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Figure 1: A panoramic view of water resources in a river [1]

River Basin Management Guidelines for Water Management in Uganda

Comparison with EU case studies

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Abstract

This research is based on the hypothesis that the EU water legislation establish river basin management rules which are based on better scientific knowledge and available technologies than the existing national policy and legal framework supporting water management in Uganda. It is however acknowledged that the requirements of the existing EU water policies are hardly often directly applied to the situations of a developing country such as Uganda, but that they provide lessons that are useful when preparing agreements and policies in these countries. This therefore means that alternatives always have to be found to ensure that water quality management may be efficiently undertaken in the most economical and technically feasible way. Therefore, this research aims at making an in-depth study of the existing EU water legislation, gather practical experiences from different river basins and examine how these may be adapted to the situation of Uganda. In general, the key issues that are necessary for improved WRM in Uganda include:

- A comprehensive strategy for management of national and international shared water resources;
- An updated policy and legal framework supporting WRM in the country;
- A revised institutional framework for policy making, planning and coordination of WRM at various levels;
- A long term capacity building programme for WRM;
- A clear guideline to promote the active participation of various stakeholders in WRM;
- Increased allocation of funds for WRM; and enforcement of the laws.

Key words: EU water notes, International conferences, Water Framework Directive, Uganda, National Water Policy, Integrated water resources management.

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List of Abbreviations and Acronyms

CBO	Community Based Organisation
CEC	Commission of the European Communities
CEU	Council of the European Union
CMO	Catchment Management Organisation
DEA	Directorate of Environmental Affairs
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
EC	European Commission
ENR	Environment & Natural Resources
ENRWG	Energy & Natural Resources Working Group
EP	European Parliament
EPA	Environmental Protection Agency
EQS	Environmental Quality Standards
EU	European Union
GDP	Gross Domestic Product
GWP	Global Water Partnership
HEP	Hydroelectric Power
ICFW	International Conference on Freshwater
ICWE	International Conference on Water & Environment
IGAD	Inter-Governmental Authority for Development
INBO	International Network of Basin Organisation
IPPC	Integrated Pollution Prevention & Control

IRBD	International River Basin District(s)
IWRM	Integrated Water Resources Management
LVEMP	Lake Victoria Environmental Management Programme
LVFO	Lake Victoria Fisheries Organisation
MAAIF	Ministry of Agriculture, Animal, Industry & Fishery
MDG	Millennium Development Goal
MFPED	Ministry of Finance and Economic Development
MGLSD	Ministry of Gender, Labour and Social Development
MoEMD	Ministry of Energy and Mineral Development
MoES	Ministry of Education and Sports
MoH	Ministry of Health
MoLG	Ministry of Local Government
MoTI	Ministry of Tourism and Industries
MS	Member State(s)
MWE	Ministry of Water and Environment
NBI	Nile Basin Initiative
NDP	National Development Plan
NEMA	National Environmental Management Agency
NFA	National Forest Authority
NGO	Non-Governmental Organisation
NS	North/South
NWP	National Water Policy
NWSC	National Water & Sewerage Corporation
RBD	River Basin Districts
RBMP	River Basin Management Plan(s)

SRBDA	Swedish River Basin District Authorities
SWAP	Sector Wide Approach Planning
TAC	Technical Advisory Committee
UN	United Nations
UNBS	Uganda National Bureau of Standards
UNCED	United Nations Conference on Environment & Development
UNESCO	United Nation Education, Scientific Organisation
UWASNET	Uganda Water & Sanitation NGO Network
UWWT	Urban Wastewater Treatment
WAP	Water Action Plan
WESWG	Water & Environment Sector Group
WFD	Water Framework Directive
WHO	World Health Organisation
WMZ	Water Management Zones
WPC	Water Policy Committee
WPR	World Population Review
WRM	Water Resources Management
WSP	Water Safety Plan
WSS	Water Supply & Sanitation
WSSD	World Summit on Sustainable Development
WSSWG	Water & Sanitation Sub-sector Working Group

1 Introduction

This chapter briefly describes the background of Uganda, challenges facing water resources management in Uganda, research objective, research question, research limitation, and research methodology.

1.1 Background of the study area

Uganda is a landlocked country found on the eastern part of Africa with a per capita income of about US\$330 and an estimated population of 39.2 million as of 2016 [2]. It is bordered by Sudan on the North, Kenya, on the East, Tanzania on the South, Rwanda on Southwest and the Democratic Republic of Congo on West as shown in Figure 2. Uganda shares a total length of 2,698 km of international borders with its neighbours and has a total area of 241,138 km² spread across the equator between latitude 1° 30' South and 4° North, and longitude 29° 30' East and 35° East [3]. It is a former British Protectorate that became fully independent in 1962. The economy of Uganda is largely dependent on agriculture, which accounts for 43% of GDP and 90% of total exports. In addition, 80% of Ugandans derive their livelihoods from agriculture. In terms of human development, Uganda is ranked 158th out of 174 countries world-wide. Currently, it is estimated that 35% of Ugandans live on less than a dollar a day, and are unable to meet their basic requirements. [4]



Figure 2: Map of Uganda. Showing positions of neighbouring countries and Uganda's geographical location with respect to Africa [3].

1.2 Problem Statement

Uganda's water resources is estimated to be approximately 66 km^3 per annum, which corresponds to about $2800 \text{ m}^3/\text{person/year}$ [5]. In general, the problems facing water resources management (WRM) in Uganda can be put in two categories: inefficient governance, and increased competition for the finite resource [6]. Although Uganda is a country usually considered by many to have abundant amount of water resources, these resources are not evenly distributed in the country. That is to say, they exhibit both seasonal and spatial variability, which poses a big challenge to WRM [5]. Thus, some places

receive too little water whereas other areas receive too much water during certain periods of the year. Climate change impacts exacerbate both of these situations causing different parts of the country to experience extreme weather events in the form of floods and droughts [4]. The different socio-economic activities that have greatly relied on rainfall have significantly been affected by seasonal variability of rainfall [5]. Uganda is one of the most vulnerable countries in the world to climate change. In Uganda, smallholder farmers are already experiencing prolonged droughts and floods and are struggling to cope. The Ugandan economy and welfare of the population are intricately linked to the natural environment and, therefore highly vulnerable to climate variability and change. The fact that over 80% of people in Uganda live in rural areas and depend on rain fed agriculture that is prone to the impacts of climate variability, makes Uganda's economy and the wellbeing of its people tightly bound to climate. Therefore, it is imperative that Uganda urgently develops climate change adaptation strategy for WRM [7].

Additionally, conflicts between upstream and downstream users are a common occurrence which poses a daunting challenge on Uganda's WRM, for instance, at a local scale, water may be used by the upstream riparian in a way that may make water quality to be unsuitable for use by the downstream users, such is the case where untreated sewage is discharged upstream of a water body which is consumed by the people downstream of the water body [8].

Ground water, which has been planned as the main source of water for small towns and rural growth centres in Uganda by 2015, is presently the major source of rural domestic water supply. However, because some aquifers in Uganda are low in yield, extent, hydraulic properties, it means in some parts of the country, replenishment is also low. This therefore presents a significant

challenge to the quantity and quality of groundwater for larger rural water supply projects in the future. The fact that groundwater supply is limited means that groundwater abstractions for many large projects such as irrigation and municipal water supplies will not be sustainable in the long term, yet there is still insufficient knowledge on what the impacts of climate change on this precious resource will be. This is because Uganda has limited data and resources, which means it has so far carried very few groundwater recharge assessments and as a result most areas of the country do not have recharge estimates [5].

Although the government considers the development of hydroelectric power (HEP) programmes a non-consumptive use, it creates reservoirs which negatively affect water resources and aquatic ecosystems, for example sedimentation and aquatic weed encroachment in the reservoir, reduced downstream river discharge, eutrophication in reservoirs, increased loss of water due to evaporation etc. [5].

Furthermore, Uganda's entire surface water resources are part of the transboundary basin due to its position within the Nile basin. Therefore, it suffices to assume that the future demands for the available water resources by the riparian countries will be exceeded and yet Uganda does not have any kind of formal agreements with the upstream countries to protect the water quality and its equitable utilisation. Consequently, this may limit Uganda's unhindered access and use of water resources within its territorial boundaries [4].

The aforementioned problems are worsened by shortcomings in the governance of water resources in the country [6], which is explained as follows: The water resources of Uganda still continue to be managed and developed by different sectors of government located in different ministries

without proper coordination. There is a continued practicing of sectoral planning of water in Uganda without a holistic approach to water resources development and use. In addition, WRM in Uganda is centralised with the central government, a top-down institution being responsible for all WRM functions, without decentralisation of decision-making at the lowest appropriate level. Water users and interested stakeholders are not included in decision-making concerning WRM and planning. There is inadequate utilisation and enforcement of institutional mechanisms for water disputes resolution, leading to water conflicts never being attended to. Uganda has not determined the economic, social and environmental values of water, leading to ineffective water allocation [4].

1.3 Justification of the study

Having identified the above problems, the government of Uganda carried out a WRM reform study from 2003 to 2005 with the objective “to establish an effective framework for WRM in Uganda to ensure that water resources are managed in an integrated and sustainable manner”. The National Water Policy, the Water Sector Reform Study (2005), the Joint Sector Review (2006) and other national and regional policies as well as steps already taken for implementation purposes, all recommended a paradigm shift from a centralized to a catchment/basin level WRM as the most effective way to implement the strategies to combat or remedy the above problems [9]. Moreover, the framework of integrated water resources management (IWRM) requires that water resources are better managed at a catchment or basin unit

[5]. As a result, decentralisation of WRM to the local catchment level with stakeholders' participation has been a key feature in the efforts by the Ministry of Water and Environment (MWE), through its Directorate of Water Resources Management (DWRM) to implement IWRM in Uganda. Accordingly, Uganda was delineated into four main management zones, called Water Management zones (WMZs), along the hydrological boundaries, namely; Victoria, Kyoga, Albert and Upper Nile WMZs, shown in Figure 3 [10]. In line with the need to sustain river basin approach, the structures of WMZs, Catchment Management Organisations (CMOs) and River Basin Management Plans (RBMPs) require legal consolidation before activities start. However, as of FY 2013/14 the four decentralised WMZ offices, CMOs and RBMPs were still not fully operational due to lack of staff, full legal backing and clear regulation regarding the decentralised WRM structures in Uganda. It is also important to point out that WMZs are part of the DWRM and since the MWE has the mandate to decentralise its resource, in principle, it does not require further legal backing for the establishment of WMZs. However, the CMOs and the RBMPs that will be prepared through stakeholders participation are separate from DWRM and do require full legal backing [11]. As of mid-2014, a draft of the amendment to the existing legal and policy framework supporting water management (i.e. Water policy and Act) was being discussed with various stakeholders and up to date, it is still undergoing review [10]. Nevertheless, with the help of international organisations to implement activities or provide technical expertise, piloting of RBMPs already started in several hotspot catchments (see Table 1 below). The government needs to carry out further reform of the WRM sector so as to develop a comprehensive management strategy for Uganda's water resources, which are now under increasing

pressure from various factors described above. However, the existing national policy, legal and institutional framework for WRM in the country are inadequate to address all the water resources related issues in an integrated and sustainable manner [12]. Therefore, the existing national policy and legal framework needs to be updated in order to include provisions to enable Uganda to fulfil its mission of “promoting and ensuring the rational and sustainable utilisation and development, and the effective management and safeguard of water resources, for social and economic welfare and development as well as the equitable sharing and adequate protection of trans-boundary water resources” [8]. Thus, this study is very essential as it is looking more likely that the current water management practices in Uganda is not adequate to cope with these challenges, which impact on water resources and increase water use requirements [13].

1.4 Main objective

The main aim of this research is to make an in-depth study of the existing European Union (EU) river basin management practices and guidelines, gather practical experiences from different river basins and examine how these may be adapted to the situation of Uganda.

1.4.1 Specific objectives

- 1) To make a comparative analysis between the EU and Uganda water management practices and guidelines.
- 2) To propose recommendations for establishing river basin management practices and guidelines for water management in Uganda.

Table 1: Pilot Catchment intervention. Showing ongoing pilot catchment interventions in Uganda with respective responsible WMZs and implementation partners [9].

Catchment	Responsible WMZ	Implementation partner
River Rwizi	Victoria Zone	DWRM alone
River Mpanga	Albert Zone	Protos
River Semliki & Lake Albert	Albert Zone	WWF
River Aswa	Upper Nile Zone	IUCN
River Akok	Kyoga Zone	IUCN
River Awoja	Kyoga Zone	DWRM alone
River Mpologoma	Kyoga Zone	Nile Basin Initiative
River Kagera	Victoria Zone (trans-boundary)	Nile Basin Initiative

1.5 Research Question

How effective is the existing national policy and legal framework in managing and protecting Uganda's water resources in a sustainable and integrated manner?

1.6 Limitations of the Study

In this study, the existing national policy, legal and institutional framework supporting water management in Uganda were examined to ascertain the extent to which they compare to EU's. It is important to point out that conducting interviews with some of the key policy makers, key staff in the various water institutions and civil society organisations working on water issues in Uganda would have improved the research findings. However, since the author is located far away from Uganda, this has not been possible [14]. As a result, all the relevant documents were obtained online (official websites). Furthermore, all the documents related to EU's water policies were obtained online. No interviews were conducted since a lot of documents with examples of practical experiences could readily be accessed online.

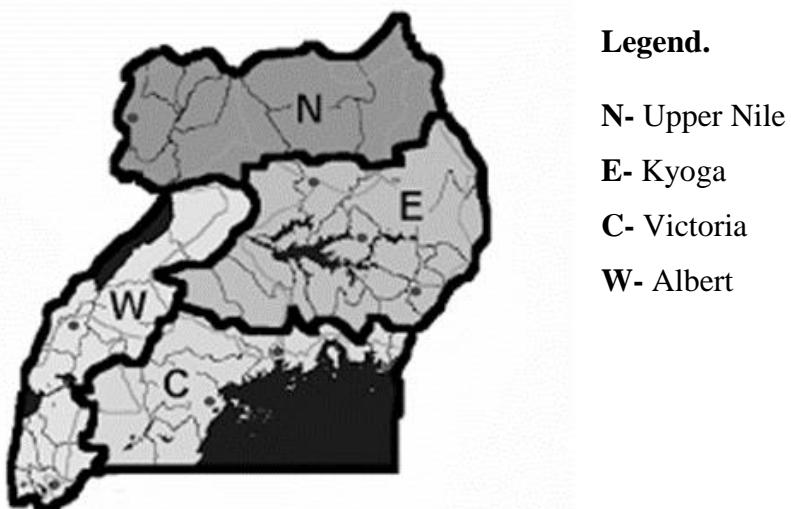


Figure 3: Map of Uganda. Showing the four WMZs of Victoria, Albert, Kyoga and Upper Nile [9].

1.7 Research methodology

The data and documents for this research were primarily obtained through desk research method. It included review of literatures that focus on policy and legal frameworks supporting water management in Uganda and the EU using secondary data sources [13]. The majority of literatures on Uganda's water resources is found in policy documents, strategic plans and reports produced by the government, consultants and international organisations [5]. It included gathering of an initial list of organisations, papers and websites, which was then followed by a joint decision with my supervisor to include sources basing on the perceived relevance to the research objectives. From these sources, it was possible to start the study that set out an analytical framework to guide the proceeding steps of this research [14].

The literature that included the national policies, legislations, international conferences and institutions on WRM focused on European Union (EU) and Uganda. For the EU, the Water Framework Directive (WFD) and other related legislation, Water notes, associated papers, Swedish water districts and other relevant documents, were reviewed. For Uganda, the key policies, the National Water Policy of 1999, the 1995 Constitution of Uganda, the Water Act Cap 52 of 1997 and the National Environment Statute, were reviewed to find out the foundation blocks of the national policy, legislation and strategy for WRM in the country. These findings were complemented by analysing several more recent documents that involved proposed reviews of the policy, legal and institutional framework supporting the management of the water and environment sector [14].

The EU WFD and existing national policy and legal framework supporting water management in Uganda were compared with five internationally agreed principles promoting IWRM, namely; International Conference on Water and Environment (Dublin, 1992), the United Nations Conference on the Environment and Development (Rio de Janeiro, 1992), the Second World Water Forum (Hague, 2000), International Conference on Freshwater (Bonn, 2001) and the World Summit on Sustainable Development (Johannesburg, 2002) [18]. In addition, the existing national policy and legal framework supporting water management in Uganda was compared with the ‘water information notes’ about integrated water management, EU water legislation and the WFD, intended to give an introduction and overview of key aspects of the implementation of the WFD [23]. Positive lessons learnt from these detailed comparisons, which are applicable to Uganda, where the gap between policies, legislations and institutional framework is still immense were identified and recommendations proposed to help formulate a better river basin management guidelines for water management in Uganda [13].

2 Literature Survey

This chapter gives a brief description of the concept of WRM and IWRM both at national and basin levels and a number of guiding principles that have been established at international conferences for promoting IWRM and the conditions necessary for its implementation. There are numerous of these guiding principles, but the chapter will only focus on the most relevant ones for this study. The chapter proceeds to describe water notes, which is an overview and introduction of key aspects on the implementation of the WFD. It further presents integration principles and the key principles that are incorporated into the various EU water legislation.

2.1 Water resources management

WRM is the process of attaining the water related goals and objectives of a country in an effective and efficient manner through planning, organizing, leading and controlling the water resources. The responsibility to carry out WRM functions is a very challenging task which may involve many different activities conducted by various players. However, the most important requirement of WRM is the development of appropriate quantities of water with an adequate quality. As water exhibits seasonal and spatial variations in line with the hydrological cycle, the phrase ‘water management’ covers a number of activities and disciplines. In general, these can be split into three groups as managing the resource, managing water services, and managing the trade-offs needed to balance supply and demand. It is important to point out

that WRM requires technical know how and a mix of measures that include changes in policies, prices and other incentives as well as infrastructure and physical installations. All in all, WRM is composed of the following components: Water allocation, river basin planning, stakeholder participation, pollution control, monitoring, economic and financial management, and information management. IWRM on the other hand focuses on the necessary integration of water management across sectors, policies and institutions as illustrated in Figure 4 below [6].

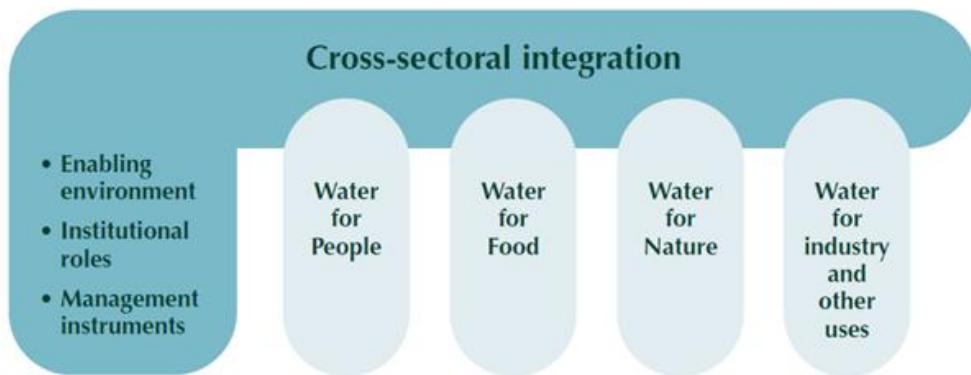


Figure 4: IWRM and its relations to sub-sectors. Showing the cross-sectoral integration between water use sub-sectors, and the role of IWRM in their linkage [6].

2.2 Integrated Water Resource Management (IWRM)

IWRM emerged around the 1980s in response to increasing pressures on water resources from competition amongst various users for a limited resource, the recognition of ecosystem requirements, pollution and the risk of declining water availability due to climate change [15]. IWRM practices depend on the

circumstance being considered; when at the operational level, the main challenge is to implement the agreed principles so that it starts producing results, and the response to this is referred to as IWRM. The art and science of blending the right proportions of systems into a whole is referred to as 'integration' [6]. Therefore, IWRM is a holistic concept trying to combine many different approaches for sustainable water and natural resources use. Its basis is that all the different uses of water resources should be considered together since they are interdependent. There is a growing recognition throughout the world of the urgent need for IWRM for the effective and efficient management of water resources [9].

Thus, IWRM is defined by the Global Water Partnership (GWP) as a process which promotes the co-ordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystem [6]. The IWRM approach helps to manage and develop water resources in a sustainable and balanced way, taking account of social, economic and environmental interests. It recognises the many different and competing interest groups, the sectors that use and abuse water, and the needs of the environment. The integrated approach co-ordinates WRM across sectors and interest groups, and at different scales, from local to international. It emphasises involvement in national policy and law making processes, establishing good governance and creating effective institutional and regulatory arrangements as routes to more equitable and sustainable decisions [16].

The two highly complex problems that IWRM seeks to simultaneously address are: sustainable development and cross-sector planning. Often in practice, this

has resulted into the formulation of very vague plans and policies that do not make it down to the implementation level. As a result, it has led to the promotion of a concept called “Adaptive Management,” which is an integrated, multidisciplinary approach intended to deal with the uncertainty in natural resources. This concept recognises that due to human activities the quality and availability of managed resources will always be uncertain, that there will always be surprises, and that there will always be new uncertainties cropping up. As a result, this concept produces policies which must be continually modified and be flexible for adaptation to such unexpected changes. Therefore, it is analogous to management concepts found in disaster risk reduction with a strong focus on lowering vulnerabilities and human capacity building [9].

2.2.1 Integration principles

Contrary to the traditional or conventional, fragmented and uncoordinated WRM, the concept of IWRM takes into account both the management of water demand and its supply. Thus, integration is considered under two basic categories by IWRM [6]:

- The natural system; important for resource availability and quality, and
- The human system; determines the resource use, waste production and pollution of the resource, and sets priorities for resources development

IWRM requires that integration should take place both between and within these two categories while taking into account the temporal and spatial

variability [6]. The EU legal framework supporting water management considers integration as a crucial concept that is worth taking into consideration for an effective river basin management. Below are some of the integration principles that have been adopted by the EU legal framework for water management [17]:

- Integration of environmental objectives, which combines quantity, quality and ecological objectives to protect highly valuable aquatic ecosystems and ensure a general good status of other waters.
- Integration of all water resources: integrating management of surface water and groundwater, wetlands, and coastal waters at the river basin level [17].
- Integration of all water uses, functions and values into a common policy framework, i.e. integrating water resources policy with national economic policy as well as national sectoral policies. Also, taking in account the implication of water resources in the development of economic and social policies [6, 17].
- Integration of disciplines, analyses and expertise: This involves the assessment of current pressures and impacts on water resources and identification of measures to achieve the environmental objectives of the Directive in the most cost-effective manner using a combination of knowledge derived from fields such as hydrology, hydraulics, ecology, chemistry, soil sciences, technology engineering and economics.
- Integration of water legislation into a common and coherent framework: In order to meet modern day ecological thinking, the requirements of some old water legislation, for instance the Freshwater Fish Directive have been reformulated in the WFD. These old

Directives are repealed after a transitional period. Other pieces of legislation such as the Nitrates Directive, the Urban Wastewater Treatment Directive and the Integrated Pollution Prevention and Control, must be co-ordinated in river basin management plans, where they form the basis for the programmes of measures.

- Integration of all significant management and ecological aspects relevant to sustainable river basin management. This includes aspects which are beyond or marginal to the scope of the WFD such as Environment Impact Assessment and the Habitat Directive.
- Integrated measures. A programme of measures, which include infrastructure, management, economic and financial measures, are defined in the River Basin Management Plans developed for each river basin.
- Stakeholder participation: Integration of stakeholders and the civil society in decision making, by promoting transparency and information to the public, and by offering a unique structured approach for stakeholders to participate in the development of river basin management plans, taking into account the fact that the objectives of the water users often differ a great deal, because in most cases they have conflicting interests concerning WRM.
- Integration of different decision-making levels that influence water resources and water status, that is, local, regional or national, for an effective management of all waters
- All these combined with a clear timetable in appendix 1, enables all concerned parties to have a clear view of what is happening and when it happens. These parties may include: the Government, Competent

Authorities, industry and the public. It specifies clear decision points and allows consultation and public engagement at known points in its implementation [17].

2.2.2 Important conditions for implementing IWRM

Although the conditions listed below are important for the implementation of IWRM, they are not a set of necessary prerequisites for its implementation. The goal of IWRM is to create sustainable water security within the present limitations and through incremental improvement of conditions. Therefore, water managers need to identify those conditions which are essential for the effective management, which are impossible to be put in place immediately, and which are possible to be wholly or partly developed over time to enable effective implementation of IWRM [15]:

- Political will and commitment.
- Basin management plan and clear vision.
- Participation and coordination mechanisms, fostering information sharing and exchange.
- Capacity development programmes
- Well-defined flexible and enforceable legal frameworks and regulation (enabling environment).
- Water allocation plans.
- Adequate investment, financial stability and sustainable cost recovery.
- Good knowledge of natural resources present in the country and basin.

- Comprehensive monitoring and evaluation

2.2.3 River basin management

A number of terms such as basin, catchment and watershed are used by different disciplines and countries to mean different things, but in this study, basin, catchment and watershed are used interchangeably. Thus, the area of land that drains to a specific point or outlet is called a river or lake basin. A groundwater basin or aquifer is a discrete body of sub surface water. The basin has been recognised as a practical hydrological unit for WRM in a more sustainable manner [16]. River basin management refers to the management of water resources, water-related resources and water-related development within the confines of a river basin whereas river basin planning is the process of collecting and analyzing river basin data and evaluating management measures in order to achieve the objectives within agreed timescales [15]. In many countries, policies for water resources use and protection are still prepared by the central government. Although policies can be effectively implemented at the national level, implementation at the basin level offers the opportunity to deliver ‘whole basin’ solutions and resolve upstream-downstream and region-region conflicts. That is to say, the application of national policies, international agreements and regional conventions for transboundary waters to natural basins. Therefore, the relationship between administering water resources within a country and managing water in basins becomes dynamic as well as more responsive to changing circumstances, whether environmental, social or economic [16].

Therefore, from a river or lake basin and aquifer level point of view, IWRM is defined as a process that enables the co-ordinated management of water, land and related resources within the limits of a basin in order to optimise and equitably share the resulting socio-economic well-being without compromising the long-term health of vital ecosystems. The implementation of IWRM at the basin level for the provision of water services is referred to as integrated river basin management. The river basin approach, which focuses on allocating and delivering reliable water-dependent services in an equitable manner, seeks to focus on the implementation of IWRM principles on the basis of better coordination amongst operating and water management entities within a river basin. It therefore has the benefits of enabling the integration of downstream and upstream issues, quantity and quality, surface water and groundwater, and land use and water resources in a practical manner. However, well-developed, well tested, scientifically robust, socially acceptable and economically viable approaches to implement IWRM at the river basin level are still not widely available [15].

Implementation of IWRM at the national level does not conflict with implementation at the basin level, in fact they complement each other. Moreover, linking national IWRM policy setting and planning processes with basin management helps lower risks and leads to more sustainability, promoting economic growth and more equitable development while protecting the environment. The integrated approach recognises and tackles the difficult trade-offs that government policy makers and basin managers need to make in the context of the region's or country's overall strategic development goals [15]. Both the national and transboundary basin management require a comprehensive national framework for IWRM [15].

2.2.4 Relevant IWRM guiding Principles

The concept of IWRM is being promoted by many international organisations worldwide. Several conferences and fora to give specific guidelines for promoting IWRM have been held in recent years. Of all these conferences, the ones summarised below are considered the most significant as far as this research is concerned. In all these conferences, representatives from all walks of life have shared their views on new approaches for the assessment, development and management of freshwater resources [18]:

- a) Second World Water Forum and Ministerial Conference, The Hague 2000

The Second World Water Forum was held from 17-22 March 2000 in The Hague, the Netherlands. The urgency of water crisis was discussed by about 5700 participants from all over the world who also debated on the steps required to ensure the provision of sufficient clean water for everybody in the future. Another issue that received a great deal of attention during this forum was Privatization of water, or more precisely, the issue of public-private partnerships. Another hot topic was ‘water is a basic human right’. The key issues raised in the Second World Water Forum are summarised below [19, 18]:

- Privatization: In order to achieve water security, water must be made everybody's business. However, the government monopoly in water management should not be replaced by a private monopoly.

- Charging the full cost for water services: Users should be charged the full cost of the services, with appropriate subsidies made available to the poor and with recognition of the resources the poor do have i.e. their labour
- Right to access: Water is not only considered essential for human health, but also desperately needed by millions of poor women and men in rural areas for productive reasons: to grow food for the family or generate income. Almost 90% of water resources are used for agriculture. Right of land and use of water are key determinants for people's potential to break down the poverty trap.
- Participation: Water can empower people, and women in particular, through a participatory process of water management. Participation implies sharing of power, democratic participation of citizens in elaborating or implementing water policies and projects, and in managing water resources.

b) International Conference on Water and Environment (ICWE),
Dublin 1992-The Dublin principles

The ICWE issues for the 21st century was held on January 1992, Dublin, Ireland. Recommendations for action based on four guiding principles known as the Dublin principles at local, national and international levels were set out by the conference report. The Dublin Principles heavily influence how people currently think about the crucial issues in WRM and development. These principles include [6]:

- 1) Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
 - 2) Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
 - 3) Women play a central role in the provision, management and safeguarding of water.
 - 4) Water has an economic value and should be recognized as an economic good, taking into account affordability and equity criteria
- c) The World Summit on Sustainable Development (WSSD),
Johannesburg 2002

The WSSD was held in August and September 2002, Johannesburg, South Africa. The world is faced with a number of daunting challenges, which include; improving people's lives and conserving natural resources in a world that is growing in population, with ever-increasing demands for food, water, shelter, sanitation, energy, health services and economic security. The WSSD therefore aimed at focusing the world's attention and directing action towards finding a lasting solutions to these challenges. It had a strong focus on IWRM since it strongly reaffirmed commitment to Rio Principles and commitment to the full implementation of Agenda 21. Summarised below are the main points of the WSSD Plan of Implementation relating to IWRM [18, 20]:

- Developing IWRM and water efficiency plans by 2005 for all major river basins of the world. Developing and implementing national/regional strategies, plans and programmes with regard to IWRM.
- Improving the efficiency of water usage.
- Facilitating the establishment of public-private partnership.
- Developing gender sensitive policies and programmes.
- Involving all concerned stakeholders in all kinds of decision making, management and implementation processes

d) International Conference on Freshwater (ICFW), Bonn 2001

The ICFW took place in Bonn, December 2001, focusing on water as being key to sustainable development. This event was in preparation towards the WSSD, Johannesburg 2002. Not only did the conference review the role of water in sustainable development, but it also took stock of progress in the implementation of Agenda 21 and identified how its implementation can be improved. The Summit noted that making such policies is one thing, but implementing them is a completely different ball game. Hence, practical ideas were the main focus of this conference. The Bonn Keys are listed below [18, 21]:

- The first key is to meet the water security needs of the poor.
- Decentralization is key; the local level is where national policy meets community needs.
- The key to better water outreach is new partnerships.

- The key to long-term harmony between nature and its neighbours is cooperative arrangements at the water basin level, including across waters that touch many shores. IWRM is therefore needed to bring all water users together to share information and make decisions.
 - The essential keys are stronger, better performing governance arrangements.
- e) United Nations Conference on the Environment and Development (UNCED, Agenda 21, Chapter 18)- Dublin-Rio Principles

The UNCED, the "Earth Summit" took place on 3-14 June 1992 in Rio de Janeiro where Agenda 21 and the Rio Declaration were agreed. A number of key policies to achieve sustainable development that meets the needs of the poor and recognises the limits of development to meet global needs have been outlined in these documents. Therefore, "needs" was not only interpreted in terms of economic interests, but also as being those of a fully functional, harmonious, global system that incorporates both people and ecosystems. The environmental and development issues were firmly brought into the public arena by this Summit. Along with the Rio Declaration and Agenda 21, it led to agreement on two legally binding conventions: Biological Diversity and the Framework Convention on Climate Change [22]. The Dublin-Rio principles are listed below [3]:

- 1) Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.
- 2) Management of water resources at the lowest appropriate level.

- 3) The role of Government as an enabler in a participatory, demand-driven approach to development.
- 4) Recognition of water as a social and economic good with a value reflecting its most valuable potential use.
- 5) Integration of water and land use management
- 6) Recognition of the central role played by women in the provision, management and safeguarding of water.
- 7) The important role played by the private sector in water management.

2.3 Water Information Notes on the Implementation of the WFD

The WFD is a complex, technical and far-reaching document which may not be completely understood by a layman who is reading it for the first time. A number of questions normally come up that need to be answered before implementation is started. To make it easier to understand, the Environmental Division of the European Commission (EC) published the twelve Water information notes or the ‘Water notes’, about integrated water management, EU water legislation and the WFD, intended to give an introduction and overview of key aspects of the implementation of the WFD [23]. However, due to the limited scope of this study, only the water notes that are relevant to Uganda’s situation have been given in detail. Consequently, Water notes 7 and 11 have been considered not relevant to Uganda’s situation.

1) Water note 1: Joining forces for Europe's shared waters - Coordination in International River Basin Districts (IRBD)

The EU, with approximately 60% of its surface lying in river basins crossing at least one national border, is a land of shared waters apart from Cyprus and Malta who are the only Member State (MS) who do not contain sections of at least one IRBD. Article 3 of the WFD requires MS to create international districts for basins that cover the territory of more than one MS and appoint a Competent Authority to implement the requirements of Directive in the portion of the IRBD that falls in their territory and that it should coordinate activities with the other MS in the district. Therefore, from a water management point of view, it meant many different national traditions had to be bridged since some countries already practiced the concept of river basin while others did not. According to the Directive, MS could use the already existing administrative structures for these international basins. Article 5 of the Directive also directs MS to perform the environmental and economic analysis of river basins, which should be completed in 2005 or a set deadline, after having set up the administrative structures [23].

2) Water note 2: Cleaning up Europe's waters - Identifying and assessing surface water bodies at risk

Article 4(1) of the Directive obliges MS to achieve good status in all bodies of surface water and groundwater by 2015. Good ecological and chemical status are specified by the Directive with regards to a healthy ecosystem and low levels of chemical pollution respectively. MS are required to address factors such as pollution and morphological changes such as dam built on rivers that

are harming water eco-systems in order to be able to achieve good ecological status. Also, when water extraction for irrigation or industrial uses reduce water levels in rivers or lakes below a critical point, it can also harm ecosystems. There are some distinguishing features that each water body identifies with, for example geology, pollution and other pressures it faces. These features set it apart from other sections of the same river, lake, transitional or coastal water, as illustrated in Figure 5 below. Separate water bodies can be designated by MS at an appropriate scale needed to manage the objectives of the Directive. This way, MS can focus monitoring activities on problems affecting specific water bodies since water bodies are designated along a river course. Measures to best improve conditions in the water bodies at risk can then be tailored. The progress of the chosen measures to improve the status of the water bodies at risk can then be tracked by the governments, stakeholders and the public. This strategy assures rational applications of effort on urgent water qualities. The Directive sets separate, less stringent goals for artificial and heavily modified water bodies. Artificial water bodies include man-made lakes, such as mountain reservoirs. An example of a heavily modified water body is an estuary that has been transformed into a major industrial port [23].



Figure 5: Ecological and chemical status. Showing ecological and chemical status at different sections along a water course. Each section has some distinguishing

features such as geology, pollution etc. that sets it apart from other sections of the same water body [23].

3) Water note 3: Groundwater at Risk - Managing the water under us

Groundwater is the only source of recharge to a river during dry periods and so it's important to maintain this base flow and keep it free from pollution since its essential for surface water ecosystem. Approximately 75% of EU citizens use groundwater as a source of drinking water supply, and for industrial cooling and for agricultural irrigation. The WFD protects clean water across Europe and it highlights the importance of groundwater bodies by requiring MS to designate separate bodies of groundwater and ensuring that each of them achieves "good status" by a set deadline. Article 4(1) of the Directive requires MS to ensure that surface water and groundwater bodies achieve good status by 2015 (set deadline). The Directive defines good status of groundwater with regard to both quantity and chemical status. Therefore, to ensure a stable quantity of groundwater, the Directive requires the long-term sustainable use of groundwater. Thus, the rate at which water is abstracted from a groundwater source must not exceed the rate at which freshwater recharges it, otherwise it would be depleted. MS set the quality standards nationally for chemicals in groundwater. This is done so in accordance with the approach and methods laid out in the Groundwater Directive of 2006 (2006/118/EC), which takes into account the widespread differences in geology and other factors across Europe. Achieving good chemical status also means complying with EU-wide quality standards for nitrates and pesticides, laid out in the Nitrates Directive, which

requires measures to protect surface and groundwater from pollution due to nitrogen-based fertilisers used in agriculture [23]

4) Water note 4: Reservoirs, Canals and Ports - Managing artificial and heavily modified water bodies

Rivers and other water bodies across Europe have been physically altered for navigation, flood control and other purposes. Structures such as barge canals and hydroelectric reservoirs have been constructed where water bodies never existed previously. Through the WFD, EU's waters can be protected and managed in a sustainable manner. Article 4(3) of the Directive allows MS to designate water bodies as artificial and heavily modified. A water body is artificial when it's created by human activity and it's modified when it has undergone man-made alterations that have substantially changed its character. The fact that the Directive allows MS to classify their water bodies this way provides them with a mechanism to reconcile economic activity with environmental goals, since aquatic ecosystem which are part of these modified waters may not meet the Directive's standard. In this case, these water bodies will not need to meet the same quality criteria required of other surface waters [23]

5) Water note 5: Economics in Water Policy - The value of Europe's waters

To manage Europe's waters in a sustainable manner, the WFD has introduced economic principles and methods. There are two key economic principles

introduced by the Directive: firstly, it requires water users such as industries, farmers and households to pay the full cost of the water services they receive; secondly, it calls on MS to employ economic analysis in the management of their water resources and to assess both the cost-effectiveness and the overall costs of alternatives when making key decisions. According to article 9 of the Directive, MS are required to recover the costs of providing water services. Article 5 of the Directive requires an economic analysis of water use and Annex III lists the elements that MS should include in this analysis. In a bid to recover cost, the Directive calls for water services such as those supplying clean drinking water, irrigation for agriculture, reservoirs for hydropower and wastewater treatment facilities to be charged at a price which fully reflects the services provided. The prices users pay for water should cover the operational and maintenance costs of its supply and the costs invested in infrastructure. The Directive further requires that prices paid by users also cover environmental and resource costs and possibly the polluter pays principle. This is a key step towards implementing the economic principle that polluters and users should pay for the natural resources they use and the damage they create. The Directive also states that water pricing should create incentives for the efficient use of water resources. If users pay the real costs of the water they use, they will certainly waste less of it. This brings economic efficiency and reduces the financial burden on public authorities while improving the environment. It is however difficult to measure other benefits of clean water [23].

6) Water note 6: Monitoring programs - taking the pulse on Europe's waters

The WFD calls on the MS to protect and restore clean water across Europe by gauging the health of surface waters and groundwater through national monitoring programmes. The issue of monitoring is addressed in article 8 and Annex V of the Directive. MS use monitoring as the main tool to classify the status of each water body by setting a five-class scale i.e. high, good, moderate, poor and bad status for surface waters and two classes i.e. good and poor for groundwater, which requires them to achieve good status in all surface waters and ground waters respectively by 2015. Monitoring also helps MS to track the effectiveness of measures needed to clean up water bodies and achieve good status after finishing the determination of the current status of their waters. Although the Directive does not specify the methods to be used, it sets a common approach for monitoring water quality by all MS. It is therefore up to each MS to choose the best method based on the local conditions and existing national approaches. Surface water monitoring may cover the chemical composition of water, a number of key biological elements, and the hydrological and morphological characteristics of water bodies in order to provide a comprehensive overview of the health of Europe's waters. Three types of monitoring are specified by the Directive [23]:

- Long-term surveillance monitoring, which provides a broad understanding of the health of water bodies and tracks slow changes in trends such as those resulting from climate change
- Operational monitoring, which focuses on water bodies which do not meet good status and on the main pressures they face.

- Investigative monitoring, which is done when MS need further information about surface water bodies that cannot be obtained via operational monitoring, including information on accidents.

7) Water note 7: Inter-calibration - a common scale for Europe's waters

An inter-calibration exercise is required between MS with the help of the EC to ensure that national assessment methods used for measuring good ecological status deliver comparable results that are consistent with the WFD. Furthermore, a five-point scale for surface water defined from high to bad is specified by the Directive. Much work is focused on defining the upper and lower boundaries of good status. Of particular importance is the line between “good” and “moderate” status as it defines whether or not a water body will meet the Directive’s 2015 goal of good status [23]

8) Water note 8: Pollution - Reducing dangerous chemicals in Europe's waters

The aim of the WFD is to ensure that both surface water and groundwater bodies across Europe achieve good chemical status. The Directive defines this goal by limits on the concentration of specific pollutants of EU relevance for surface waters, known as priority substances (33 substances identified to date). A new Directive, published in December 2008 (2008/105/EC), establishes limits, known as Environmental Quality Standards (EQS), for these 33

substances and for an additional 8 substances regulated under previous legislation. Since MS have been obliged by the Directive to meet good ecological status for surface waters, they also need to ensure that additional pollutants of national relevance are controlled. Furthermore, the Directive calls for good chemical status for ground water, which can be reinforced by the 2006 Groundwater Directive (2006/118/EC), which specifies measures to assess, monitor and control groundwater pollution. Finding their way into Europe's waters are chemicals from point sources like industrial wastewaters, and from diffuse sources like pesticides from agricultural lands. The Directive takes a combined approach in designing measures to control the chemical pollution from point and diffuse sources. That is to say, it considers pollution in terms of what is released into the environment and the resilience of the receiving environment (waters). Chemical pollution is addressed by articles 4, 10, 11 and 16 and Annexes V, VIII, IX and X of the Directive. The Directive is supported by other EU environmental legislation targeting specific activities, for example the Directive on Integrated Pollution Prevention and Control (IPPC) regulates pollution from large industrial installations, Nitrates Directive limits nitrogen pollution from fertilisers and manure, Urban Waste Water Treatment (UWWT) Directive, for collecting and treating sewage from urban centres [23].

9) Water note 9: Integrating water policy - linking all EU Water legislation within a single framework

Ever since the EU started adopting legislation in the area of environmental protection, the need to protect the waters of Europe has been a constant high

priority. The first Directives, which introduced a series of quality standards aimed at protecting human health and the living environment were adopted in the mid-1970s. These included surface water used for drinking water, bathing water, fish waters, shellfish waters, groundwater and water for human consumption. The same generation of legislation included a Directive that set standards for the discharge of dangerous substances into the aquatic environment and was for many years the main instrument to control emissions from industry. However, when the quality standard approach proved insufficient for protecting Europe's waters from pollution and eutrophication became a major problem in late 1980s, the EU started to focus on the nutrients and source of the pollutants. This led to the Directives on UWWT, Nitrates and IPPC. To make these many patchwork of legislation more coherent and streamlined, the EU adopted the WFD in 2000, incorporating and reformulating seven old Directives in the WFD, creating a global and unified approach to water legislation. The WFD regards implementation of these repealed Directives as a minimum requirement. Other EU water legislation like UWWT, Nitrate and IPPC Directives must be coordinated in the RBMP. According to article 11.3(a) of the Directive, the measures to implement them must be integrated into river basin management planning as illustrated in Table 2. The WFD uses nearly all the measures presented in these Directives and also sets a combined approach that links other water legislation. Article 10 of the Directive details its "combined approach for point and diffuse sources" and refers to several related Directives [23].

Table 2: Common measures used in EU Directives. Showing common measures used in EU Directives to protect water quality and how they are integrated into RBMP [23]

Directives:	Bathing water	Drinking Water	Nitrates	UWWT	WFD
Measure					
Quality standards in water	✓	✓			✓
Identification of risks	✓		✓	✓	✓
Classification of water bodies	✓				✓
Management plan	✓		✓		✓
Emission limit values				✓	
Information to the public	✓	✓			✓
Public participation	✓				✓
Monitoring	✓	✓	✓	✓	✓

10) Water note 10: Climate change - Addressing floods, droughts and changing aquatic ecosystems

The WFD obliges MS to address the wide ranging impacts being caused by climate change through their RBMPs. Climate change will most likely cause different impacts in the northern part of Europe as compared to the southern part. There is already a sign of decreasing rain in southern Europe. As a result, more extended periods of drought and water scarcity are likely to exist in southern Europe. In contrast, northern European countries are expected to

receive higher levels of rainfall, a trend already seen in recent years. Although farming will most likely flourish due to higher precipitation, it will most likely increase the risk of flooding. Extreme weather events like heavy rains leading to flash flooding are expected to become more common across Europe. Climate change will also result in sea-level rise leading to coastal erosion, thereby putting low-lying coastal cities and towns at greater risk from flooding. Aquatic ecosystems will in turn be affected by climate change impacts. Hotter temperatures and reduced water flows will increase the risks of eutrophication in many rivers, lakes, and coastal waters. The Directive provides EU MS with a common basis for addressing the problems brought by climate change impacts, in particular the Directive's river basin approach to water management, which establishes a mechanism to prepare for and adapt to climate change. Planning for droughts and floods will also be an integral part of this system. The Directive on the assessment and management of flood risks (2007/60/EC) requires MS to assess if water courses and coast lines are at risk from flooding, then to map flood risks and finally to take adequate and coordinated measures to reduce the risk [23].

11) Water note 11: From rivers to the sea - Linking with the new Marine Strategy Framework Directive

The environmental component of Europe's new cross-sector Integrated Maritime Policy constituted by the new Marine Strategy Framework Directive extends EU water legislation to the marine environment. EU MS are obliged by the new Directive to ensure the "good environmental status" of all Europe's marine regions and sub-regions. According to the new Directive, the

populations of commercially exploited fish and shellfish should not be pushed beyond their safe limits by fishing and other activities, and that non-indigenous species should not affect ecosystems. Good environmental status also requires physical, chemical and acoustic conditions that support healthy ecosystems [23].

12) Water note 12: A common task - Public participation in River Basin Management Planning

The WFD calls for the preparation of the RBMP, which identifies measures to improve water quality, to be done while ensuring that the public is kept informed and involved in decision making. In its article 14, which covers public information and consultation, the Directive acknowledges that its success relies on close cooperation with the public and stakeholders at local level and their involvement in key decisions. Consultation is usually a mechanism used by governments, through which people and interested organisation (stakeholders) can participate to gain from their knowledge and experience and to jointly develop solutions to problems. The Directive recognizes that in order to ensure public participation, it is important that the public is availed with proper information of planned measures before final decisions on the measures are adopted. All water users and non-governmental organisations (NGOs) like local and national environmental groups should be included in the participation. The EU concept of public participation adopts Aarhus rights. The Aarhus Convention that includes the Convention on Access to Information, Public Participation in Decision making and Access to Justice

in Environmental Matters, gives a number of rights to the public which includes [23]:

- the right to have access to information on the environment held by government authorities,
- the right to participate in the decisions taken by government authorities that affect the environment, and
- The right to review and legally challenge such decisions.

These three “pillars” of the Aarhus Convention were adopted by the EU in 2003 through two Directives: Directive on public access to environmental information (2003/4/EC) and Directive on providing for public participation in environmental plans and programmes (2003/35/EC). Both of these Directives contain provisions on access to justice, the third pillar [23].

2.4 Key principles adopted by EU water policies

These are the key principles that have been adopted by the EU legal framework supporting water management, the majority of which are directly applicable to Uganda’s situation. They highlight the key issues that have been addressed in the legal framework, which provides a legal and management platform for their application across the major river basins in Europe. These principles include [17]:

- Adoption of a high level of protection: From a WRM point of view, it means the protection of water resources and their associated ecosystems against pollution and deterioration. As a result, the legal

framework supporting water management in Europe adopted the ecological objectives as its key outcome.

- Adoption of the ‘precautionary principle’: The precautionary principle states that “the measures that can prevent threats that can cause potentially irreversible damage to the environment should not be postponed due to lack of full scientific certainty on a causal link between cause and potential damage”. This implies that costs may be reduced by avoiding the damage rather than having to remedy the damage after it has already happened, but not that all possible risks should be avoided
- Prevention is better than cure: It requires that steps to prevent the release of pollutants that can pollute or damage aquatic environment are taken in order to avoid potentially long lasting and expensive remediation.
- Deal with pollution at source: This requires that in the event that pollution is detected, it is more important to trace the source and deal with the problem at the source rather than trying to address the problem in the environment.
- Adopt the ‘polluter pays principle’: This principle requires that the polluter bears the full cost of preventing, controlling and remedying pollution
- Use available scientific and technical data. The underlying principle here is that water managers should use the available scientific and technical data to help them generate the information they need to make decisions on water related issues based on facts and apply the best available techniques for prevention and treatment of water problems.

This approach is commonly referred to as ‘evidence based policymaking’

- Take account of the variability of water and environmental conditions in the regions of the Community. This calls for the recognition of the need to be flexible in order to avoid the use of standards that are too stringent and allow for solutions tailor made for each region. For instance, MS set the quality standards nationally for chemicals in groundwater in accordance with the approach and methods set in the 2006 Groundwater Directive, which takes into account the widespread differences in geology and other factors across Europe.
- Take account of costs and benefits: This calls for the use of regulations and standards, new technology, pricing and market based initiatives to develop a cost effective strategy.
- See water policy as a contributory element of a balanced and stable economy: This principle advocates for the need to see environmental protection as a key and integral part of a sustainable and balanced economy. It calls on the society not to see it as blocking economic growth but as an essential part of this. Development plans must take into consideration full economic costs, including environmental externalities. “External costs exist when the private calculation of benefits or costs differs from society's valuation of benefits or costs”.
- Recognise the need for international collaboration: Rarely are issues concerning air, land and water confined to a single geographical location. It is a proven fact that river basins are sometimes transboundary in nature thus, need coordinated and combined actions to address issues within them

- Adopt the principle of subsidiarity: Measures or decisions that can be made more effectively at MS level should not be made at community level and the reverse is true. From a water resources perspective, the subsidiarity principle suggests that water management and service delivery should take place at the lowest appropriate governance level.
- Outcome Based Regulation: The legal framework supporting water management in Europe provides MS with grounds to meet common and agreed environmental outcomes, such as good status. Environmental outcomes do not refer to the process itself, but the overall results of the process. Thus, the system is designed for decentralised implementation according to local conditions rather than prescribing how the outcomes are achieved.
- A Combined Approach to Regulation of pollution. To ensure that the agreed objectives are achieved, the EU water legislation utilises a combination of regulatory approaches that include: emission control, environmental standards and the principle of ‘no deterioration’. For instance, a combination of emission controls for point source pollution from industrial processes set in IPPC and Best Available Technology (BAT) approach control pollution at source. Environmental Standards for the receiving water body to protect the river and ensure that the ecosystems, or human uses, are protected must be met and in order to comply with these, emission permits must be fully protective. One further measure is the concept of ‘no deterioration’, which entails maintaining or improving the quality of the emissions and/or the receiving environment.

- Risk based approach: This implies that the need to take any kind of action or adopt programs of measures within river basins should be based on structured risk assessment of the pressures and impacts as illustrated in Figure 4. Only the section of a water body where the objective of achieving good status by 2015 has failed or at a risk of failing requires actions. Sections where objectives have already been achieved require no action other than monitoring. In this way, monitoring activities are focused on known problems or pressures affecting specific sections of the basin since the water bodies are designated along a river course. This strategy ensures that scarce resources are optimised to solve problems and to make real improvements.
- Six Year Planning Cycles and Clear Timetable: This calls for policy makers to recognise strategic water planning as a long term process that needs to span between 25 and 30 years. However, it is important to allocate an implementation and review cycle of about 6 years necessary to make progress and drive improvements within these strategic plans. This way, industries and public sector are provided with reasonable lead time to make investment as well as install pollution reduction and control equipment and processes. It also recognises that adjustments need to be made in a progressive way, informing and amending the programme for next 6 years' period [17].

3 Legal and Policy Framework for water management

This chapter presents the legal and policy frameworks that are in place to guide the development and management of water resources and water services delivery at different levels of society in Uganda and the EU.

3.1 Introduction

Water legislation is a vital element within the enabling environment that provides the basis for government intervention and action and establishes the conditions and structure for action by NGOs. They establish the rights and obligations of all stakeholders in water management, the powers and functions of regulatory bodies and penalties for violation of the law [6]. Thus, water legislation are rules that should be followed to achieve policies and so they convert water policies into laws and should therefore have the following requirements [24]:

- Clarify the entitlement and responsibilities of users and water providers;
- Clarify the roles of the state in relation to other stakeholders;
- Formalise the transfer of water allocations;
- Provide legal status for water management institutions of government and water user groups;
- Ensure sustainable use of the resource.

Since amending water legislation is usually a tedious and time-consuming process, it is always kept at a sufficiently general level. Therefore, regulations and by-laws are the more dynamic parts of the legislative system that often have incorporated in them, detailed guidelines and provisions for implementation that may be amended in a continuous process as circumstances change [6]. A policy on the other hand, is a goal set by the government for water use, protection and conservation [24].

3.2 The Uganda policy and legal framework

It is important to point out from the beginning that Uganda follows a decentralised government structure, which implies that public service delivery such as water, education and health is supposed to be implemented through the local government. As a result, Uganda has a series of laws, policies, regulations and institutions operating at the national, regional and local level. The government has put in place a comprehensive framework, comprising a set of policies, laws and regulations to support the management of the water and environment sector, shown in Table 3 below [13].

Table 3: Relevant policies, legislations and regulations in Uganda. The government has put in place a set of policies, laws and regulations to support the management of water and environment sector [11].

Policies	Legislations	Regulations
Uganda Water Action Plan (1995)	The Constitution of the Republic of Uganda (1995)	The Water Resources Regulations (1998);
The National Gender Policy (1997).	The Water Act (1997), Cap 152	The Water Supply Regulations (1998)
National Water Policy (1999)	The National Environment Statute, 1995	The Water (Waste discharge) Regulations (1998);
The National Environmental Management Policy (1994)	The National Water and Sewerage Corporation Act, Cap 317	The Sewerage Regulations (1999);
Climate Change Policy (2012, draft).	The Local Governments Act Cap 243	The Waste Management Regulations (1999);
The Wetlands Policy (1995)	Land Act Cap 227	Environmental Impact Assessment Regulations (1998);
The upcoming Land Use Policy	The Public Health Act (1964);	National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations (1999);
National Health Policy and Health	The Children Statute (1996)	National Environment (Waste Management) Regulations (1999).

Sector Strategic Plan (1999);		
National Environmental Health Policy (2005);	The National Meteorological Authority Act (2012)	
The School Health Policy (2006);		

3.2.1 The Uganda policy framework

Every country has a responsibility not only to adopt national strategies, but also plans of action in order to implement the right to water. Moreover, it is every country's responsibility to adopt comprehensive and integrated strategies to ensure availability of sufficient and safe water for present and future needs of its citizens. Thus, for its part, Uganda has adopted numerous policies supporting the water and environment sector which include those listed in Table 3 above [13]. However, due to the limited scope of this study, all these Policies will not be discussed further. This section will only focus on the 1999 National Water Policy (NWP), which is the overall policy that outlines the roles played by the different institutions at central, local and community levels and also states the role of private sector in WRM [25].

3.2.1.1 The National Water Policy (1999)

The NWP is the major document for water management in Uganda, which was developed as a follow-up to the Water Action Plan (WAP) in the period 1993-1994 [8]. The Policy was not only developed in line with the constitution, but also Uganda's goals for social and economic development, decentralisation, environmental sustainability and realisation of gender equality. It makes plans for the future of Uganda by giving consideration on the prevailing socio-economic development and financial fabric in present day Uganda. The policy advises putting more emphasis on the IWRM while keeping in mind the finite nature of water resources and the important function of the private sector in water management. Therefore, the NWP (1999) and the Water Act (1997) form the future framework within which the Uganda water sector is destined to operate [25].

The NWP was developed under two distinct categories: WRM and Water Development and use. WRM covers policy objectives, principles and strategies for monitoring, assessment, allocation and protection of the resource and management framework. Water development and use covers policy objectives, principles and strategies for the development and use of water for domestic water supply, water for agricultural production, and other water uses including industry, hydropower, recreation and ecosystem needs. Water resources allocation priority has been accorded to domestic water supply and sanitation services and allocation to other uses to be based on economic, social and environmental values of water (most beneficial). The Policy objective for WRM is therefore ‘’to manage and develop the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of

adequate quantity and quality for all social and economic needs of the present and future generations with the full participation of the stakeholders''. The Policy recognizes that WAP prepared in the period 1993-1994 helped in its formulation. The WAP adopted and operationalized the IWRM guiding principles as they emanated from the Dublin-Rio de Janeiro (UNCED) process and Agenda 21's Chapter 18 on freshwater resources, implying NWP automatically inherited it [8].

The Policy lays down four strategies through which its objective would be achieved: Establishment of an enabling environment; development of appropriate institutional framework; planning and prioritization of water use; data collection and data dissemination; and capacity building. An enabling environment is to be provided by the government. The Policy emphasises the need to have a cross-sectoral coordination mechanism, with DWRM as the lead agency. It also recognises the importance of involving the users and the private sector in the decision making process and in the management of resources at the lowest appropriate level. The essential role of women in the provision, management and safeguarding of water and in health and hygiene promotion is recognised. Polluter pays principles to discourage water pollution and economic applied with regulatory instruments have been recognised by the Policy. The obligation of government through DWRM to collect, collate, store and disseminate data for public knowledge, awareness and socio-economic development has been recognised by the Policy. That the national handling of weather and climate data is the responsibility of the Department of Meteorology in collaboration with DWRM. The Policy notes that to keep pace with the ongoing decentralisation process, the districts will gradually take over

some tasks of monitoring such as groundwater quality for domestic use and ground water abstraction in relation to recharge. [25]

The Policy recognises that integrated management of water and land related issues requires that policies and plans are made at both national and district level. It further states that policies should be prepared, regulations made, national water quality standards set, and project activities in sector coordinated at national level. That the districts will set local priorities and by-laws, but major water uses like hydropower generation and trans boundary issues are to be handled at national level. The Policy notes that for the time being, the use of water resources is regulated centrally through the DWRM, but when districts acquire capacity to make assessments of the impacts of water abstraction, they will be the ones to administer the application and permit procedures. The management of wastewater discharge permit is handled at the national level by DWRM in consultation with National Environmental Agency (NEMA). That there will be penalties on those who discharge waste and effluent into open water. It states that as far as wastes are concerned, NEMA guidelines are to be followed. Furthermore, the policy recognises the role of the DWRM and district administrations as the enforcers of the standards, regulations and by-laws through imposition of penalties and use of judicial system [25].

For mediating disputes between individuals and groups regarding access to water resources without permits, the policy states that it's to be managed by the local council systems and local council courts as appropriate. The final appeal is to be handled at the national level by the Minister responsible for water. The role of the government through DWRM to provide capacity building at national and sub-national levels right down to the grassroots

(training of users) has been recognised [25] The Policy acknowledges that the existing institutional and management arrangements for the management of water resources in Uganda is inadequate. It calls for the management of water resources arrangements to be streamlined as proposed in the NWP and supported by the Water Act (Cap 152), 1997. This is explained further that: at the national level, is the Minister for Water and Environment who has the overall responsibility for initiating national policies, setting standards and priority for WRM in the country. That the Water Policy Committee (WPC) will advise the minister on the above functions and initiate revision to legislation and regulations and coordinate sector ministries' plans and projects affecting water resources. Similarly, it notes that there should be management structures at districts level, municipal level, sub-county level, local level and river basin/catchment level. However, the Policy states that presently, in Uganda, a river basin has not been found necessary and that the government would take necessary steps if in future it becomes necessary to create river basins for better management. [8]

The role of non-governmental organisation (NGOs) and private sector in helping to implement the strategies set in the Policy has been recognised. These organisations supplement the efforts of the public sector and help to ensure that the concerns of the underprivileged are incorporated in the national development process. Government pledges to strengthen its relationship with NGOs and community based organisations (CBOs) through the establishment of a regular forum for information exchange as well as formulation of guidelines for harmonised and co-ordinated operations [8]. The Policy further states that national investment and development efforts in the water supply and sanitation follows an equitable share principle, focusing on urban versus rural

intervention. That areas most in need of sector improvements are selected based on need-related criteria. However, the Policy makes it clear that at present, the majority of water supplies are being offered subsidies by the government and that this will continue until the districts and urban councils develop adequate financial and management capacities to sustain themselves.

[25]

The Policy recognises the need for Uganda to take its international and regional obligations for shared waters seriously. A number of declarations and guiding principles emanating from international fora on WRM, including Chapter 18 of Agenda 21 has been endorsed by the Policy [8]. It notes that, Uganda, by virtue of its location, is both a lower and upper riparian in the Nile Basin thus, regional co-operation for optimal resource use is encouraged within the accepted principles of international law on the use of shared water resources. The need for Uganda to safeguard the water quality of her lakes at national level has also been recognised by the Policy. The Policy provides for a priority action programme to ensure that WRM, and water supply and sanitation goals are achieved [25].

3.2.2 The Uganda legal framework

To implement the NWP, appropriate legislation and supporting regulations have been enacted. Uganda has a series of laws supporting water sector that apply at the national, regional and local level due to Uganda's decentralised system of governance. The main legislation is the 1995 Constitution of the Republic of Uganda, which clearly states all laws that concern the environment

and natural resources management [13]. Other relevant legislations are listed in Table 3 above. However, due to the limited scope of this study, the discussion of all these legal frameworks will not be presented here. This section will only focus on the two pertinent legal instruments that govern the regulation, management and utilization of Uganda's water resources. These are: the Uganda Constitution (1995) and the Water Act (1997), Cap 152. All in all, the Water Act is the core legislation for WRM, development and use in Uganda, supported by the Constitution and the National environment Statute.

3.2.2.1 The Constitution of the Republic of Uganda, 1995

In 1995, Uganda passed the current constitution in order to restore constitutionalism and the rule of law back to the country, which had for many years been characterised by lack of constitutionalism, oppression, political and other forms of instability [26]. The constitution is aimed at providing a comprehensive framework through which all the laws, policies and institutions governing water should be established. It is a national objective and directive principle of State policy that the state shall protect important natural resources including land, water, wetlands, fauna and flora on behalf of the people of Uganda. The utilisation of the natural resources of Uganda shall be managed in a sustainable manner. The State shall take all possible measures to prevent or minimise damage and destruction to land, air and water resources resulting from pollution or other causes. The State shall take all practical measures to promote a good water management system at all levels. These constitutional objectives act as a guiding principle in determining and applying the Constitution to ensure good governance [25].

According to Article 189, the constitution provides for decentralisation, which is further explained in the Local Government Act, 1997. The state has been entrusted by the people of Uganda to take care of natural resources including natural lakes, rivers and wetlands for the common good of all citizens. In Article 245, the constitution gives parliament powers to provide measures to ensure that the environment is protected and preserved from abuse, pollution and degradation, and manage the environment for sustainable development. Article 39 lays down the right to a clean and healthy environment, which is further reiterated in the National Environment Statute. All in all, the Constitution is the supreme law of Uganda and provides the foundation on which other laws are built. It provides a firm basis for water and environmental laws that are people oriented [25].

3.2.2.2 The Water Act (1997) Cap 152

The core legislation for WRM, development and use in Uganda is the Water Act (1997) Cap 152, which clearly states the framework for development and management of water resources in a sustainable way. Through the Act, clean, safe and sufficient amounts of water can be provided and water pollution, which is detrimental to the health and to the environment controlled through waste discharge [13]. The long title of the Act clearly explains its purpose, which is to provide for the use, protection and management of water resources and supply; to provide for the constitution of, and facilitate the devolution of water supply and sewerage undertakings. Therefore the objectives of the Act include the promotion of the rational management and use of the waters of Uganda through application of appropriate standards and techniques; and the

co-ordination of all public and private activities which may influence the quality, quantity, distribution, use or management of water resources [25]. The NWP indicated that provision of water for domestic use is always accorded first priority as far as water allocation is concerned. The policy categorically states that in allocating water, allocation for the domestic needs of a community should be reserved within the total available from each water resource. According to section 2 of the Act "Domestic use" includes use for the purpose of basic human consumption; watering not more than thirty livestock units, (approximately 43 cattle or 50 horses or 75 donkeys or 200 goats or 200 sheep or a mixture of these animals); subsistence agriculture, and watering a subsistence fish pond [27].

The Act vests all rights to manage all Water resources related issues in the government. That these vested rights of the government is to be exercised by the Minister in charge of water and its lead agency Directorate of Water Resources Management (DWRM). According to the Act, the occupier of the land is given rights to use water that naturally exists on the land for domestic use, firefighting or irrigating a subsistence garden. The occupier can only use water that exists under the land with the approval of the water authority responsible for the area. The Act further clarifies that the general rights to use water are different from the rights to construct works. Section 6 of the Act clearly states that, unless a person is authorised under Part II of this Act, they should not acquire any rights to use water or to construct or operate any works [25].

The Act defines Water to include surface waters whether contained in a river, stream, lakes, swamp or elsewhere on the surface of land, ground water, and such water as the Minister may from time to time declare to be water. Therefore,

without the approval of an authority, water may not be used for any purpose by any person who is not the occupier of land on which surface water exists. The importance attached to water supply for domestic uses is once again indicted by the fact that the general rights to use water are limited to domestic use and firefighting. The fact that the Act has provisions for compensation further strengthens the rights of government in water. In the event that water causes damage to land or property of an occupier through the exercise of powers conferred upon authorised persons by the Water Act, government should compensate all parties having an interest in that land. However, it's important to note that compensation is only paid for the taking or use of water on that land if the effect of such taking or use is to deprive the occupier of the right to use water [27].

The Act further recognises the importance of water resources planning and makes a provision for it. In section 12, the Act makes provision for water resources investigation, which includes data collection and construction of works. The act gives powers to any authorised person carrying out his/her duties to enter any land but must also leave the land as nearly as possible in the condition in which it was prior to entry [27]. The Act further states that any equipment/attachments brought to the land by the authorised person do not in any way become part of the land and that therefore, the occupier or owner does not in any way take ownership of them. This way, the Act ensures that state equipment are not taken over by land occupiers. The Act makes it clear in section 18, that no one is allowed to construct or operate any works if they are not granted a permit for that purpose by the DWRM. The Act defines construction to include alteration, improvement, maintenance and repair. However, according to section 18 of the Act, DWRM has powers to exempt a

person on such conditions as it thinks fit. These are the kind of exemptions under which most local authorities and NGOs have been operating; and therefore have not had to undergo the rigorous procedures of application for a permit [25].

The Act makes provision for easements, which is a means to allow authorised persons who have failed to reach agreements with land occupiers to gain access to water or waste discharge, and it acknowledges that the definition of easements used here is more restrictive than that in common law. However, it further argues that a court of law will most likely apply a wider interpretation to the term in order to give proper effect to the Act and ensure that justice is done. The Act makes provisions for waste management and pollution control. According to the Act, any person who allows waste to come into contact with water or in any way to pollute water, breaks the law. Sanitation is taken care of by this provision. Any individual who fails to comply with this law commits an offence, attracting penalties that include environmental restoration orders [25].

The Act turns its attention to WRM after dealing with planning. According to the Act, the overall national responsibility for WRM, co-ordination and regulation of the water sector as well as overseeing and supervising the development and exploitation of water resources is performed by MWE through DWRM. WPC is at the apex of the WRM structure [37]. WPC is composed of independent experts and officers from line ministries, departments and institutions chaired by the Permanent Secretary of the Ministry responsible for water resources with the Director from DWRM as Secretary. The main functions of WPC are; reviewing the law relating to water, coordinating the formulation of national policies relating to national and

international water resources, national priorities for the use of water, the implementation of the WAP. Its coordination activities are performed in consultation with the National Environment Management Authority (NEMA) [25].

At the sub-national level, the Minister responsible for water may appoint water authorities and sewerage authorities for designated water supply and sewerage areas. These appointed authorities are responsible for the provision and management of water supply and sewerage/sewage services in their designated areas. The Act further states that in appointing these authorities, government most likely thinks (envisages) they are private sector bodies who would operate in a water supply or sewerage area for gain. As a result, they would not usually be willing to invest in rural areas since it would involve high capital investment with very low returns if any at all hence, making Water User Groups (WUG) and Water User Associations (WUA) as the appropriate organisations for rural areas According to the Act, individuals or households who plan and manage a point source water supply system in their area can come together to form a WUG. The operations of the WUG is done through a water and sanitation, which is also its executive organ. Not only is the WUG responsible for water supply in the area, but also sanitation and hygiene. Since the costs of operations and maintenance of the point source water supply, sanitation and hygiene systems is the responsibility of the WUG, it may collect revenue for that purpose which tariffs must be approved by the Director. When a water supply system serves more than one WUG, the different WUGs served by this system can come together and form a WUA. The WUA is therefore formed by the Water and Sanitation Committees of each WUG, comprising of agreed representatives of each committee. The management of water system and

possibly collection of revenue for system maintenance purposes approved by the Director is the responsibility of this formed WUA. Under section 2(2) of the Act, local authorities are authorised to organise the formation of WUG's and WUA's within their jurisdiction [25].

3.3 The EU water legislation

This section presents the evolution of the EU legal framework supporting water management. It then makes a more detailed discussion of the WFD, which is one of the many legislation supporting water management in the EU.

3.3.1 Introduction

The legal framework for WRM in the EU is centred on the WFD, which is a very innovative and essential policy that develops a common approach of managing and protecting all waters of Europe, giving a particular attention to river basins. The main objective of the WFD is to ensure that all waters in Europe achieve good status by 2015. In principle, the legal framework supporting water management in the EU aims at achieving the following [17]:

- Reducing pollution, preventing deterioration and improving the condition of aquatic ecosystems including wetlands.
- Promoting the sustainable use of water.
- Reducing pollution by hazardous substances.
- Progressively reducing the pollution of groundwater.

- Reducing the effects of floods and droughts.

3.3.2 Evolution of the EU Water Legislation

The EU started developing water legislation, which set standards for a limited number of waters such as rivers and lakes for drinking water abstraction as far back as the mid-1970s, with the Dangerous Substances Directive as the main emission control element [14]. At the time, the main focus was quality standards, which were set to ensure the use of selected waters as the control of nutrient was still not a main concern then. However, many environmental problems such as eutrophication, ecological degradation, and disappearance of wetlands, and salination of coastal groundwater etc. were on the increase due to overexploitation, pollution and short sighted management objectives. Having recognised gaps to fill and amendments to be made on phase one due to the accelerated degradation of water quality and ecosystems during the Frankfurt ministerial seminar on water in 1988, the second phase of water legislation was drafted in 1991, with the adoption of the UWWT Directive, providing for biological wastewater treatment, and even more stringent treatment where necessary; the Nitrates Directive, addressing water pollution by nitrates from agriculture; the new Drinking Water Directive, adopted in 1998 for reviewing the water quality standards and IPPC Directive, adopted in 1996, addressing pollution from large industrial installations [14, 28].

The above legislation achieved significant progress, however, since they were dealing with individual water related issues and the existing water policy was fragmented and uncoordinated, it prompted the EC to start considering the

need for a more global and unified approach to water policy in mid-1995 [14, 28]. Moreover, not only did the EU Water legislation have to take into consideration the involvement of citizens and interested parties who were increasingly becoming aware of water related issues, but also had to address problems in a coherent way. As a result, it led to the development of a new EU water policy in an open consultation process involving the local and regional authorities, water users, and NGOs [29]. It finally led to the proposal for a WFD in 2000 by the EC to the European parliament (EP), after having agreed on the need for a single piece of legislation for water policy with a number of aims as outlined below [10, 28]. The WFD, a number of daughter Directives and other water related Directives constitute the many Directives that form a legal framework supporting water management developed by the EU. These different Directives are shown in Table 4 below [17].

The WFD (Directive 2000/60/EC) was adopted in 2000 and was published in the Official Journal of EU (OJ L 327) and became effective on 23 December 2000 [31]. This Directive is unique in that, for the first time, a framework for the protection of all waters including rivers, lakes, estuaries, coastal waters and groundwater, and their dependent wildlife/habitats is established under one piece of environmental legislation. It is a framework in the sense that it prescribes steps to reach the common goal rather than adopting the more traditional limit value approach. Previous European water legislation set objectives aimed at protecting particular uses of the water environment from the effects of pollution and guarding the water environment from dangerous chemical substances. The WFD takes many of these objectives forward. More importantly, it also introduces additional, broader ecological objectives that are designed to defend, and where necessary restore the structure and function of

aquatic ecosystems. To achieve good water status both the ecological status and the chemical status of a water body need to be at least good [14].

The WFD establishes an original, integrated approach to the protection, improvement and sustainable use of rivers, lakes, estuaries, coastal waters and groundwater within Europe. It impacts on the management of water quality and water resources and affects conservation, fisheries, flood defence, planning and environmental monitoring. It requires MS to control all impacts; physical, polluting or otherwise, on their water resource [14]. The WFD considers control of quantity to be an ancillary element in securing good water quality and so it requires the establishment of measures on quantity serving the objective of ensuring good quality. Consequently, the WFD is a comprehensive and coordinated package that ensures that all European waters are protected according to a common standard. Thus, it refers to all the other Directives supporting WRM such as UWWT Directive, Nitrate Directive, Drinking Water Directive, IPPC etc., which are co-ordinated in RBMPs where they form the basis for the programmes of measures [17, 28]. The primary focus of the Directive is to achieve 'good' ecological status for all waters by a given deadline. The proposal by the MS for the establishment of the WFD had key environmental objectives including [14, 28]:

- Expanding the scope of water protection to all waters; surface waters, and groundwater
- Achieving “good status” for all waters by a set deadline of 2015
- Setting up river basin management plans
- Introducing a combined approach of emission limit values and quality standards

- Ensuring correct pricing to foster sustainable water use and full cost recovery
- Encouraging public participation during development and implementation of the WFD
- Having a rationalized legislation to ensure efficiency

The WFD is based on the application of the River Basin“ as the administrative paradigm for water management. The WFD lays out a schedule for both the transposition of the Directive into the national laws of each MS, and the implementation of the various requirements. This timetable sets out the dates at which, each of the key deliverables of the WFD must be met. WFD Implementation timetable and key deadlines are shown in appendix 1 [14, 30].

Table 4: Various EU water legislation. The WFD, a number of daughter Directives and other water related Directives constitute the many Directives that form a legal framework supporting water management developed by the EU [17].

Directive	Authority	Year
Directive establishing a Framework for Community Action in the Field of Water policy (WFD)	EC	2000
Daughter Directives and Related Directives		
Directive concerning Integrated Pollution prevention and control (IPPC)	EP & CEU	2008
Directive on the Assessment and Management of Flood Risks	EP & CEU	2007
Priority Substances Directive		2006
Commission Directive amending Annex I to Council Directive 91/414/EEC concerning the placing of plant protection products on the market to include amitrole, diquat, pyridate and thiabendazole as active substances	CEC	2001
Directive on the Quality of Water Intended for Human Consumption	CEU	1998

Council Directive on the Control of Major accident Hazards involving Dangerous Substances	CEC	1996
Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora	CEC	1992
Council Directive concerning Urban Waste-Water Treatment (UWWT Directive)	CEC	1991
Council Directive concerning the Protection of Waters against Pollution caused by Nitrates from Agricultural Sources (Nitrate Directive)	CEC	1991
Council Directive on the Protection of the Environment, and in particular of the Soil, when Sewage Sludge is Used in Agriculture	CEC	1986
Council Directive on the Assessment of the Effects of Certain Public and Private Projects on the Environment	CEC	1985
Council Directive on the Conservation of Wild Birds	CEC	1979
Council Directive concerning the Quality of Bathing Water	CEC	1976

3.3.3 The Water Frame Work Directive (WFD)

The WFD establishes the framework for community action relating to water policy. This framework sets out an integrated approach to the protection, improvement, and sustainable use of Europe's rivers, lakes, Estuaries, coastal waters, and groundwater. Each MS is obliged to transpose this Directive into its domestic laws relating to water. From its onset, the Directive states that water is not a commercial product like any other but is a heritage, which must be protected, defended and treated as such. It further states that EU environmental policy is aimed at preserving, protecting and improving the quality of the environment and at prudent and rational utilization of natural resources. The WFD is based on the precautionary principle and on the

principles of prevention that environmental damage should, as a priority, be rectified at the source and that the polluter should pay [32].

The Directive also obliges MS to undertake within the framework of the river basin, the planning and implementation of the measures required to ensure the protection and sustainable use of water. But, according to the Directive, any decision making should be done as close as possible to the place where water is affected or used. Additionally, the Directive demands that MS should ensure that proper information of planned measures is available to the public before any final decision on necessary measures are adopted. This is the best way to ensure that the general public, including water users are involved all the way in the establishment and updating of the RBMPs. According to article 1, the aim of this Directive is to create a framework for the protection of inland surface waters, coastal, transitional waters and ground waters. Article 1 further states that this Directive aims to among other things, prevent further deterioration of aquatic systems; promote sustainable water use; reduce pollution of water bodies, including ground waters; and contribute to the provision of a sufficient supply of good quality water. Since the WFD is intended as a framework for EU action, it does not give any provisions concerning the ownership of the water or the establishment of water rights. This issue is left to the domestic law of each MS. Likewise, there is no provisions concerning the allocation, loss, or transfer of rights to use water due to the same reason [32].

The WFD has eleven annexes that are extensively devoted to issues dealing with the protection of water. Environmental objectives, which the MS are required to achieve for every category of water in the RBMP are laid down in article 4 of the Directive. For example, article 4(1) (a) (ii) and article 4(1) (b)

(i) of the Directive oblige MS to protect, enhance and restore all bodies of surface water, and implement the measures necessary to prevent or limit the input of pollutants into groundwater respectively. The Directive also sets deadlines for achieving good surface or groundwater status for the relevant category of water in article 4. More extensive details on pollution controls and on the acceptable levels of pollutants in water bodies are given in the annexes to the Directive. In article 5, the Directive obliges MS to undertake a study of each RBD within its territory. According to article 2(13) of the Directive, a river basin is defined as an area of land that forms a natural basin. A RBD is defined in article 2(15) of the Directive as an administrative unit which may comprise more than one river basin. Article 5 of the Directive outlines what should be included in the analysis studies undertaken by MS, which may include: characteristics of the RBD, impact of human activity on the surface and groundwater in the basin and economic analysis of water use. Moreover, according to article 5, the Directive requires MS to update the study after every six years. Article 6 of the Directive stipulates that MS should establish a register of all areas that fall within each river basin that have been identified as requiring special protection under EU legislation dealing with the protection of water or the conservation of habitats and species dependent on water [30, 32].

Article 7 of the Directive obliges MS within each RBD to identify all water bodies used for the abstraction of water for human consumption and monitor these water bodies to ensure that they meet certain stipulated water quality standards. Article 8 of the Directive requires MS to establish programs for monitoring water quality covering issues such as flow rates, ecological and chemical status, and quantitative status in each RBD. According to the

Directive, a program of measures and a management plan for each RBD must be developed by each MS within its territories, which among other things, can protect the water in the basin, promote efficient and sustainable water use, and control pollution discharges into the water bodies in the river basin [31]. Article 14 of the Directive also requires MS to encourage all interested parties to actively get involved in the process of implementing and updating the pertinent RBMP. By this, an obligation is imposed on the MS to publish and make available for public comments all relevant information which may include among other things, timetable, work program for producing the plan, draft copies of RBMP. According to article 14, the Directive requires that these information is published at least six months before the final decision is made to allow for public consultations. Article 15 of the Directive requires that copies of the RBMP as well as updates are sent by MS to the EC and any other MS that may have an interest in the particular RBD. The WFD is one of many other Directives that regulate water resources use and protection in the EU. The Directives on Dangerous Substances, Urban Wastewater Treatment, Nitrate and Surface Water are the other relevant ones. It is also worth noting that the Directive gives no provisions concerning the regulation of water infrastructures. [32]

According to the WFD, the responsibility to establish a program of measures against water pollution by either individual or groups of pollutants lies with the EP and the CEU. Article 16 of the Directive states that a list of priority substances that present significant risks to, or via, the aquatic environment shall be prepared by the EC. It further states in article 16(5) that the list compiled by the EC should not only take into account the recommendations of a number of official technical environmental bodies, but also MS, business

and environmental groups, and international organizations to which the EU is party. That these official technical environmental bodies can be composed of the Scientific Committee on Toxicity, Ecotoxicity and the Environment and the European Environment Agency [31]. According to article 18, the Directive obliges the EC to publish a periodic report reviewing a number of things, including progress made in implementing the Directive and the status of surface and groundwater in the EU and summarizing proposals, control measures, and strategies for dealing with pollutants. Article 21 also states that a regulatory committee shall assist the EC in its responsibilities under the Directive. For river basin management, article 3 of the Directive obliges MS to identify an appropriate Competent Authority for each river basin that falls within their territory and adopt appropriate administrative arrangements for the RBD. However, there is no provision given by the Directive on WUA or advisory committees [32].

Article 9 of the Directive requires MS to take account of cost recovery principles in their water pricing policies. That, these costs should include environmental costs, resource costs and polluter-pays principle. Article 9 further states that the pricing policies adopted by MS should act as an incentive for users to efficiently use water. This should in turn help in achieving the environmental objectives of the Directive, and must ensure adequate contribution from different water users to the recovery of the cost of providing water services. Article 23 of the Directive states that to discourage breach of the national laws adopted by MS to help in the implementation of the Directive, MS are required to introduce effective, proportionate and dissuasive penalties to help in its enforcement. As such, article 23 makes it the obligation of each

MS to adopt the laws and regulations needed to bring its national legislation and regulatory framework to conform to the Directive [31, 32].

As far as mediation is concerned, the Directive does not make reference to any bodies specifically dedicated to resolving water related disputes. However, it's worth noting that in the past, the European Court of Justice under Directives has decided over a number of cases. Most notably are the cases under the Surface Water Directive against France and the United Kingdom [29]. For a transboundary water body, the Directive requires that all the work being done to achieve the requirements of the environmental objectives established under article 4 and, in particular all programs of measures given under article 11, should be coordinated with other MS who are part of that IRBD. Article 3(3) of the Directive obliges MS to establish an IRBD in case a river covers the territory of more than one MS. Article 3(3) further states that the EC shall act to facilitate the establishment of such RBD when requested by the MS involved. Each MS is responsible for implementing the requirements of the Directive in the part of the basin that belongs to its territory in coordination with the other MS of the IRBD. According to article 3(4), the Directive allows MS to use already existing structures stemming from international agreements. In this case, therefore, MS are allowed in article 3(6) to identify an already existing international body as a Competent Authority for applying the rules of the Directive within the IRBD [31, 32]. Therefore, any transboundary institution formed as result of international agreement between countries is allowed to perform the tasks of implementing the supranational requirements of the Directive [32].

4 Institutional framework

This chapter describes the institutional arrangements, roles and functions concerning WRM and development in Uganda and the EU, with Sweden taken as a case study from the EU for further illustration

4.1 Introduction

Countries have different institutional arrangements for WRM with varying roles and functions at different levels. This is because a number of factors such as level of economic development, financial and human resources, traditional norms and other specific circumstances, which differ from country to country always play a key role in determining the most appropriate institutional arrangement, roles and functions depending on the context. Despite this, we cannot ignore the critical role played by institutional development to the formulation and implementation of IWRM policies and programmes. The process of implementing IWRM may encounter complications from sources such as flawed demarcation of responsibilities between key players, inadequate co-ordination mechanisms, jurisdictional gaps or overlaps, and the failure to match responsibilities, authority and capacities for action. The consideration of the agencies that are to be involved in the management of water resources has to be done on the basis of their various geographical settings, paying special attention not only to the political structure of the country and unity of the resource in a basin or aquifer, but also to capacities of community organizations. It is important to note that institutional development does not

only involve the creation of formally constituted organizations such as service agencies, authorities or consultative committees, but also consideration of a whole range of formal rules and regulations, customs and practices, ideas and information, and interest or community group networks, which together provide the institutional framework within which water management actors and other decision-makers operate [6].

4.2 Ugandan institutional framework

In Uganda, the Water and Environment sector consists of two sub-sectors: the Water Supply & Sanitation (WSS) and the Environment & Natural Resources (ENR) sub-sectors, of which the WSS Sub-Sector is divided into four departments as given below [11]:

- Water Resources Management;
- Rural WSS;
- Urban WSS and;
- Water for production, and

The ENR Sub-Sector, is divided into three departments as below [11]:

- Environmental management; management of forests and trees;
- Management of wetlands and aquatic resources;
- Climate, weather and climate change.

The institutions that influence the management of water and environment sector in Uganda is composed of: MWE and its three Directorates (i.e. DWRM, DWD and DEA) and various parastatal organisations as well as related Government and NGOs and stakeholders at community, district, regional and

national levels. The institutional structure for the current centralised WRM in Uganda is shown in Figure 6 below. [11]

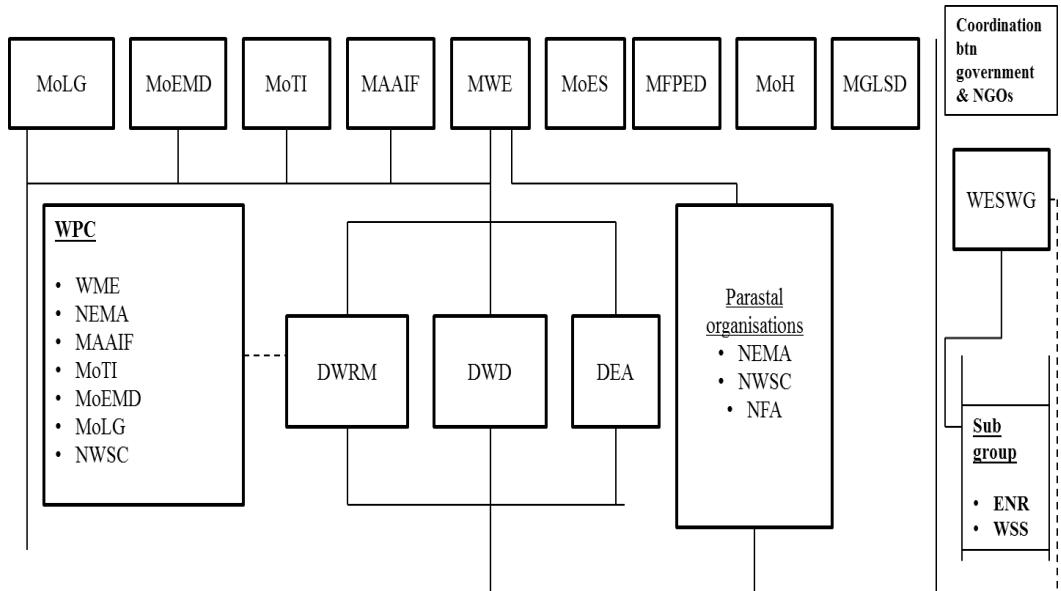


Figure 6: Institutional structure for WRM in Uganda. Showing the current centralised institutional framework for WRM in Uganda [33]

4.2.1 National level: Ministry of Water and Environment

The MWE, through its DWRM represents the institutional IWRM landscape at the national level in Uganda. MWE also takes part in the WPC, which is an inter-ministry advisory body for national water resource policy and legislation. Through its other two directorates; Water Development (DWD) and Environmental Affairs (DEA), the MWE is also indirectly taking part in water resources planning and implementation with their departments like Water for Production and Wetlands Management as well as parastatals such as the

National Environmental Management Authority (NEMA), the National Water and Sewerage Cooperation (NWSC) and the National Forest Authority (NFA) [3, 11].

As far as national coordination is concerned, there is also the government Water and Environment Sector Working Group (WESWG), with the Water and Sanitation Sub-Sector Working Group (WSSWG) taking care of WRM in greater detail whereas Energy & Natural Resources Working Group (ENRWG) is complementing this for land-use related topics. For the civil society organisations, national coordination can be achieved through the Uganda Water and Sanitation NGO Network (UWASNET), Integrated Water Resources Management Climate Change and Environment Working Group (IWRMCCEWG). Table 5 shows the different institutions involved in water sector activities in Uganda and their roles [3].

Table 5: Key players in Uganda's water sector. Showing the different institutions have interests in the Water Sector activities in Uganda [3].

NSTITUTION	ROLE
Ministry of Water and Environment	Policy formulation, setting standards, strategic planning, coordination, quality assurance, provision of technical assistance, and capacity building.
Directorate of Water Resources Management (DWRM)	Lead agency responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring, and regulation of water resources; IWRM activities and management of transboundary activities
Directorate of Water Development (DWD)	Lead agency responsible for policy guidance, coordination and regulation of all water sector activities including provision of oversight and support services to the local governments and other water supply service providers
National Water and Sewerage Corporation (NWSC)	Autonomous entity responsible for the delivery of water supply and sewerage services in the major towns and large urban centres.

Ministry of Finance, Planning and Economic Development.	Mobilization and allocation of financial resources including coordination of donor inputs and the privatization process
Ministry of Local Government	Establish, develop and facilitate the management of efficient and effective decentralized government systems capable of delivering the required services to the local people.
Ministry of Health	Promotion of hygiene and household sanitation.
Ministry of Education and Sports	Promotion of sanitation and hygiene education in schools.
Ministry of Gender, Labour and Social Development	Coordination of gender responsive development and community mobilization.
Ministry of Agriculture, Animal Industries and Fisheries	Planning, coordination and implementation of all agriculture development in the country including irrigation development, aquaculture, and livestock development.
Local Governments	Responsible for the provision and management of water and sanitation services in rural areas and urban areas outside the jurisdiction of NWSC, in liaison with DWD.
User Communities	Planning, implementation and operation and maintenance of the rural water and sanitation facilities. User communities are also obliged to pay for urban water and sanitation services provided by NWSC and other service providers.
Donors	Provide financial resources for implementation of water sector activities.
Private Sector	Valuable resource for design, construction, operation and maintenance of water and sanitation facilities; conduct training and capacity building for both central and local government staff; provision of other commercial services including mobilization of financial resources for water sector development activities.
NGOs and CBOs	Supplement the public sector efforts and ensure that concerns of the underprivileged/poor are catered for; provision of financial and planning support to communities and local governments.

4.2.2 Proposed decentralisation level

The section discusses the proposed decentralisation structure for WRM in Uganda, which was realised following the recommendations of the NWP, the Water Sector Reform Study (2005), the Joint Sector Review (2006) and other national and regional policies as well as steps already taken for implementation purposes. These various sources recommended a paradigm shift from centralised to catchment based WRM as the best strategies to combat the problems facing WRM in Uganda [2], which ultimately led to the country being delineated into four WMZs as shown in Figure 3 (Chapter 1), along hydrological boundaries. However, staff, full legal backing and clear regulation regarding the decentralised WRM structures is still lacking in Uganda. As of mid-2014, a draft of the amendment to the Water Act was being discussed with various stakeholders and up to date is still undergoing review [10].

4.2.2.1 Regional Level: Water Management Zones (WMZ)

A WMZ can be composed of one or more catchments, depending on the sizes of the catchments in question. The four WMZs under the DWRM, which are responsible for facilitating the creation of detailed catchment based WRM plans for their respective regions, will represent the institutional IWRM landscape at the regional level in Uganda. The 4 WMZs are shown in Table 6 below. Uganda commenced piloting with the catchment based WRM shortly after the creation of the four WMZs, but it wasn't until July 2011 that some of the WRM functions of the DWRM were effectively decentralised to the newly

created regional WMZs. The WMZs are currently undergoing a restructuring and re-establishing process and are expected to lead creation of individual hotspot or priority catchment management plans and respective Catchment Management Organisations (CMOs) in the coming years. [9, 11]. Figure 7 shows a proposed decentralised organisational structure. The management team of the WMZ is composed of the senior staffs from the MWE who are supported by other technical staff as appropriate. [34]. The four decentralised WMZ offices were as of FY 2013/14 still not fully operational due to gaps in staffing and still lacking legal consolidation. Never the less, piloting of catchment management plans has already started in several hotspot/priority catchments (Table 1) usually with the help of international organisations that implement activities or provide technical expertise [10].

Table 6: WMZ offices. Showing geographic coverage and office location of the four WMZs in Uganda [10]

WMZ	Major Basins	Office
Upper Nile	Albert Nile, River Aswa, River Kidepo	Lira
Kyoga	Lake Kyoga	Mbale
Albert	Lake Albert, Lake Edward	Fort portal
Victoria	Lake Victoria	Mbarara

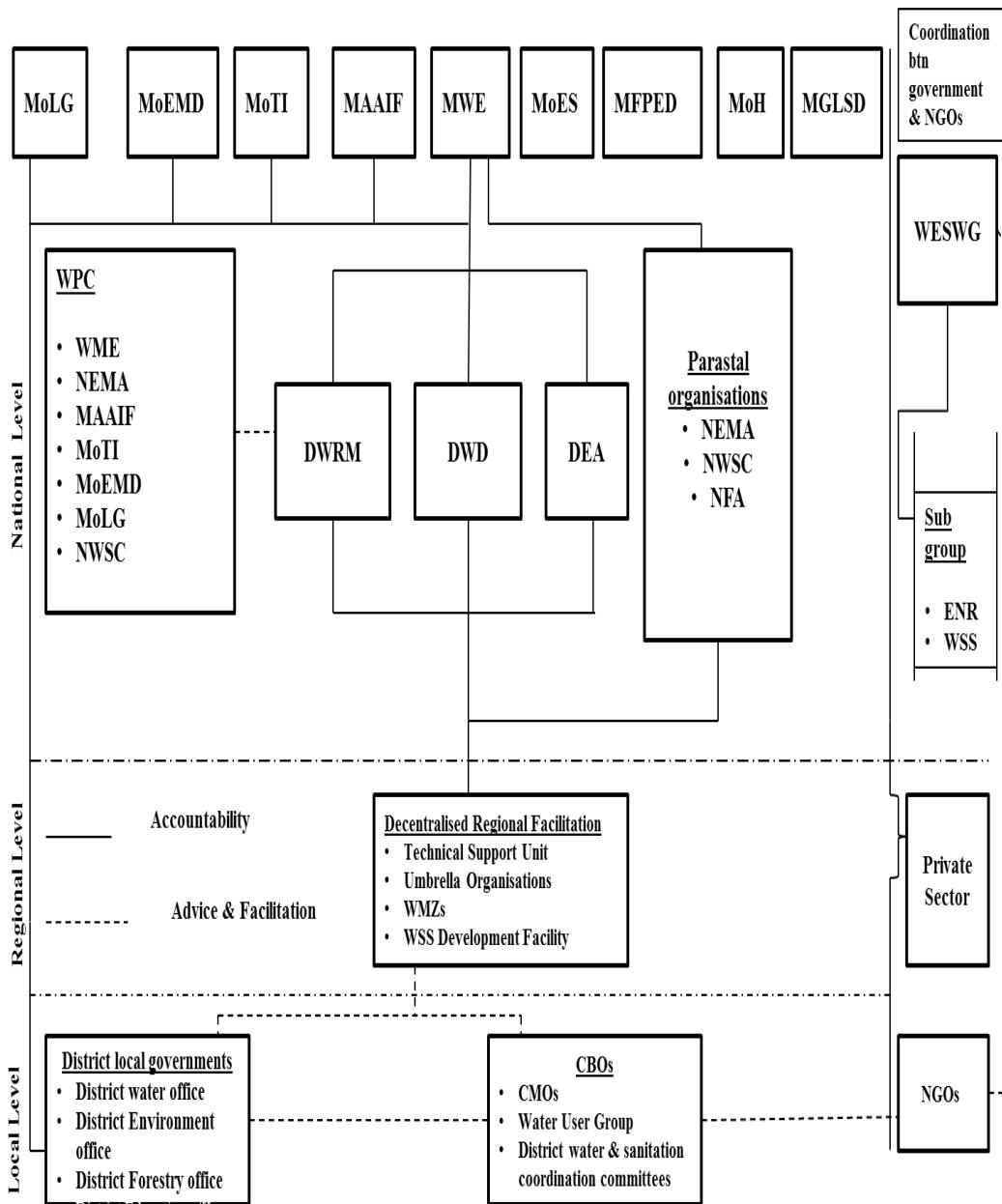


Figure 7: Proposed institutional structure for WRM in Uganda. Showing the proposed decentralised institutional Framework for water management in Uganda [33].

4.2.2.2 *Catchment/Basin level*

The WMZs are again broken down to form individual catchment areas as shown in Table 6. It is important to reiterate that Uganda at the moment still lacks full legal backing and clear regulation regarding the decentralised WRM since the amendment to the Water Act is being discussed with various stakeholders and up to date is still undergoing review. Although piloting of catchment management plans has already started in several hotspot/priority catchments as shown in Table 1 with the help of international organisations that implement activities or provide technical expertise, catchment management of water resources is still very much at an infant stage in Uganda and a lot of work still remains to be done [34].

4.3 EU Institutional Framework

The section presents the institutional arrangements for water management with the EU, starting at the EU level down to the local level, with Sweden's institutional arrangement used as an example to illustrate the management and coordination arrangements from national level downward to the basin level. The EU consists of 27 countries with over 500 million people, who are not only rich in traditions and languages, but also shared values. Thus, to defend their shared values such as democracy, freedom and social justice, the EU countries have formed several bodies to be in charge of the EU and help in the formulation of its legislation. These bodies include [17]:

- The European Parliament (EP), which represents the people of Europe.
- The Council of the European Union (CEU), which represents the national governments.
- The European Commission (EC), which represents the common EU interest and is the executive arm of the parliament and council.

4.3.1 Supranational level: EU level

According to the WFD, the EP and the CEU shall always adopt special measures against pollution of water by individual or groups of pollutants. Article 16(5) of the WFD instructs the EC to develop a list of priority substances that present significant risks to, or through the aquatic environment while paying attention to the recommendations of a number of official technical environmental bodies, as well as the MS, business and environmental groups, and international organizations to which the EU is party. In addition, article 18 of the WFD obliges the EC to publish a periodic report reviewing, among others, both progress made in implementing the WFD and the status of surface and groundwater in the EU and summarizing proposals, control measures, and strategies for dealing with pollutants. Article 21 of the WFD states that the EC is to be assisted in dispensing its duties under the WFD by a regulatory committee. Therefore, at the EU level, the EP, CEU and the EC are in charge [31]. Figure 8 shows the institutional structure at EU level down to the level of MS.

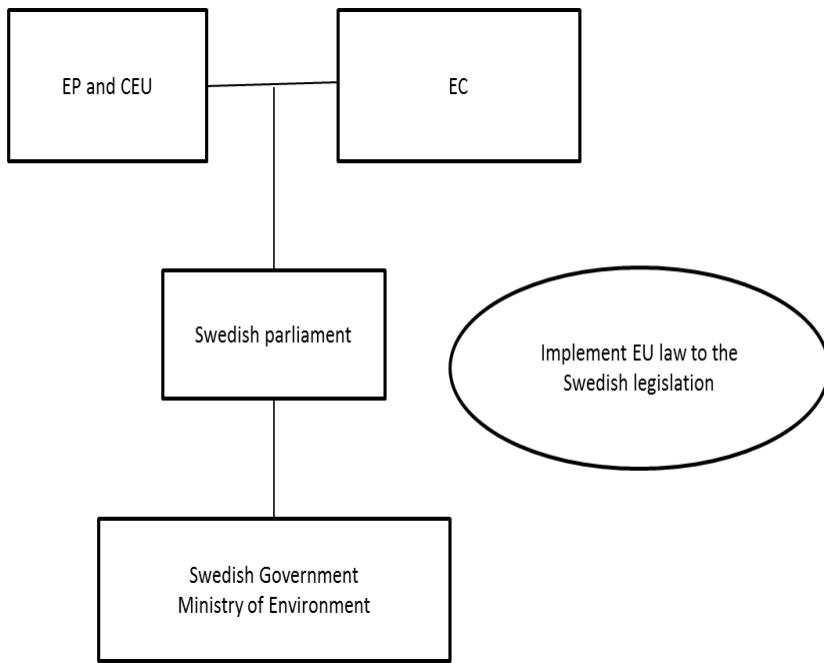


Figure 8: EU institutional structure. Showing the EU institutional structure down to level of MS [35].

4.3.2 National level: Sweden as a case study

Article 24 of the WFD obliged MS to bring into force their domestic laws, regulations and administrative provisions necessary to comply with the WFD latest, 22 December 2003 and to give the EC progress report [31]. For its part, Sweden transposed the WFD into its domestic legislation in 2004. Therefore, the Swedish Government through Ministry of Environment, has the ultimate responsibility for implementing the WFD, with its national authorities; the Swedish Environmental Protection Agency (EPA) and the Geological Survey

of Sweden guiding the RBD and County Administrative Board Authorities by creating regulations and guidelines etc. [29]. Figure 9 illustrates the Swedish WRM institutional structure.

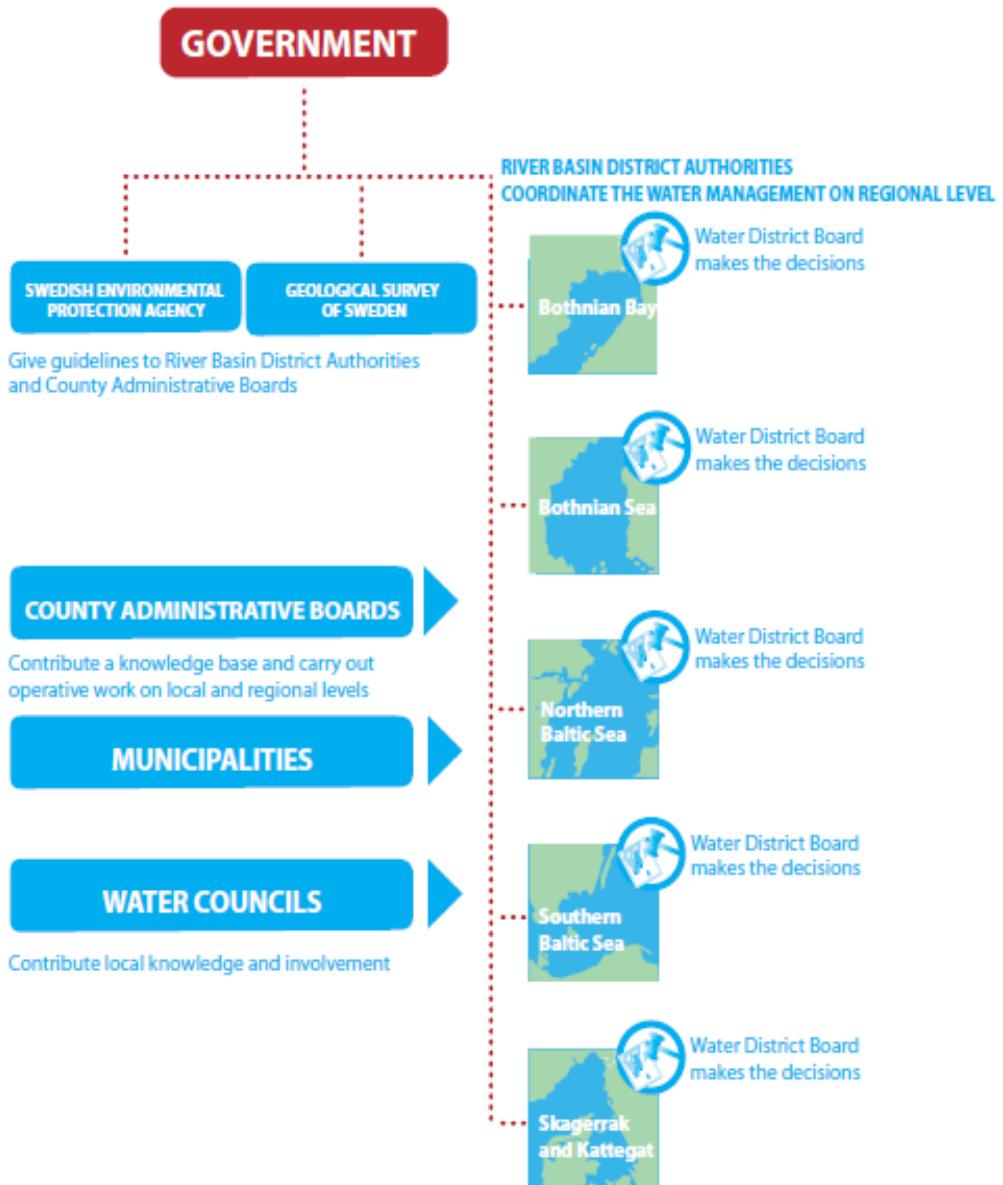


Figure 9: Swedish institutional structure for water management. Sweden taken as a case study to illustrate the institutional arrangement within the MS [29].

4.3.3 Regional level: River Basin Districts

The WFD commits all EU MS to cooperate on water issues and that water quality management be centred on river basins, which it defines as an area of land that forms a natural basin and a RBD as the administrative unit that may comprise more than one river basin. Article 3(3) of the WFD requires that in the case of a river basin covering the territory of more than one MS, an IRBD has to be established. Accordingly, article 3 of the WFD commits MS to identify an appropriate Competent Authority for each river basin within their territory and adopt appropriate administrative arrangements for the RBD and IRBD [8]. Thus, following the transposition of the WFD into its domestic law in 2004, Sweden was ultimately delineated into 5 RBDs as shown in Figure 10.

The RBDs are [29]:

- Bothnian Bay,
- Bothnian Sea,
- Northern Baltic Sea,
- Southern Baltic Sea and
- Skagerak and Kattegat



Figure 10: The 5 River Basin Districts in Sweden. Sweden was delineated into 5 river basins along the hydrological boundaries; Bothnian Bay, Bothnian Sea, Northern Baltic Sea, Southern Baltic Sea and Skagerakk and Kattegat [36]

At every RBD, there is a Water District Board, which is part of a RBD Authority, responsible for making decisions on the Authority's various fields of responsibility. The Water District Board is made up of experts from different fields, and is appointed by the Government, while a County Administrative Board in each RBD is appointed a RBD Authority. The RBD Authority is responsible for coordinating the work in the district and ensuring that the different organisations are working towards the same goal. For each RBD, work is carried out in a six-year cycle. A management cycle normally starts by a characterization of the water from which basic data, the RBD Authorities use to develop suggestions for environmental quality standards for each of the district's existing water bodies. If the evaluation of the water shows any indication of not meeting the quality requirements on time, appropriate measures have to be taken. The directive of the RBD Authorities to the Municipalities and County Administrative Boards to carry out the measures presented to them takes precedence. A RBMP, which is a detailed account of how the objectives set for the river basin are to be reached within the required timescale, is developed at the end of each management cycle and the results of the work are reported back to the EU. The elements of a RBMP may include the following [29]:

- Identification of Competent Authorities
- RBD and IRBD characterisation
- Reporting on monitored networks, Environmental objectives and programs of measures
- A register containing all protected areas.

- Summary of the consultative and participative activities undertaken to support RBMP production and the outcome of these activities

Among the elements of a RBMP, the most important ones are the analysis of the characteristics of each RBD, the review of the impact of human activity on the status of surface waters and the groundwater, and the economic analysis of water use. [29]

4.3.4 Local level

At the local level, are the Municipalities and County Administrative Boards that contribute a knowledge base to the RBD Authorities, and perform a great deal of the operative work on local and regional levels. There are also Water Councils that contribute local knowledge and involvement. The Water Council Board can be made up of Municipalities, land owners, industries, nature organisations, fishing organisations, agricultural organisations [29].

5 Comparison of the water policies and institutional setup

This chapter compares the policy and legal framework that support water management in Uganda and the EU. It draws some of these comparisons by examining how these two policy documents comply with the IWRM guiding principles and with each other, with the EU ‘water information notes’ giving an overview and introduction of key aspects of the implementation of the WFD, being a vital component of the comparison.

5.1 Introduction

The EU’s water policies establish river basin management rules which are based on the best scientific knowledge and available technologies. These principles and rules are applied in EU and non-EU countries through RBDs and international river basins organisations gathering countries sharing river basins with EU MS. However, it is important to recognise that the requirements of the existing guidelines are often hardly directly applicable to the situations of a developing country such as Uganda, but they provide lessons that are useful when preparing agreements and policies in these countries [16]. This is because IWRM concept, from which these policies adopt several principles, is a general concept whose focus varies enormously depending not only on natural, but also socio-economic conditions in the targeted country or region. Consequently, most documentation on global good practice of IWRM has been formulated and validated under conditions different from the specific

circumstances that exist in Uganda. For instance, most IWRM literature from the developed countries focus on the restoration of river ecosystems deteriorated from massive pollution and past ill-advised modifications. However, Uganda's ecosystems may still be at a near natural state that requires less efforts and resources to conserve [9]. This is further complicated by the fact that well-developed, well tested, scientifically robust, socially acceptable and economically viable approaches to implement IWRM at the river basin level are not widely available at the moment [15]. This therefore implies that alternatives have to be found to ensure that water quality management may be efficiently undertaken in the most economical and technically feasible way [16].

5.2 Comparative analysis

This section focuses on identifying some of the differences and similarities that exist between the legal and policy frameworks that support water management in the EU and Uganda.

5.2.1 Differences

- a) Assessment and management of flood and drought risks; and climate change adaptation strategy

According to the water note 10, the 2007 Flood Directive [36] obliges EU-MS to assess if water courses and coast lines are at risk from flooding, map

flood risks and finally take adequate and coordinated measures to reduce the risk. Regarding adaptation to climate change, the WFD provides EU MS with a common basis for addressing the problems brought by climate change impacts, particularly the Directive's river basin approach to water management, which establishes a strategy to prepare for and adapt to climate change [23]. In Uganda's case, the NWP vaguely states that variations in vegetation and in farming practices may lead to land degradation, soil erosion and siltation of water bodies, and may affect the hydrology and the water balance leading to the risk of inducing adverse micro-climatic changes (droughts and floods) and desertification trends. However, the existing national policy and legal framework supporting water management does not provide comprehensive guideline for assessing, managing and reducing risks from natural disasters such as floods and droughts [14]. Furthermore, the national policy does not establish strategy for preparing for and adapting to the impacts of climate change [23].

b) Water pricing and economics

According to the water note 5, the WFD has introduced two key economic principles that MS should take into consideration while pricing their water [23]:

- It requires water users such as industries, farmers and households to pay the full cost of the water services they receive;
- It requires MS to employ economic analysis in the management of their water resources and to assess both the cost-effectiveness and the overall costs of alternatives when making key decisions.

As a result, article 9 of the Directive requires MS to take account of cost recovery principles in their water pricing policies. Furthermore, article 5 of the Directive obliges MS to do an economic analysis of water use and all the elements that MS should include in this analysis are listed in Annex III of the WFD [8]. Water note 5 further states that the prices users pay for water should cover the operational and maintenance costs of its supply, costs invested in infrastructure, environmental costs, resource cost and polluter-pays principle. This has factored in a key step towards implementing the economic principle that users and polluters should pay for the natural resources they use and the damage they create to the environment [23]. Article 9 further states that the pricing policies adopted by MS should be intended to act as an incentive for users to efficiently use water. It should in turn help in achieving the environmental objectives of the Directive, and must ensure adequate contribution from different water users to the recovery of the cost of providing water services [31]. For Uganda, the existing national policy and legal framework does not require users to pay the full cost of using water. Water users only pay costs related to the operation and maintenance of the water delivery system. [8]. The NWP therefore, does not provide a comprehensive strategy for full cost recovery for the use of Uganda's water resources since the costs of the resource and damage caused to the environment during water use are excluded.

c) Groundwater Management

The WFD calls on the MS to ensure that good chemical status for ground water, which can be reinforced by the 2006 Groundwater Directive (2006/118/EC), is achieved by 2015 [23]. Article 4(1) (b) (i) of the WFD requires MS to implement the measures necessary to prevent or limit the input of pollutants into groundwater. Hence, the 2006 Groundwater Directive of the EU specifies measures to assess, monitor and control input of pollutants into groundwater [31]. Moreover, in order to ensure a stable quantity of groundwater, the WFD requires MS to ensure long-term sustainable use of groundwater by making sure that the rate of extraction of water from a groundwater body does not exceed the rate at which freshwater recharges it [32]. For Uganda, the NWP provides no guideline for monitoring, assessing and managing ground water quality and quantity. The Policy only mentions the role of the DWRM as the one in charge of monitoring, assessing and forecasting of water resources and water quality; managing surface water, groundwater and water quality data banks; and disseminating data on water resources to relevant agencies and users without further clear guideline [8].

d) Monitoring and evaluation programmes; availability and quality of meteorological, hydrological and water quality data

According to water note 6, EU MS were required by the WFD to set up monitoring programmes by December 2006 [11]. Article 8 of the WFD requires MS to establish programs for monitoring water quality covering issues such as flow rates, ecological and chemical status, and quantitative status in each RBD [32]. EU MS use monitoring as a main tool to classify the status of

their water bodies. The WFD has set a five-class scale; high, good, moderate, poor and bad status, for surface waters and a 2 class scale; good and poor, for groundwater, and it requires MS to achieve good status in all waters by 2015. Monitoring of surface water may cover the chemical composition of water, a number of key biological elements, and the hydrological and morphological characteristics of water bodies in order to provide a comprehensive overview of the health of Europe's waters. Three categories of monitoring to be performed by MS have been specified by the WFD as [23]:

- Long-term surveillance monitoring, which provides a broad understanding of the health of water bodies and tracks slow changes in trends such as those resulting from climate change
- Operational monitoring, which focuses on water bodies which do not meet good status and on the main pressures they are subjected to.
- Investigative monitoring, which is done when MS need further information about surface water bodies that cannot be obtained via operational monitoring, including information on accidents.

The NWP only states that the national role of monitoring, assessing and forecasting of water resources and water quality; managing surface water, groundwater and water quality data banks; and disseminating data on water resources to relevant agencies and users is to be retained by the DWRM. It also states that the Meteorological Department is in charge of the weather and climatic data and that it will collaborate with the DWRM to provide climate data for WRM [8]. However the NWP does not provide further clear guideline on monitoring and evaluation programmes needed to ascertain the health or quality of Uganda's water.

e) Management of pollution from point and diffuse sources
(industrial, municipal and agricultural discharges)

A number of chemicals and pollutants find their way into Europe's waters from point sources such as industrial wastewaters, and from diffuse sources like pesticides and fertilizers from agricultural lands. The WFD requires MS to take a combined approach in designing measures to control the chemical pollution from point and diffuse sources. That is to say, to consider pollution in terms of what is released into the environment (source) and the resilience of the receiving environment (waters). Chemical pollution is addressed by articles 4, 10, 11 and 16 and Annexes V, VIII, IX and X of the WFD [31]. The WFD is supported by other EU environmental legislation targeting specific activities such as the Directive on IPPC regulates pollution from large industrial installations, Nitrates Directive limits nitrogen pollution from fertilisers and manure and Directive on the UWWT for collecting and treating sewage in urban areas [23]. The EU water policy therefore provides a comprehensive and coordinated strategy for assessing, monitoring, controlling and managing pollution from diffuse and point sources.

The NWP states only that nationally, the function of managing wastewater discharge is under DWRM in consultation with NEMA. It further states that penalties are to be introduced for discharging wastes and effluent into open water bodies and river courses and that environmental statements, audits and impact assessments are to be done as appropriate in accordance with NEMA guidelines [8, 38]. However, as much as there are fixed emission standards set in the NEMA guidelines that the industries are supposed to pre-treat their wastes to comply with before discharging, most industries in Uganda have not

yet installed adequate pre-treatment facilities and there is no organisational structure well equipped to monitor and ensure that they comply accordingly. Furthermore, the current infrastructure in the country for collecting and treating municipal wastes from bigger urban centres are inadequate and substandard. This is actually the biggest problem causing pollution of many water bodies because Uganda as a country only has two substandard wastewater treatment plants yet, most industries have not installed pre-treatment facilities. In addition, the existing national policy and legal framework does not address the problem of pollution originating from diffuse sources such as fertilizers from farm lands. This is because it does not commit farmers to control the amount of nitrogen fertilizers they apply to their fields [8]. There is therefore lack of a comprehensive or clear guideline and organisational framework to monitor, analyse, control and manage pollution from non-point and point sources. Furthermore, inadequate enforcement/regulation of wastewater discharge permit conditions has led to low compliance to water laws and regulations, thereby increasing pollution levels of freshwater resources which has deteriorated water quality in the major water bodies in Uganda [39].

f) Drinking Water Quality Standards and Water Safety plan (WSP)

According to the NWP, until national water quality guidelines and/or standards are put in place, the World Health Organisation (WHO) guidelines (see appendix 2) for drinking water quality are being used with due consideration to specific local conditions and water use habits [33]. The Uganda National Bureau of Standards (UNBS), a parastatal body established by the Act of

Parliament formulates and campaigns for the use of standards; implementing standards in protection of human health and safety and the environment against hazardous, fake and substandard products [40]. According to UNBS, all drinking-water suppliers in Uganda are required to develop, implement and uphold a water safety plan (WSP), which is a comprehensive risk assessment and risk management approach that encompasses all aspects of the water supply chain from ‘Catchment to Consumer’, including: preventing contamination of the water resources; treating the water to reduce or remove contamination that could be present to the extent necessary to meet the water quality targets; and preventing re-contamination during storage, distribution, and handling of drinking water. UNBS compiles reports about the drinking water quality in the country though the reports are not made accessible to the community mainly due to lack of funds to publish them in the media and absence of a central point to have these reports disseminated [14]. The WPC, established under the Water Act is also supposed to coordinate the preparation of national water quality standards [40]. However, much as the existing national policy and legal framework in Uganda makes provisions that provide enabling environment for provision of safe drinking water, they do not make clear or explicit mention of the WSP.

According to the water note 9, the Drinking Water Directive (98/8/EC) aims at protecting human health by setting standards to ensure that the water EU citizens consume is clean and healthy and conforms to the WHO guidelines (see appendix 2). Not only does the Directive require MS to monitor the quality of the drinking water supplied to their citizens, but also the water used in the food production industry against the 48 microbiological and chemical parameters set in the Directive. Moreover, EU MS are allowed to include

additional or higher standards than those set in the Drinking Water Directive, but they are not allowed to lower the EU standards [23, 41]. In addition to the Drinking Water Directive, article 7 of the WFD obliges MS within each RBD, to identify all water bodies used for the abstraction of water for human consumption and monitor these water bodies to ensure that they meet certain stipulated water quality standards and as such, the WFD complements the requirements of the Drinking Water Directive [31]. Hence, the EU water legislation provides a comprehensive and coordinated guideline for monitoring, controlling and managing drinking water quality standards.

g) Integration, harmonisation and amendment of water policies and legislation into a common and coherent framework

Earlier EU legislation supporting water management consisted of many legislation dealing with individual water related issues hence, the existing water legislation was fragmented and uncoordinated, which prompted the EC to start considering the need for a more global and unified approach to water legislation in mid-1995 [14, 28]. The WFD was developed by reformulating the requirements of some of these old water legislation, for instance the Freshwater Fish Directive, Shellfish water Directive etc. in the WFD to meet modern ecological thinking. After a transitional period, the operative provisions of these old Directives will be taken over in the WFD allowing them to be repealed. The WFD provides a unique and innovative way to simplify legislation by incorporating and annulling seven old Directives whose requirements or provisions have been superseded by the WFD [17]. Therefore,

the WFD is a comprehensive and coordinated package that ensures that all waters in Europe are protected according to a common standard. Thus, it refers to all the other pieces of Directives supporting water management, such as UWWT Directive, Nitrate Directive, Drinking Water Directive, IPPC Directive etc., which are co-ordinated in RBMPs, where they form the basis for the programmes of measures [17, 28].

For Uganda, the existing legal framework in the form of the Water Act supporting water management passed by DWRM and the National Environmental Statute passed by NEMA, both contain provisions relating to pollution control [12]. The NWP only vaguely mentions that the permanent national function of managing a wastewater discharge permit shall be under DWRM in consultation with NEMA, due to the detailed technical expertise required, and the need to ensure adherence to international and national standards. It does not categorically clarify which of the two legislation takes precedence [8]. Consequently, this has created institutional conflicts between the DWRM and NEMA, with NEMA asserting its supervisory powers and DWRM staking their bid in the water sector as specialists in this field [18]. Additionally, the existing national policy and legal framework for WRM is also inadequate as far as regulation of pollution from diffuse and point sources is concerned. Environmental Statue also contains pollution standards that are considered by many to be too strict, hence it discourages industrial development. Uganda also has some regulations that have been issued under the provisions of the Water Act, such as regulations for the issuance of permits for water abstraction, construction of hydraulic works, drilling works, waste discharge and easement certificates, which have been facing a lot of difficulties in their implementation and enforcement. Moreover, there are some crucial

elements concerning land use and ownership in the existing legal framework that need urgent revision so that issues concerning water rights are clearly defined and properly protected. These include elements such as granting of water rights to local governments, rights of privately owned water facilities within water authority controlled service areas, the process of dispute resolution over water rights, and legislation governing catchment protection and pollution of water sources [12]. Therefore, the existing and policy legislation supporting water management in Uganda is fragmented, uncoordinated and inadequate [28].

h) Integration of land and water management

Since the physical distribution and quality of water are affected by land use changes and vegetation cover, their impacts should therefore be taken into account during the overall planning and management of water resources. Conversely, the overall allocation of available water resources must take into consideration the water quantity and quality requirements of all ecosystems since water is a key determining factor of their character and health. The concept of a river basin has been recognised as a logical planning unit for the implementation of IWRM from a natural system point of view. More importantly, catchment or basin level management is an essential means of integrating land use and water related issues [6]. For EU MS, article 3 of the WFD stipulates that planning and implementation of measures to ensure the protection and sustainable use of water is undertaken within the framework of the river basin, making a river basin a primary prerequisite for the planning and implementation of the requirements of the Directive [23]. Therefore, by

requiring MS to engage in river basin management approach, the WFD implicitly promotes integration of land use and water related issues. The existing national policy and legal framework in Uganda does not make clear provisions for integrated management of land use and water issues. The NWP only states that Uganda has not found it necessary to engage in river basin management approach at the moment. That it would be introduced in the future should problems that can only be solved using catchment level management arise, hence it is not a primary prerequisite for the planning and implementation of the requirements of the policy framework [8]. As a result, the planning and implementation of the requirements of the policy lacks that all important logical planning unit, important for integrating land use and water related issues. Therefore, the existing national legal and policy framework does not provide strategies for integrating land use and water related issues.

i) Decentralization/Devolution of decision-making to the lower level

Decentralisation of WRM, which helps to relieve the burden on the central government institutions and empower communities, has been very attractive to developing countries. The principle of subsidiarity of water resources requires that the management of water resources and service delivery should take place at the lowest appropriate governance level. The principle of subsidiarity is the basis for the IWRM concept and it became famous almost at the same time as the widespread adoption of IWRM itself. The most essential aspect of IWRM planning is perhaps the realignment of management structures and institutions along the hydrological boundaries. Realigning boundaries according to the properties of a water resource allows the IWRM plan to respond more to

localized environmental variables. Therefore, when the management of water systems are restructured, IWRM implicitly recognises a decentralized decision-making structure, where institutions at the level of water resource undertake governance of water resources. The adoption of IWRM has been mirrored by the rise of subsidiarity principle in the international agreements and policy statements [42]. In fact, the Dublin principles, Second World Water Forum and WSSD have all established stakeholder participation as one of the guiding pillars of IWRM. According to these agreements, a participatory approach requires taking decisions at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects [18]. In addition, the Bonn Key considers decentralisation to be a key element in WRM. According to the Bon Key, the local level is where national policy meets community needs and that if the local authorities are delegated power and the means and supported to build their capacities, they can provide for responsiveness and transparency in water management, and increase the participation of water users and interested stakeholders [21]. Dublin-Rio principle 2 also advocated for the management of water resources at the lowest appropriate level [3]. The subsidiarity principle is one of the many principles adopted by the EU water legislation, in which MS action is only justified when individual community action is incapable of effective governance and vice versa. As article 3 of the WFD obliges MS to identify the river basin and appropriate Competent Authority for each river basin within their territory and adopt appropriate administrative arrangements for the RBD and IRBD, it realigns EU's water management structures and institutions along hydrological boundaries, implicitly endorsed by IWRM as the best decentralised decision-making structures, where institutions at the

level of water resource undertake governance of water resources. [42]. For Uganda, the NWP adopted the Dublin-Rio principles, of which principle 2 urged that WRM should be done at the lowest appropriate levels [3]. However, according to the NWP, currently, Uganda manages its water resources centrally and the existing centralised institutional and management arrangements in Uganda are inadequate to address the WRM in the country given the need for decentralisation and devolution of powers to the lower levels of government. It further states that presently, Uganda has not found it necessary to create basins and that the government would take the necessary steps if in future the requirement for the creation of basins arise within Uganda. The Policy further notes that for the time being, the use of water resources is regulated centrally through the DWRM, but when districts acquire capacity to make assessments of the impacts of water abstraction, they will be the ones to administer the application and permit procedures. It also notes that the management of wastewater discharge permit is handled at the national level by DWRM in consultation with NEMA. Although the existing national policy and legal framework for WRM in Uganda advises that Uganda streamlines WRM arrangements as proposed in Figure 7 and specifies the roles and responsibilities of the Central and Local Governments with respect to WRM, it does not provide a full legal backing and clear regulation regarding the decentralised WRM structures in Uganda [8].

j) The combined approach to regulation of pollution

A number of chemicals and pollutants from point sources like industrial wastewaters and diffuse or non-point sources like pesticides and fertilizers

from agricultural lands, find their way into the waters of Europe [23]. To ensure that the objectives that the MS have agreed upon are achieved, the legal framework supporting water management in Europe utilises a combination of regulatory approaches, which include emission control, environmental standards and the principle of ‘no deterioration’[17]. The WFD takes a combined approach in designing measures to control the chemical pollution from point and diffuse sources. That is to say, it considers pollution in terms of what is released into the environment (source) and the resilience of the receiving environment (waters) [23]. For example, a combination of emission controls for point source pollution from industrial installations set in IPPC and the Best Available Technology (BAT) approach control pollution at the source. Then the environmental Standards for the receiving water body to protect the river and ensure that the ecosystems, or human uses, are protected must be met and in order to comply with these, emission permits must be fully protective hence, preventing pollution of receiving waters or environment. Moreover, the concept of no deterioration ensures that the quality of the receiving water or environment is maintained or even improved [17]. The policy and legal framework supporting water management in Uganda does not utilise combined approach to regulation of pollution.

5.2.2 Similarities

a) Integration between different sectors

The IWRM approach requires that the overall WRM takes in to consideration water related developments within all the economic and social sectors. Thus,

water resources policy should not only be integrated with national economic policy, but also with national sectoral policies, in areas such as health, spiritual needs, comfort, livelihood and ecosystem. Also, the development of economic and social policies need to take into consideration the implications of water resources, for example, national energy and food policies may have a profound impact on water resources and vice versa [6]. The basis of IWRM principle is that the many different uses of water resources are interdependent. The needs of all different sectors is taken into consideration when integrated approach to water and water management is at play. Therefore, the key to future action on water and sustainable development is the integration of conservation programmes and policies. The need to manage natural resources in a sustainable and integrated manner to achieve sustainable development was the main focus of the WSSD. It advocated for the implementation of the national and regional strategies to achieve integrated management of land, water, living resources and protecting ecosystem [18].

Although the WFD vaguely recognises the importance of integrating protection and sustainable management of water into other sector policy areas such as energy, transport, agriculture, fisheries, regional policy and tourism, and also acknowledges the fact that it needs to provide a basis for a continued dialogue and for the development of strategies towards a further integration of policy areas, its present focus is mainly on water status, environment and water needed as drinking water [31]. It has still ignore the need to focus on integrating between different water related sectors. Similarly, the existing national policy and legal framework supporting water management in Uganda also focuses mainly on water status, environment and water needed as drinking water, hence, ignoring the need to focus on integrating between different water

related sectors. As a result, these two policy documents do not provide comprehensive guidelines to relate population growth, increasing demand for water (for food, hydropower, transportation, fisheries, energy etc.), promotion of water efficient technologies in industry, and water saving irrigation technique. Thus, the important role played by water in economic development is lost and not appreciated in both policy documents [18]

b) Develop responsibilities at lowest appropriate level

Participation, which is an essential means of striking a balance between a top-down and bottom-up approach to IWRM, calls for the involvement of all stakeholders at all levels of the society, rich or poor in decision making at different levels of water management. In some situations, a household or the farm may constitute an appropriate decision making unit. It is important to point out that for communities to participate effectively, they need to be empowered with mechanisms and information to allow them make water sensitive choice [6]. Ability to develop responsibilities at the lowest appropriate level is very crucial for an effective IWRM approach. According to the Bonn Recommendation for Action and Dublin-Rio Principle 2, decision making, the implementation of projects and the operation of services should be decentralized to the lowest level [3, 6]. The responsibility of managing and operating water and sanitation services should be on local governments, community-based organizations (CBOs) and private service providers. The EU legal framework supporting water management, for example the WFD provides an appropriate institutional role by anchoring coordination at the highest apex level and creating co-ordinating bodies at the river basin levels,

however, it does not provide a clear guideline about water and sanitation services allocation at the lowest appropriate level [19]. The existing national policy and legal framework supporting water management in Uganda only vaguely recognises the importance of involving the users and the private sector in the decision making process and in the management of resources at the lowest appropriate level [8]. It also provides an appropriate institutional role by anchoring coordination at the highest apex level and creating co-ordinating bodies at national level. However, it also does not provide a comprehensive guideline about the allocation of water and sanitation services at the lowest appropriate level [19].

c) Involvement of women in decision-making

A lot of concerns regarding gender issues have been included in several guiding principles promoting IWRM concept, however, before rhetoric is replaced by operational mechanisms and actions to ensure an equitable participation of women in IWRM, a lot of work still remains to be done to get there. Therefore, the pivotal role of women as providers and users of water and guardians of the living environment has to be recognised and special efforts must be made to ensure women's participation at all organizational levels [6]. The role of women as carriers of water, main users, family health educators, motivators and agents of change, for better and efficient WRM must be reflected in the institutional arrangement of water resources. Women are entitled by right to an equitable share in the management of water for all uses including domestic, farming and entrepreneurial and protection of the environment. IWRM requires that the specific needs of women should be

addressed and they should be equipped and empowered so that they participate at all levels in water resources programmes, including management, problem analysis and in the decision-making process related to water resources, in ways defined by them [18]. According to the Dublin Principle 3 and Dublin-Rio Principle 6, women play a central part in the provision, management and safeguarding of water [3, 42]. The Ministerial Conference was implored at the Second World Water Forum to advocate for the need for fair and balanced male and female roles and responsibilities at all ages and in all settings, including water policies, institutions and in the design, planning, implementation, monitoring and evaluation of schemes [18, 19]. The promotion of gender equity in WRM was further stressed in the Bonn Recommendation for Action. The management of the sustainable use of water resources and sharing of benefits should be equally executed by both men and women. Planners were implored by the Report of the Gender Plenary Session in the Bonn Conference to systematically include a gender perspective in the development of all national and regional water resources policies and programmes. That all settings related to water should reflect the division of roles and labour, paid and unpaid, between men and women. That data relating to water should be disaggregated by gender [18, 21]. According to the WSSD Plan of implementation, the role of women should be enhanced at all levels and in all aspects of rural development, sustainable agriculture, and nutrition and food security [18].

However, the two policy documents for supporting water management in the EU and Uganda fall short of focusing on gender awareness and the involvement of women in water management, decision making and the

implementation of water related projects. Both policy documents do not provide clear strategies for gender mainstreaming [18].

d) Participation of stakeholders in WRM

IWRM considers stakeholders participation as one of the most important issues in water resources development and management [6]. IWRM requires that the planning and implementation of water related projects are done with full consultation and involvement of the users and that the decisions are made at the lowest appropriate levels. According to the Dublin principle 2, water should be developed and managed through a participatory approach, involving users, planners and policy makers at all levels [18]. The Bonn Recommendation for Action calls for the participation of stakeholders who use or protect water resources and their ecosystem in decision making. It further states that special attention is needed to improve the participation of the marginalised people, particularly the poor and women, who are often excluded from decision making. In order to ensure public involvement and the inclusion of stakeholders' interests in WRM, the Ministerial declarations of the Second World Water Forum implored that water should be governed wisely. That users should have a right to access water services as well as actively participate in WRM. There is a need to observe the principle of subsidiary which drives down action to the lowest appropriate level so as to achieve efficient, equitable and sustainable water management within the IWRM approach [18, 42]. According to the WSSD, the involvement of all concerned stakeholders is recommended to facilitate the establishment of public-private partnership and other forms of partnership. WSSD also urged that focus must be put on the

need to facilitate access to public participation and participation, including women, in all kinds of policy and decision making and implementation processes related to WRM [18].

According to the water note 12, article 14 of the WFD requires MS to encourage all interested parties to actively get involved in the process of implementing and updating the pertinent RBMP [23]. Article 14 of the Directive thus imposes an obligation on MS to publish and make available for public comments all relevant information. The same article further requires that these information is published at least six months before the final decision is made to allow for public consultations [32]. Thus, the EU legal framework for water management gives clear guideline for stakeholders participation in the production, review and updating of the RBMPs, but does not provide a comprehensive guideline to include water users and other interested stakeholders in the management of water resources [18]. In fact, the WFD does not have any provision dealing with the inclusion of Water User Groups (WUG) or Water User Association (WUA) [32]. Although, the importance of stakeholders' participation in water supply and sanitation provision in rural and peri-urban areas is vaguely mentioned in the existing national policy and legal framework supporting water management in Uganda, there is no clear guideline in either the production, review and updating of RBMPs or the inclusion of water users and other interested stakeholders in the management of water resources provided [8].

e) Coordination in international, regional or transboundary river basins

According to water note 1, in case of a transboundary water body, EU MS are required to coordinate their activities to achieve the requirements of the environmental objectives established in the WFD with other MS who are part of that IRBD, particularly all programs of measures [23]. Article 3(3) of the WFD obliges MS to establish an IRBD in case a river covers the territory of more than one MS and that each MS is responsible for implementing the requirements of the Directive in the part of the basin that belongs to its territory in coordination with the other MS of the IRBD. Article 3(4) of the Directive allows MS to use already existing institutional structures stemming from international agreements. Thus, article 3(6) of the WFD allows MS to identify an already existing international body as a Competent Authority for applying the rules of the Directive within the IRBD. As a result, the Directive allows MS to use any transboundary institutional structure established under international law for implementing the supranational requirements of the Directive [31, 32]. For Uganda, as far as transboundary waters are concerned, the existing national policy and legal framework recognises the various currently accepted principles of international law on the use of shared water resources and Uganda participates in international, regional and basin-wide bodies of cooperation. This therefore means that for water resources involving regional and Nile basin wide context, international laws, principles and procedures are applied. For instance, the Lake Victoria Basin Commission (LVBC) for ensuring sustainable management of Lake Victoria between the countries of Uganda, Kenya and Tanzania who share it. Also, the Nile Basin

Initiative (NBI) for the sustainable management of the River Nile of which 98% of Uganda lies within the Nile basin. Cooperation between Uganda and the other Nile Basin countries is ongoing and will continue to ensure the supply of sufficient water needed for development to all basin countries [8]. Therefore, like the EU water legislation, the existing national policy and legal framework for water management allows Uganda to use already existing structures stemming from international agreements. Thus, transboundary institutional structure established under international law may be entrusted with the task of implementing the supranational requirements of the NWP [8, 32].

Therefore, the two policy documents both have provisions for coordination in the transboundary waters. More importantly, they both recognise the importance of using already existing international structures and bodies to enhance the efforts of transboundary WRM [32]. However, the integration of the transboundary waters into the policy and legal framework supporting water management in Uganda is inadequate. As a result, Uganda currently lacks adequate national strategy for management of national and international shared water resources. The present agreements for sharing transboundary waters are the colonial period agreements signed between United Kingdom and Egypt; and between Egypt and Sudan, which are not well supported within Uganda [12].

f) Institutional capacity building

The means of enhancing institutional performance is through all round capacity building of the institutional human resources. From the IWRM point of view, the efforts of nurturing, enhancing and utilizing the skills and

capacities of people and institutions at all levels, whether local, national, regional or international so as to make better progress towards a broader goal, all tantamount to capacity building. The best way to achieve capacity building is when people and organisations are empowered and equipped with appropriate tools and sustainable resources that can help them solve their problems by themselves, instead of attempting to fix the problems for them. More importantly, the most satisfying products of a successful capacity building is when individuals and institutions are better capable of providing products and services on a sustainable basis more effectively [6]. The NWP only states that the DWRM is responsible for building capacity to monitor and forecast seasonal variations in water resources as they are related to climatic variations and that capacity to objectively analyse water quality will be developed and sustained [8]. The WFD does not explicitly make provisions dealing with matters concerning institutional capacity building. Although the NWP vaguely mentions capacity building, both policy documents do not provide comprehensive programmes intended to realise institutional capacity building for sustainable WRM functions at international, national, regional and local levels [12].

6 Discussion

This chapter outlines the key issues identified as being the ones preventing the sustainable and integrated water management in Uganda. It then discusses the proposed course of actions that need to be taken to address these issues in order to improve water management and development in Uganda.

6.1 Introduction

Policy development in Uganda continues to be influenced by new developments in the international scene, which often lead to changes in the ways government conducts its business. There have been calls to change the way WRM functions are performed in Uganda due to the emerging water resources related issues such as decentralized service delivery and management of resources, promotion of private sector participation, increased need for stakeholder participation and environmental management. Despite government's efforts in doing all it can to address all the aforementioned emerging issues, the existing policy, legal and institutional framework, and strategies for WRM are inadequate to address all of them in an integrated and sustainable manner. Therefore, to ensure the availability of water of adequate quantity and good quality for the present and future generation of Uganda, there is a need to develop a policy and legal framework that promotes a holistic approach to WRM and development in the country [12]. Uganda therefore needs to update the existing legal, policy and institutional framework supporting water management in order to be able to effectively and efficiently

fulfil its mission of “promoting and ensuring the rational and sustainable utilisation and development, and the effective management and safeguard of water resources, for social and economic welfare and development as well as the equitable sharing and adequate protection of trans-boundary water resources” [8].

6.2 Recommendations

This section discusses possible course of actions to deal with the key issues related to WRM that have either been inadequately addressed or have just recently emerged in order to formulate better guidelines for a sustainable and integrated management of water resources in Uganda. In principle, the key course of actions that are necessary for improved WRM in Uganda may be grouped as [12]:

- A comprehensive strategy for management of national and international shared water resources;
- An updated policy and legal framework supporting WRM in the country;
- A revised institutional framework for policy making, planning and coordination of WRM at various levels;
- A long term capacity building programme for WRM;
- A clear guideline to promote the active participation of various stakeholders in WRM;
- Increased allocation of funds for WRM; and
- Improved enforcement of water legislation.

Further discussion of these proposed course of actions to address the key issues preventing sustainable and IWRM in the country are given below:

a) Mainstreaming of gender issues

According to the Dublin Principle 3 and Dublin-Rio Principle 6, women play a central part in the provision, management and safeguarding of water [3, 18]. Despite the fact that women are active in providing and using water, they are far less involved in water management, decision making and the implementation of water related projects in Uganda. Although women have often had a unique and valuable point of view on how water can be used in an efficient way, their inclusion in the decision-making processes in the country is still inadequate despite government's efforts to put in place gender sensitive policies [12]. To ensure that the water sector as a whole is gender aware, the government needs to implement training programmes for water professionals and community or grass root mobilizers [6]. Thus, there is a need to mainstream gender sensitive issues in the management of water resources activities in Uganda in order for women to be involved in decision making at community level and other higher levels of the government [12].

b) Institutional capacity building

For an effective management of water resources related projects, there should at least be a minimal level of capacity at all levels, including that of decentralized local governments. Having a community-level capacity that is

functional builds resilience to hazards, and facilitates the use of knowledge and technologies, innovation and education, thereby creating a culture of safety and resilience at all levels [6]. Although the main focus of Uganda government over the last few years has been capacity building for WRM at the national level, more work still remains to be done to adequately address emerging water resources related issues, such as decentralisation. As a result, building the capacity of the people at the local government and community levels to perform functions of WRM still remains the biggest challenge to be overcome [12]. There is a need for the government to express local capacity development and training priorities as a regional agenda, so as to enable many partners to buy in along the research-to-development continuum (where research continues to be problem-driven), and to form collaborations where consortia, alliances, networks, and individual organizations may all find their place to both fund and benefit from it [6]. Thus, to make sure that the WRM functions at national, regional and district levels are efficiently and effectively performed, there is a need for Uganda to develop a comprehensive capacity building programmes. This will however require more funding to be allocated for WRM [12].

c) Participation and coordination in international and regional water resources initiatives and HEP programmes

Due to the position of Uganda in the Nile basin, it is both a lower and upper riparian. It is an upper riparian in relation to Egypt and Sudan; and a lower riparian in relation to Kenya, Tanzania, Rwanda, Burundi and the Democratic Republic of Congo and therefore has an interest in uninterrupted flow and

conservation of water quality [3, 8]. Moreover, the economy of Uganda almost entirely depends on hydropower for the generation of its electricity. Uganda's main source of energy is hydropower, concentrated along the River Nile, with an estimated potential of over 4000MW. Uganda currently depends on two sources on the Nile, which is part of a transboundary water, at Owen Falls and Bujagali. The country has plans underway to increase its energy capacity by developing more hydro power stations on the Nile and other non-Nile rivers. However, this is complicated by the fact that currently, the integration of the transboundary waters into the policy and legal framework supporting water management in Uganda is inadequate. As a result, Uganda still lacks adequate national strategy for management of national and international shared water resources as the colonial period agreements on which the plans for sharing transboundary waters were based, are not fully supported in the country and yet, it is still upheld by its beneficiaries. These agreements were signed between United Kingdom and Egypt; and between Egypt and Sudan [12]. It therefore suffices to say Uganda may in the future face challenges such as lack of a better regulatory policy to regulate Lake Victoria, fluctuation in the levels of Lake Victoria and other equatorial lakes within the Nile Basin due to climate change and variability, water quality maintenance due to water hyacinth, sedimentation etc [5]. The fact that energy is essential to socio-economic development of Uganda means that hydropower generation will remain a major consideration in the management and use of water resources, including its allocation among competing uses [39]. Uganda therefore needs to develop a comprehensive transboundary water resources strategy that will guide her participation in regional WRM initiatives in order to obtain its equitable share of the Nile Basin water resources to be able to develop her HEP programmes.

Equally important is the need for Uganda to be able to regulate Lake Victoria with a more scientifically friendly policy supported by Decision Support Systems (DSS), which may help it develop her HEP programmes without infringing on water rights of other riparian countries and local users. [12].

d) Decentralisation/devolution of WRM

The management of water resources requires that actions and decisions are taken at the most appropriate level with the central government retaining the ultimate responsibility for WRM [12]. Also, the Bonn Keys considered decentralisation to be key to WRM and that the needs of the community is usually met by the national policy at the local level [18]. It is against this background that the NWP has allowed some of the water management functions that can best be performed at lower levels to be decentralised. Uganda has been undergoing a decentralization of responsibilities from central government level to district local government level since 1993. The roles and responsibilities of the Central and Local governments with respect to WRM have been specified in the Constitution, Local Government Act and the Water Act [39]. This shift of responsibility with districts becoming the main implementation agents has had a positive impact on the players in the urban and rural WSS sectors and the human dimension is now being emphasised in WRM issues. [5]. Uganda therefore needs to develop a comprehensive guideline promoting WRM, paying particular attention into the creation of CMOs, capacity building in the local governments and district level institutional arrangements, clearly specifying the roles and responsibilities, rights and obligations of stakeholders, the levels of decentralisation, and the

processes and means for good water governance [4, 16]. In addition, there is need to allocate adequate funding for WRM functions at the local governments since this intervention is bound to result into addition of institutional structures at lower levels [12].

e) Integration, harmonisation and amendment of water policies and legislation into a common framework

To apply the concept of IWRM, it is necessary to assemble and review the full range of existing policies, laws and regulations that apply to water-related activities and how the existing policy and legislation adapts or can better be adapted to accommodate sustainability and integration with regard to WRM. Water legislation can clarify the entitlement, roles, rights, obligations and responsibilities of stakeholders and ensure sustainable use of the resource by presenting a balanced approach between resource development for socio-economic purposes, and the protection of water quality, ecosystems and other public welfare benefits. However, if the water resources of a country is governed by too many pieces of policies and legislation dealing with individual water related issues, it's bound to create fragmented, inadequate and uncoordinated mechanism for WRM that may lead to challenges in the implementation and enforcement [17]. Uganda has a number of legal instruments that need to be updated to remove the implementation and enforcement bottlenecks for effective WRM, some of which may include [12]:

- The Water Act and National Environmental Statute both contain provisions relating to pollution control, which need to be harmonised.

- The inadequacy of the existing national policy and legal framework to control pollution from point and diffuse sources. Needs to be amended.
- Environmental statute contains pollution standards that are considered too strict, hence, it discourages industrial development. Therefore, needs to be reviewed.
- Some regulations issued under the provisions of the Water Act are challenging to implement and enforce. The Water Act and Regulations therefore need to be amended.
- Some crucial elements concerning land use and ownership in the existing legal framework need to be revised

Uganda therefore needs to update its existing national policy and legal framework related to water to produce a more comprehensive, coordinated and unified framework of water legislation similar to the WFD [12].

f) Monitoring and evaluation programmes; availability and quality of climatic, hydrological and water quality data

Having adequate knowledge and information about the water resources inventory of a country is a very vital aspect of WRM. Maintaining and accruing sound knowledge of a country's water resources should strongly be supported by scientific knowledge and views. This therefore calls for a comprehensive monitoring and evaluation programmes, essential for ensuring that the current management of water resources is properly implemented and to identify the needs for adjusting management strategies. Effective monitoring requires accessible data, analytical tools and adequate information [6]. Therefore,

against this background, it is apparently clear that the availability and quality of climatic, hydrological and water quality data of Uganda is vital for WRM as a whole and, in particular water resources assessment studies. However, the existing meteorological and hydrological monitoring networks being maintained by the Meteorology Department and DWRM respectively, are inadequate [12, 39]. This is because currently, data collection exercises are done by DWRM on a quarterly basis, which does not only compromise real time availability of information for planning, management and regulation purposes, but also a major factor in the poor quality and gaps in data. Moreover, the access of reliable hydrological, meteorological, and water quality data for use in planning is a major challenge to the different institutions and agencies in need of using it. Furthermore, rating curves of many rivers require recalibration as they are outdated. Therefore, it is of utter most importance that the monitoring systems of Uganda are upgraded and expanded so that they meet the acceptable minimum international or even higher standards for capturing adequate and reliable data and information to assess: quality, quantity and use of water resources; health of aquatic ecosystem; atmospheric conditions that may affect water resources etc [39]. All in all, Uganda needs a comprehensive monitoring and evaluation programme to help gauge the health of its water resources and aquatic ecosystems [6, 23].

g) Management of pollution from diffuse and point sources.

Uganda being a country whose economy primarily depends on agriculture, has a low per capita income and living standards. However, in an effort to improve per capita income and living standards, the government is committed to the

process of industrialization leading to a remarkable growth in the industrial sector in recent years. However, since most industries in Uganda have not installed adequate wastewater pre-treatment facilities and there is inadequate infrastructure for collecting and treating municipal sewage, industrial pollution is becoming a significant environmental problem in some areas [12]. The situation is worsened by the fact that the existing national policy and legal framework for water management in the country does not provide adequate regulation for pollution from point sources, like industrial and municipal waste discharges to receiving environment and pollution from diffuse sources, like agricultural waste discharges to groundwater. Therefore, in order to ensure that pollution from point and non-point sources are effectively monitored, controlled, managed and treated, there is need to update the existing national policy and legal framework for managing water resources to ensure that there is a proper setup for point and diffuse source waste management in the country, with a competent organisational structure for executing the functions [6, 12].

h) Coordination mechanisms

The implementation of IWRM could better be achieved in Uganda if the coordination of the administrative organisations is improved [17]. There are a number of key players such as ministries and parastatal bodies listed in Table 5, that influence the way Uganda's water and environment sector is managed. This has created a scenario where Uganda's water resources are managed and developed by different sectors of government located in different ministries without proper coordination [4]. In an attempt to foster coordination, the WPC, which is responsible for developing national policies, priorities, and

coordinating revisions to legislation and other sector ministries' plans and projects which affect water resources, was established under the Water Act. The WPC also coordinates the preparation of national water quality standards, mediates and undertakes conflict resolution between national authorities on water resources matters. Also, at the national level there is the WESWG with the WSSWG taking care of WRM in greater detail whereas ENRWG is taking care of land-use topics related to WRM. However, the National Development Plan 2010-2015 identified some weaknesses in the institutional setup which result into limited networking, coordination, collaboration, financial leverage and information exchange among the role players in the water and environment sector [39]. Therefore, there is a need to review the roles and redefine the functions of these coordination mechanisms so that they effectively perform, since they have so far not carried out their mandated roles [12].

i) Integration of land and water resources management

As the physical distribution and quality of water is affected by land use changes and vegetation cover, their impacts should therefore be taken into account during the overall planning and management of water resources. Conversely, the overall allocation of available water resources must take into consideration the water quantity and quality requirements of all ecosystems since water is a vital factor in determining their character and health [6]. Therefore, it is apparently clear that to a large extent, the quality and quantity of the available water resources is determined by land, making it difficult to disentangle the management of water resources from that of land [12]. In addition, the Dublin-Rio principle 5 also recommends that land use and water related issues should

be integrated to ensure a sustainable WRM [3]. Therefore, a comprehensive national policy and legal framework for integrated land and WRM in the country needs to be developed [12].

j) Implications of the recommendations of water supply and sanitation reform studies on WRM

The WSS sector has been undergoing reforms by the government of Uganda for the past four years. The reform process, which included studies on the rural and urban sub-sectors, and water for production, has involved a comprehensive assessment of the WSS sector. The key strategies to emerge from these studies include; more decentralised delivery of services, increased private-sector participation, and the need for a programmatic, sector-wide approach (approach to support a country-led program for a coherent sector in a comprehensive and coordinated manner), aimed at providing adequate safe drinking water to the rural and urban populations of Uganda and water for increasing production [43]. These strategies have implications on WRM and thus call for reform of the WRM sector to cope with the recommendations [12].

k) Charging the full cost of water

Presently, the existing legal and policy framework for water management in Uganda does not require water users to pay the full cost of water services. Water users only pay costs related to the operation and maintenance of the water delivery system [8]. However, in principle, charging the full cost for water assures the long-term viability of the water supply service and effectively

limits water demand thereby ensuring sustainability of the resource [6]. Also, the Second World Water Forum recommends that water users should be charged the full cost of the services, with appropriate subsidies made available to the poor [18]. The full cost of providing water should include: operational and maintenance costs; the costs invested in infrastructure; the environmental and resource costs; and possibly polluter pays principle. This is a key step towards implementing the economic principle that polluters and users should pay for the natural resources they use and the damage they create [6]. According to the WSSD, charging the full cost of the services is intended to act as an incentive for water users to use water more efficiently [6, 12]. Where the users are too poor to pay for the full cost, government can subsidise accordingly, but all the costs have to be factored in. Therefore, Uganda needs to develop a comprehensive national policy and legal framework for water pricing to ensure appropriate pricing that fosters sustainable water use and full cost recovery [4].

- I) Management of flood and drought risks; and climate change adaptation strategy

The fact that Uganda's water resources exhibit both seasonal and spatial variability means that some parts of the country may have too little water while other areas have too much water during certain periods of the year. Both of these situations, worsened by the impacts of climate change often result in disasters in form of droughts and floods in different areas of the country. For instance, in late February 2010, heavy rains resulted into floods, water logging and landslides that affected more than 50,000 people across the country.

Additionally, in May 2013, heavy rains caused the rivers Nyamwamba, Mobuku and others in western Uganda to burst their banks which led to heavy floods in nine sub counties of the district, killing a number of people and destroying a lot of properties [4]. Preparing for and adapting to climate change is a major challenge for water management in a poor country like Uganda, where the population is vulnerable and lacks capacity. In the years to come, it is predicted that climate change will increase the frequency and seriousness of flooding, droughts and other consequences throughout the water cycle [6]. Uganda therefore needs to develop a comprehensive guideline for assessing and managing drought and flood risks, with a clear strategy to prepare for and adapt to climate change that gives a particular attention to river basin approach [6, 23]. Also, the WRM department should closely collaborate with the urban and rural WSS departments to ensure that provision is made for water related disasters with regards to water services which should become an integral element of water for production and WSS development plans [39].

m) Groundwater management

61% of Uganda's water resources comes from ground water sources, accessed from springs and boreholes. Groundwater is the major source of water supply in the rural, semi-arid and arid areas in Uganda. Groundwater development has been going on since the 1930s through construction of deep boreholes, shallow wells and protected springs [5]. Therefore, in light of this importance of groundwater to the country, Uganda should jealously protect its groundwater resources from pollution as well as ensure its long-term sustainable use [23]. However, due to inadequate data and resources, very few groundwater

recharge and quality assessments have been carried out in Uganda thus, recharge and quality estimates for most areas remain unknown [5]. Therefore, Uganda needs to develop a comprehensive guideline for monitoring and assessing groundwater quality and quantity. This could include strategies to prevent or limit inputs of pollutants into groundwater and ensure a long term sustainable use of groundwater to ensure a stable quantity for the future generation. This will also require serious enforcement of laws for groundwater use and protection [39].

n) Stakeholders participation and awareness

IWRM requires that decisions are taken at the lowest appropriate level, with full consultation and involvement of the users in the planning and implementation of water related projects. It calls for a broad participation of people from various backgrounds, professions and functions to ensure that all vital water uses and needs are taken into consideration [6]. Also, Dublin principle 2 calls for water development and management to be based on a participatory approach, involving users, planners and policy makers at all levels. According to the Second World Water Forum, through a participatory process of water management, water can empower people, in particular women and that participation entails sharing of power, democratic participation of citizens in elaborating or implementing water policies and projects and in managing water resources [43]. Uganda still has a long way to go in ensuring that there is a satisfactory stakeholders' participation and awareness as water users and interested stakeholders are still not included in WRM and planning

[6]. Although some stakeholders have been directly engaged by the DWRM, particularly those in the pilot catchment based initiatives in the Albert and Victoria WMZs, many people still do not understand what functions of the MWE are performed by the DWRM. This has primarily been blamed on the fact that there is limited interaction between sub-national level stakeholders and the DWRM officials. This situation has been worsened by lack of direct linkages between district local governments and the DWRM and because currently, DWRM operations are centralised in nature. Therefore, unless there is a better understanding of the DWRM functions and the roles of the various stakeholders in delivering water related services, there is bound to be concerns of divergent expectations and ineffective consultations [39]. Therefore, water users should not only have a right to access of water and sanitation services but also participate actively in WRM [6]. For this to be possible, Uganda needs to develop comprehensive strategies not only for stakeholder participation in the production, review and updating of the RBMP or whichever management unit it uses and other water related projects, but also for the inclusion of all interested stakeholders and water users in WRM [18].

o) Drinking water quality standards and WSP

The existing national policy and legal framework supporting water management in Uganda i.e. the Constitution, NWP and Water Act, were developed in the period 1994-2000 after the UNCED in Rio de Janeiro in 1992, where Agenda 21 on freshwater resources was developed. The WSP concept came to prominence after its inclusion in the 4th edition of the WHO guidelines (see appendix 2) on drinking water quality in 2004. Although the existing

national policy and legal framework in Uganda has provisions to provide enabling environment for safe drinking water, it does not make clear mention of the WSP [39]. The 1995 Constitution of Uganda acknowledges access to clean and safe water as a basic human right and that the State shall take all practical measures to promote a good water management system at all levels [26]. The NWP, provides for setting of national drinking water quality standards as one of the key functions of WRM [8]. The Water Act provides for the establishment of a protected zone around where water for human consumption is abstracted [27]. The National Water Quality Management Strategy (2006) adopted WSP tool for assessment of rural/small community water supplies which was then incorporated as part of the national drinking water and bottling water standards in 2008, but it is only partly implemented in the large towns under NWSC, and not yet at the rural level [39]. Therefore, Uganda needs to update its existing national policy and legal framework to incorporate provisions that require all drinking-water suppliers to develop, implement and uphold WSP to ensure safe drinking-water through good water supply practice, both in rural and urban areas. It should also setup a competent organisational structure to monitor, assess, manage and enforce the law to ensure that drinking water quality standard is upheld in the country [40].

p) Developing responsibilities at the lowest appropriate level

Participation, which is an essential means of striking a balance between a top-down and bottom-up approach to IWRM, calls for the involvement of all stakeholders at all levels of the society, rich or poor in decision making at different levels of water management [6]. However, water management in

Uganda presently continues to be centrally performed by the government, a top-down institution, without the decentralisation of decision-making at the lowest appropriate level [4]. To achieve efficient, equitable and sustainable management of water resources within the IWRM approach in Uganda will require a drastic institutional change in water management, where both top-down and bottom-up participation of all concerned stakeholders is promoted, from national level down to the level of a village or from the level of a catchment or basin up to the national level. It also calls for the adoption and promotion of the subsidiarity principle for water resources, which suggests that water management and service delivery should take place at the lowest appropriate governance level [6]. Therefore, Uganda needs to develop a comprehensive legal and policy framework for both national and transboundary waters that provides clear strategies for allocation of responsibilities for water management and services to the lowest appropriate level [18].

q) Integration between Different Sectors

The IWRM approach requires that the overall WRM should take in to consideration water related developments within all the economic and social sectors. Thus, water resources policy should not only be integrated with national economic policy, but also with national sectoral policies, in areas such as health, spiritual needs, comfort, livelihood and ecosystem. Also, the development of economic and social policies need to take into consideration the implications of water resources, for example, national energy and food policies may have a profound impact on water resources and vice versa.

Therefore, it is imperative that when development projects are being designed and prioritised, it should take into consideration the possible impacts of such developments on the water resources [6]. However, water resources planning in Uganda presently continues to be performed on a sector basis and there is no holistic approach to water resources development and use [4]. Moreover, the National Development Plans 2010-2015 pointed out that there are gaps and, in some cases, inconsistencies in the overall sector policy and legal environment which have created an inadequate legal backing for holistic planning and implementation [39]. The process of integration and coordination with other sector policies will require some drastic changes which may not be supported by everyone affected. However, it is only through this painful, yet helpful changes that Uganda can gain a new perspective and path towards an integrated approach to sustainable water management [17]. Therefore, Uganda needs a comprehensive legal and policy guideline that clearly relates population growth, increasing demand for water, promotion of water efficient technologies in industry, and water saving irrigation techniques. In principle, it is imperative that the policy and legal framework supporting WRM is formulated in a way that makes the role played by water in development to be clearly understood and appreciated [18].

r) The combined approach to regulation

Presently, Uganda uses NEMA guidelines [38], which deals with the needs of the receiving environment in the form of quality/environmental standards to help bring gross pollution of the water environment under control. However, due to lack of full scientific knowledge within the environment, quality

standards can underestimate the effect of a particular pollutant on the ecosystem hence, there has been limited success in this regard. This however, could be done more effectively and cheaply by adopting an approach similar to the EU's combined approach of emission limit and environmental standards for rivers and lakes, which offers greater flexibility and customisation of the regulatory efforts to optimise environmental conditions [17] The combined approach considers pollution in terms of what is released into the environment and the resilience of the receiving environment (waters) [23]. Addressing pollution from diffuse and point sources require innovative approaches that employ a wide range of regulatory and financial tools. Therefore, Uganda needs to develop a strategy for regulation of emission quality and environmental standards that utilises the combined approach method similar to the EU's [17].

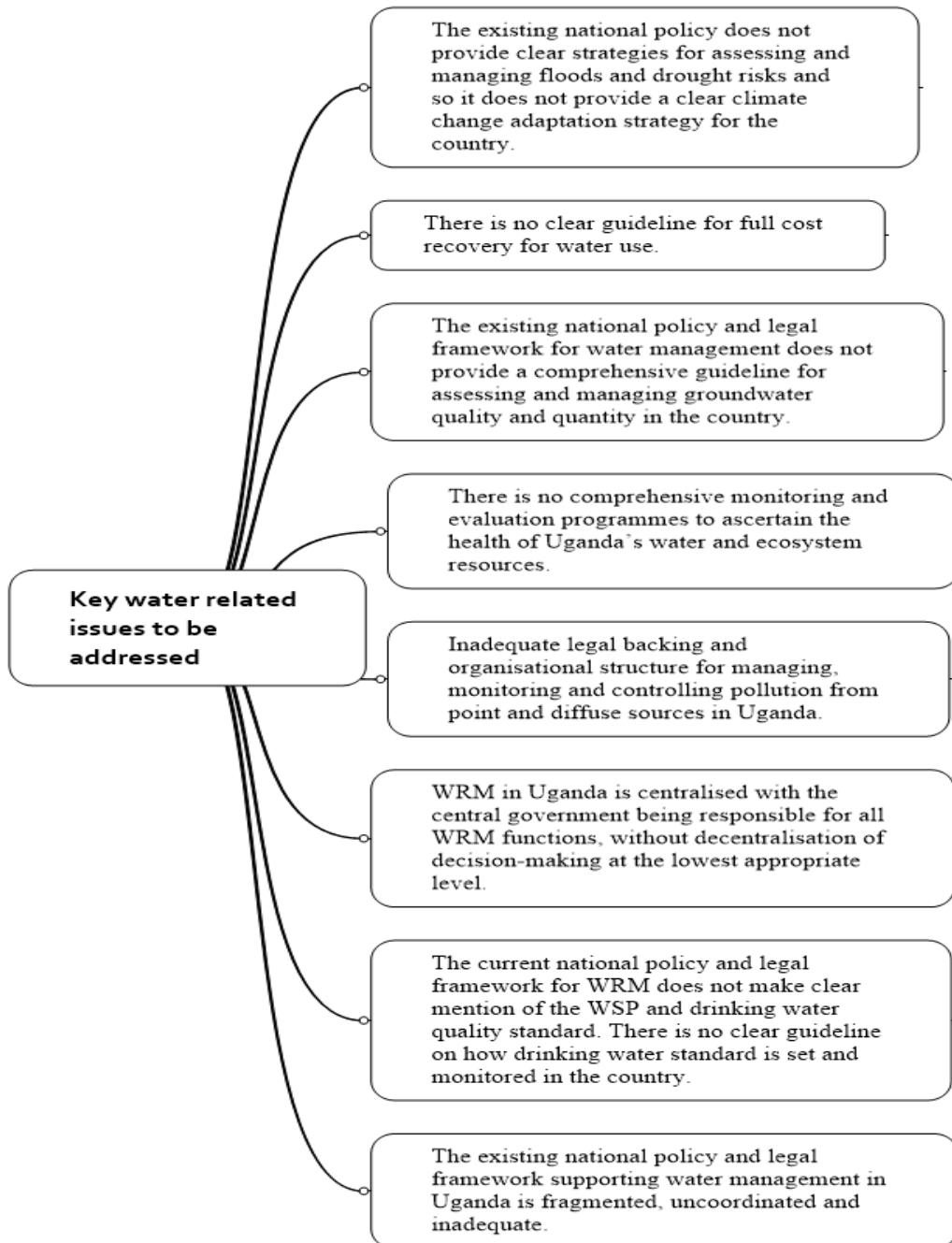
s) Need for education, public awareness and information sharing

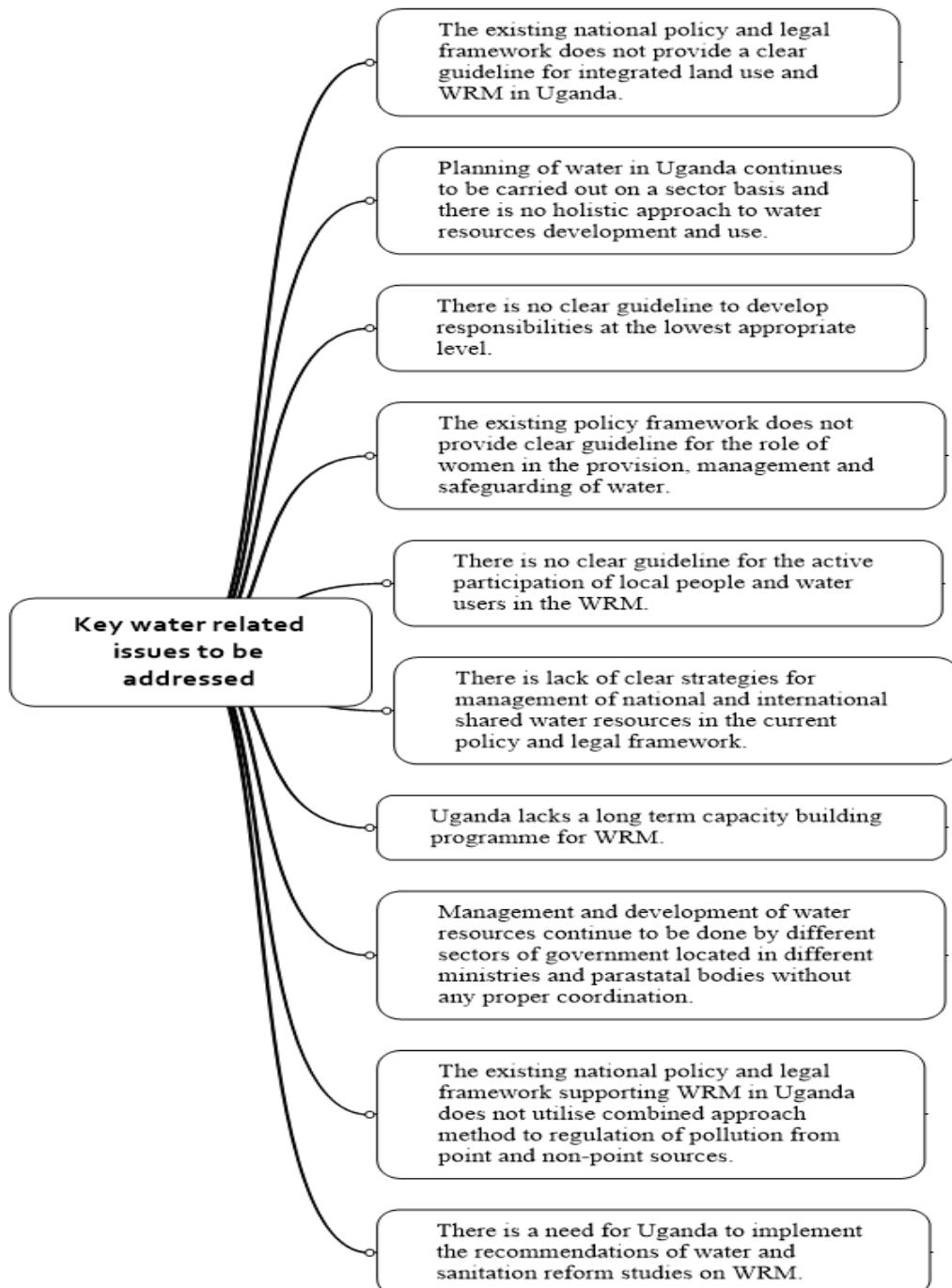
The majority of the local people are illiterate and some rural people are often oblivious of the legal structures of a democracy and their legal rights to water resources. The fact that the majority of the people who live around the catchments are poorly educated is going to be a big obstacle in a full and participatory IWRM in Uganda. As a result, most local communities will not be able to find their way to the channels to provide input and to make their voice count. This is further worsened by the fact that most rural and poor people do not speak or understand English, which makes it difficult to adapt to the new changes being introduced around them. Also most of these people can neither read nor write. Moreover, the flow of valuable information about

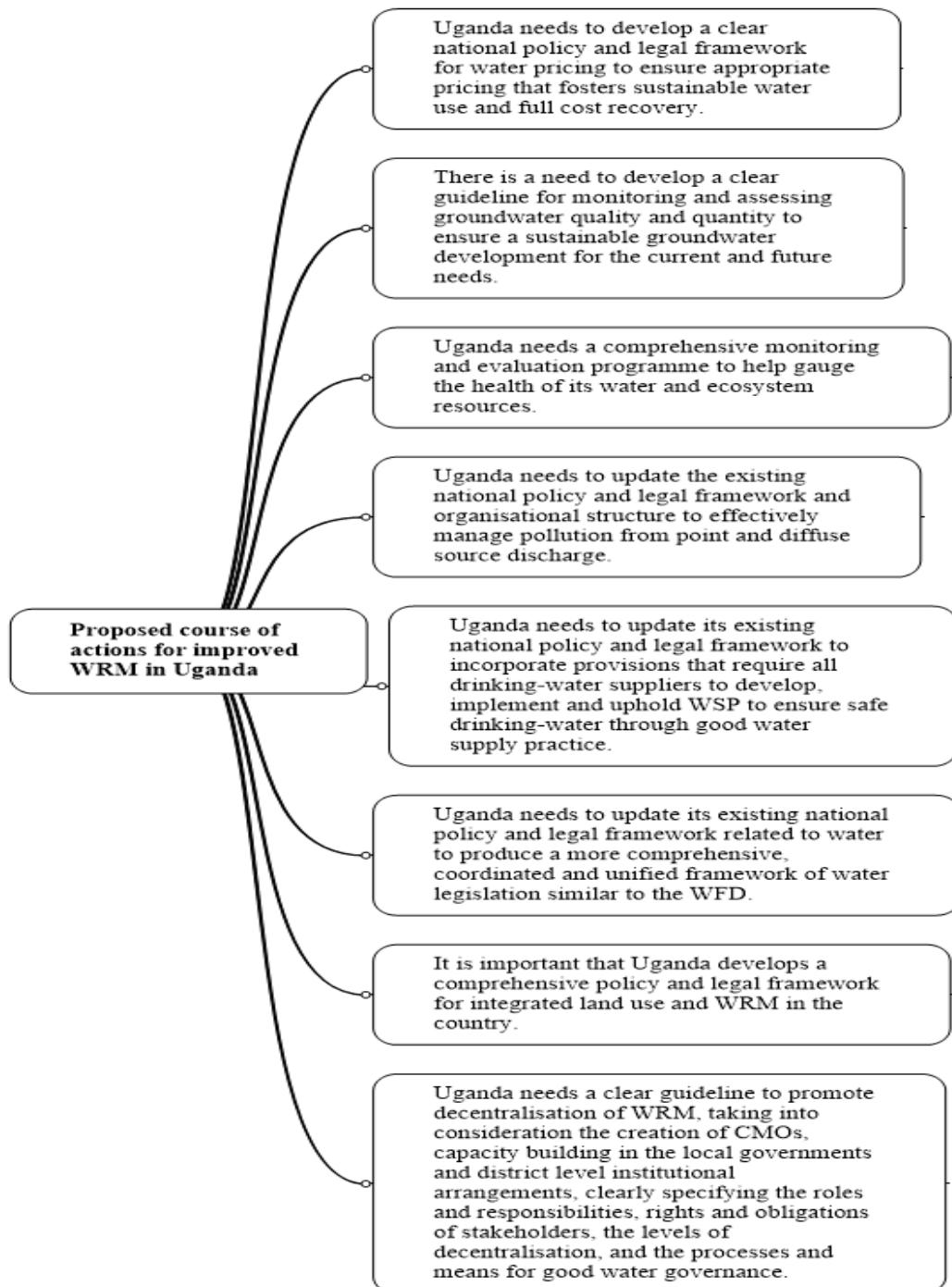
emerging water related issues to the local communities is not sufficient at the moment. Therefore, Uganda needs to develop comprehensive adult education programmes, in local languages designed to make the public aware and sharing information about emerging water related issues.

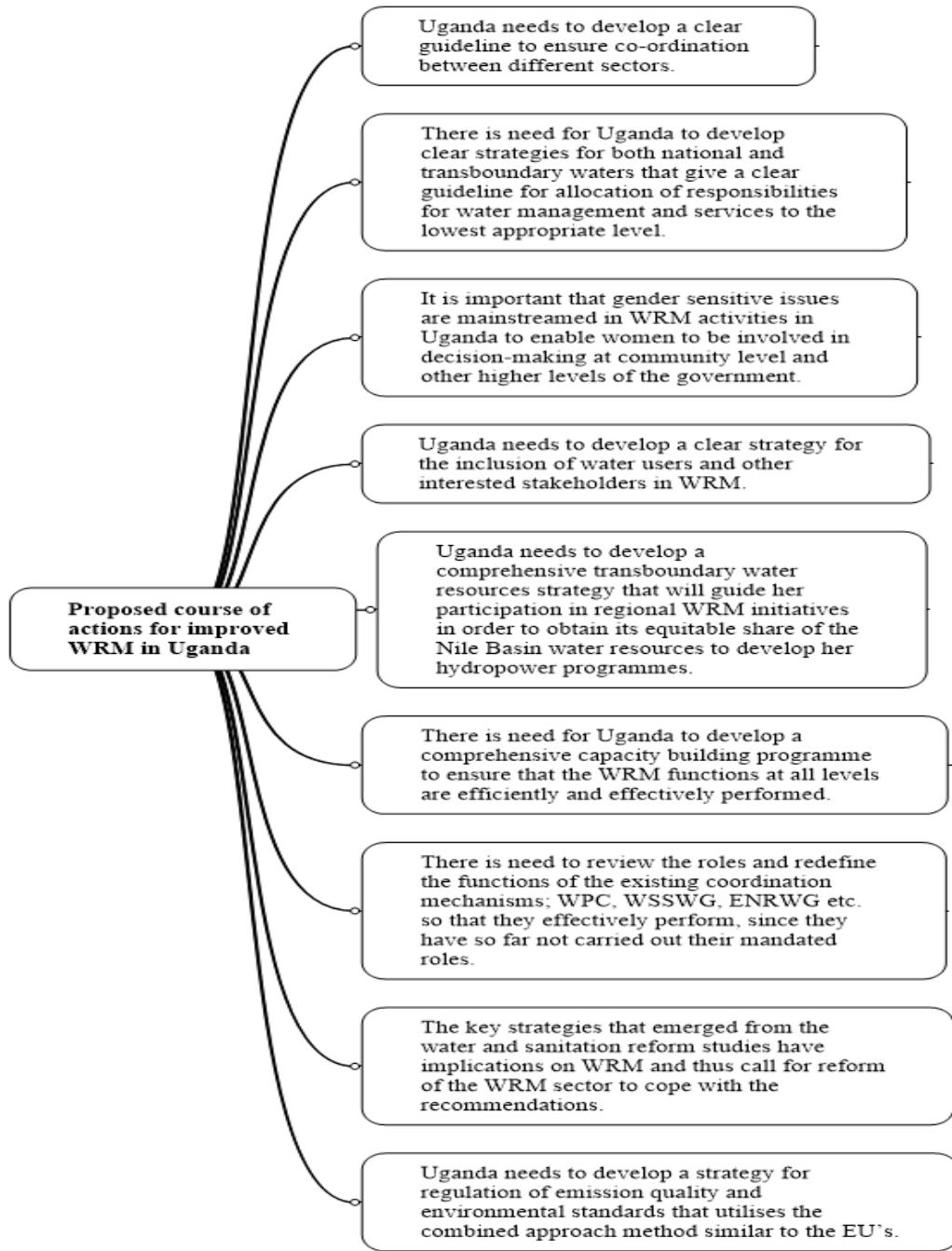
6.3 Conclusion

The WFD and the existing national policy and legal framework for WRM in Uganda were compared with five general principles promoting IWRM and it was found that both the EU WFD and NWP do not fully comply with these principles [18]. In addition, the existing national policy and legal framework for WRM in Uganda was compared with the ‘water notes’ about integrated water management, EU water legislation and the WFD [13]. The key issues identified to be preventing sustainable and integrated WRM and the proposed course of actions for improved WRM in Uganda are summarised below:









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Appendices

Appendix 1: WFD implementation Timetable. Showing the Timetable, Key Deadlines and deliverables for the implementation of the WFD [17, 44]

Complete action by end of	Action Required	Overview
2000	Directive entered into force (Article 22)	3 years for Member States to prepare
2003	Transpose Directive into domestic law (Article 24).	
	River Basin Districts (RBDs) and International River Basin Districts (IRBDs) identified and the competent authorities that will be empowered to implement the Directive, appointed (Article 3).	
2004	Complete an analysis of characteristics and a review of the impact of human activity on status (characterisation) on RBDs and IRBDs (Article 5).	6 years to analyse issues and prepare the River
	Complete first economic analysis of water use.	
	Establish a register or registers of protected areas in each River Basin District (Articles 6&7)	
2005	Establish criteria for the assessment of good groundwater chemical status and criteria for identifying significant upward trends (Article 17)	
2006	Set up environmental monitoring programmes to ensure comprehensive view of water quality status within each RBD (Article 8).	Basin Management Plans
	Publish, for consultation, a work programme for producing the first RBMPs (Article 14).	
	Establish environmental quality standards for priority substances and controls on principal sources (Article 16)	
2007	Publish, for consultation, an interim overview of the significant water management issues in each RBD and IRBD (Article 14).	
2008	Publish full draft RBMPs for consultation (Article 14).	
2009	Finalise and publish first RBMPs (Article 13).	Basin Management Plans
	Finalise programme of measures to meet objectives (Article 11).	
2010	Introduce pricing policies (Article 9).	

2012	Ensure programme of measures operational (Article 11).	3 years to put programmes of measures in place
	Publish timetable and work programme for second RBMPs.	
	Report progress in implementing measures (Article 15)	
2013	Review, for the first RBMP;	3 years to achieve specified objectives
	Characterisation and impact assessments	
	Economic analysis of water use	
	Publish, for consultation, an interim overview of the significant water management issues for second RBMP.	
2014	Main environmental objectives specified in the first RBMPs met?	Further 6 years' planning, consultation and implementation cycles
	Publish second draft RBMPs for consultation.	
2015	Achieve environmental objectives set out in first RBMPs i.e. 'good status' achieved (Article 4). Finalise and publish second RBMP with revised Programme of Measures (Articles 13, 14 &15).	Further 6 years' planning, consultation and implementation cycles
2021	Review if main environmental objectives specified in the second RBMPs are met, and review and update second RBMPs	Further 6 years' planning, consultation and implementation cycles
2027	Review if main environmental objectives specified in the third RBMPs met and review and update third RBMPs	

Appendix 2: Comparison of WHO/EU drinking water standards. The EU standards are more recent (1998), complete and strict than the WHO standards (1993) [45].

	WHO standards (1993)	EU standards (1998)
Suspended Solids	No guideline	Not mentioned
COD	No guideline	Not mentioned
BOD	No guideline	Not mentioned
Oxidisability		5.0 mg/O ₂
Grease/oil	No guideline	Not mentioned
Turbidity	No guideline ⁽¹⁾	Not mentioned
pH	No guideline ⁽²⁾	Not mentioned
Conductivity	250 microS/cm	Not mentioned
Colour	No guideline ⁽³⁾	Not mentioned
Dissolved solids	No guideline ⁽⁴⁾	Not mentioned
Hardness	No guideline ⁽⁵⁾	Not mentioned
TDS	No guideline	Not mentioned
Cations (positive ions)		
Alluminium (Al)	0.2 mg/l	0.2 mg/l
Ammonia (NH ₄)	No guideline	0.5 mg/l
Antimony (Sb)	0.005 mg/l	0.005 mg/l
Arsenic (As)	0.01 mg/l	0.01 mg/l
Barium (Ba)	0.3 mg/l	Not mentioned
Berillium (Be)	No guideline	Not mentioned
Boro (B)	0.3 mg/l	1.00 mg/l
Bromate (Br)	Not mentioned	0.01 mg/l
Cadmium (Cd)	0.003 mg/l	0.005 mg/l
Chromium (Cr)	0.05 mg/l	0.05 mg/l
Copper (Cu)	2 mg/l	2.0 mg/l
Iron (Fe)	No guideline ⁽⁶⁾	0.2 mg/l
Lead (Pb)	0.01 mg/l	0.01 mg/l
Manganese (Mn)	0.5 mg/l	0.05 mg/l
Mercury (Hg)	0.001 mg/l	0.001 mg/l

Molibdemium (Mo)	0.07 mg/l	Not mentioned
Nickel (Ni)	0.02 mg/l	0.02 mg/l
Nitrogen (total N)	50 mg/l	Not mentioned
Selenium (Se)	0.01mg/l	0.01 mg/l
Silver (Ag)	No guideline	Not mentioned
Sodium (Na)	200 mg/l	200 mg/l
Tin (Sn) inorganic	No guideline	Not mentioned
Uranium (U)	1.4 mg/l	Not mentioned
Zinc (Zn)	3 mg/l	Not mentioned

Anions (negative ions)

Chloride (Cl)	250 mg/l	250 mg/l
Cyanide (CN)	0.07 mg/l	0.05 mg/l
Fluoride (F)	1.5 mg/l	1.5 mg/l
Sulphate (SO ₄)	500 mg/l	250 mg/l
Nitrate (NO ₃)	(see Nitrogen)	50 mg/l
Nitrite (No ₂)	(see Nitrogen)	0.5 mg/l

Microbiological parameters

Escherichia coli	Not mentioned	0 in 250 ml
Enterococci	Not mentioned	0 in 250 ml
Pseudomonas aeruginosa	Not mentioned	0 in 250 ml
Clostridium perfrigeneus	Not mentioned	0 in 100 ml
Coliform bbacteria	Not mentioned	0 in 100 ml
Colony count 22°C	Not mentioned	100/ml
Colony count 37°C	Not mentioned	20/ml

Other parameters

Acrylamide	Not mentioned	0.0001 mg/l
Benzene (C ₆ H ₆)	Not mentioned	0.001 mg/l
Benzo(a)pyrene	Not mentioned	0.00001 mg/l

Chlorine dioxide (ClO ₂)	0.4 mg/l	
1,2-dichloroethane	Not mentioned	0.003 mg/l
Epichlorohdrin	Not mentioned	0.0001 mg/l
Pesticides	Not mentioned	0.0001 mg/l
Pesticides- Total	Not mentioned	0.0005 mg/l
PAHs	Not mentioned	0.0001 mg/l
Tetrachloroethene	Not mentioned	0.001 mg/l
Trichloroethene	Not mentioned	0.001 mg/l
Trichloromethanes	Not mentioned	0.1 mg/l
Tritium (H)	Not mentioned	100 Bq/l
Vinyl chloride	Not mentioned	0.0005 mg/l
(1) Desirable: Less than 5 NTU		(5) Desirable: 150-500 mg/l
(2) Desirable: 6.5-8.5		(6) Desirable: 0.3 mg/l
(3) Desirable: 15 mg/l Pt-Co		
(4) Desirable: less than 75% of the saturation concentration		