

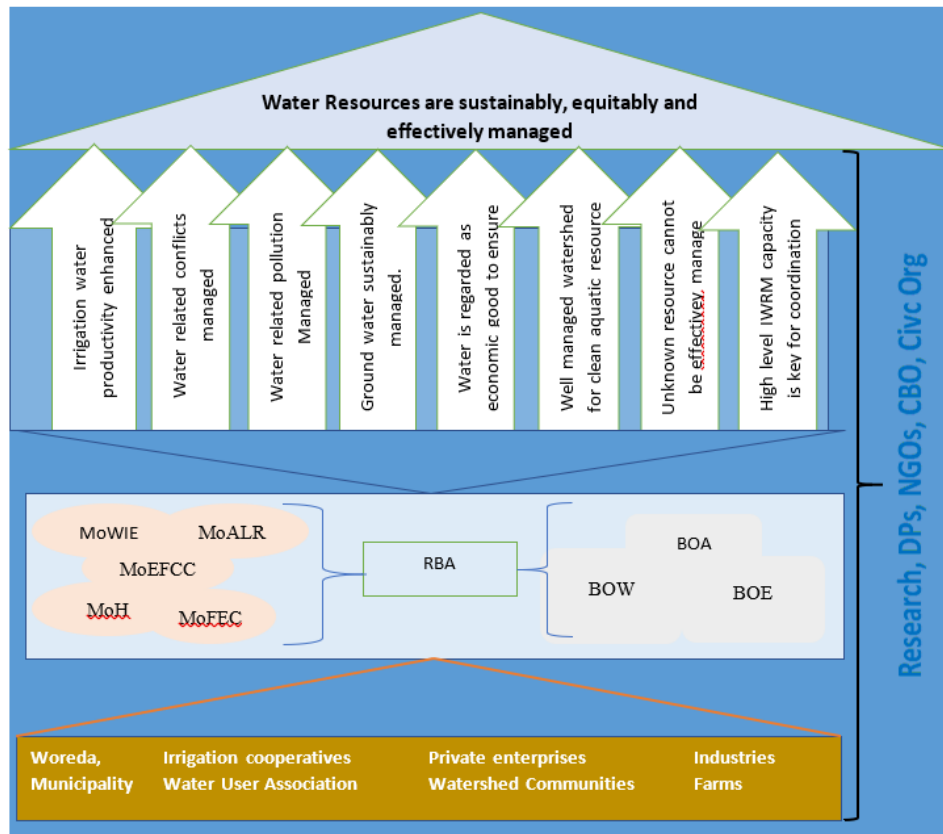


# **NATIONAL INTEGRATED WATER RESOURCES MANAGEMENT PROGRAM**

## **DRAFT REPORT**

**AUGUST 2018, ADDIS ABBA**

## NATIONAL INTEGRATED WATER RESOURCE MANAGEMENT PROGRAM



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## Abbreviation

BHC	-	Basin High Council
BIS	-	Basin Information system
DPs	-	Development partners
DPSIR		Drivers, Pressures, State, Impact and Response
GTP II	-	Growth and Transformation Plan II
HIS	-	Hydrologic Information system
IC	-	Irrigation Cooperatives
IWUA		Irrigation Water Users Association
JTR	-	Joint Technical Review
MDG	-	Millennium Development Goal
MoALR	-	Ministry of Agriculture and Livestock Resources
MoEFCC	-	Ministry of Environment Forestry and Climate Change
MOH		Ministry of Health
MoWIE	-	Ministry of Water, Irrigation and Electricity
RABs	-	Regional Agriculture Bureaus
RBA	-	River Basin Authority
REB	-	Regional Environment Bureaus
RWBs	-	Regional Water Bureaus
SDG	-	Sustainable Development Goal
WRM	-	Water Resource Management
WSWG	-	Water Sector Working Group
WUAs	-	Water User Associations
WWOs	-	Woreda Water Offices

## Executive Summary

1. Water resource (surface, ground, and wastewater) management deals with the process of attaining water related goals and objectives of a country in an effective and efficient manner through planning organizing, leading and controlling the limited amount of water resources nations have. It includes a wide set of related problems that should be jointly considered since they strictly interact with water demand, water availability, and water quality. The integrated basin approach to water resource management remains the only pragmatic, effective and efficient process to coordinate interests, roles and actions in water resource development and use.
2. The state of many of fresh water systems (rivers and lakes) in Ethiopia that are physically accessible and needed for societal wellbeing and economic activities are getting polluted (Awash, Zeway, Hawassa, smaller stream nearby industries) and/or drying up (e.g. Haramaya, Abijata, and others) because of the unregulated abstraction and pollution driven by burgeoning population, emerging industrial activities and flourishing flower farms, rapid urbanization with limited wastewater services. This is further aggravated by climate change induced rainfall variability in the face of limited hydraulic infrastructure development, inadequate institutional arrangement and functionality for effective management, and incoherence in the water related policies and strategies.
3. The government of Ethiopia designed a national water resource development and management policy and strategy. These has been instrumental in guiding water resource development over the last 17 years, but they have now become obsolete. This obligates the development of new water resource development and management strategy that takes cognizant of recent national and global development initiatives such as the GTPs, CRGE, and SDGs).
4. Although IWRM has been the guiding water resource management principles in the country since the launching of the water policy, clarity of roles and responsibilities, mandates overlaps particularly between sector ministries (MoEFCC, MOALR, etc), regional water bureaus (in relation to provision of permit and compliance to environmental standards, inability to enforce regulations) has failed to save vulnerable water resource systems from pollution and desiccation.
5. In line with national water resource management policy, River Basin Authorities have been established for three river basins. These authorities, however, are grappling with a number of problems. First, their technical and financial capacity is limited to design initiatives that draws the top leadership attention and mobilize resources. Second, although they have been established to harmonize water resource development and management initiatives, they lack due recognition from regional water bureaus and sector ministries (environment and agriculture). Hence more effort is required to raise awareness on the complementarity and alignment with sector activities with that of Basin Authorities

6. Many organizations including the ministries, development partners and bureaus are investing substantial amount in the broad areas of water resource development and management. The problem, however, is initiatives are fragmented, and at times overlap, and lessons from earlier interventions are not guiding new initiatives. Hence, harmonization and coordination of initiatives at the highest level is urgently required.
7. The management of water resources requires the active involvement of different stakeholders. In support of these national initiatives, Water Resources Management Working Group (WRMWG) which comprises sector ministries (such as MOALR and MoEFCC), development partners, national non-governmental organizations and the private sector have been formed. The goal is to contribute towards coordinated water resource development management in Ethiopia through nationally harmonized and enhanced water resource development and management interventions.
8. With financial support from USAID through UNICEF, a team was commissioned to develop a WRM programme document building on above identified water resource management hotspot areas with implementable activities with indicative budget which could be presented to the government and development partners for finance.
9. Building on the findings of the JTR undertakings and field missions to validate the review process recommendations, the following the WRM - JTR field mission, the following eight components (thematic packages) have been identified to kick start the national water resource management program (NIWRMP):
  - 9.1. **Irrigation for growth** – continuously improve irrigation water productivity, and reduce water loss, attenuate adverse negative environmental and social impact of irrigation related activities.
  - 9.2. **Conflict management and stakeholder engagement** – build water wise society, promote participatory water resource governance, and manage conflicts through transparent and agreed water allocation system.
  - 9.3. **Water pollution prevention and control** – protect untreated waste from reaching water bodies through coherent and enforceable economic incentives, and supporting on site treatment of wastes to the environmentally acceptable standards, and ensure health aquatic ecosystems.
  - 9.4. **Groundwater use and legislation** – support promulgation of groundwater policy, groundwater water aquifers are well understood, vulnerable aquifers have protected and managed recharge systems.
  - 9.5. **Water charge and scheme sustainability** – support the promulgation and institutionalization of

water charges and ensure that economic incentives are contribution to efficient water utilization and reduction of pollution.

9.6. **Catchment management and buffer zone protection** – Ensure that all vulnerable water bodies have buffer-zones reducing siltation and pollution; watersheds are protected so that soils and fertilizer are retained in the field, and gully formation is stopped, and existing gullies are rehabilitated through appropriate check dams and biological measures.

9.7. **Basin hydrologic information system(B/HIS)** – ensure that water resource use and management is based accurate information on the resource availability and variability, and quality. This includes information on climate, hydrology, water resource use, watershed, and socio-economic activity in the basin or sub-basin. All information at a basin need to be centrally archived through a data sharing protocol.

9.8. **National Integrated Water Resource Management Capacity:** The Federal Ministries have the capacity to **provide** policy and capacity development support to basin authorities including the team for upcoming river basins

10. **WRM Fund Establishment and Project Support:** There will be a WRM-Fund managed centrally. The Fund will be sourced from Government, States and Development Associates, bilateral projects, etc. Basin Authorities in collaboration with Bureaus prepare and WRM projects to the steering committee. The Steering Committee, supported by members of the WSWG-WRM sub group shall prioritize interventions depending on the availability of fund and request the BHC to authorize MOFEC to support the projects and program. The Steering committee will establish monitoring and establishment mechanisms.

11. Projects suggested in this report will be implemented as short (with in the remaining GTP II years), medium term aliened to the next national development planning time frame (2020-2025). Form 2016-2030, attention will focus more on achieving the SDG targets.

	GTP II		GTP III				
	2019	2020	2021	2022	2023	2024	2025
• WRM Capacity of development - three Basins, Water Bureaus, MOWIE, etc.) State of the Basin (Baseline Information) documentation management plan (strategic plan development) • Alignment of policies, proclamations, and regulations			Interventions on (irrigation, water quality, allocation/conflict, catchment management, BIS/HIS, groundwater, etc.) hotspots.				
						Monitoring and Evaluation	



*Cross-sector collaboration is doable and benefits all sectors!*

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Revision of  
the Water  
Resource  
Management  
Plan

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## 1. Introduction

Ethiopia is endowed with substantial amount of water resources and regarded as the ‘water tower’ of Eastern Africa. Yet, it is also a land of hydrologic extremes with significant interannual and inter-seasonal variability, and geographical disparities often accompanied with catastrophic droughts and episodic floods. The water related challenges in Ethiopia are complex. The substantial lowland areas of the country, which accounts to over 60 percent of the land mass, are unproductive or marginally productive primarily due to physical water scarcity. Even in high rainfall areas of the country, water is scarce for much of the year due to low water-storage capacity while flood causes havoc during the rainy season.

Recognising its importance to sustain economic growth and poverty reduction, the government of Ethiopia has made efforts to develop water resources for domestic and industrial water supply, irrigation and hydro-power generation uses. Although there is still long way to go to harness the resource potential and meet the growing demand, both federal and regional governments have been undertaking a number of initiatives to develop the water resources to improve access to water supply, develop irrigation schemes, and generate hydropower. The achievements include: meeting the MDG targets; growing farm area under small, medium and large-scale irrigation; and improving hydropower generation capacity.

On the other hand, many of the water resources are experiencing quantitative and qualitative degradation due to over abstraction and pollution driven by population increase, urbanisation, lackluster water resource management policy and ineffective institutional arrangements for policy and regulation implementation and enforcement. Few glaring examples of water resource management failures in Ethiopia include the demise Lake Haramaya, the shrinking of Lake Abijata, the pollution of Awash River and Zeway and Hawassa Lakes; and siltation of Koka and Gilgel Gibe Dams and many other smaller micro-dams.

Cognizant of the threat associated to improper water resource management and its negative consequences in the face of increasing demand and growing pollution, different initiatives have been put forward. One such initiative is the formation of the National Water Resource Management Working Group (WRMWG) with primary objective of promoting and harmonising the different water resource management initiatives. The WRMWG, which was initiated in 2016, prepared a brief Joint Technical Review (JTR) of state of water resource

management challenges. In order to identify entry points and project proposals, the group also convened national workshop that brought in stakeholders from different sector ministers, regional water bureaus, development partners, NGOs, etc. This National IWRM program, therefore, outlines possible candidate projects for implementation to contribute to efficient, equitable and sustainable management of the water resource in Ethiopia.

## **2. Global WRM Context and Trends**

It is widely stipulated that the world's water supply will come to symbolize the 'blue gold' of the 21st century (Meire *et al.*, 2008), and more effort needs to be invested in developing practical means for managing this natural wealth, in order to avoid any possible threat of depletion, contamination or adverse side effects for the societies who depend on it.

The World has changed dramatically in several ways and the past four or five decades have brought about significant changes in water resource management and use. The major drivers of the changes are: increasing global population, which has tripled since the early 1950s and exceeded seven billion in 2010; a significant increase in water demand, primarily for drinking water, energy and food, and the impact of dietary changes as countries develop; the rapid shift of populations from rural to urban areas (the United Nations predicts that by 2050 urban dwellers will increase from 50% to 70%)<sup>1</sup>.

Feeding nine billion people by 2050 will require a 60 percent increase in agricultural production, which consumes 70 percent of the water resource today, and a 15 percent increase in water withdrawals the consequence of which is expected to quickly become dire. Estimates show that with current practices, the world will face a 40 percent shortfall between forecast demand and available supply of water by 2030 (World Bank, 2017). Estimates also indicate that 40 percent of the world population live in water scarce areas, and approximately quarter of world's GDP is exposed to this challenge. By 2025, about 1.8 billion people will be living in regions or countries with absolute water scarcity. Water-related disasters account for 70 percent of all deaths related to natural disasters.

Water security, therefore, is a major and growing challenge for many countries today. Climate change is also expected to exacerbate water management related problems in developing

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<sup>1</sup> <http://www.worldwatercouncil.org>

countries because of their strong dependence on vulnerable agricultural production system and weak adaptation capacity. According to the World Economic Forum's 2015 Global Risks Assessment report, water crises – from drought in the world's most productive farmlands to the hundreds of millions of people without access to safe drinking water – ranked as the biggest threat facing the planet.

In Africa, rapid population increase, inappropriate water governance and institutional arrangements, depletion of water resources through pollution, environmental degradation, deforestation, and low and unsustainable financing of investments in water supply and sanitation are some of the main threats that pose challenges to the management of water resources on the continent. African countries have adopted and worked towards the Africa Water Vision 2025 which states "... an Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment". The objective of the initiative has been to promote cooperation, security, social and economic development and poverty reduction among members states through effective management of continental water resources and provision of water supply services<sup>2</sup>.

It is with this background that 'Ensure availability and sustainable management of water and sanitation for all' by 2030 is identified as one of SDG (SDG 6) goals. Water, in addition to achieving the SDG 6, is vital in achieving the many other goals that has to do with society's health and well-being, ending hunger, achieving food and energy security and improving nutrition, etc.

Integrating water-using sectors is essential for ensuring that limited water resources are shared effectively among many competing demands. One of the targets under SDGs is "implement integrated water resources management at all levels, including through transboundary cooperation as appropriate by 2030 (SDG 6.5) which is measured in 0-100 scale. The operational definition of IWRM by Global water partnership is a process which promotes the coordinated 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 ecosystems" (GWP, 2000). Developing the IWRM metrics

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<sup>2</sup> <http://www.amcow-online.org/>

has been contentious for many years, but UN-Water (2018) has now identified the following major of indicators for which countries have to work towards meeting SDG 6.5 targets.

- i. **Enabling environment:** assessed through extent of IWRM principles embracing national water resources policy, plans and regulation.
- ii. **Institutions and participation:** This evaluated through authorities' capacity for leading implementation of national IWRM plans; coordination between national government authorities representing different sectors; public and business participation in water resources policy, planning and management; gender-specific objectives for water resources management at all levels, etc.
- iii. **Management instruments:** This is measured through the performance in monitoring of water availability, sustainable and efficient water use; pollution control and management instruments to reduce impacts of water-related ecosystem disasters, basin and aquifer management instruments, data and information sharing within countries and between countries.
- iv. **Financing:** Assessed through national budget for investment including water resources infrastructure and recurrent costs of the IWRM elements

The World weighted average status of IWRM implantation in 2018 has been 48 from a maximum of 100 which is said to be below average. Ethiopia's IWRM implementation was reported as 32 which is again lower from the global average. It is therefore clear that Ethiopia is expected to do more on IWRM implementation to achieve the SDG water and related goals among others, and the NIWRMP could be one vehicle that can help focus on the national water resource management effort.

### 3. The state of Water Resources Management in Ethiopia

Ethiopia is endowed with good amount of surface and ground water and related aquatic resources. Thus effective utilization of these water resources will offer huge potential for the country's economic development. In addition to the natural water bodies, there are growing number of reservoirs constructed for hydropower, irrigation and/or water supply which is expected to improve the per capita

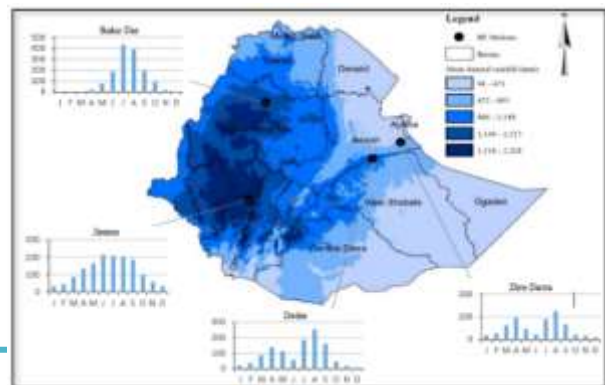


Figure 1 Rainfall distribution in Ethiopia

water storage. The source of all water for Ethiopia is endogenous rainfall; i.e. there is no runoff that comes from neighboring countries. The spatially averaged mean annual rainfall of the country is 848 mm/year. The rainfall distribution, however, is spatially uneven (see Fig 1), causing transient and permanent water insecurity in many of low-lying semi-arid and arid areas. Annual rainfall distribution tends to be generally high ( $> 2000$  mm/year) in the northwest, west and southwest while it is low ( $\sim 200$  mm/year) in the northeast and southeast. Moreover, the inter-annual rainfall variability, exacerbated by climate change, particularly in low (bimodal) rainfall regimes, is highly exposing communities and their livelihoods to frequent drought and flood (Berhanu et al., 2014).

The total annual renewable surface water resource of the country is estimated at 120 BCM, and the renewable groundwater resources is estimated at 20 BCM from which about 18 BCM is considered as an overlap between surface-water and groundwater resources (Kebede, et al., 2011). This gives the internal renewable water resource of the country to be in the order of 122 BCM per year. From this, about 96 BCM/year is estimated to leave the country as transboundary water in seven major transboundary rivers. Figure 2 shows mean annual runoff volume and drainage coefficient (specific water yield) in each river basin. The difference in the drainage coefficients is explained mainly by the uneven rainfall distribution, but also due to rainfall modality. Bimodally distributed rainfalls are known to have lesser rainfall concentration index with lesser runoff or drainage coefficient expressed in litter/sec/km<sup>2</sup>.

The supply side spatial and temporal water related challenges of water resources are depicted in Fig 3a and 3b. The quantitative water resource degradations are associated with over abstraction of lakes (e.g. Lakes Haramya and Abjata), diversion rivers for irrigation, and groundwater over abstraction. Quality degradations are mainly associated with pollution from untreated municipal and industrial wastes (e.g. Zeway, Hawassa, Koka, Akaki and Mojo (Awash), etc.) and off-site impacts that includes soil erosion and nutrient transport.

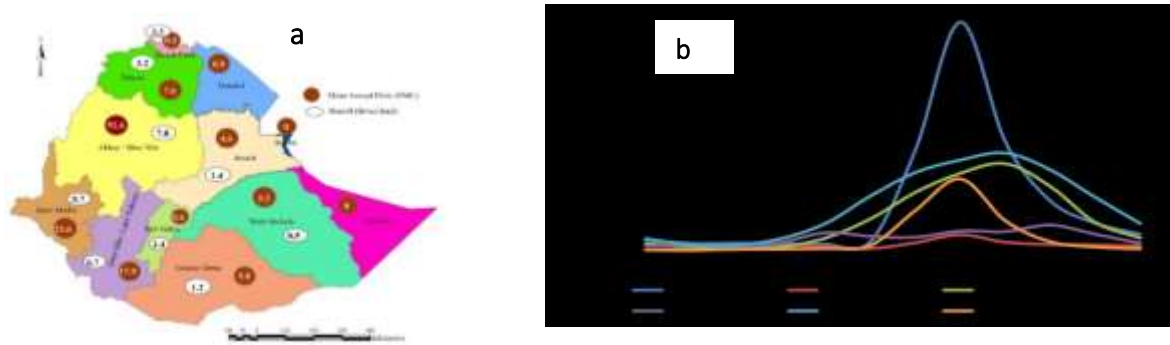


Figure 2. Spatial (a) and temporal (b) variability of rainfall in Ethiopia

Catchment degradation due to deforestation and poor cultivation practices explains the substantial amount of suspended sediment load to river systems in the country. Haregeweyn et al. (2008) found that the amount of sediment that leaves the watershed due to erosion is expected to vary from 237 to 1817  $ton/km^2/yr$  with a mean of  $909 \pm 500 ton/km^2/yr$ . The high turbidity in the rivers during the high-flow season, besides the off-site impact on reservoirs, lakes, wetlands, irrigation canals, makes surface water treatment less preferred compared to groundwater for water supply. For instance, water treatment plants that draw water from Awash River in Adama, Metehara, and Awash are being forced to stop drawing water early in rainy season because of high sediment load that exceeds the capacity of the treatment plants. Moreover, treatment plants that draw municipal water supply from Awash (e.g., Adama) are finding the cost of water treatment chemicals prohibitive.

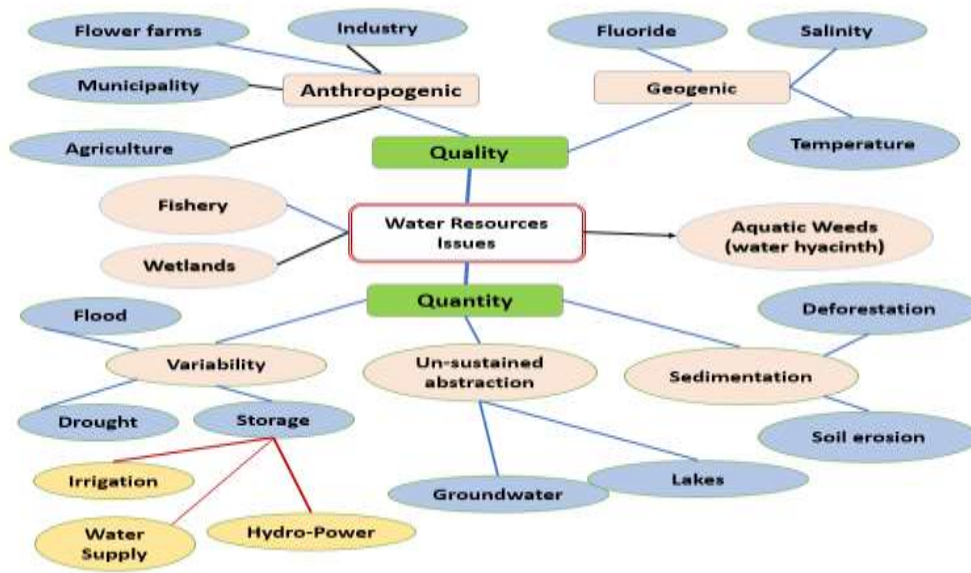


Figure 3: Water resource management issues in Ethiopia

The state of water resource management in Ethiopia could be explored with DPSIR framework (Fig 4) .The model is used as convenient tool to systematically structure water related issues. The DPSIR represents a systems analysis view. Social and economic developments exert pressures on the environment, and as consequence the state of the environment changes. This impacts societal and ecosystem wellbeing and development that may elicit a societal response that feeds back on the driving forces in the pressures or the state or imapcst directly through adaptation or curative action.



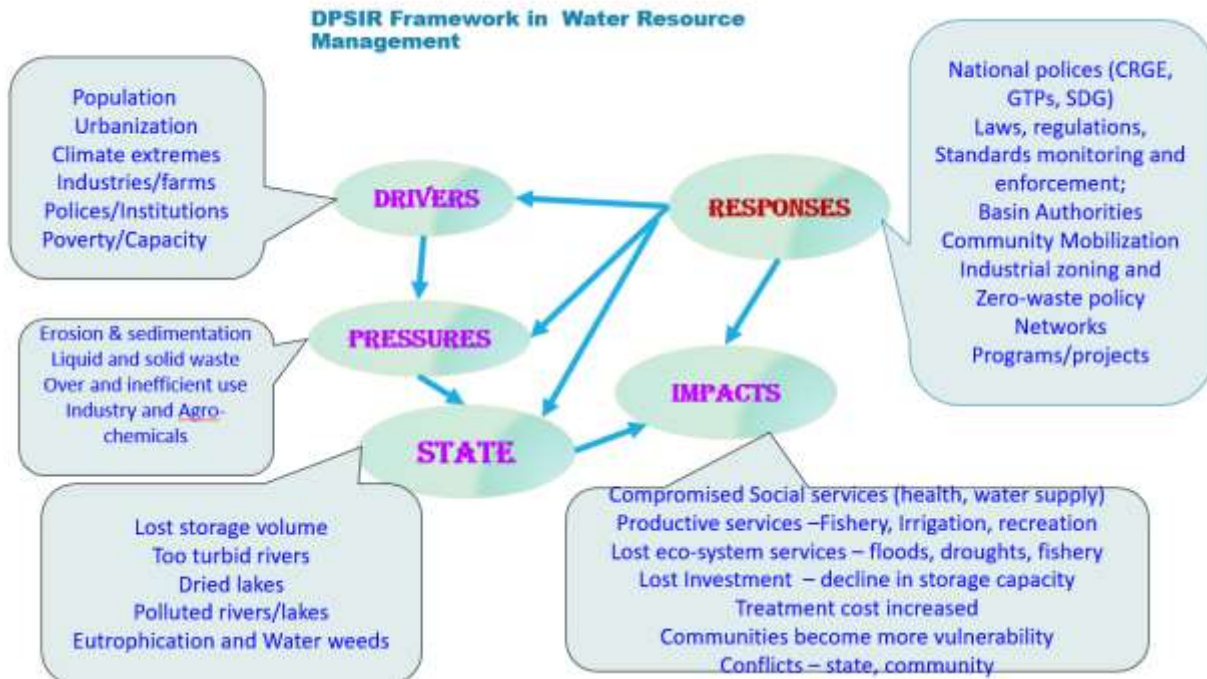
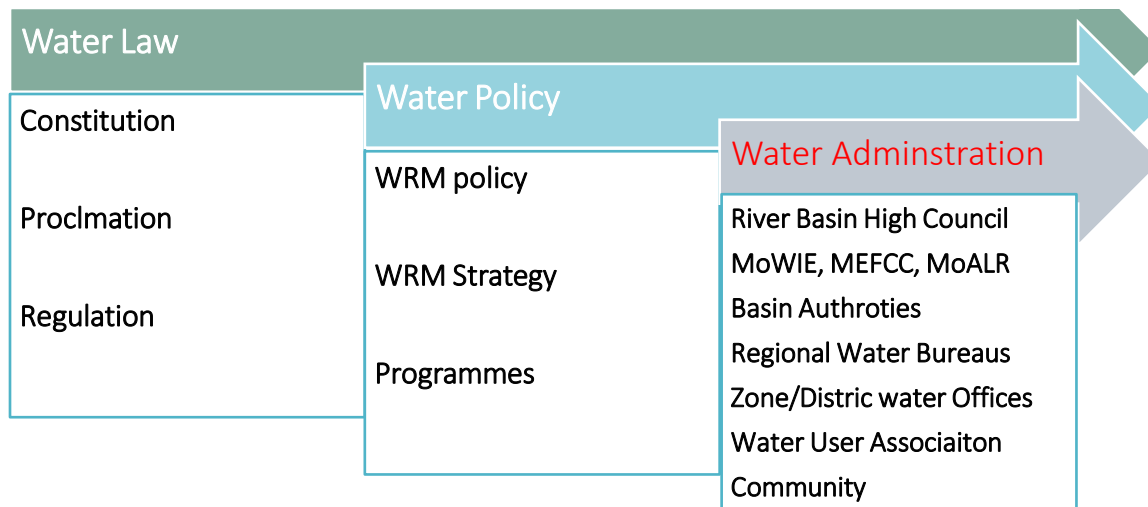


Figure 4. State of water resources following DPSIR framework.

#### 4. Existing Institutional arrangements for Water Resources Management

The metrics of water resource management institutions are evaluated through the

#### WRM Governance and Enablers



The Constitution of FDRE (1995) is a source of all subsidiary laws and policies. Water resource management relevant articles are stated under articles: 43 - Right to Development, 44 – Environmental Rights, 51 – Powers and functions of Federal Government, 52 – Power and functions of States, and 92- Environmental Objectives. The articles provide citizens the right to: improved living standard and sustainable development (Art.43.1); be consulted with respect to policies and projects affecting their community (Art. 43.2); live in a clean and healthy environment (Art. 44.1); and live in a clean and healthy environment (Art. 92). Further, Article 51.5 provides the Federal Government to enact laws for the utilization and conservation of land and other natural resources including water resources of the country, while Article 52.2d grants the Regional States the mandate to administer land and other natural resources in accordance with federal laws. As an exception, water bodies linking two or more States or crossing the boundaries of the national territorial jurisdiction are administered by the Federal government (Art. 51.11), while Regional states administer water resources which are located entirely within a certain region (e.g. ground water, lakes etc).

Perhaps the two articles that may require further elaboration and harmonization through the appropriate organs are Article 51 and Article 52. Rivers that are intra-state are converted to trans-state downstream. Hence, abstraction or pollution at the head will affect water availability or quality downstream.

Building from the Constitution, Water Resources Management Policy (WRMP), Environmental Policy of Ethiopia (EPE), Water Resources Management Proclamation (Proclamation No.197/2000), Water Resources Management Regulations (Regulation No. 115/2005) and River Basin Councils and Authorities Proclamation (Proclamation No. 534/2007) have been promulgated.

The objective of the Water Resource Management policy (2000) has been stated as “...to enhance and promote all national efforts towards the efficient, equitable and optimum utilization of the available water resources of the country for significant socio-economic development on a sustainable basis.” The policy principles are: water is a natural endowment commonly owned by all the people of Ethiopia; every Ethiopian citizen shall have access to sufficient water of acceptable quality to satisfy basic human needs; water shall be recognized both as an economic and social good; water resources development shall be underpinned on rural-centered, decentralized management, participatory approach as well as integrated framework; management of water resource shall ensure social equity, economic efficiency, system reliability and sustainability; and the participation of all stakeholders, user communities especially of women shall be promoted in water management. Although fundamental policy changes in terms of water resource management may not be expected, there are opinions for it to be updated taking the recent level of economic transformation into account.

Water Resources Management Proclamation (Proclamation No.197/2000) is currently the basic legal instrument governing the management, planning, utilization and protection of water resources in Ethiopia. It laid the general conditions that need to be fulfilled for anyone wishing to use water resources for different purposes on the basis of water use permit. The fundamental principles of the Proclamation include: the integrated Basin Master Plan Studies and Water Resources legislative framework shall serve as a point of reference and ensure that any water resource is put to the highest social and economic benefit of the people of Ethiopia; the social and economic development programs, investment plans and programs and water resources development activity of any person shall be based on the country's Water Policy, the relevant Basin Master Plan Studies and Water Resources laws; the supervising body shall ensure and administer that the management of any water resource is put to the highest social and economic benefits of the Ethiopian people in accordance with the provisions of the Ethiopian Water Resources Policy, Basin, Master Plan Studies and Water Resources laws; and management of the water resources of Ethiopia shall be in accordance with a permit system.

Water Resources Management Regulations (Regulation No. 115/2005) have been issued by the Council of Ministers. They provide detailed provisions for the effective implementation of the Proclamation (Proclamation No.197/2000). They also provide main requirements for the issuance of permits for different uses of water such as construction works and waste water discharge; the conditions for renewal, revocation etc. of such permits; and the fees for application for permits as well as the requirements of water charges to be paid for different uses of water.

Environmental Policy of Ethiopia (1997) incorporated sector specific environmental policy provisions for water resources and related sectors. Among others, the specific policy guideline aims to subject all major water conservation, development and management projects to the environmental impact assessment process, protection of the interface between water bodies and land, and integrate the rehabilitation and protection of wetlands and upstream forests into conservation, development and management of water resources. A lot has changed since the policy was formulated and requires update.

River Basin Council and Authorities Proclamation (Proclamation No. 534/2007) aims to institutionalize decentralized water resources planning and management functions to River Basin Organizations (RBOs) at the basin level so that most of the functions of the Federal government delegated to such a two-tier organizational set-up of RBO—Basin High Councils (BHC) and River (Lakes) Basin Authorities (RBA).

Following this proclamation, the Council of Ministers established three Basin Authorities – Abbay, Awash and Rift valley Lakes. Their main responsibilities include: knowledge-building to allow informed decision-making; information exchange and networking with stakeholders to build a shared

vision; coordination of planning to ensure a framework for IWRM; regulation and enforcement of water use for sustainable and equitable development, etc.

The Basin High Council has also been established to make high level policy and strategic decision under the proclamation 534/2007. As per Article 6 of the Proclamation, powers and responsibilities of BHCs include: examine and decide on water allocation rules and principles in normal times and in times of water shortage as well as in times of drought or flooding, ensure high level coordination among stakeholders for the implementation of IWRM in the basin, and propose to the Government the rate of water charges to be paid by water users in the basin. This provides the opportunity of getting the highest ownership of the political leadership ownership to manage water resources.

## **5. WRM Related Mandate Interfaces and Alignment Needs**

There are a number of mandate overlaps in the national and state efforts to develop, use and manage water resources due to the inherent nature of water. First, water is everybody's concern and it cuts across many sectors and frontiers directly or indirectly. Second, the efforts to proactively make policies and regulations/laws adaptive are limited: some policies and regulation, at least in part, are overtaken by changes in the institutional arrangement on ground. Finally, many of the role and responsibility issues in terms of water resource management could be addressed if stakeholders are duly engaged through an appropriate forum. The following are the major areas of contention and cooperation in water resource management.

### **i. Between MoEFCC and MoWIE**

Ministry of Environment, Forestry, and Climate Change (MEFCC) is a new Ministry which is charged to address policy and regulation issues related to the environment, forest and climate change. Regional states are also following the federal structure and are establishing environment bureaus. Setting standards, developing pollution prevention, etc are in MoEFCC portfolio. On the other hand, MoWIE has a Hydrology and Water Quality Directorate, which is responsible to evaluate the fitness of water bodies for a given purpose upon request. Although this is a contested mandate, neither of them are effective in a preventing pollution. Hence, both are expected to come together and agree on duties and share responsibilities.

Further, catchment (forest) management is another area that both ministries are required to align roles and share responsibilities. Greening the dry lowlands while deforesting uplands has

no logic. In this regard, there are also plenty of complementarities any catchment management plan should accommodate the interest of both ministries.

## **ii. Between MOALR and MOWIE**

Issues between MOALR and MOWIE revolve around (1) catchment management, (2) small scale irrigation development, and (3) the permit, use and disposal systems pesticides and herbicides. MOALR undertakes watershed management to enhance agricultural productivity, the co-benefit of which is erosion and sedimentation reduction, retention of nutrient and pesticides/herbicides in farmlands.

The Basin Administration Directorate of MoWIE carry out watershed development activity, particularly in areas where reservoirs are vulnerable to erosion the co-benefit of which is improving agricultural productivity. Although the priorities in the intervention may differ, the activity could be harmonised to address both concerns.

Irrigation is another area of contention. Small scale irrigation (<200 ha) is the responsibility of MOALR while schemes larger than 200 ha fall under MoWIE mandate. There are, however, schemes which are large but still managed by individual smallholder farmers for which the role of MoALR is critical. For instance, Koga dam, which irrigates close to 7000 ha, is managed by farmers. But the dam is managed by Abay Basin Authority delegated by MOWIE. The total irrigated area developed and managed by Regions is much larger than that developed by MoWIE.

Permit for herbicide and pesticide control is provided by MOALR. Many of these chemicals ended up in water bodies, making standing water bodies such as lakes and wetlands vulnerable. The capacity to monitor the impact of these chemicals on the aquatic systems at all levels is very low.

## **iii. Between RWBs and RBAs.**

As per the Federal Constitutions, regional bureaus have the right to develop the natural resource in the region including water. Hence, these offices provide licence to develop the water resource, or develop the water infrastructure without consulting the Basin Authorities. All the three RBAs are invariably grappling with this mandate overlaps or lack of coordination.

## **iv. Between MoWIE and RBAs**

Many of the water resource management functions of the MoWIE is supposed to be transferred to RBAs. The transition, however, is slow as there are still capacity related issues at RBAs to fully takeover the responsibility.

## **6. Goal and Objectives of NIWRP.**

The over-arching goal of the NIWRMP is ‘**to contribute towards people’s livelihoods, welfare enhancement and sustained economic growth through efficient, equitable and sustainable water resources development, use and management.**’ This is achieved, among others, by pursuing the following general objectives:

- Curb water quality and quantity degradation;
- Reduce irrigation water loss and enhance water and land productivity for both small- and large-sale irrigation schemes;
- Rehabilitate and/or protect water bodies from anthropogenic pollution;
- Avoid or manage water related conflicts through a participatory and transparent water resource administration;
- Develop and use groundwater resource sustainably using appropriate policy instruments along with improved groundwater recharge systems;
- Support water resource management through well-organized, accurate and comprehensive hydrologic and basin information systems;
- Support water resource management initiatives through proper financial/economic instruments by promoting appropriate users pay or polluter pay principles;
- Manage watersheds and protect buffer zones to reduce the off-site impact of land degradation;
- Develop IWRM awareness and capacity in water resource management taking all uses and users into account; etc.

## **7. Scope of the Program**

A country wide detailed enough integrated water resource management program for a large and hydrologically diverse country like Ethiopia is difficult. Rather, basin authorities are better suited to prepare water body specific water resource management program. Hence, the proposed projects are intended to develop a national consensus on the urgency of the following water resource management discourses: (1) address most urgent water resource management

issues at stake; (2) bring major actors (sector ministries, regional bureaus, basin authorities) together) for coordinated water resource management interventions; and (3) establish model interventions for up/out scaling. It is, therefore, important to stress that the specific activities described in the report need to be further detailed during project write up.

## 8. Conceptual Framework and Implementation Strategy

Integrated water resource management, in general, comprises operational activities such as development of basin information system, water resource management planning, water allocation and administration, pollution control, catchment management, stakeholder engagement, monitoring and evaluation. The relative priorities of these activities differ from one basin to another basin; from one water body to another body. For instance, rivers that traverse cities are prone to pollution which may not be the case for rivers and water bodies that are far from pollution sources. On the other hand, problems such as lake, reservoir and wetland sedimentation may be nationwide problem the severity of which depends on the level of the catchment degradation.

It is for this reason that the IWRM principles prescribe for water to be managed at lowest level. Hence a national water resource management plan developed centrally needs to be contextualised and for the management of specific water bodies duly considering all uses and users.

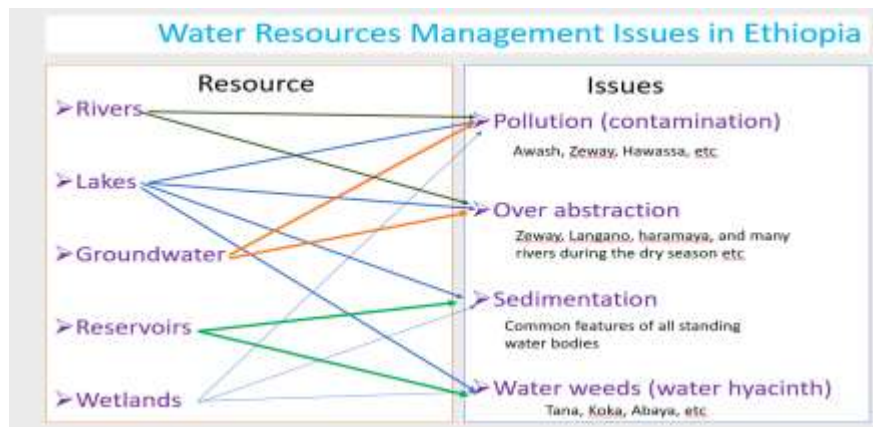


Figure 5. Water sources and management challenges

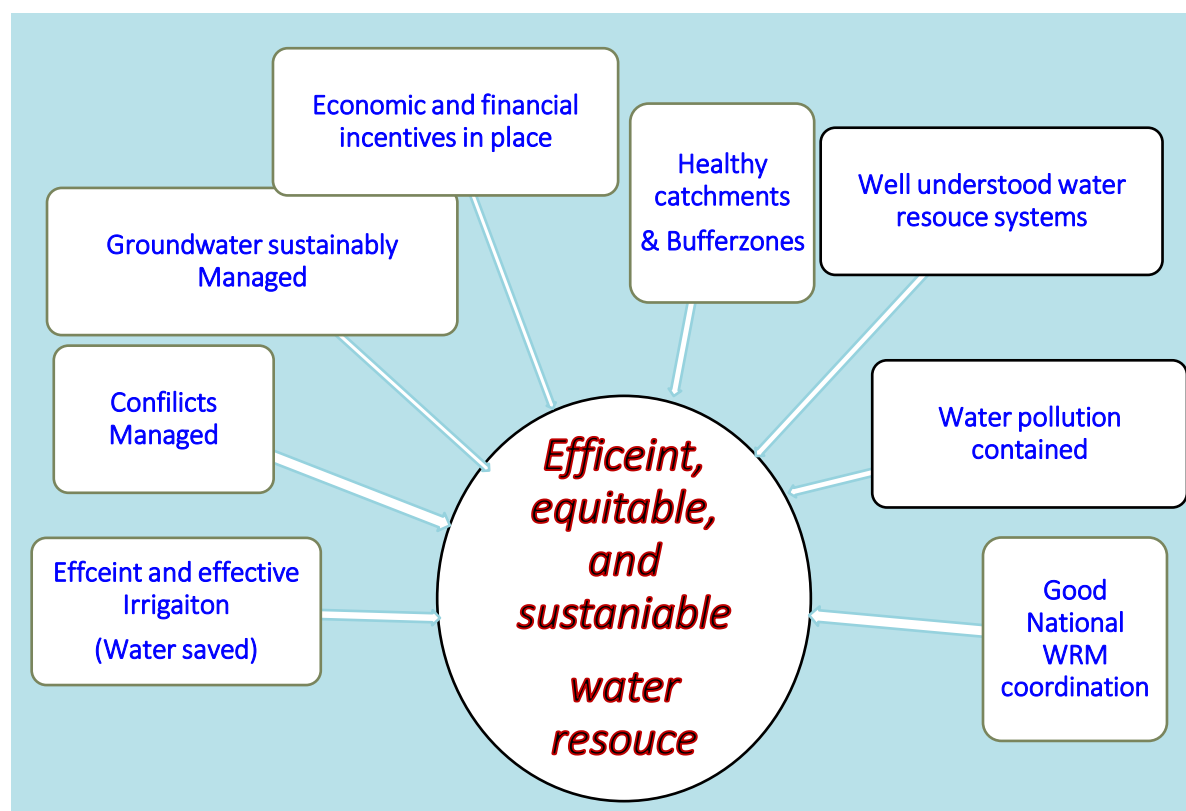


Figure 6. The NIWRMP components

### 9. Principles behind the NIWRM program

The NIWRMP, in addition to the four IWRM principles, i.e. water is finite resource, participatory management, the central role of women; and water as an economic good – shall embrace the following sub-principles:

- **Integration** - Water resource management is strongly multi-dimensional in a sense that it needs integration of all uses and users simultaneously. There is always a trade-off in using water for one purpose against another use. It is for this reason that integration including the active engagement of sectors and development partners is imperative.
- **Sustainability** – ‘Some, for all, for ever, together’: The interdependence between humans and ecosystems is clear. The more the quality and quantity of available water is compromised, the more livelihoods are compromised. Moreover, water allocation decisions must consider the needs of future generations as well since ecological and socio-economic sustainability depend on water resources.
- **Equity**: Allocation of water should address the issue of fair access to water resources



between existing and potential users. A special focus should be on those who have historically not benefited from water resources management, such as women and the poor. Equity issues also arise when an allocation regime is changed by changing a minimum flow, altering priorities or changing the total amount of water that can be allocated from a resource.

- **Efficiency/optimal beneficial use:** Allocation of water to users should be guided by the need to encourage and support efficient, optimal and beneficial use of water. The aim of this principle is to allocate water to a broad range of uses in a variety of sectors so that a diverse, robust and stable economy can be supported.
- **Harmonization and Coordination:** Develop partners support will be effective when supports are harmonized, aligned, owned, managed for the results, and accountability is ensured. The NIWRMP program can therefore help to bring together development actors – donors, public institution's, academia, private sectors and NGOs together to chart the road towards effective use of the developmental support and strive towards the targets set under SDGs.
- **Balancing Bottom up – top down approach:** - water management should be implemented at the lowest possible management unit. For instance, a small lake could be best managed by engaging the communities that have stakes in the well-being of the water bodies. It is however, equally important that activities among different sectors be aligned and cascaded to respective bureaus and offices at region and woreda level. The role the BHC plays is equally vital in ensuring leadership ownership and enforcing grass root decisions.
- **Alignment:** Donor countries and organizations bring their support in line with developing countries strategies and use local systems.

## **10. Major Assumptions in NIWRMP Design**

The primary assumption while developing the National Program includes the following:

- IWRM as an approach in the management of water resources remains the guiding principle for the management of water and related aquatic resources;
- The major sector of ministries (MoWIE, MoEFCC, MOALR, MOH) will be convinced on the importance of harmonising water resource development and management for the good of the nation and neighboring countries.;
- TBAS in collaboration with Water Bureaus will establish Water Resouce Users Accoation

which may comprise Irrigation Water Users Associations. This is expected to promote collaboration between catchment and command communities.

- MoWIE will establish a focal unit to strive towards SDG 6.5;
- Development partners will embrace the NIWRM program;
- NGOs will strive to harmonise their water management interventions.

## **11. Implementation Strategy**

- i. The overall mandate to oversee the implementation of the NIWRMP shall be the responsibility of the BHC, MOWIE, guided through a National Steering Committee comprised of the three Ministers (MoEFCC, MOALR, MoFEC) and other major actors.
- ii. The Water Resource Management Working Group (WRMWG) shall be the forum where specific activities in a basin are evaluated, finance solicited, and progress monitored.
- iii. Selection and prioritisation of specific activities will be done by Basin Authorities building on their water resource management plan.
- iv. Grass root implementation shall be the responsibility of regional water, environment and agriculture bureaus and woreda offices.
- v. In the short term, Basin authorities shall prepare detailed project proposal for implementation.
- vi. The plan should be jointly submitted between the basin authority and the regional concerned offices with clear roles and responsibilities in the project implementation.

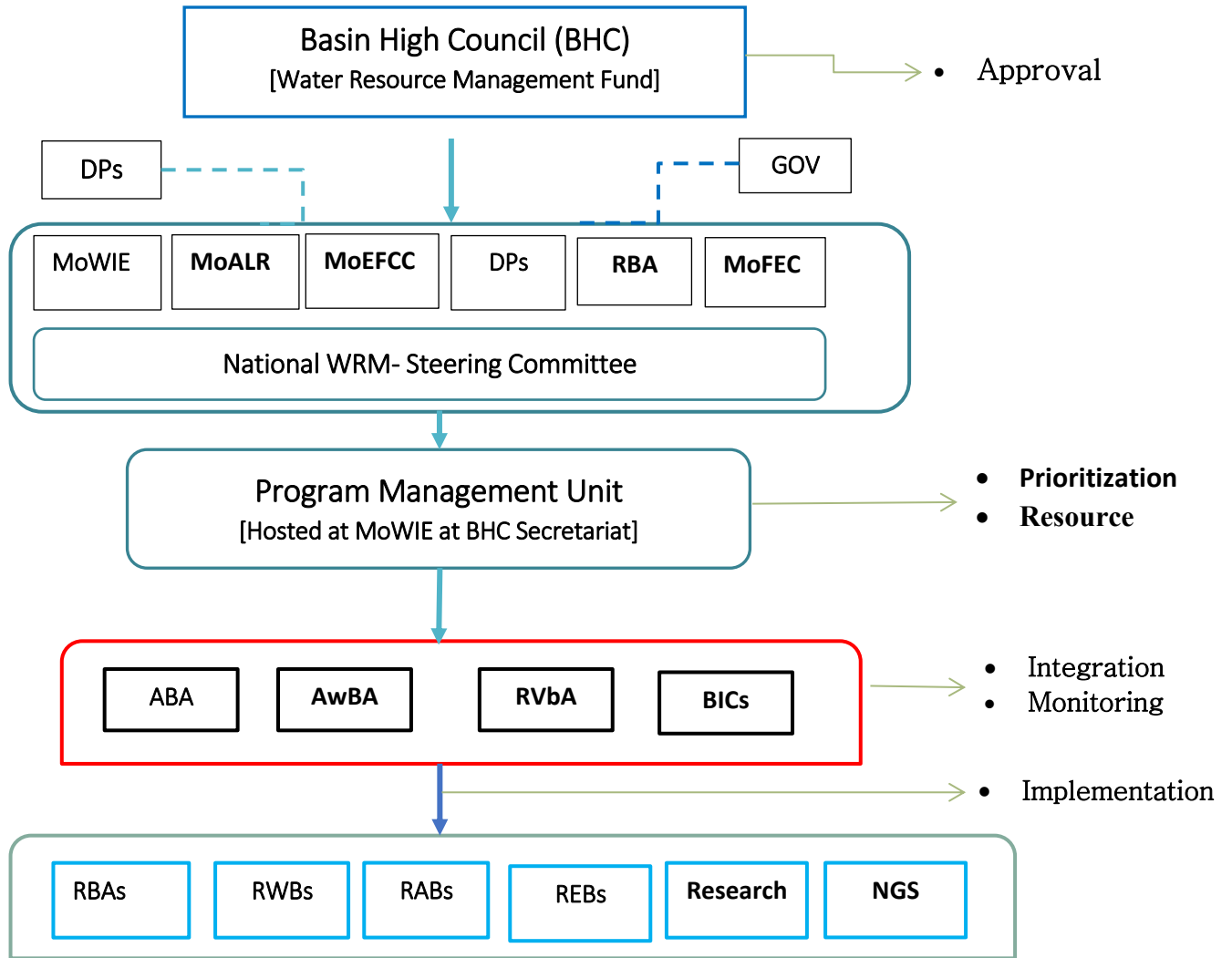



Figure 7. Implementation arrangements for NIWRM Program

## 12. Proposed IWRM interventions/projects

### 12.1. Irrigation Systems Performance Enhancement

Component 1	National Irrigation System Performance Enhancement Program (NISPEP)	Lead: MOALR
<p><b>1. Rationale</b></p>  <p>The diagram illustrates the process of irrigation systems performance enhancement through seven sequential steps, each represented by a blue oval with a yellow border, connected by downward-pointing blue triangles. The steps are: Capacity Dev't, Schemes Mapping, Baseline, Model Schemes Revitalisation, Best Practice Documented, Schemes Strategy, and Monitoring. A vertical yellow box on the left contains the title 'Irrigation Systems Performance Enhancement'.</p>	<p>Irrigation development is a vital strategy for increasing productivity of land and labor; ensuring food security, reducing reliance on rainfall, thereby mitigating vulnerability to rainfall variability; reducing degradation of natural resources; increasing exports; and increasing job opportunities, and promotion of a dynamic economy with rural entrepreneurship.</p> <p>An irrigated agriculture is the main water user in large water resource regions, consuming 70 percent global and 80 percent national water abstraction, respectively. Unlike hydro and domestic consumptions where much of the water rejoins the system after use, irrigation abstraction is consumptive in that there is little water that rejoins the system after use.</p> <p>Ethiopia may have considerable area that can be developed through irrigation. But a conservative estimate shows that the total area under irrigation is 2.025 million hectares under small, medium and large-scale irrigation schemes consuming about 16.26 BCM. (GIRD, 2018).</p> <p>Improving the water productivity of irrigated agriculture has a far reaching economic and environmental benefits. FAO (2013) reported that average irrigation efficiency in Ethiopia is in order of 40 percent which is equivalent to about 10 BCM is lost annually unaccounted.</p> <p>Improving irrigation systems performance can create the opportunity to develop more land, create more opportunities and avail water for ecosystem service. Improving the irrigation system performance should be continuous endeavor and should be made at all scales. At the moment, the aggregated area under small scale irrigation scheme is much larger than medium and largescale irrigation schemes combined. Hence the water</p>	

	<p>saving that can be achieved by improving the performance of small-scale irrigation schemes could be more significant.</p> <p>Therefore, there is great potential for irrigation systems performance to improve economic returns from irrigation investments and reducing environmental impact due to salinization and nutrient and pesticide pollution.</p> <p>The component of the program, therefore, aims at supporting continuous irrigation systems performance improvement in small scale irrigation system and transformation of large-scale irrigation systems into a more modern water saving irrigation technologies.</p> <p>Major assumption on irrigation for growth:</p> <ul style="list-style-type: none"> <li>• Regardless of the basin where irrigation scheme is located, all irrigation schemes go through either transient or terminal water shortage; and</li> <li>• By mainstreaming irrigation water productivity and building the capacity of scheme managers and irrigators, irrigation water productivity can be improved;</li> </ul>
<p><b>2. Goal</b></p>	<p>Enhancing irrigation performance and water productivity through improved management of selected irrigation schemes and thus build institutional capacity for integrating water resources management in Ethiopia.</p>
<p><b>3. Objectives:</b></p>	<ol style="list-style-type: none"> <li>i. To build capacity of basin authorities, regional bureaus, water user associations, irrigation cooperatives, and irrigation scheme operators on harmonized irrigation system performance monitoring and evaluation. <b>Irrigation system performance appraisal capacity developed – (National)</b></li> <li>ii. To support revitalization/improvement of irrigation infrastructure for selected schemes where water scarcity is a limiting factor for sustainable irrigated production; <b>(Selected (model) small irrigation schemes infrastructure developed – at least one basin from AbBA, AwBA, and RVLBA).</b></li> <li>iii. To support the institutional arrangement of irrigation schemes for market oriented irrigation production – <b>(Market oriented irrigation production contributes to schemes sustainability- first one scheme from each basin)</b></li> <li>iv. To support irrigation system development continuous water productivity strategy and monitor implementation of the same. <b>(Continuous performance improvement is ensured – the three RBA)</b></li> <li>v. To contribute to the government’s effort in engaging educated youth in irrigated</li> </ol>

	commercial agriculture ( <b>Irrigation for job creation supported – number schemes to be supported need to be requested by the MoWIE</b> )	
	vi. To Build the national capacity on irrigation induced soil salinization appraisal ( <b>Adverse impacts of soil salinity tamed in Awash, Wabi-Shebele, and Omo-Gibe basins</b> )	
<b>Outcome</b>	<b>Description of Activities</b>	<b>Activity Leader</b>
1. Irrigation system performance appraisal capacity developed	1.1 Develop a standardized and harmonized irrigation system operation and performance evaluation protocol and training manual;	MOALR/RBA
	1.2. Organize capacity building (cascading) training for authorities, bureaus, irrigation extension workers; and WUAs.	RBA/RABs
2. Model Irrigation schemes infrastructure improved and water productivity increased.	2.1. In consultation with basin authorities and bureaus, identify an irrigation scheme underperforming due to weak operation and maintenance;	RBA/RABs
	2.2. Survey and carefully document scheme performance baseline;	RBA/RAB
	2.3. Rehabilitate irrigation infrastructure and targeting and water need water productivity enhancement;	RABs/RBAs
	2.4. Organize best practice learning events to promote lesson learn for out/up scale	RBAs
3. Market oriented irrigation production contributes to schemes sustainability)	3.1. Evaluate and build the capacity of WUA or IC on irrigation schemes management.	RABs/RBA
	3.2. Demonstrate scheme operation from the current supply management to demand management to improve water productivity and create jobs.	RBA
	3.3. Build postharvest handling and storage capacity of irrigation cooperatives;	RBA/WUA/IC
	3.4. Evaluate the impact current fruit and vegetable market network and support model schemes to build cold storage for postharvest storage.	RAB/IC
	3.5. Establish networks and support irrigation schemes with access to international markets.	RABs/ICs
4. Strategy for gradual transformation to a more efficient irrigation water application	4.1. Support model schemes, identify areas of irrigation water productivity improvement;	MOWIE RBA
	4.2. Support schemes develop <b>strategy (plan)</b> to transform the system to a more water efficient technology – lining of main canals, efficient water application technologies;	RBA/RWB

technologies developed.	4.3. Support model irrigation schemes transformation into a more efficient water application technologies – conveyance systems upgraded; change from flood to furrow, surface to sprinkle, and surface to pressurized irrigation systems supported;	RBA/MOWIE
	4.4. Support the national agricultural electrification to promote groundwater irrigation and job creation;	MoWIE RWB/EEP
	4.5. Promote the use of water lifting technologies (photovoltaics) for community pressurized irrigation.	MOALR RABs
5. Irrigation for job creation supported.	5.1. Support the capacity educated youth on irrigation water resource management;	MoWIE
	5.2. The support the adoption and promotion improved irrigation technologies in the schemes managed under educated youth program	MoWIE
6. Adverse impacts of soil salinity tamed.	6.1. National capacity soil irrigation induced soil salinization appraisal and mapping capacity developed.	MoWIE/RBA
	6.2. Extent of soil salinity problem at basin scale mapped.	MoWIE/RBA
	6.3. Large irrigation schemes (in particular) are required and supported to develop strategy to prevent or manage irrigation induced soil salinization.	MoWIE/RBA
	6.4. Large irrigation schemes are guided to design drainage systems for salinity control and soil reclamation.	MoWIE/RBA
Remark	MOALR is expected to play a role in improving irrigation schemes performance enhancement with active engagement of MoWIE particularly on large irrigation schemes and RBA on the monitoring and evaluation.	

## 12.2. Water Related Conflict Management and Stakeholders Engagement

Component 2	Conflict management and stakeholder engagement in water resource management (CMSEP)	Leader: MoWIE
<p><b>1. Rationale</b></p>  <p>The diagram is a vertical flowchart with the title 'Conflict Management and Stakeholder Engagement' on the left. It consists of five upward-pointing arrow shapes, each containing a stage of the process: 'Capacity Dev't', 'Hotspot Schemes', 'Conflict Mgmt Plan', 'Stakeholder Engaged', and 'Governance Capacity'.</p>	<p>Given its vitality and centrality to human life, it is not surprising that water management is complex and that water related interests are frequently contested. Water related conflicts - which may be real or perceived set of incompatible interest and goals among two or more parties - is inherent in water resources management unless mutual interests are perceived. Non-substitutability, high and increasing demand, degrading quality, increasing scarcity, weak regulatory apparatus, incomplete knowledge are basic ingredients of conflicts between uses and users.</p> <p>Disputes between communities or individuals over access or usage rights could easily turn violent in the absence of strong, legitimate governing institutions where the rule of law extends clearly over water rights.</p> <p>Water related conflicts can be multi-dimensional. It can be between users or between institutions. Conflicts between water users could be addressed through participatory integrated water allocation plan that has been deliberated and agreed in forms with proactive engagement of stakeholders. There are also high-level conflicts between governmental institution that emanate from gaps, overlaps and lack of clarity from policy, regulatory and proclamations related instruments. This is an area that can be rectified through public discourse and roundtable consultation.</p> <p>There is no water related conflict immune region in the country. Even areas which are considered as water resource abundant (the western part of the country) grapple with transient water scarcity resulting violent conflicts. In areas where water resource is physical scarce while water-dependent economic activity is intense, competition for the scarce water resource is rampant.</p> <p>Water related conflicts are avoided though proactive participatory and</p>	



	<p>transparent stakeholder engagement and design of comprehensive conflict prevention, resolution and management mechanisms, and effective implementation of norms and laws.</p> <p>Stakeholder management, - which is the process that identifies the stakeholders, analyzes their expectations and impacts, and develops appropriate strategies for effective engagement in the water resources management is a very important step in conflict management.</p> <p>There are no two water bodies that are alike, hence basin specific stakeholder management is important. Effective involvement of the stakeholders in water resources management throughout the basin. i.e., in planning, implementation as well as evaluation and monitoring, is imperative to solicit their support for anticipated resistance, conflict, or competing objectives among the stakeholders.</p> <p>In the past, water resource management has been prescriptive, technocratic and top-down with little participation of stakeholders. That has been compromising the sustainability of water bodies as it has been the case in Lake Haramaya . In the absence of the right stakeholders’ participation and public awareness, enforcing laws and decisions is a challenge.</p>
<b>2. Goal</b>	To promote societal wellbeing and economic growth through equitable, efficient and sustainable use water resources by instituting a proactive and effective conflict prevention, resolution, and management developed through transparent, inclusive, participatory stakeholder engagement.
<b>3. Objectives:</b>	<ol style="list-style-type: none"><li>i. To developed Basin Authorities capacity for stakeholder engagement <b>(Stakeholder analysis capacity developed);</b></li><li>ii. To identify and prioritize water resource systems vulnerable to conflict; <b>(Conflict vulnerable schemes identified)</b></li><li>iii. To establish a vibrant stakeholder platform and endorse the same through agreed charter or MOU;</li></ol>

	<p><b>(Vibrant stakeholders platform developed)</b></p> <p>iv. To develop basin or resource system specific water related conflict prevention, resolution, and management systems; and</p> <p><b>(Conflict management capacity developed)</b></p> <p>v. To enhance the capacity to enforce charters, bylaws, and other water resource management instruments.</p> <p><b>(Monitoring and enforcing capacity developed)</b></p> <p>vi. To assess water resource demand and supply and prepare water allocation plan.</p> <p><b>(Basin management is guided through a comprehensive water allocation plans)</b></p>	
<b>Outcome</b>	<b>Description of Activities</b>	<b>Lead(s)</b>
1. Conflict resolution and stakeholder engagement capacity developed	1.1. Develop conflict resolution and stakeholder engagement manuals.	MOWIE
	1.2. Provide training for river basin authorities and key stakeholders on water related conflict prevention and resolution.	RBA RWBs
2. Conflict vulnerable systems identified and prioritized with stakeholders.	2.1. Investigate causes of conflict associated to a given water body through systematic investigation or commission study (water allocation plan, and pollution prevention strategy, etc.).	RBA RWBs
	2.2. Organize stakeholders' forum/meeting(s) to reach to a mutual understanding to causes of conflict.	RBA RABs
3. Vibrant stakeholder platform developed and charter on conflict resolution are signed	3.1. Identify conflict resolution institutions both formal and customary (traditional) with specific water body.	RBA RWBs
	3.2. Organize stakeholder platform to raise awareness on the state of water body	RBA RWBs
4. Water related	4.1. Taking into the formal regulation, and customary/	RBA

conflict prevention, resolution, and management systems are developed	indigenous conflict resolution mechanisms, develop water related conflict prevention, resolution and management system	RWBs
	4.2. Provide awareness creation and capacity building trainings so that conflict management related bylaws understood and observed by all including the law-enforcement institutions	RBAs RWBs
5. Capacity to enforce charters, bylaws, and other water resource management instruments developed and used	5.1. Provide trainings to the most relevant and appropriate law enforcement (police, and court) on agreed bylaws	RBAs RWBS
	5.2. Ensure that the bylaw is validated and interpreted by the formal law enforcement, and/or the customary institutions as appropriate.	RBAs
	5.3 Evaluate the conflict management and stakeholder engagement processes through a regular and organized monitoring.	RBAs RWBs
6. Basin management is guided through a comprehensive water allocation plans.	6.1 Assess current demands and forest future demands	RBAs
	6.2. Prepare water allocation plan with active consultation of stakeholders	RBAs
	6.3. Endorse the water allocation plan by the BHC's and solicit the buy-in of Regional Bureaus	RBA
Remark	RBAs shall have harmonized water related conflict resolution mechanisms. But the actual implementation will be best implemented by RWBs they have legitimacy in enforcing laws and orders.	

### 12.3 Water Resources Pollution Prevention and Control (PPC)

Component 3	Pollution Prevention and Water Quality Enhancement Program.	Lead: MoEFCC
<p><b>Rationale</b></p>  <p>The diagram is a vertical flowchart with the title 'Water Quality and Pollution Prevention' on the left. It consists of five upward-pointing chevron shapes, each containing a label: 'Mang't Plan' at the bottom, followed by 'Baseline Data', 'Lab Infrastructure', 'Information System', and 'Pollution Prevention' at the top.</p>	<p>Water quality is the term used to describe the physical, chemical, biological and aesthetic properties of water that determines its fitness for a variety of uses and for the protection of the health and integrity of aquatic ecosystems.</p> <p>The state of many fresh water systems (rivers and lakes) in Ethiopia are deteriorating rapidly due to pollution (Awash R, Zeway, Hawassa, etc) and/or drying up (e.g Ziway and Haramaya) because of the pressure from unregulated abstraction and untreated wastewater release into the system. This is driven by burgeoning population, rapid and unplanned urbanization with no wastewater treatment services, increase in industrial activities that do not meet the required environmental safety standards, and flower farms with unregulated chemical use, limited wastewater services. This primarily impacts communities that depend on the water for drinking, irrigation, and fishing, the ecosystem services derived from the lake.</p> <p>Another major challenge affecting water quality in Ethiopia as in many developing countries includes inadequate measures to control pollution from point and non-point sources; inadequate enforcement capacity by institutions mandated to control pollution and enforce water quality standards; lack of incentives to polluters and low compliance; inadequate water quality data for planning and decision making; inadequate allocation of financial resources; inadequate human resource capacity; research gaps in water quality; scarcity of potable water; dilapidated potable water distribution network; dilapidated/inadequate sewerage system; poor land use practices including unplanned urbanization; conflicting laws and policies; inadequate documentation and dissemination of available information.</p> <p>Geogenic water quality problem in is also another water quality problem area in the country particularly those associated to fluoride. Much of the ground water in rift valley aquifers are not fit for drinking without treatment. This can, however, be treated and used for both drinking and industrial purposes with the</p>	

	<p>state-of-the-art technologies (Zero Liquid Discharge) as it is the case in Hawassa Industrial Park.</p> <p>Water quality management (WQM) is an important water resource management task. WQM should aim at improving water quality by reducing pollution from point and non-point sources; enhance water quality monitoring programmes, water data management; harmonized WQM guidelines recognizing differences in institutional social and natural conditions; equipped laboratories at different levels with professional staff for improved water quality analysis; improved enforcement and compliance to water quality standards and guidelines; support to applied water quality research, etc.tc.</p> <p>Ethiopia has the opportunity of ‘growing clean’ if appropriate measures are in place to protect the pollution. If industries are developed with the state of the art mandatory wastewater technologies; industrial zones with ‘Zero Liquid Waste Discharge (ZLD), municipalities are provided with effective wastewater treatment units water bodies and related aquatic ecosystems will be sustainable.</p> <p>This national PPC sub-program should, therefore, aim to facilitate sustainable and integrated water quality management for human health, environmental health and sustainable development.</p>
<p>Goal</p>	<p>Ensure that water bodies (lakes, rivers, and wetlands) and related eco-systems are sustainably contributing to societal and environmental wellbeing by reducing pollution (organic solid and liquid waste) and contamination (less degradable chemicals).</p>
<p>Objectives</p>	<ol style="list-style-type: none"> <li>1. To harmonize and/or develop national environmental pollution prevention and control policies, strategies, instruments, regulations are harmonized, and management instruments (such as polluters pay/clean) are developed and institutionalized and used. <b>(Revising and harmonization of the enabling instruments)</b></li> <li>2. To develop the national capacity to monitor hazardous pollutants, such heavy metals trace-elements, herbicides, pesticides, etc.</li> </ol>

	<b>(Water quality monitoring capacity development)</b>	
	3. To develop capacity of RBAs to undertake a regular monitoring of water pollution levels, and identify point source polluters. <b>(Water quality surveillance capacity develop)</b>	
	4. To support major towns to come with systems for safe disposal of urban liquid and solid waste management – <b>(Water bodies pollution from Urban Wastes reduced).</b>	
	5. To build the capacity of RBAs to develop and maintain a reliable updated water quality information system. <b>(Water Quality Information Systems developed).</b>	
	6. To raise public awareness on water pollution cause, levels, impacts, recommended intervention – <b>(The state of water pollution awareness developed and behavior changed).</b>	
Outcome	Description of Activities	Leads(s)
1. Water pollution prevention enabling instruments harmonized.	1.1. Review and harmonize national and regional water pollution prevention policies, proclamations, regulations, and management instruments;	MoFCC
	1.2. Create national fora to build national awareness on the gaps identified and proposed adaptations;	MoFCC RBA
	1.3. Developing national water quality management strategy document	MoFECC MoWIE
	1.4. Develop/design/adapt the relevant pollution prevention instruments and get them approved following due process. Ensure, through effective monitoring regulations arrangement, the effective implementation of these policies and management instruments.	MoFCC MoWIE
2. Water quality monitoring capacity development	2.1. Investigate the water quality analysis capacity of national laboratories and identify gaps particularly in relation to analysis of pollutants from industry (heavy and radio-active	MoWIE

	metals), and agricultural wastes (pesticides).	
	2.2. Strengthen the national water testing laboratory of MoWIE	MoWIE
3. RBAs water quality surveillance capacity develop and harmonized with regional bureaus.	3.1. Support river basin organizations to develop water quality management strategy;	MoEFCC
	3.2. Build the capacity of basin authorities, and water and environment bureaus on water pollution monitoring and evaluation;	MoEFCC
	3.3. Support RBAs in the preparations of the state water pollution report for threatened water bodies.	MoEFCC
	3.4. Support the promotion of appropriate wastewater treatment technology in collaboration with industries and farms.	MoWIE
4. Water bodies pollution from Urban Wastes reduced.	4.1. Support a detail investigation of the impact of waste (solid and liquid) disposal of towns to receiving aquatic resources;	MoEFCC
	4.2. Undertake a public discourse on the impact along with recommended solutions.	MoEFCC
5. Water Quality Information Systems developed.	5.1. Develop the capacity of basin authorities to develop water body specific water quality report, and communicate findings to stakeholders for all possible intervention;	MoEFCC MoWIE
	5.2. Support Basin Authorities State to develop state of the basin water quality report;	MoWIE
	5.2. Develop an effective national water quality information system that is reliable, relevant, and accessible.	MoEFCC MoWIE
6. The state of water pollution awareness	6.1. A long term national water pollution control and prevention program is developed.	MoEFCC MoWIE

developed and behavior changed .	6.2.Ensure that water pollution related national state of the environment reports are based on the reliable facts and figures derived from the national system of monitoring networks.	MoEFCC MoWIE
	6.3.Support industries to deploy state of the art waste treatment technology – aiming at Zero Liquid Discharge.	MoWIE
Remark	The Pollution prevention and control program can be lead by the MoFCC with active engagement of MOWIE, RBAs and REBs. Many federal and regional units strive to establish water quality laboratory. An agreement could be reached where the water quality laboratories should be, what are the parameters they are expected to monitor and for which parameters should they have to go elsewhere.	



#### 12.4. Groundwater Management and Legislation of Use

Component 4	Formulating National Groundwater Use Legislation	Leader: MoWIE
Rationale	<p>Groundwater constitutes the main source of water for small scale irrigation, industrial and domestic uses. However groundwater has largely been unknown and underestimated resource. There is no comprehensive study on its occurrence, distribution, development potential, and groundwater dynamic. Assessments and investigations of the resource potential are conducted in different parts of the country but even the findings of these assessments are not well documented and there are different estimates of the resource conducted at different times. Overall, .Groundwater resources are not well defined and assessed. Comprehensive and adequate information on the quantity, quality and utilization of groundwater resources is scanty.</p> <p>Access to groundwater resources has traditionally been linked to the right to land so that the level of abstraction depends on the decisions of millions of individuals at the local level. Decisions related to groundwater abstraction are thus largely unregulated and made without adequate data and information. Lack of accurate information on groundwater potential, poor groundwater development planning and absence of groundwater monitoring have lead to overexploitation of groundwater resources. In addition, groundwater resources are vulnerable to contamination from agricultural chemicals as well as domestic and industrial waste. It is therefore, important to incorporate the planning and management of pollution control system by identifying, controlling and regulating point and non-point sources of pollution to safeguard the quality of the country's groundwater resources. Moreover, the degradation of watersheds and wetlands the very resources that enhance groundwater recharge is widespread and this will have repercussion on the sustainability of groundwater resources.</p>	

	<p>Patterns of groundwater use and overuse as well as issues related to pollution and sustainability of groundwater resources are nevertheless influenced significantly by legal and administrative factors. The state of the country's groundwater resources thus calls for a need to introduce effective legal and regulatory framework and improving the knowledge level of the resource. Effective groundwater legislation is required, among other things, to regulate groundwater development, constrain activities that might compromise groundwater availability and quality, address increasing competition and conflict between groundwater users, and address increasing threat of groundwater pollution. The legislative provisions need to include groundwater Abstraction and use rights, wastewater discharge licensing, sanctions for non-compliance, controlling well construction activities, catchment or aquifer level resource planning, conjunctive use of groundwater and surface water, land surface zoning for groundwater conservation and protection, facilitating water-user and stakeholder participation, and provisions for groundwater monitoring. Improving the knowledge level of the resource and information on the present abstraction and management of the resource is a prerequisite for instituting enabling and enforceable legislation on groundwater use. Therefore, action plan related to improving the knowledge base on the existing groundwater use in terms of quantity and quality will be priority.</p>
<p><b>Goal</b></p>	<p><b>Groundwater resources are assessed, well defined, well managed and regulated to ensure availability of sufficient quantity and quality groundwater for all uses.</b></p>
<p><b>Objectives</b></p>	<ol style="list-style-type: none"> <li>1. To improve the knowledge base on the country's groundwater resources and their potential for sustainable groundwater resources management, development and protection.</li> <li>2. Ensure the availability of good groundwater quality for all uses to achieve sustainable national economic development by effectively</li> </ol>

	<p>controlling groundwater pollution.</p> <p>3. Enhance and upgrade watershed and wetland protection and management practices to improve the ecosystem and enhance groundwater recharge.</p> <p>4. Enhance the creation and implementation of enabling environment that support efficient and sustainable utilization of the country's groundwater resources</p>	
<b>Outcome</b>	<b>Description of Activities</b>	<b>Basin</b>
1. Capacity to collect, store, process, and disseminate groundwater data (quantity and quality) developed	1.1. Provide equipment, facilities and training to strengthen the RBOs and other institutions involved in collecting, storing, processing and disseminating of groundwater data.	MOWIE
	1.2. Assess the capacity (institutional and human) gap in groundwater data collecting, storing, processing and disseminating of RBOs and other institutions and strengthen them by filling the identified gaps	MoWIE
2. Knowledge of policy and decision makers on the importance of reliable groundwater data to national development improved	2.1: Raise awareness of policy and decision makers focusing on the importance of reliable groundwater data on the national development by organizing workshops and sponsoring scientific papers that depict the state of the country's groundwater resources.	MoWIE
	2.2: Develop manuals, guidelines, formats on the collection, recording and storing of groundwater data and undertake groundwater inventory.	MoWIE
3. National groundwater monitoring network designed, established and implemented	3.1. Design groundwater monitoring network based on field studies of geophysical, geological, hydro geological and groundwater quality variations and implement establishment of the network phase by phase	MoWIE

4. Regulatory instruments for maintaining groundwater quality standards developed and enforced	4.1. Develop or revise and enforce standards, guidelines and procedures on wastewater quality, solid wastes and discharge regulation	MoWIE
5. Capacity of relevant institutions on groundwater quality monitoring and regulating improved	5.1. Identify relevant institutions, assess their institutional capacity (availability of equipment, facility, etc) and provide equipment and facilities that enhance their water quality monitoring and regulating capacity.	MoWIE
	5.2. Identify training needs of relevant institutions and provide required training to relevant staff of the institutions.	MoWIE
6. Inventory of groundwater quality and pollution sources undertaken	6.1 Conduct inventory of groundwater quality and pollution sources and identify mitigation measures to improve the existing water quality of important groundwater sources	MoWIE
7. Development and management plan for major groundwater potentials devised	7.1 Study the occurrence and present use and development potential of major groundwater potentials and devise development and management plan for major groundwater potentials.	MoWIE
	7.2. Propose alternative development and management plan and establish monitoring and evaluation mechanism.	MoWIE
8. Land, water and forest use and management policy harmonized with appropriate watershed protection and management principles	8.1 Review the existing land, water and forest use and management policy and law and harmonize it with sound watershed protection and management principles; Monitor the implementation and document lesson learned	MoWIE

<p>9. Effective legislative framework that support efficient and sustainable groundwater development, use and conservation instituted</p>	<p>9.1. Develop legislation (laws and regulations) for groundwater abstraction and use rights Assess the existing regulatory framework related to groundwater abstraction and use rights; develop legislation (laws and regulations) for groundwater abstraction and use rights; facilitate the approval and enactment of the drafted legislation and supervise and follow up the implementation of the approved legislation</p>	<p>MoWIE</p>
<p>10. National and regional bodies that enact and enforce legislation on groundwater development, use and conservation developed</p>	<p>10.1. Develop a proposal for the establishment of a national and regional groundwater monitoring and regulatory bodies with their organizational structures, institutional arrangement and clearly defined mandate.</p>	<p>MoWIE</p>
	<p>10.2. Facilitate the review process; establish national and regional bodies that overlook the enforcement of groundwater legislation; and develop the required human and institutional capacity to enact and enforce legislation on groundwater development, use and conservation.</p>	<p>MoWIE</p>
<p>Remark</p>	<p>Effective legislative framework that supports efficient and sustainable groundwater development, use and conservation will be instituted and implemented in the three basins that have RBAs</p>	

## 12.5 Water charge and Scheme Sustainability

Component 5	Water charge and scheme sustainability	Leader: MoWIE
1. Rationale	<p>Water is recognized as an economic good; it is not considered as a free good. Water is a valuable resource that has to be managed in the best national interest to achieve equity, efficiency and sustainability. Water used for one purpose is not available for another use. That is, water is a scarce resource and its use involves opportunity cost. Accordingly, water allocation should give priority to desirable and most productive users that generate highest socio economic benefits while ensuring sustainability of the resource. The fact that water is a scarce economic good justifies payment for water use and pricing mechanisms to promote efficient use of water resources and prevent wasteful use of water and undesirable environmental impacts. Water charge is considered to be an effective instrument to water saving through increased efficiency. It helps reduce the quantity of water to be abstracted impacting on the amount of water polluted. Similarly, charge on treated wastewater discharge induces water saving by encouraging recycling and reuse. Instituting payment for ecosystem services is also essential for preserving vital environmental resources and ensuring sustainability of water supply sources.</p> <p>The three major river basins, namely Abay River Basin, Awash River Basin and Rift Valley Lakes Basin have institutions that help the collection of charges. However, the existing water charge system is constrained by several limitations. These include lack of customer based water charge structure, limited billing and collection performance, lack of a system for assessing and charging treated wastewater discharge, absence of a system for charging payments for ecosystem services. Effective regulation of water use and charge system requires reliable data on the available water resources and the present water use. Therefore, action plan related to improving the knowledge base on water availability and use in</p>	

	terms of quantity and quality is imperative.	
<b>2. Goal</b>	<b>Surface and groundwater resources are assessed, well defined, well managed and regulated to ensure availability of sufficient water resource in quantity and quality for all uses.</b>	
<b>3. Objectives:</b>	<ol style="list-style-type: none"> <li>1. To improve the knowledge base on the country's water resources and their potential for sustainable management, development and protection.</li> <li>2. To strengthen the national capacity to conduct water resources assessment and monitoring for sustainable water resources management, development and protection.</li> <li>3. Ensure the availability of good water quantity and quality for sustainable national economic development by enhancing water use efficiency and effectively controlling pollution.</li> <li>4. Create enabling environment that support optimal and efficient utilization of the country's scarce water resources on the basis of national priorities and strategies</li> <li>5. To increase knowledge on present and future demand for water for all uses, and on mechanism that enhance water use efficiency.</li> </ol>	
<b>Outcome</b>	<b>Description of Activities</b>	<b>Basin</b>
1. Coverage and status of stream gauging metrological stations improved in major river basins	1.1 Improve the coverage and status of stream gauging stations for major river basins of the country and collect, compile and disseminate available hydrological data scattered in different institutions	MoWIE
	1.2 Improve the coverage and status of meteorological stations of the country and collect, compile and disseminate available meteorological data scattered in different institutions.	MOWIE RBAs
2. Human and institutional capacity of water sector	2.1 Provide equipment, facilities and training to strengthen the capacity of water sector institutions involved in collecting,	MoWIE RBAs

institutions involved in collecting, storing, processing and disseminating hydro meteorological data improved	storing, processing and disseminating hydro meteorological data.	
3. An efficient platform for information exchange and flow of data among and between key water sector institutions established.	3.1 Identify relevant institutions involved in collecting, storing, processing and disseminating hydro meteorological data and devise and develop a system for information sharing	MOWIE RBAs
4. Manuals, guidelines and formats for the collection, recording and storing of hydro meteorological data developed	4.1 Develop manuals, guidelines, formats on the collection, recording, compiling, storing and dissemination of hydro meteorological data.	MoWIE
5. Develop and enforce guidelines and standards for conducting water resources assessment and development	5.1 Develop/revise and enforce guidelines and standards for conducting water resources assessment and development.	MOWIE
6. Knowledge level on the existing and projected future water use by sectors in terms of quantity and quality improved.	6.1 Establish a system of data collection and information exchange platform on the existing water uses and present and projected future demand for water in relevant sectors.	MoWIE



7. Regulatory instruments on maintaining water quality standards and controlling water pollution developed	7.1 Prepare Guidelines on the design of wastewater treatment, disposal and reuse facilities.	MoEFCC
	7.2 Develop/revise standards, guidelines and procedures on wastewater quality, solid wastes and discharge regulation	MoEFCC
	7.3 Provide equipment and facilities that enhance the water quality monitoring and regulating capacity of relevant institutions	MoEFCC
	7.4 Provide education and training to water sector staff on water quality monitoring, data analysis, pollution control mechanism and on the development and application of efficient water quality regulatory instruments.	MoWIE
8. Inventory of surface water quality and pollution sources conducted	8.1 Conduct inventory of surface water quality and pollution sources and identify potential mitigation measures and mechanisms to improve the existing water quality of important water sources	MoWIE
9. Effective water resource allocation guidelines and procedures instituted on the basis of national priorities, plans and strategies	9.1 Assess and evaluate existing water allocation guidelines and procedures and develop forward looking water allocation model that takes into account projected future demand for water by major water users	MoWIE
	9.2 Provide adequate equipment, facility and training to build the capacity of RBOs to carry out appropriate and effective decisions on water allocation and use	MoWIE
10. Effective system for assessing and charging water use by all sectors developed	10.1 Develop/ revise a system for issuing water use permit and assessing and charging water use by all sectors	MoWIE
	10.2 Assess and evaluate existing regulations on issuing water use permits, identify major gaps (e.g. mandate overlaps) and make required revisions	MoWIE

	10.3 Develop detail regulation on water use measurement and devise mechanism to charge for water abstracted at source	MoWIE
	10.4 Strengthen the capacity of relevant institutions in issuing and administering water use permits and implementing water use charges	MoWIE
11. Effective system for assessing and charging treated wastewater developed	11.1 Develop/revise a system for issuing permits and assessing and charging treated wastewater discharge on the basis of “polluter pays” principle.	MoWIE
	11.2 Assess and evaluate existing regulations on waste water discharge permits and identify major gaps (e.g. mandate overlaps) and make required revisions	MoWIE
	11.3 Strengthen the capacity of institutions relevant or involved in issuing and administering waste water discharge permits and implementing charges for treated wastewater discharge	MoWIE
12. Payments for ecosystem services instituted	12.1 Develop a system for assessing, identifying and valuing ecosystem services offered by vital environmental resources in major river basins	MoWIE
	12.2 Institute payments for ecosystem services to ensure sustainability of vital environmental assets in major river basins	MoWIE
	12.3.Action Strengthen the human and capacity of institutions relevant in implementing payment for ecosystem services	MoWIE
13. Capacity of water sector institutions to enforce water use permit and charge conditions developed	13.1 Support the establishment of water users’ associations and strengthen existing ones to improve the rate of billing and collecting payments for water use, treated wastewater discharge and ecosystem services	MoWIE

	13.2 Foster compliance with permit and charge for water abstraction and treated wastewater discharge with penalties for non-compliance	MoWIE
14. Appropriate action plans and mechanisms that increase water use efficiency, conservation, recycling and reuse of water are developed	14.1 Develop appropriate economic incentives for water use efficiency and conservation by revising the existing low water use charge and implementing wastewater charge	MoWIE
	14.2 Identify appropriate and efficient irrigation technologies to enhance efficiency in irrigation water use and encourage their adoption by major water users	MoWIE
	14.3 Develop appropriate mechanisms, incentives (e.g. access to credit, training on operation & maintenance) and awareness raising programs to influence water users' attitude towards water use efficiency, conservation and adopting efficient irrigation technologies and influence	MoWIE
	14.4 Develop and introduce Water Management Plan that restricts certain water use rights during drought time and low flow seasons	MoWIE
Remark	Effective water tariff/charge structure that supports efficient and sustainable water, use and conservation will be instituted and implemented in the three basins that have RBAs	

## 12.6 Catchment Management and Buffer Zone protection program

<b>Component 6</b>	<b>Catchment management and buffer zone protection program (CMSE)</b>	<b>Leader: MoWIE</b>
1. Rationale	<p>The state of nearly all water and aquatic eco-systems (particularly lakes, reservoirs and wetlands) both in terms of quality and storage capacity is declining due to the off-site impacts of land degradation – erosion and deforestation in addition to unregulated abstraction. A conservative estimate shows that about 900 ton per square kilometer contributing area per year (t/km<sup>2</sup>/yr) sediment joins lakes and reservoirs.</p> <p>Time series investigation showed that the annual sediment loss in Blue Nile Basin at the border with Sudan is 7 t ha<sup>-1</sup> and is equivalent 0.5 mm of soil over the entire basin. Although this seems to be relatively small, it is an enormous amount of sediment for the Rosaries reservoir and, consequently, its capacity to store water has been decreased significantly since 1966 when it was completed.</p> <p>The Ministry of Agriculture and Livestock Resources (MOALR) and line Agriculture Bureaus have been undertaking soil and water conservation activities under Sustainable Land Management (SLM), Agricultural Growth Program (AGP) and Productive Safety Net (PSLP) programs. A initiatives have been focusing on natural resource conservation-based agriculture productivity enhancement. Both initiatives, though not explicitly stated have co-benefit in reducing the off-site impact of soil conservation.</p> <p>The Ministry of Environment, Forestry and Climate Change (MEFCC) and Regional Environment Bureaus, though recent in its establishment, is also undertaking afforestation programs in mountain areas which are the water towers of springs and rivers. Protecting mountain degradation is vital in reducing floods and improving base flow availability.</p>	

	<p>The Ministry of Water Irrigation and Electricity and River Basin Authorities, have been undertaking watershed development in order to protect specific water bodies from siltation. In here, water buffer zones and gully may be critical and priority areas. But the principle of catchment management dictates that soil should as much as possible, be retained on site (before it leaves the field).</p> <p>Another area which has not been seriously considered are wetlands - areas which are known to surround and protect water bodies from sedimentation. Conversion of wetlands into agricultural areas is bound to expose the vulnerability of water bodies.</p> <p>Hence, in order to protect the water bodies from degradation due the off-site impact of soil erosion, coordinating the policies, programs, and activities of the different sectors is of a paramount importance. This component of the program, therefore, seeks to harmonize different complementary natural resource (soil, water and forest) management initiatives to multiple benefits.</p>
<p>2. Goal</p>	<p>To enhance sustainability water bodies by reducing land degradation (soil erosion and deforestation) and enhancing buffer-zone ecosystems services and function.</p>
<p>3. Objectives:</p>	<ol style="list-style-type: none"> <li>1. To support RBAs characterise catchment in terms of degradation hotspots and design watershed development plans in prioritized catchments; <b>(Degradation hotspots identified and rehabilitation plans developed)</b></li> <li>2. To support integrated watershed development in erosion vulnerable area; <b>(Degraded landscape or watersheds rehabilitated following the IWM principles)</b></li> <li>3. To develop buffer zone protection act (regulation) and its implementation institutionalised. <b>(Buffer zone protection act promulgated and institutionalised)</b></li> </ol>

	<p>4. To implement buffer zone protection surrounding lakes, reservoirs, wetlands; and  <b>(Prioritised buffer zone protected)</b></p> <p>5. To support development and promulgation of national land use plan and policy and support its adoption by regions.  <b>(National Land use policy and regulation enacted and promulgated)</b></p>	
4. Outcomes	Degradation of Activities	Lead
1. Catchment degradation hotspots identified and rehabilitation plans developed	1.1. Collect by bio-physical and socio-economic data on vulnerable catchment including spatial hydrologic and hydro-sediment modelling;	RBA RAB
	1.2. Organise stakeholder meetings to validate model outputs on identified and prioritised hotspots; and	RBA RAB/RWB
	1.3. Develop integrated watershed management plans and get it validated by stakeholders.	RBA RAB
2. Degraded landscape/ watersheds rehabilitated following the IWM principles	2.1. Organise participatory integrated watershed management workshop on selected watersheds or landscapes;	RBA/ RABs
	2.2. Support the implementation of IWM activities in the selected watersheds;	RABs
	2.3. Perform performance and sustainability assessment of watersheds developed through community mobilisation and with the project support following the built in SLM Exit-Strategy and their impact on the health of waterbodies; and	RBA RABs
3. Buffer zone protection act promulgated and institutionalised.	3.1. Support the finalisation of the buffer zone protection regulation currently being developed by River Basin Authorities with RVLBA leadership;	RBA REBs RWBs

	3.2. Support promulgation and awareness creation of the buffer zone protection act; and	RBA REBs
	3.3. Support the buffer-zone development plan for vulnerable water bodies identified by RBAs.	RBA/ RWBs
4. Prioritised buffer zones protected	4.1. Prepare baseline studies on the state and impact of the buffer zone before intervention;	RBA
	4.2. Build stakeholder capacity (awareness creation) on the buffer zone protection in selected buffer zones;	RBA RWBs/REB
	4.3. Perform buffer zone delineation and protection undertakings; and	REB/RWBs
	4.4. Monitor the implantation and performance of protected buffer-zone.	RBA
5. National Land use policy/plan and regulation enacted and promulgated.	5.1. Support land use plan and policy discourses at national and state levels;	MEFCC
	5.2. Support roads to cascade national land use policy and plan development at landscape level; and	REB /RABS
	5.3. Monitor the implementation of and impact from the land use policy and plan	RWB REB
Remarks	Catchment management and buffer zone protection is an area which involves the active engagement the three sector ministries and their line bureaus. When these organisations sit, plan and act in coordination resource use efficiency will be ensured, impacts and co-benefits will be substantial.	

## 12.7. IWRM Information systems Development

Component 7	IWRM Information Systems Development	Leader: <b>MOWIE</b>
Component 7	IWRM - Information Systems Development and Management	
<b>Rationale</b>	<p>Water resource management in the absence of comprehensive information on the state of water resource cannot be effective. In order to be able to manage water resources, the knowledge of how much and where the resource availability is vital. One major and pervasive challenge for water resource management in Ethiopia is scarcity of information about the state of basins both in terms of water availability in space and time.</p> <p>MoWIE, through the Hydrology and Water Quality Directorate, has been responsible for the collecting hydrological data. There are a number of issues and challenges in the data collection, processing and availability. But there has not been an organised knowledge sharing platform developed. First for a large and hydrologically diverse country as Ethiopia is, the number of river gauging station which are known to be under 500 are very few in number. Second, even for these stations, data collection method is outdated, coarse time resolution missing peak flows; delayed in reporting deterring real time decision making, high probability human errors, absence of mechanism for data triangulation and quality assurance, etc. Moreover, the data processing in MoWIE is also time taking and tedious not IT supported. In summary, substantial improvement is required to ensure that reliable data collection in place to guide water resource management decision making.</p> <p>On the other end, advances on new cost-effective devises for hydrologic monitoring of rivers, lakes and groundwater are now available. Abbay Basin Authority has tested the potential of some of these technologies in its pilot Tana Beles Sub-basins project. There is now the experience to scale up the data collection and knowledge management to another basins.</p>	



	<p>Another important development in the hydrologic-information system development and management is the fact that for basins with RBAs, Basin information systems development and management is their the responsibilities of these authorities. Although this enables the development a more comprehensive basin specific information, information on the national water bodies will be fragmented, and data quality compromised unless coordinated and rigorous effort is made to coordinate the initiative. Hence, relevant data need to be shared to MOWIE, secured and archived at the national level, and regular quality control be implemented.</p> <p>Rainfall and other climate data collections are the responsibilities of National Meteorological Agency. The Agency is known to be better organised in terms of weather data collection and generation of climate data including those satellite products. As rainfall/climate data is vital to interpret hydrology data – data sharing agreements need to be in place between hydrology and rainfall entities.</p> <p>It is, therefore, important that a national basin information generation and management strategy be designed; appropriate infrastructure be put in place; river gauging stations deploy improved technologies, digital data and information management employed, and the basin information systems be used for management intervention including those of extreme events such as floods and droughts.</p>
<b>Goal</b>	To ensure that accurate and timely hydrology data is deployed to guide water resource management decision making.
<b>Objectives:</b>	<ol style="list-style-type: none"> <li>1. To develop a national protocol that guides basin information system development <b>(Data collection and sharing protocol developed and adopted)</b></li> <li>2. To establish and manage geo-spatial water and water related resources database both at the national (federal) and Basin level; <b>(National and Basin specific information management infrastructure built)</b></li> <li>3. To support both MOWIE and RBAs to revitalize river gauging stations using digital river gauging stations including the establishment of new ones prioritized by basin Authorities.</li> </ol>

	<p><b>(Hydrologic data collection upgraded and revitalized)</b></p> <p>4. To enhance management capacity on water and water resource related information and technology</p> <p><b>(Capacity of Basin Authorities in hydro-metric monitoring built)</b></p> <p>5. To develop national state of hydrology and climate information to raise public awareness and support national water resource management decision making.</p> <p><b>(Public awareness on the state of water resource enhanced)</b></p>	
Outcome	Description of Activities	Basin
1. Data collection and sharing protocol developed and adopted.	1.1. Develop national guideline on the attributes of basin information requirement and collection protocol.	MoWIE
	1.2. Provide capacity building on harmonized hydrologic and basin information system data collection.	MoWIE
	1.3. Harmonize BIS/HIS management strategy among different basins.	MoWIE
2. National and Basin specific information management infrastructure built	2.1. Evaluate the current status of national and basin specific hydrologic/basin information systems and infrastructure requirement;	MoWIE
	2.2. Design or customize hydrologic information systems that is synchronized with basins specific database/server;	RBAs
	2.3. Procure and install server and related infrastructure the national HIS and specific BIS.	RBAs
3. Hydrologic data acquisition system revitalized or upgraded.	3.1. Make inventory of the status of hydro-metric stations with requirements for upgrade (if necessary),	RBAs
	3.2. Install devices for real time HIS data acquisition for rivers in the order of their importance;	RBAs
4. Capacity of Basin Authorities in hydro-metric monitoring and modelling developed	4.1. Provide capacity building to staff of MoWIE and Basin Authorities on HIS/BIS management including software, hardware, and field equipment maintenance.	MoWIE
	4.2. Build capacity of river basin staff to develop basin specific hydrologic modeling, simulation and impact assessment.	RBAs
5. Public awareness on the state of water	5.1. Generate annual reports and periodicals on the state of the basin or sub-basin for public communication;	RBAs

resource enhanced	5.2. Organize end of the season knowledge sharing event to raise public awareness sustainable water resource management.	RBA's
<b>Remark</b>	In an effort to build the capacity of river basin authorities to generate basin information system for specific basins, there is chance that hydrologic data collection could be fragmented, lacks coherence among basins. Hence MoWIEy should continue to play the leading role in overseeing the hydrologic information system. There could be some basin specific data base like land and other information system which could be retained at the basins, but the core hydrologic information systems need to be archived and stored for national wide data analysis, decision making.	

### 12.8. National Water Resource Management Support (NIWRM)

<b>Component 8</b>	<b>Strengthening Water Sector working group secretariat and the national IWRM capacity (NISPEP)</b>	<b>Leader: MOWIE</b>
Rationale	<p>Investment in the water sector in the past has not been as significant as it ought to have been. Recently, however, due to increasing population pressure, growing economic activity and urbanisation, and a new paradigm following the green growth trajectory. In this regard, substantial amount of scarce capital is being allocated to build hydraulic infrastructures such as dams for irrigation, hydropower, and water supply.</p> <p>Recent evidences show that expensive investment on infrastructure may not be the panacea of water security problem, unless it is accompanied with effective and efficient water resource management. It is for this reason that the government started to proclaim and establish BHC and RBAs (now for the three basins but other are expected to follow suit building on the experiences the existing basins). Their overall mission is to coordinate integrated water resource management and development in the river basin.</p> <p>Although still at their establishment phase, basins have started to demonstrate their role as custodians of the river bodies. The main challenge during this endeavour is limitation in human, financial and technical capacity. Although different development partners have been active in supporting authorities in their endeavour harmonising support has been found important for effectiveness and sustainability. It for this reason and building from the experiences of WaSH Sector Working group that the WRM-Working group was initiated in 2016. The WRM-Working group has prepared a Joint Technical Review (JTR) and its road map, prioritised seven key WRM intervention areas, organised field visits to validate water resource management areas identified through serious of stakeholder meetings.</p> <p>In order to ensure the integration, working group needs to meet regularly,</p>	

	share experiences on best practices, develop fund raising mechanism to support water resource management interventions and evaluate project and program implementation. This component is therefore proposed to support the proper function of the WRM-WS working secretariat to generate its own resources.	
<b>Goal</b>	To support the effort towards achieving GTPs and SDG targets of the government of Ethiopia by supporting RBAs and Sector ministries capacity to effectively implement IWRM.	
<b>Objectives:</b>	<ol style="list-style-type: none"> <li>1. To facilitate preparedness for the establishment of candidate river basin organizations <b>(Basin Incubation Centers at MoWIE are strengthened)</b></li> <li>2. To support the BHC Secretariat at MoWIE to strengthen its role in facilitating decision making by the BHC. <b>(Effective BHC meetings are organized and decisions followed)</b></li> <li>3. To strengthen WRM-WSWG by employing/seconding high caliber experienced secretariat team; <b>(Strong WRM-WSWG) secretariat established)</b></li> <li>4. To support partners/stakeholders' meetings, experience sharing events, <b>(Regular and effective stakeholder meetings organized)</b></li> <li>5. To establish and support the WRM fund management; and <b>(WRM fund established and maintained)</b></li> <li>6. To mobilize funds through a proactive engagement of donor communities, <b>(Regular fund raising events organized and resource raised)</b></li> <li>7. To build the IWRM implementation capacity of ministries, regional and bureaus and basin authorities through formal post graduate diploma and degree program, on job skill development training. <b>(National IWRM capacity developed)</b></li> </ol>	
<b>Outcome</b>	<b>Description of Activities</b>	<b>Leader(s)</b>
1. Basin Incubation Centers at	1.1. Build the capacity of candidate basins incubation desks staff through experience sharing and/or exposure visits	MoWIE

MoWIE are strengthened	1.2. Support basin specific water resource management relevant data generation.	MoWIE
2. Effective BHC meetings are organized and decisions followed)	2.1. Organize on job training to effectively organize BHC meetings, and monitor decision implementation.	MOWIE
	2.2. Support the Secretariat to BHC Modus Operandi to enable effective decision making	MoWIE
3. Strong WRM-WSWG) secretariat established.	3.1. Strengthen the human resource profile and capacity of national Water Sector Working Group secretariat	MoWIE
	3.2. Ensure the secondment of an international expert in the Secretariat to backstop the national team	DPs
4. Regular and effective stakeholder meetings organized;	4.1. Organize state and outlook of national water resource management day when research findings and best practices are shared and lessons learned.	WSWG Secretariat
	4.2. Informative communication to the WSWG members is in place.	WSWG Secretariat
5. WRM fund established and maintained	5.1. Support the establishment of WRM fund with in the MOWIE; and	MoWIE
	5.2. Develop fund management and disbursement policy.	MoWIE
6. Regular fund raising events organized and resource raised.	6.1. Request for concept note, evaluate the same through established proposal evaluation systems, and submit the same to donors group for consideration;	MoWIE
	6.2. Request for detail and bankable proposal for funding, and submit selected proposal for funding to the donor who showed interest to support the project.	MoWIE
	6.3. Compile, regularly update and avail to walk-in donors who wish to support water resource management project	MoWIE

	6.4. Monitoring and evaluation systems for effective use of the WRM fund.	MoWIE
4. National IWRM capacity developed	7.1. Provide national IWRM capacity building on elements of water resource management – allocation, pollution, conflict, planning, modeling etc.	MOWIE
	7.2. Support researches of MSc PhD studies to be undertaken on topic of importance to address water resource management in the country.	MoWIE
	7.3. Support commission research to generate primary data on water resource management	MOWIE
	7.4. Organize national knowledge sharing event on water resource management	MoWIE
Remark	This part of the project is mainly for tightening and sustaining the fund raising and building the national IWRM implementation capacity.	

### 13. Indicative Budget

The summary budget outline in the table below is an indicative budget only. As water resource management cuts across different sectors, the amount of resource that can be potentially developed from government, development partners, bilateral and multilateral initiatives during this period could even be higher.

No	Component	Indicative Budget (USD)	Share of Total cost (%)
Component 1	Irrigation Systems Performance Enhancement	640,000,000	20
Component 2	Water Related Conflict Management and Stakeholders Engagement	320,000,000	10
Component 3	Water Resources Pollution Prevention and Control	640,000,000	20
Component 4	Groundwater Management and Legislation of Use	320,000,000	10
Component 5	Water charge and Scheme Sustainability	160,000,000	5
Component 6	Catchment Management and Buffer Zone protection program	480,000,000	15
Component 7	IWRM Information systems Development	320,000,000	10
Component 8	National Water Resource Management Support (NIWRM)	320,000,000	10
	Total	3,200,000,000	100



## 14. Proposed Activity Plans

### 14.1. Irrigation for Growth and Sustainable Development

Output	Priority	I	II	I	II	III	IV	V	
1.1. Standardized and harmonized irrigation system operation and performance evaluation protocol and training manual developed;	I								
1.2. Capacity building (cascading) training for authorities, bureaus, irrigation extension workers; and WUAs organized.	I								
1.3. Irrigation schemes underperforming due to weak operation and maintenance identified and prioritized;	II								
1.4. Baseline information on selected schemes documented.	II								
1.5. The performance of the selected schemes enhanced and infrastructures rehabilitated.	III								
1.6. Best practices for out/upscaling documented.	II								
1.7. The capacity of WUA or IC on irrigation schemes management evaluated and built.	I								
1.8. Scheme operation shifted from the current supply management to demand management to improve water	III								

<b>Output</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	
productivity, and create jobs demonstrated.									
1.9. Postharvest handling and storage capacity of irrigation cooperatives built;	II								
1.10. The impact current fruit and vegetable market network and support model schemes to build cold storage for postharvest storage evaluated.	II								
1.11. Networks and support irrigation schemes with access to international markets established.	II								
1.12. Model schemes identify areas of irrigation water productivity improvement supported;	I								
1.13. Schemes developed strategy (plan) to transform the system to a more water efficient technology – lining of main canals, efficient water application technologies;	II								
1.14. Model schemes transformed with a more efficient technologies – conveyance systems upgraded; flood to furrow, surface to sprinkle, and surface to pressurized irrigation systems developed;	III								

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<b>Output</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	
1.15. National agricultural electrification to promote groundwater irrigation and job creation supported;	II								
1.16. Use of water lifting technologies (photovoltaics) for community pressurized irrigation promoted;	II								
1.17. Capacity educated youth on irrigation water resource management developed;	I								
1.18. Improved irrigation technologies in the schemes managed under educated youth program promoted.	I								

## 14.2. Conflict Resolution and stakeholder engagement

Expected Output	Priority	I	II	I	II	III	IV	V
2.1. Conflict resolution and stakeholder engagement manuals developed.	I							
2.2. Training for river basin authorities and key stakeholders on water related conflict prevention and resolution provided.	I							
2.3. Causes of conflict associated to a given water body through systematic investigation or commission study (water allocation plan, and pollution prevention strategy, etc.) investigated.	I							
2.4. Stakeholders' forum/meeting(s) to reach to a mutual understanding to causes of conflict organized.	II							
2.5. Conflict resolution institutions both formal and customary (traditional) with specific water body identified.	II							
2.6. Stakeholder platform to raise awareness on the state of water body organized	I							
2.7. Customary/indigenous conflict resolution mechanisms, water related conflict prevention, resolution and management system developed	I							

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<b>Expected Output</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
2.8. Trainings on conflict management related bylaws understood and observed by all including the law-enforcement institutions provide and awareness created	II							
2.9. Trainings to the most relevant and appropriate law enforcement (police, and court) on agreed bylaws provided	II							
2.10. Bylaws are duly institutionalized and enforced.	II							
2.11. Conflict management and stakeholder engagement processes through a regular and organized monitoring evaluated.	III							

**14.3. Water Resources Pollution Prevention and Control**

<b>Expected Output</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
2.1. National and regional water pollution prevention policies, proclamations, regulations, and management instruments reviewed and harmonized;	I							
2.2. National fora to build national awareness on the gaps identified and proposed adaptations created.	II							
2.3. National water quality management strategy document developed.	I							
2.4. Relevant pollution and prevention instruments developed, and get them approved following due process.	II							
2.5. Ensure, through effective monitoring regulations arrangement, the effective implementation of these policies and management instruments developed or designed.	III							
2.7. Water quality analysis capacity of national laboratories and identify gaps particularly in relation to analysis of pollutants from industry (heavy and radio-active metals),	II							

<b>Expected Output</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
and agricultural wastes (pesticides) strengthened								
2.8. Basin Authorities laboratories strengthened.	II							
2.9. River basin organizations to develop water quality management strategy supported;	II							
2.10. Capacity of basin authorities, and water and environment bureaus on water pollution monitoring and prevention built.	II							
2.11. Basin authorities for the development of the state of water pollution report for threatened water bodies supported.	I							
2.12. Promotion of appropriate wastewater treatment technology in collaboration with industries and farms supported.	III							
2.13. Detail investigation of the impact of waste (solid and liquid) disposal of towns to receiving aquatic resources supported.	II							
2.14. Public forum on the impact along with recommended								

<b>Expected Output</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
solutions organized.								
2.15. Capacity of basin authorities to develop water body specific water quality report, and communicate findings to stakeholders for all possible intervention built.	I							
2.16. Basin Authorities to develop state of the basin water quality report supported;	II							
2.17. An effective national water quality information system that is reliable, relevant, and accessible developed.	II							
2.18. A long-term national water pollution control and prevention program is developed.	II							
2.19. Water pollution related national state of the environment reports are developed based on the reliable facts and figures derived from the national system of monitoring networks.	I							
2.30. Support industries and farms to deploy state of the art waste treatment technology.	II							



**14.5. Groundwater Management and Legislation of Use**

<b>Outcomes</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
1. Provide equipment, facilities and training to strengthen the RBOs and other institutions involved in collecting, storing, processing and disseminating of groundwater data.	I							
2. Assess the capacity (institutional and human) gap in groundwater data collecting, storing, processing and disseminating of RBOs and other institutions and strengthen them by filling the identified gaps	I							
3. Raise awareness of policy and decision makers focusing on the importance of reliable groundwater data on the national development by organizing workshops and sponsoring scientific papers that depict the state of the country's groundwater resources.	II							
4. Develop manuals, guidelines, formats on the collection, recording and storing of groundwater data and undertake groundwater inventory.	II							
5. Design groundwater monitoring network based on field studies of geophysical, geological, hydro geological and groundwater quality variations and implement	II							

<b>Outcomes</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
establishment of the network phase by phase								
6. Develop or revise and enforce standards, guidelines and procedures on wastewater quality, solid wastes and discharge regulation	I							
7. Identify relevant institutions, assess their institutional capacity (availability of equipment, facility, etc) and provide equipment and facilities that enhance their water quality monitoring and regulating capacity.	II							
8. Identify training needs of relevant institutions and provide required training to relevant staff of the institutions.	I							
9. Conduct inventory of groundwater quality and pollution sources and identify mitigation measures to improve the existing water quality of important groundwater sources	I							
10. Study the occurrence and present use and development potential of major groundwater potentials and devise development and management plan for major groundwater potentials.	I							

<b>Outcomes</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
11. Propose alternative development and management plan and establish monitoring and evaluation mechanism.	I							
12. Review the existing land, water and forest use and management policy and law and harmonize it with sound watershed protection and management principles;	I							
13. Monitor the implementation and document lesson learned	II							
14. Conduct situation analysis and establish environmental degradation status and prepare watershed and wetland management plan for identified major and priority catchments.	I							
15. Undertake capacity assessment related to protection and management of watersheds and wetlands at a basin scale and provide required capacity building programs.	II							
16. Develop legislation (laws and regulations) for groundwater abstraction and use rights	II							
17. Assess the existing regulatory framework related to groundwater abstraction and use rights; develop legislation (laws and regulations) for groundwater abstraction and use rights; facilitate the approval and	II							

<b>Outcomes</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
enactment of the drafted legislation and supervise and follow up the implementation of the approved legislation								
18. Develop a proposal for the establishment of a national and regional groundwater monitoring and regulatory bodies with their organizational structures, institutional arrangement and clearly defined mandate.	II							
19. Facilitate the review process; establish national and regional bodies that overlook the enforcement of groundwater legislation; and develop the required human and institutional capacity to enact and enforce legislation on groundwater development, use and conservation.	I							
20. Provide equipment, facilities and training to strengthen the RBOs and other institutions involved in collecting, storing, processing and disseminating of groundwater data.	I							
21. Assess the capacity (institutional and human) gap in groundwater data collecting, storing, processing and disseminating of RBOs and other institutions and	II							

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<b>Outcomes</b>	<b>Priority</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
strengthen them by filling the identified gaps								
22. Raise awareness of policy and decision makers focusing on the importance of reliable groundwater data on the national development by organizing workshops and sponsoring scientific papers that depict the state of the country's groundwater resources.	II							
23. Develop manuals, guidelines, formats on the collection, recording and storing of groundwater data and undertake groundwater inventory.	I							
24. Design groundwater monitoring network based on field studies of geophysical, geological, hydro geological and groundwater quality variations and implement establishment of the network phase by phase	I							

### 14.5. Water charge and scheme sustainability

Description of Activities	Priority	I	II	I	II	III	IV	V
1. Coverage and status of stream gauging stations for major river basins of the country improved	II							
1. Equipment, facilities and training to strengthen the capacity of water sector institutions involved in collecting, storing, processing and disseminating hydro meteorological data provided	I							
2. Relevant institutions involved in collecting, storing, processing and disseminating hydro meteorological data and establish a coordination mechanism to facilitate access and linkage to database identified.	II							
3. Manuals, guidelines, formats on the collection, recording and storing of hydro meteorological develop.	I							
4. Guidelines and standards for conducting water resources assessment and development developed and enforced.	I							
5. Training to the staff of water sector institutions provided	I							
6. A system of data collection and information exchange on the existing water uses and present and projected future demand for water in relevant sectors established..	I							

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7. Standards, guidelines and procedures on wastewater quality, solid wastes and discharge regulation developed	II							
8. Equipment and facilities that enhance the water quality monitoring and regulating capacity of relevant institutions provided.	I							
9. Education and training to water sector staff on water quality monitoring, data analysis, pollution control mechanism and on the development and application of efficient water quality regulatory instruments provided.	I							
10. The implementation of appropriate decision on water allocation and use facilitated.	I							
11. System for assessing and charging water use by all sectors developed or revised	I							
12. A system for assessing and charging treated wastewater developed	I							
13. Payments for ecosystem services instituted	III							
14. system of data and information collection, analysis, exchange and overall knowledge management between sectors and water resources managers and planners on water use efficiency established	III							

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15. Actions that increase efficiency in supply and delivery of water for major water users supported.	II	■	■	■	■	■	■
16. A mechanism and support actions that increases water use efficiency, conservation, recycling and reuse of water develop	III	■	■	■	■	■	■



**14.6. Catchment Management and Buffer Zone protection**

<b>Outputs: Catchment Management and Buffer Zone Protection</b>	<b>Budget ('000)</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
4.1. Bio-physical and socio-economic data on vulnerable catchment including spatial hydrologic and hydro-sediment modelling collected and compiled.	300							
4.2. Stakeholder meetings to validate model outputs on identified and prioritised hotspots organised	150							
4.3. Integrated watershed management plans developed and validated by stakeholders.								
4.4. Participatory integrated watershed management workshop on selected watersheds or landscapes organised;								
4.5. Implementation of IWM activities in the selected watersheds supported								
4.6. Performance and sustainability assessment of								

<b>Outputs: Catchment Management and Buffer Zone Protection</b>	<b>Budget ('000)</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
watersheds developed through community mobilisation and with the project support following the built in SLM Exit-Strategy and their impact on the health of waterbodies regularly evaluated;								
4.7. Finalisation of the buffer zone protection regulation (currently being developed by River Basin Authorities with RVLBA leadership) supported;								
4.8. Promulgation and awareness creation of the buffer zone protection act supported;								
4.9. Buffer-zone development plan for vulnerable water bodies identified by RBAs supported;								
4.10. Baseline studies on the state and impact of the buffer zone before intervention documented;								
4.11. Stakeholder capacity (awareness creation) on the buffer zone protection in selected buffer zones supported;								

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<b>Outputs: Catchment Management and Buffer Zone Protection</b>	<b>Budget ('000)</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
4.12. Buffer zone selected waterbodies protected;								
4.13. Implantation and performance of protected buffer-zone monitored;								
4.14. National land use plan and policy discourses supported;								
4.15. National land use policy and plan development cascaded at landscape level;								
4.16. Implementation of and impact from the land use policy and plan implemented;								

### 14.7. IWRM Information Systems Development

<b>Outputs: Catchment Management and Buffer Zone Protection</b>	Budget ('000)	I	II	I	II	III	IV	V
<b>5.1.Current status of national and basin specific hydrologic/basin information systems and infrastructure system development requirement established.</b>								
5.2.Hydrologic information systems that is synchronized with basins specific database/server designed or customize.								
5.3.Server and related infrastructure the national HIS and specific BIS procured and installed.								
5.4. Inventory of the status of hydro-metric stations with requirements for upgrade (if necessary) is prepared,								
5.5. Devices for real time HIS data acquisition for rivers in the order of their importance installed;								
5.6.Capacity building to staff of MoWIE and Basin Authorities on HIS/BIS management including software, hardware, and field equipment maintained.								
5.7.Capacity of river basin staff to develop basin specific hydrologic modeling, simulation and impact								

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<b>Outputs: Catchment Management and Buffer Zone Protection</b>	Budget ('000)	I	II	I	II	III	IV	V
assessment developed.								
5.8. Annual reports and periodicals on the state of the basin or sub-basin for public communication generated.								
5.9. End of the season knowledge sharing event to raise public awareness sustainable water resource management organized.								

**14.8. National Water Resource Management Support (NIWRM)**

<b>Outputs: National Water Resource Management Support</b>	<b>Budget ('000)</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
2.4. Candidate basins incubation desks staff through experience sharing and/or exposure visits built.		50						
2.5. Basin water resource management relevant data generation supported.			30					
2.6. On job training for the BHC secretariat to deliver its role organized		10						
2.7. Secretariat to BHC Modus Operandi to enable effective decision making supported.		10						
2.1. Human resource profile and capacity of national Water Sector Working Group secretariat strengthened.		10						
2.2. Secondment of an international expert in the secretariat to backstop the national team ensured.		36	36	36	36	30	30	30
3.1. State and outlook of national water resource management day when research findings and best practices are shared and lessons learned organized.								

<b>Outputs: National Water Resource Management Support</b>	<b>Budget ('000)</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
3.2. Informative communication to the WSWG members has been put in place.								
4.1. Establishment of WRM fund with in the MOWIE supported.								
4.2. Fund management and disbursement policy developed.								
5.1. Concept notes developed and submitted to the development partners.								
5.2. Detail and bankable proposal for funding submitted.								
5.3. Regularly update and compiled project developed for walk-in donors who wish to support water resource management project.								
5.4. Monitoring and evaluation systems for effective use of the WRM fund developed.								
6.1. National IWRM capacity building on elements of water resource management – allocation, pollution, conflict, planning, modeling etc. provided.								

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<b>Outputs: National Water Resource Management Support</b>	<b>Budget ('000)</b>	<b>I</b>	<b>II</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
6.2. Researches of MSc PhD studies to be undertaken on topic of importance to address water resource management in the country supported.								
6.3. Commission research to generate primary data on water resource management supported								
6.4. National knowledge sharing event on water resource management organized								



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