutions. A National Fund for Water was established by the government in 2001 in addition to creating the Djibouti Agency for Social Development. These actions intended to prioritise financing for emergency interventions and other concerns raised by the National Committee on Water Resources, which plays a significant role in managing water resources.

**Eritrea** initiated a water sector situation analysis report in 2006, with support from the government, and commitment from partners and stakeholders. In 2007 this was formulated as a policy for participatory water management and in 2008 a neutral multi-stakeholder platform for negotiation and dialogue was established.

Despite these commitments, fragile countries like **Somalia** and **South Sudan** are still lagging behind. They have done very little to consolidate their fragmented laws, policies, and strategies to invest in water management, infrastructure, and services. In **Somalia** the establishment of the Puntland State Agency for Water, Energy, and Natural Resources is encouraging, but it needs to be complemented with policy and legislative reforms to introduce, among other issues, equity, subsidiarity, water as a social and economic good, allocation of water among competing uses, and the ‘polluter-pays’ principle.

To support this work, the Intergovernmental Authority on Development (IGAD) obtained €6.6 million from the European Union to implement the Hydrological Cycle Observation System project under the umbrella of the World Meteorological Organization (WMO). WMO is assisting East African countries to develop adequate infrastructure for hydrological observations and appropriate regional cooperation and information exchange. A hydrologic information system now exists for Burundi, Djibouti, Somalia, Sudan, and South Sudan to feed their hydrological data into a regional water information system. National capacities are being developed to enable more efficient, cost-effective, and sustainable water management. The project is guiding basin-wide water resource assessment and planning to support the Inland Water Resources Management Programme in a holistic way.

Countries are expected to link surface water and groundwater resources with sustainable water structures and ‘state-of-the-art’ observation systems/instruments to reduce water-related disasters such as floods, droughts, and water pollution. However, “the best policy and legislation cannot help to bridge droughts or manage floods, without the necessary infrastructure being in place” (GWP EnA and GWP Southern Africa, 2009). Thus, while developing legal and regulatory instruments, greater effort is needed to improve water infrastructure in order to achieve sustainable development goals.

## 5.2 Investment in WSP

WSP is an important part of IWRM (Annex 2). Major investments have been made to secure water provision to all sectors of society, improve access to drinking water and sanitation services, and take care of waste water collection and treatment (including solid waste management). Despite these investments across the sub-Saharan region, the proportion of people who have access to piped water in urban areas decreased from 42 percent to 34 percent (UN-Water, 2015).

This trend is mainly attributed to rapid population growth and urbanisation. However, at the national level WSP still has a lower priority than education and health (UNDESA, 2013) even though investment in water resources is the key to economic growth in the region (SIWI, 2005) and poverty reduction (UN-Water, 2015).

Equity in service provision remains a challenge, especially for the urban poor, and must be considered as a component of water security in the region. Inequity in this case is not only reflected by accessibility to water, but also the safety, reliability, and cost of providing water services.

## 6 Conclusion

An integrated approach to water resources management, introduced almost 20 years ago in countries across Eastern Africa, is still very much a ‘work in progress’. The stages of adopting IWRM and enforcing the rules differ from country to country and still require more support from national governments and the development community, mainly for building professional, technical, and institutional capacity.

Good progress is being made at policy and strategy levels and in setting up various instruments, such as the legal frameworks, but there are serious concerns about the lack of appropriate infrastructure for water management and services’ provision. Progress is also being made at the watershed level and this is highlighted in some of the case studies. However, governance is still a challenge; even though the case studies demonstrate an appreciation for a strong focus on stakeholder participation, which is seen as one of the corner stones of adopting IWRM at all levels. More is needed. In addition to participation, effective governance requires “accountability, transparency, equity and fairness, efficiency and effectiveness, and the rule of law” (UN-Water, 2015). Additionally, the case studies reflect that in Eastern Africa there is an urgent need to build the capacity of institutions as well as personnel that focuses on pragmatic solutions and understands the realities of IWRM in the region, while putting into practice the principles of equity, efficiency, and ecology.

- Further institutional reforms are needed to adapt to the changing context in the region, such as urbanisation and environmental degradation. WSP needs to be distinguished from water resources management to enhance effective water resources development as well as service provision.
- IWRM enforcement mechanisms are needed, such as strategic plans and multiple management instruments at different levels i.e. National Strategic Plan, National Management Strategy, Catchment Management Strategies, Sub-catchment and Watershed Management Plans.

- Facilitation at the national level by organisations such as GWP, is important for formulating and harmonising the policies of different sectors affecting water resources. Water resources management needs to be an integral part of national and regional strategic development investment plans, especially when balancing growing water demands with the limited available resources.
- Sustainable financing mechanisms are needed for securing long-term investment in water infrastructure, management, and planning, such as the water funds established in Kenya, including accountability and transparency for reducing unethical practices.
- Comprehensive data collection and management systems need to be implemented and maintained, to enable information to be shared and disseminated in order to support evidence-based decision-making.
- Substantial data and knowledge gaps exist regarding the total renewable water availability in the region. These must be closed if improved water management is to fulfil its sustainable development promise (Schuster-Wallace and Sandford, 2015).

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## Annex 1 Overview of IWRM instruments in selected countries

Country	National WRM strategies	National WRM regulations	National WRM plans	Basin-specific management strategies
<b>Ethiopia</b>	National Water Sector Strategy, 2001.	Water Resources Management Proclamation, 2000.	Water Sector Development Programme, 2002.	River Basins Integrated Master Plan Implementation Proclamation. Proclamation on Establishment of RBOs, 2007.
<b>Kenya</b>	NWRMS 2006, 2010 (every six years).	WRM Rules 2007 and amendment.  Water Quality Regulations 2009.	Annual WRM Plans (2005 onwards).	CMSs 2009 (revised every 5 years).  Guidelines for Catchment-based Water Resource Planning in Guidelines, 2013.
<b>Rwanda</b>	National Policy for WRM (2011).  National Water Supply and Sanitation Policy (2010).	Water Law (2008).  Law on use, conservation, protection and management of water resources regulation (2008).	WRM Strategic Plan (2011–2015).  Green Growth and Climate Resilience Strategy (2011).	National Water Resources Master Plan (2014).  Rwanda Irrigation Master Plan (2010).
<b>Uganda</b>	National Water Policy 1999.  Water Sector Reform Study 2005 and 2006.  Environment Health Policy 2005.  National Policy for WRM (2012).	Water Act Cap 152.  National Water and Sewerage Act 1997.  Water Act 1997. Public Health Act 2000.	Water Action Plan in 1995.  National Development Plan (NDP).  Vision 2020 and 2040.  Economic Development and Poverty Reduction Strategy (EDPRS II) (2013–2017).  Strategic Plan for the Transformation of Agriculture in Rwanda – Phase III (PSTA III 2013–2017).	Framework and Guidelines for Source Protection, 2013.  Operationalisation of catchment-based water resource management.

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Country	Basin-specific management plans	Sub-catchment management plans	Performance evaluation	Quality assurance
<b>Ethiopia</b>	Master Plans for 8 of the 12 water basins prepared. Regulations to Establish RBOs for the Awash (2010), Abay (2008) and the Rift Valley Lakes Basins.	Developed and implemented by regional and <i>Woreda</i> (District) governments.	Annual Water Sector Review WASH Multi-stakeholder Forum.	WRM regulation, 2005.
<b>Kenya</b>	Regional Annual Management Plans.  Subregional Annual Management Plans.	SCMPs 2006 onwards (revised regularly).	Annual Performance Reports (since 2007).	QMS 2013 (ISO 9001: 2008).
<b>Rwanda</b>				
	Performance contract (Annually).		Joint Sector Review Platforms for WRM, WS, and Sanitation.	
<b>Uganda</b>			Joint Sector Review Platforms for WRM, WS, and Sanitation.	

## Annex 2 Overview of water services provision in selected countries

Country	National WS strategies	National WS regulations	National WS plans
<b>Kenya</b>	National Water Sewerage Strategies (NWSS) 2007 (every 8 years).	Water Services Regulatory Rules 2012.	National Water Master Plan 2030.
<b>Uganda</b>	National Water Strategy (reviewed after 5 years).	Water Act Cap 152 Public Health Act 2000.	
		National Water and Sewerage Act 1997 Water Act 1997.	Water Action Plan in 1995.
<b>Rwanda</b>	National Policy and Strategy for Water and Sanitation Services (2010).	Water Services Licensing Regulations (2012).	Water and Sanitation Sector Strategic Plan 2013/2014–2017/2018.
	National Water Supply and Sanitation Strategy (2013).	National Water Supply and Sanitation Policy (2010); Water tariffs (2014).	WS Annual Action Plan.
<b>Ethiopia</b>	Universal access programme (2005).	WRM regulation, 2005.	

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<b>Country</b>	<b>Basin specific strategies</b>	<b>WSP corporate strategies</b>	<b>Auditing/performance evaluation</b>
<b>Kenya</b>	Specific Water Service Boards' strategies monitored by the WASREB.	Specific Water Service Providers' strategies monitored by the Water Service Boards.	Annual impact reports (2008 onwards).
<b>Uganda</b>			Internal and external audit (annually).
<b>Rwanda</b>	Not existing.	Under development.	Annual financial audit (internal and external).
	As per EDPRS II targets.	WASAC Strategy in place.	Internal audit (annually).
<b>Ethiopia</b>	Mandates of basin organisations.		



Global Water Partnership (GWP) Secretariat  
PO Box 24177  
104 51 Stockholm, SWEDEN  
Visitor's address: Linnégatan 87D  
Email: [gwp@gwp.org](mailto:gwp@gwp.org)  
Websites: [www.gwp.org](http://www.gwp.org), [www.gwptoolbox.org](http://www.gwptoolbox.org)