Awash River Basin

Information Management and Communication System

Strategic Plan

December 2016

ACRONYMS AND ABBREVATION

AwBA	Awash Basin Authority
BIMCS	Basin Information Management and Communication System
CSA	Central Statistics Agency
EIA	Ethiopia Investment Agency
ELWRC	Ethiopia Land and Water Resource Center
EMA	Ethiopia Map Agency
EPCO	Electricity power corporation
ERA	Ethiopia Road Authority
ESA	Ethiopia Standard Authority
ETC	Ethiopia telecommunication
EWPC	Early Warning Protection commission
EWT I	Ethiopia Water Technology Institution
EWWCE	Ethiopia Water Works and Construction Enterprise
EWWDC	Ethiopia Water Work Design construction
GSoE	Geological Survey of Ethiopia
IA	Investment Agency
IWRM	Integrate Water Resource Management
MoA	Ministry of Agriculture
MoCT	Ministry of Culture and Tourism
MoE	Ministry of Education

MoEFCC	Ministry of Environmental, Forest and climate change
MoH	Ministry of Health
MoI	Ministry of Industry
MoLFD	Ministry of Livestock and Fishery Development
MoST	Ministry of Science and Technology
MoWIE	Ministry of Water, Irrigation and Energy
NMA	National Meteorology Agency
RAB	Regional Agricultural bureaus
RC	Research Centers
REPB	Regional Environmental protection bureau
RIB	Regional irrigation bureaus
RIDA	Regional irrigation development agency
RWB	Regional water bureaus
WUCE	Water using Companies Enterprises,

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1. Background

1.1. Introduction

The Awash River Basin embodies significant water and land resource potential involved in wide variety of development activities. The river basin contains rivers and large tributaries, natural lakes, swamps and springs, reservoirs and dam expended for different uses: irrigation, hydropower, domestic, livestock, industry, tourism and recreation under wider levels of exploitation. Its ideal location for development has rendered the basin a corridor of intensive urbanization, industrialization and mechanized irrigation farming.

Despite its immense possessions, the basin has got intricate social, economic and environmental pressures which resulted in resource degradation: water pollution, water scarcity, watershed degradation and flooding. These are the recognized water resource challenges of Awash River Basin. On top of that, climate change as one the major global phenomenon has made the water resource system in the basin unconditionally dynamic and unpredictable, which remarks better knowledge of the overall basin water resource system changing aspects and determination of the resource distribution in space and with time.

In this respect implementation of information and communication technology (ICT) are crucial in improving land and water management. Starting from the 20th century, ICT tools have been increasingly used in water supply and irrigation management. The applications of advanced ICTs in water resource management provide a remarkably efficient use of water, mainly in countries exposed to severe water scarcity (Sne, 2005). The use of satellite hydro-meteorological forecasting and development of web-based information delivery services is advancing. These days, in Ethiopia the initiation of introducing satellite based information system, for example, for climatological services, and the development of telecom technologies is initiating better advancements in the water resource planning and management, making them easier and reliable.

Likewise, combining of water sector and ICTs for water resource administration in Awash River Basin puts major impact on the efforts to make the basin water resources known and to line up the basin SH and public for implementation of Integrated Water Resource Management (IWRM). ICT

systems supports supervising of basin water resources in that it aids, for instance, monitoring, allocation of resources, permit system and detect ecosystem changes.

However, the current situations of implementing effective and proficient basin information management and communication system (BIMCS) for planning, management and decision making is not as such developed at all levels. The BIMCS in Awash is fragmented and not strategically oriented towards definite targets in water resource administration. The awareness and participation of stakeholders and public for water resource information and communication in gearing for the success of IWRM is not advancing as it is required to be. Even the technology and coverage of BIMCS is so poor that stakeholders (SH) and the wider public are not benefiting from the usual information delivery and feedback system. So, developing and implementing integrated strategically tuned basin wide appropriate and effective BIMCS realizes the success of IWRM in tackling the aforementioned issues and strategic challenges of Awash River Basin.

Thus, this strategic plan prepared predestines to present the long-term directions of implementing BIMCS towards alleviating the basin water resource strategic challenges. Accordingly, the plan outlines detail of actions to be taken denoting the major actions, targets, actors, risks and mechanisms of monitoring and evaluating achievements.

1.2. Objective of the plan

The main objective of the plan is to outline the development and employment of BIMCS that denote the goals, targets, actions and actors for the implementation of IWRM in Awash River Basin.

1.3. Vision

Concerning implementation of information management and communication system, the wider vision in Awash River Basin is:

> "Realizing an integrated standard BIMCS as the foundation for effective knowledge-based water management decisions through bringing right information to all at the right time"

1.4. Scope

This is strategic information management and communication system plan of Awash River Basin that frames the strategic views for 10 planning years, in alignment with the two successive GTPs (GTP II & III), and inclusive of the plans and actions ongoing earlier in 2008. The plan is synthesized for the entire Awash River Basin recognizing the sub-basins (Awash Upstream Koka, Awash Awash, Awash Halidebi, Awash Adaitu, Awash Terminal and Eastern Catchment) as planning units or areas. In this plan the requirements of information management for enactment of IWRM and for tackling the basin water resource challenges are drawn. Undertakings that induct appropriate and effective communication system are subsequently delineated. The plan, in general, is of the basin itself showing the targets, actions, action holders, risks, and monitoring and evaluation mechanisms that direct achievement for the current and the next GTP.

2. Situation analysis

The existing situation can be described in terms of the legal conditions asserting the employment of BIMCS in Awash River Basin, and the prevailing framework of institutions to accord with the same. Moreover, the prevalent significant pressures of: social, economic and environmental concerns, principally driving the need for establishment of BIMCS are discussed.

2.1. Legal and institutional framework

The Ethiopian Government has made the development of information and communications technology (ICT) one of its strategic priorities. This ICT policy is a demonstration of its commitment to the development of ICT both as an industry and as an enabler of socio-economic transformation. The policy stems from the recognition by the Government of ICT as the key driver and facilitator for transforming Ethiopia’s predominantly subsistence-agriculture economy and society into an information- and knowledge-based economy and society, effectively integrated into the global economy. For instance, the Millennium Development Goal of the United Nations recognizes ICT as a tool for its attainment. The role of ICT in development was also recognized in the Geneva Declaration of the World Summit on the Information Society (2003) as well as other regional conferences in which Ethiopia has been actively participating.

Correspondingly, water resource management policy of Ethiopia is the guide aiming at ensuring equitable, sustainable and efficient development, utilization, conservation and protection of water

resources in the country for the social and economic benefits of the nations. To achieve this goal the policy recognizes developing of practical, coherent, well-designed and smoothly functioning information system as a cross cutting issue in the water sector. The Ethiopian Water Resource Management Proclamation [Proc. No. 197/2000] also denotes inventory of resources, i.e., WR information has to be integral part of building water resource information center of an administering body.

The River Basin Councils and Authorities Proclamation (534/2007) dictates the development and use of a management oriented basin information system to guide and support the basin water resources strategic planning and water management functions. Also, the proclamation decrees the criteria a basin information system has to employ for implementation of IWRM, and these include: the quantity and quality of water resources of the basin; the aquatic ecosystem of the basin; the level of demand within the basin; the existing and planned major water infrastructures; the main interventions or projects that may have an impact on the water resources; and the existing water users and stakeholders of the basin.

Furthermore, the Freedom of the Mass Media and Access to Information Proclamation 590/2008 asserts that a public body to establish mechanisms and procedures to give effect to persons to obtain information as quickly, inexpensively and effortlessly as is reasonably possible. This is because, according to the proclamation, it is a mechanism to promote and encourage public participation, public empowerment, to foster the culture of transparency, accountability and efficiency in the functions of institutions. All public bodies shall have the right to seek, receive and impart information; express opinion or criticism on various issues and; participate in the process of forming public opinion. Most importantly, the public has the right to be informed and to obtain information in the form of notes or extracts, certified copies of any record, modern electronic mode and printouts.

The stakeholder institution for water and water related issues in Awash River Basin can be broadly categorized in to eight which take part in one or more of the key functional roles in information: collection, analysis/processing, dissemination, collecting feedback, decision making and direct use (Table 1). As the table points out all of the roles in information management and communication

system are sheltered by at least one institution, though most cover not more than two roles. Again, data collection and information production are the most practiced functions by institutions, however, most crucial roles: information dissemination and feedback collection performed by few. Generally, universities and federal governments, like ministries, authorities and agencies, are the extra practicing categories of SH institutions.

Table 1. SH institutions information management and communication role analysis matrix

SH Institutions	Roles in information and communication					
	Data & information collection	**Data processing**	**Information dissemination**	**Feedback collection**	**Decision making**	**Direct use**
The BHC						
Federal Gov'ts						
Regional Gov'ts						
Community						
Local institutions						
NGOs or international institutions						
Companies, Enterprises & others						
Knowledge institutions						
Broadcasting/Media						

2.2. Significant pressure

This sub-section is meant to disclose the driving factors: as social, economic and environmental, that influence the nature of BIMCS principal to Awash River Basin, and describe those issues that necessitate the existence of appropriate and efficient information and communication system.

2.2.1. Social pressure

Due to the necessities of Ethiopia's growth and development, there exists an amplified need to know the availability and distribution of resource to gear for extra solicitations. The attractions currently being made to foster investments in Awash River Basin required to delineate the potential areas of growth and at the same time the obtainable resources. The noticeable improvements in the living style and standards of a country's nations definitely obliges better knowledge and understanding of the place where they are. As examples, there is growing need of getting up-to-date information on weather conditions; the intruding tendency to use most technological tools to leading modern life; the need to involve in global concerns. These all factors necessarily put pressure to getting more information with space and time.

Again, the rising affinity to implement knowledge or information to the daily activities: like farming, shopping, travels, for example, forces the readiness and securing of information and communication. The need for monitoring of drought and high flows (floods) can be mentioned here for instance. Global trend in socio-economic developments signals the public to look for easy access to the heart of nature and resources. The availability of choices or substitutes in getting nearly the similar or exactly identical sorts of information has protruded dependability syndrome on the data and information that peoples are expending. Unless addressed strategically, these features jointly have definite influence the attributes of BIMCS in place and obstruct realization of IWRM in Awash River Basin.

2.2.2. Economic pressure

Economy is a powerful factor altering the shape of BIMCS as it alters the natural environment and peoples' preferences towards the deployment of new ideas and knowledge. Due to this economic activity normally instruct the type of information to be developed, means of communication to be implemented and the user community to serve. The ever faster economic developments in Awash, for instance industrialization, requires modern technologies and capable information and communication system that supports the smooth transformation to industry led economy. The growing production and market system in the basin also entails implementation of scientific, technological and friendly BIMCS. Together, the creating of awaked community that uses the basin resource for meaningful contributions to the national economic growth depends on the

effectiveness of BIMCS. Consequently, the nature BIMCS in Awash is actually influenced largely by the huge economic concerns, most importantly, investments in industry, agriculture and urban development.

In point of fact globalization and the associated evolving of new innovations are posing significant impacts to any place and society. These days, technologies, research ideas, equipment and tools, which promote economic growth and transformations, all diffuse to the global system very easily and to all stakes. For instance, awaking the public on worldwide tested new household water treatment techniques and technologies needs a more reachable communication instruments, making the development concerns accord with social and environmental requirements. The globalization of data and information for worldwide applications is needful, for example, to take part in international markets and investments. In this context, the time element plays a tremendous role in dictating the quality of information and communication technologies that fit for empowering economic developments. Hence, to support the desired national growth the BIMCS in Awash River Basin has to reflect the global and long lasting trends of innovation and technology that harmonize economic plans.

2.2.3. Environmental pressure

In this day and age, environmental sustainability is the growing concern of every nation. In Awash River Basin, the occurrences of water shortage, flooding, watershed degradation and water quality deterioration are the core issues regarding sustainable use of resources. These intricate phenomena in the waters resources are intensified, for instance, by natural physiographic conditions in the basin showing enormous diversity in agro-ecological and socio-economic setting. In this case the basin requires a BIMCS that recognizes multiplicity in the environmental circumstances. As an example, early warning system for upstream of the basin can focus on the incidence of water pollution, while the low laying plains of the basin need cautionary on the prevalence of floods and droughts. This is because of the existing economic setup laid down according to the peoples' preference for a strategic resource locations.

Climate change is the other fact not conforming the knowledge we have on the environment. Recent experiences in the globe and specifically Awash River reveal that climate change induces

uncertainty of resources in space and time. Again, it installs unclear dynamism in water resource system in general, that it disturbs the ecology rendering the hydro meteorological and the biodiversity in the basin change unconditionally. The people's attention towards the knowledge of facts on resource dynamics and ambitions to fully trace and cope up with climate scenarios is growing. This necessitates the existence of reliable and accessible information and communication system that map out global facts, like weather monitoring and forecasts, and coping the worldwide technological developments in early warning. For example, farmers in the basin has built interests to trace seasonal weather forecasts of more than a year long period, and this imposes pressure to developing of a BIMCS efficient to handle SH institutions and public welfares.

3. Scenario analysis

The condition of the Awash BIMCS at present times and future ages is described at this section. The pivotal hits of discussion are basin wide information management system, the communication system and users (SH institutions and public).

3.1. Current scenario

Presently, Awash River Basin has got variety of fortunate environments and infringing difficulties, when understood can become action points, for strengthening and rectifying the current BIMCS. As the summary table (Table 2) of descriptions of determinant current scenarios classified as: desirable and undesirable condition reveals the existence of stakeholder institutions lawfully established and performing on water resource management in the basin. The actuality of variety of global water resource information sources, like weather satellites, and the growing international relations for exchange of information sharing and technology use can be taken a favorable condition. The advancement of telecom services nearly with the growing need of the public in global issues is the other advantage in the current BIMCS.

Conversely, there lacks of well-coordinated BIMCS with reasonable data and/or information coverage and quality, and employing modern and appropriate technologies for water resource. The absence of central basin database or information system facilities infrastructure is the other challenge. The low level of skill, awareness and participation is also another bottleneck for the advancement of BIMCS for betterment of water resource use in Awash. Though unfavorable

conditions are critical, there exist wider openings for modifying them to strengths and possibilities of stimulating the favorable conditions for development of BIMCS in Awash River Basin.

Table 2. Awash BIMCS current scenario (context) analysis matrix.

Information management conditions		***Communication system conditions***		***Information user (SU institution and Public) conditions***	
Desirable	***Undesirable***	***Desirable***	***Undesirable***	***Desirable***	***Undesirable***
- Availability of much stakeholders working on WR information management - Induction of satellite system information for WR management - Availability of global WR information sources - Growing international relations for information sharing & technology use - Existence of legal grounds for development of integral WR information system	- Existence of fragmented or poorly coordinated information management system which result in duplication of efforts - Poor data & information quality, density, continuity, & low dependability for diverse application - Low level of technology for data acquiring, storage, processing - Lack of central WR database system for the basin - Lack of data standards and metadata - Low application of geo-spatial information - Limited information management facilities and infrastructures (also unrepresentative) - Inability to have near real-time data & information	- Existence of bylaws for applying communication system - Development and application of new communication system (telecom services)	- Absence of clear and effective communication strategy - Lack of appropriate communication strategy not targeting WM management - Lack of basin wide accessible information communication system - Use of low technology for information communication	- Growing need for real-time information - Growing concerns of public on global issues - Legal frameworks addressing right for information and communication	- Low capacity (skill and experience) on information collection, analysis and reporting - Low level of awareness and skill on the use of information and communication technologies - Low level of participation on basin information management - No shared vision among SH institutions for information & communication - Diverse social and inconsistent institutional setups - Poor attention by media on the application of WR information -

3.2. Future scenario

The yet-to-come consequence of significant pressures and the current conditions in Awash BIMCS impart significant challenges in overall performance of water resource administration in the basin. The growing need for development in water sector with no knowledge based decision aggravates the current water resource scarcity and deterioration resource qualities of the basin. This leads to, on one hand, retarded growth of water sector and then overall development. On the other hand, it results water crisis – as conflicts and social instability which toughens the general fear that water becomes the sole source of conflict, even in the globe.

The pressures to environment, due to unmanaged socio-economic decisions, i.e. uninformed and unaware decisions, obstructs the implementation of IWRM with which issues of sustainability can uniquely be addressed. So, unacquainted/poorly informed/ choices on environment and its resources result in environmental hazards like flood, loss of productivity and drought, above and beyond, marks total loss of resources: land, water and life/biodiversity.

4. Goal, Objective & Measures logical framework of BIMCS

The goal of BIMCS are set for augmenting water resource administration, principally, for resolving Awash River Basin strategic challenges: water scarcity, water pollution, watershed degradation and flooding.

4.1. Goal

Based on the vision in the basin on information management and communication system the overall goals of Awash BIMCS are drawn as:

1. Implement basin information system for planning, research, development and management of basin's water resource
2. Implement appropriate, effective and basin wide water resources information and communication system

4.2. Objective

The objectives are outlined as those aims that collectively statement the drawn goals of Awash BIMCS. These are:

1. Establish basin wide geo-spatial water and water related resources database;

2. Generate and organize basin water and water related resources information;
3. Organize and manage standards, guidelines, manuals and documents essential for basin WR administration;
4. Establish Develop and implement basin wide communication strategies;
5. Raising awareness of stakeholders and the general public;
6. Enhance information management capacity on water and water resource related issues; and
7. Enhancing capacity on effective communication methods/technics and technology

4.3. Objective tree

The logical connection or relationship among the goals, objectives and measures are schematize as shown in the following objective tree (Figure1 and 2).

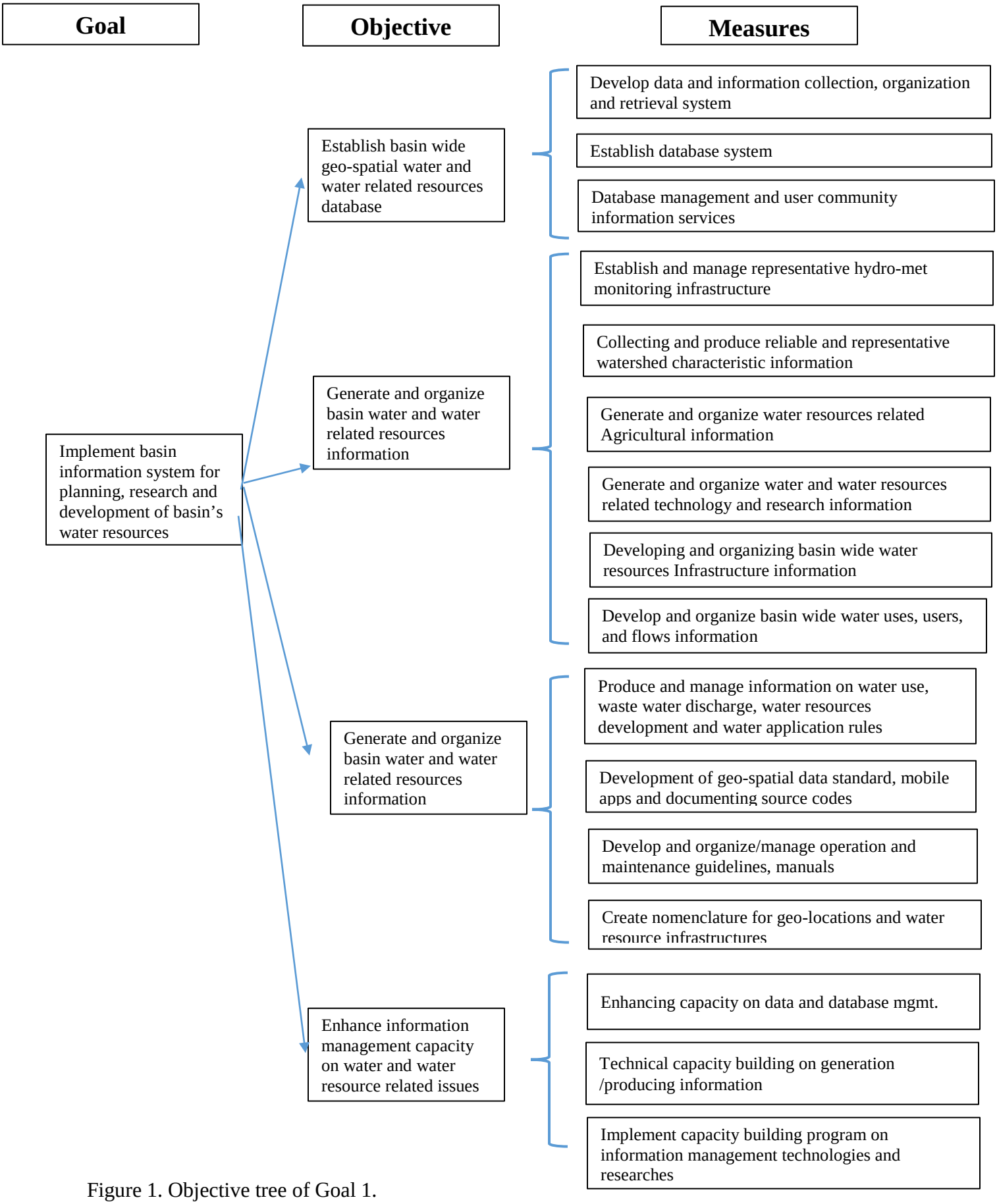

Figure 1. Objective tree of Goal 1.

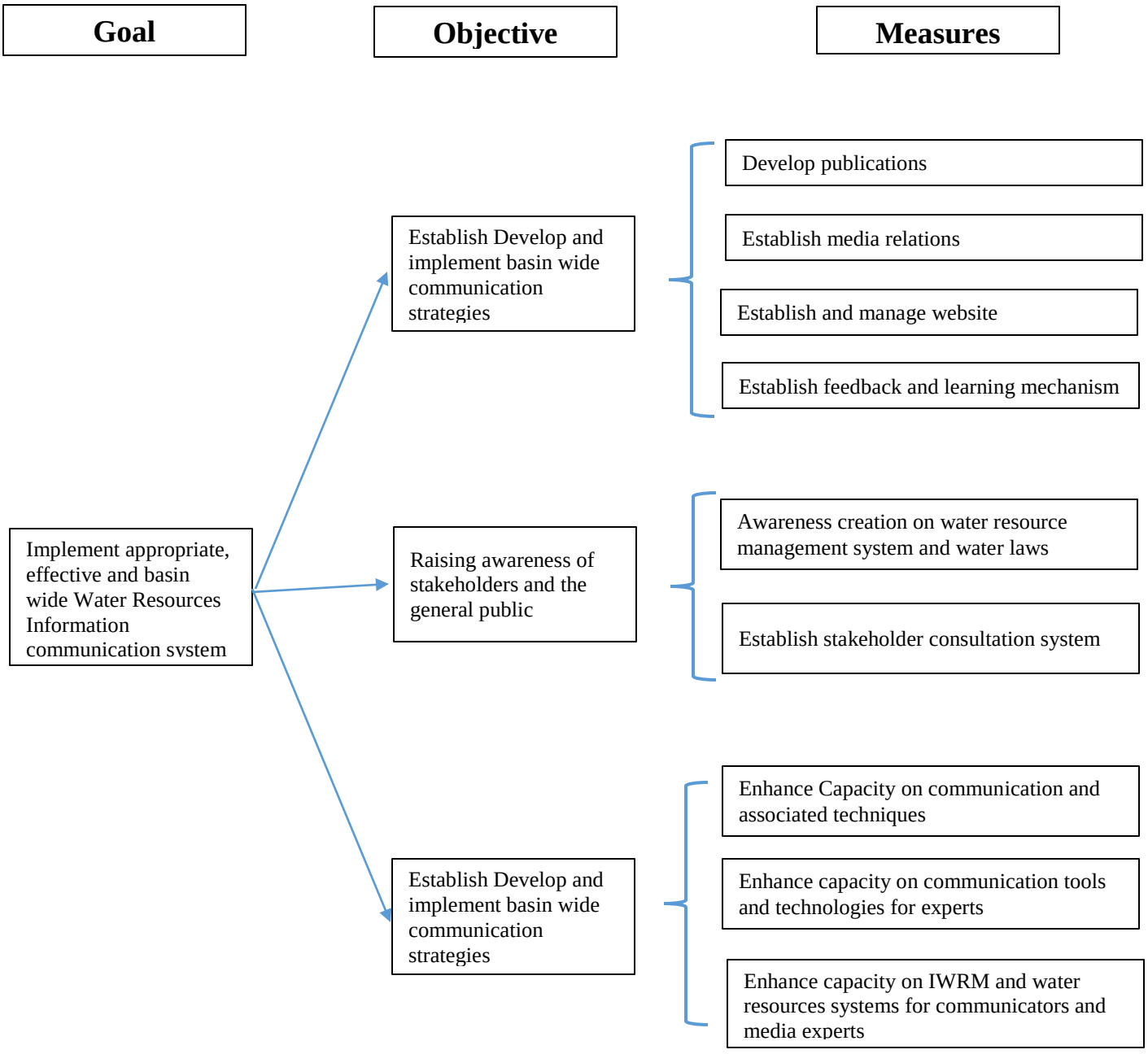

Figure 2. Objective tree of Goal 2.

4.4. Target and evaluation criteria

Table 3. Targets and evaluation criteria

Goal	Objectives	Specific Objectives	Target	Evaluation Criteria
Implement basin information system for planning, research, development and management of basin's water resources	Establish and manage geo-spatial water and water related resources database	Ensure availability of accessible and updated geo-spatial data/information	Easily retrievable updated basin water and water resources related data	Availability of functional, easily accessible Data base providing essential data/information for water allocation, water quality, watershed and flood management
		Establish and manage central data base	Developed and managed Basin wide one central data base	
	Generate and organize water and water related resources information for planning, research, development and management of basin's water resources	Establish water resources monitoring infrastructure	established representative and well-functioning water resources monitoring sites	Availability consistent, continuous and time serious data
		Generate and organize water and water resources related information	Generated and organized 6 categories of Water and water resources related data/information	Availability of Updated organized and basin wide information regarding water uses, users, return flows, socio-economic agriculture, infrastructures
		coordinate research activities and introducing and/or adopting new technologies	coordinated research activities and compatible technologies for water resources management	Implementation of coordinated research activities and introduction of compatible technologies
	Organize and manage standards, guidelines, manuals and documents essential for basin WR administration	Organize and manage water resource management rules, operation and maintenance manuals	water resources and infrastructures management to be guided by rules and manuals	water resource allocation, applications and also infrastructures management system is governed by rules and manuals
		standardizing geo-spatial data and develop interactive applications	standard geo-spatial and infrastructure location information	developed basin wide organized standard geo-spatial infrastructure information
			compatible web and software applications	Implemented interactive and user friendly web and software applications for strategic issues

	Enhance management capacity on water and water resource related information and technology	enhance data and information management capacity	developed technical and managerial capacity on data collection, processing and information generation	level of enhanced data management & information producing capacity in terms of organized, processed and disseminated data/information
		Improve on research implementation and technology management capacity	water scarcity & pollution, watershed degradation and flood related challenges to be researched and addressed with technology	number and effectiveness of research undertaken and technologies implemented
Implement appropriate, effective and basin wide water resources information communication system	Establish and implement basin wide communication strategies	provide information to the stakeholders and the wider public	producing informed and cognizant stakeholder/public on water use, quality, flooding and watershed management issues	level of information coverage
		trigger interest and to receive feedback from the stakeholders and the wider public	Having stakeholders with enhanced participation and partnership	Level of participation of stakeholders in contribution in basin water resource mgmt.
	Raising awareness of stakeholders and the general public	build stakeholders and public awareness on water resource management system	Having stakeholders and general public capacitated in water resource management	Reduced conditions of water wastage, watershed degradation, water pollution, and flooding risks in the basin
		Building awareness on WR interventions, stakeholders' roles and responsibilities	Having stakeholders exercising on their roles and responsibilities	Level of contributions from stakeholders
	Enhancing capacity on communication means and technology	Enhance the capacity on means and technic of communications	developed capacity on technic and means of communication	level of enhanced communication means and methods on water allocation, water quality, watershed and flood hazard
		Improve capacity on communications technology	developed capacity on communication technology	effectiveness of communication technologies implemented

5. Detail action plan

The detail action plan sheet presented contains the goals, objectives, measures with the logical order presented as in the objective tree (Figure 1 and 2). Furthermore, the plan shows connected activities and sub-activities with action calendars and actors (action owners and collaborators).

Table 4. Goal – objective – measure relationship

I.No	Goal		Objectives		Measures
1	Implement basin information system for planning, research, development and management of basin's water resources	1	Establish basin wide geo-spatial water and water related resources database	1.1	Develop data and information collection, organization and retrieval system
				1.2	Establish database system
				1.3	Database management and user community information services
		2	Generate and organize basin water and water related resources information	2.1	Establish and manage representative hydro-met monitoring infrastructure
				2.2	Collecting and produce reliable and representative watershed characteristic information
				2.3	Generate and organize water resources related Agricultural information
				2.4	Generate and organize water and water resources related Technology and research information
				2.5	Developing and organizing basin wide water resources Infrastructure information (Drawing, figures, facts, map…)
				2.6	Develop and organize basin wide water uses, users, and flows information
		3	Organize and manage standards, guidelines, manuals and documents essential for basin WR administration	3.1	Produce and manage information on water use, waste water discharge, water resources development and water application rules
				3.2	Development of geo-spatial data standard, mobile apps and documenting source codes
				3.4	Develop and organize/manage operation and maintenance guidelines, manuals
				3.5	Creating nomenclature for geo-locations and water resource infrastructures
		4	Enhance information management capacity on water and water resource related issues	4.1	Enhancing capacity on data and database mgmt.
				4.2	Technical capactiy building on generation/producing information
				4.3	Implement capacity building program on information management technologies and researches
2	Implement appropriate, effective and basin wide Water resources Information communication system	5	Establish Develop and implement basin wide communication strategies	5.1	Develop publications
				5.2	Establish media relations
				5.3	Establish and manage website
				5.4	Establish feedback and learning mechanism
		6	Raising awareness of stakeholders and the general public	6.1	Awareness creation on water resource mangement system and water laws
				6.2	Establish stakeholder consultation system
		7	Enhancing capacity on effective communication methods/technics and technology	7.1	Enhance Capacity on communication and associated techniques
				7.2	Enhance capacity on communication tools and thechnologies for experts
				7.3	Enhance capacity on IWRM and water resources systems for communicators and media experts

Table 5. Measure – activity – sub-activity relationship (9 pages)

I.No	Measures		Activities	Sub-activities	Unit	Quantity [Amount]	2008	2009	2010	2011	2012	2013 - 2017	Action owners	Remarks
1	Develop data and information collection, organization and retrieval system	1.1.1	Develop data entry, organizing and retrieval system	Develop Hydromet data collection, organization and retrieval system	No	1			1				AwBA , NMA,MoWIE, Regional water bureaus, Regional Agricultural bureaus, Universities	
				Develop ground water digital library	No	1			1				AwBA,MoWIE,Geological survey/Water Bureaus, MoWIE, Ground water users, Universities, Municipalities	
				Develop water quality data collection, organization and retrieval system	No	1			1				AwBA,MoEFCC, MoWIE, MoI, Investment agency, Universities, Municipalities	
				Develop watershed, agriculture, socio-economy data collection, organization and retrieval system	No	1			1				AwBA,MoA, MoFECC, CSA, Regional water bureaus, Regional aricultural bureau	
				Develop infrastructure and reservoir data collection, organization and retrieval system	No	1			1				AwBA,MoWIE, EWWCE, EWWDC, Regional water bureaus, Municipalities	
				Develop and implement (or integrate} utility data migration system	No	1			1				AwBA,Municipalities, Regional water bureaus, Regional agricultural bureau, MoI, Investment agency	
				Develop network(e.g. road) and drainage data collection, organization and retrieval system	No	1			1				AwBA,ERA, ETC, Regional road authority, Regional water bureaus, EPCO	
				Develop water permit and charging data collection, organization and retrieval system	No	1			1				AwBA,Water users (Industrial, Irrigation, Domestic, Recreation, Parks, Bottling companies, … etc)	
		1.1.2	Perform data collection, organizing and provision	Perform data collection, organizing and provision	Frequency/ Year	1	1	1	1	1	1	1	AwBA,All stakeholders	
		1.1.3	Implement web based data acquiring services	Implement web based data acquiring services	Percent/yea r	100	100	100	100	100	100	100	ETC,AwBA & All stakeholders	
		1.1.4	Develop basin wide multi-agency geo-spatial data acquisition system	Develop and implement basin wide multi-agency geo-spatial data acquisition system	No	1				1			AAwBA,ll stakeholders	
2	Establish database sy	1.2.1	Develop central database (architecture, infrastructure, security)	Develop central database (architecture, infrastructure, security)	No	1		1					AwBA,All stakeholders	
		1.2.2	Update central database	Upgrading central database	requency/Yea	1	1	1	1	1	1	1	AwBA,All stakeholders	
		1.2.3	Upgrading central database	Upgrading central database	Frequency	1						1	AwBA,MoST, Universities, EWTI	
3	Database management and user community information services	1.3.1	Establish geo-spatial and non geo-spatial data management platform	Establish and implement geo-spatial and non geo-spatial data management platform	No	1		1					AwBA,EMA, NMA, MoWIE, MoA, MoI, MoFECC, CSA,	
		1.3.2	Develop central geo-spatial data and information archive services (Data and information assets)	Develop and implement central geo-spatial data and information archive services (Data and information assets: e.g. Cloud data services)	No	1				1			ETC ,AwBA,Ministries, Regional governments, Municipalities, Authorities, Enterprises, Corporations, Agencies,	
4	Establish and manage representative hydro-met monitoring infrastructure	2.1.1	Establishing representative surface and ground water resources monitoring sites	Proposing and establishing representative surface and ground water quantity monitoring sites	No. of stations[sit es]	90		30	60				AwBA,MoWIE, Universities, Research Centers	Proposing of new sites inclusive of the current proposed site + the requirement s in the GTP III
				Proposing and establishing representative surface and ground water quality monitoring sites	No. of stations[sit es]	65		65				100	AwBA ,MoWIE, Universities, Research Centers, MoI, MoFECC,	
				Establishing representative sediment monitoring sites	No. of stations[sit es]	11			11				AwBA ,MoWIE, Universities, Research Centers	
		2.1.2	Rehabilitate/upgrade and manage existing surface and ground water resources monitoring sites	Rehabilitate/upgrade and manage surface and ground water quantity monitoring sites	No. of stations/ye ar	320		15	85	180	40		AwBA,MoWIE, Regional water bureaus	
				Manage surface and ground water quality monitoring sites	No. of stations/ye ar	65	65	65	65	65	65	65	AwBA, MoWIE, Regional water bureaus	To be managed as per water quality DAP
				Manage sediment monitoring sites	No. of stations/ye ar	89			89	89	89	89	AwBA,MoWIE, Regional water bureaus	
		2.2.1	Collection and producing of spatially resolved land and watershed characterizing data (soil, LU/LC, Base maps...) information	Study of the land and watershed characteristic of the basin	%	100	65	35					ELWRC,AwBA, Universities, MoA, Regional Agricultural bureaus,	
				Updating of land and watershed characteristic information	%	100						100	ELWRC,AwBA, Universities, MoA, Regional Agricultural bureaus,	
		2.2.2	Acquiring reliable remote sensing information	Acquiring hydro-climatic satellite information	Frequency	8				4	4	20	EMA,AwBA, MoWIE, ELWRC	
				Acquiring hydro-climatic satellite information	Frequency	24				12	12	60	NMA,AwBA, MoWIE, EMA, MoFECC	

5	Collecting and produce reliable and representative watershed characteristic information	2.2.3	Generate and update morphologic information (river bank, bed , …)	Study on awash river and tributaries geo - morphologic	%	100		35	65				AwBA,MoWIE, Regional water bureaus, EWWDC, EMA, ELWRC	
				Updating awash river and tributaries geo-morphologic information	%	100						100	AwBA,MoWIE, Regional water bureaus, EWWDC, EMA, ELWRC	
		2.2.4	Generate wetland and/or aquatic characteristic information	Study or investigate on the wetlands and aquatic ecosystem of the basin	%	100			25	40	35		MoFECC,AwBA, MoA, MoWIE, Regional Environmental protection bureau, Regional agriculture bureau, MoFLD, MoCT	
		2.2.5	Develop and organize watershed interventions impact information	Study or investigate on the impacts of watershed interventions	No of sub-basins	6			2	4		6	MoA,AwBA, MoWIE, Regiona Argi bureaus, Universities	
				Collect and organize studies and research information on watershed conservation practices	No of sub-basins/Year	6		6	6	6	6	6	MoA,AwBA, MoWIE, Regiona Argi bureaus, Universities	
6	Generate and organize water resources related Agricultural information	2.3.1	Generate suitability information on crop type, irrigation type, cultivation and agro-chemicals	Investigate on irrigation suitability of the basin areas	%	100			30	70			MoWIE,MoA, AwBA, Regional irrigation bureaus, Universities, Research Centers	
				Investigate on suitability agriculture or agronomic practice in the basin	%	100			30	70			MoA ,MoWIE, AwBA, Regional irrigation bureaus,Universities, Research Centers	
		2.3.2	Organize, generate and update livestock information	Organize and generate livestock information	Frequency /Year	1		1	1	1	1	1	MoFLD,CSA, MoA, AwBA,MoWIE	
		2.3.3	Organize and update basin wide agriculture (rain fed & irrigation) information	Organize and generate basin wide irrigation and rain fed water uses or demands in the basin	Frequency /Year	1		1	1	1	1	1	MoA ,AwBA, Regional water bureaus, Regional Agricutural bureaus, Regional irrgation developemnt agency	
7	Generate and organize water and water resources related Technology and research information	2.4.1	Organize the outputs of basin wide water resource study and research outputs	Organize water allocation or scarcity related study and research outputs	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoA, MoI, Uiversities, Research Centers, Investment Agency, Regional water bureaus, MoEFCC, Water using Companies & enterprises,	
				Organize water pollution related study and researches outputs	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoA, MoI, Uiversities, Research Centers, Investment Agency, Regional water bureaus, MoEFCC, Water using Companies & enterprises,	
				Organize flooding and early warning related study and research outputs	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoA, MoI, Uiversities, Research Centers, Investment Agency, Regional water bureaus, MoEFCC, Water using Companies & enterprises,	
				Organize watershed management related study and research out puts	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoA, MoI, Uiversities, Research Centers,Regional water bureaus, MoEFCC,	
		2.4.2	Introducing and adopting appropriate developed technology (for water quality, water allocation, flood management, watershed management)	Introducing and adopting appropriate developed water quality technology	Frequency /Year	1	1	1	1	1	1	1	EIWT &/or MoST,Universities, Research centers, MoI, AwBA, MoA, MoWIE, MoEFCC, Irrigators, industries, Municipalities, regional water bureaus, regional agri. Bureaus,	
				Introducing and adopting appropriate developed water allocation technology	Frequency /Year	1	1	1	1	1	1	1	EIWT, MoST,EIWT ,MoST,Universities, Research centers, MoI, AwBA, MoA, MoWIE, MoEFCC, Irrigators, industries, Municipalities, regional water bureaus, regional agri. Bureaus,	
				introducing and adopting appropriate developed flooding and early warning technology	Frequency /Year	1	1	1	1	1	1	1	EIWT,MoST,Universities, Research centers, MoI, AwBA, MoA, MoWIE, MoEFCC, Irrigators, industries, Municipalities, regional water bureaus, regional agri. Bureaus, Ministry of Defence,	
				Introducing and adopting appropriate developed watershed management technology	Frequency /Year	1	1	1	1	1	1	1	EIWT ,MoST,Universities, Research centers, AwBA, MoA, MoWIE, MoEFCCRegional water bureaus, regional agri. Bureaus,	

8	Developing and organizing basin wide water resources Infrastructure information (Drawing, figures, facts, map…)	2.5.1	Organize basin wide information on WR reservoirs, schemes and infrastructure (type, sediment load, status)	organize water resource schemes and infrastructure characteristic information	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoI, MoWIE, MoA, CSA, Regional water bureaus	
				organize water reservoir sediment analysis information	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoA, MoEFCC, Regional water bureau, Regional environmental protection office	
		2.5.2	Develop and organize information on water treatment facilities (domestic, industry)	Develop and organize information on water supply's treatment facilities	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, Municipalities, Regional water bureau	
				Develop and organize on waste water treatment facilities	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoI, Municipalities, Regional water bureau, MoFECC	
		2.5.3	Develop and update operation, maintenance manuals (WR infrastructure and reservoirs) information	Develop operation and maintenance manuals for schemes , reservoirs and infrastructures information	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoA, MoI, regional water bureaus, regional agri. Bureaus, Minucipalities	
		2.5.4	Develop or model dynamic reservoir information (Open water evaporation and seepage)	study or model characteristics of selected reservoirs in the basin	%	100			35	65			AwBA,MoWIE, MoA, MoI, EWWDC, EWWCE, universities, research centers	
				Regularly produce dynamic reservoir characteristic information using the model (implement the model)	Frequency /Year	3	3	3	3	3	3	3	AwBA,MoWIE, MoA, MoI, EWWDC, EWWCE, universities, research centers	
		2.5.5	Study or model the characteristics of the drainage and sewerage facilities in the basin	Study or model the characteristics of the drainage and swerage facilities in the absin	%	100			25	35	40		AwBA,Municipalities,MoWIE, MoA, MoI, universities, research centers	
				Study or model the characteristics of the drainage and sewerage facilities in the basin	Frequency /Year	1	1	1	1	1	1	1	AwBA ,MoWIE, MoA, MoI, Municipalities, universities, research centers	
9	Develop and organize basin wide water uses, users, and flows information	2.6.1	Organize spatial and temporal information of water users and uses	Implement or adapting water allocation modeling	%	100		100					AwBA,MoWIE, MoA, MoI, Regional water bureaus, Universities	implementing the modeling projects completed in 2008 - AAIT
				Regularly produce information on water uses and users	Frequency /Year	1	1	1	1	1	1	1	AwBA,MoWIE, MoA, MoI, Regional water bureaus, Universities	
		2.6.2	Producing spatial and temporal water availability information for different uses	Investigating on surface water availability or potential	%	100						100	AwBA,MoWIE, MoA, MoI, MoEFCC, Regional water bureaus, Universities	
				Investigating on ground water availability or potential	%	100						100	AwBA,MoWIE, MoA, MoI, MoEFCC, Regional water bureaus, Universities, Research centers	
		2.6.3	Develop water safety information for recreation and environment	Develop information on water safety characteristic of recreation and touristic sites	Frequency /Year	1	1	1	1	1	1	1	MoCT,MoWIE, AwBA, MoA, MoI, MoEFCC, Regional water bureaus, Ministry of culture and tourism, Universities	
				Develop information on water safety characteristic of environmental water uses/duties	Frequency /Year	1	1	1	1	1	1	1	MoFECC,MoWIE, AwBA, MoA, MoI, MoEFCC, Regional water bureaus, Universities, Research centers	
		2.6.4	Produce Eco-hydrology services information	Study or investigating on the basin ecohydrologic services	No of sub-basins	3		1	1	1			MoWIE,AwBA & all others	
10	Produce and manage information on water use, waste water discharge, water resources development and water application rules	3.1.1	Avail information on water use and application rules	Avail information on water use	requency/yea	1	1	1	1	1	1	1	AwBA,MoA, MoWIE, Regional water bureau, Regonal agriculture bureau, Municipalities	
				Develop information on irrigation water application rules for major crops	%	100			40	60		100	MoA,AwBA, MoWIE, Regional water bureaus, Regional agriculture bureau, Sugar corporation, Investment Agency, Horticulture agency	Application rules to be udated in the next GTP (GTP III)
		3.1.2	Avail information on wastewater discharge rules, standard and treatment level	Avail information on wastewater discharge rules, standard and treatment level	requency/yea	1	1	1	1	1	1	1	MoEFCC,ESA, AwBA, MoI, MoA, MoH, Regional water bureau, Municipalities	
		3.1.3	Organize information on existing and new development projects	Organize information on existing and new development projects	requency/yea	1	1	1	1	1	1	1	AwBA,MoA, MoWIE, MoFECC, MoI, Regional water bureau, Regonal agriculture bureau, Municipalities, EIA	
		3.2.1	Adopt national and international geo-spatial data standards	Adopt national and international geo-spatial data standards	%	100				35	65		EMA,ESA,MoWIE, AwBA, ELWRC, CSA, ESA*, MoA, MoI, NMA	

11	Development of geo-spatial data standard, mobile apps and documenting source codes	3.2.2	Documentation of source codes for developed applications	Document source codes for developed applications	requency/yea	1	1	1	1	1	1	1	AwBA,MoWIE, ELWRC, CSA, ESA*, MoA, MoI, NMA, MoEFCC, EWTI	
		3.2.3	Develop Mobile Applications for transparent information and early warning	Develop Mobile Applications for transparent information and early warning	No of apps	4			2	2			MoST,AwBA, MoWIE, MoI, EWPC, MoA, NMA, ETC, Universities	4 Application (flood, water use & charge, water quality, meteorology)
12	Develop and organize/manage operation and maintenance guidelines, manuals	3.4.1	Develop guidelines of water use, wastewater disposal and irrigation water application rules	Develop guideline for issuing water uses	%	100			40	60			AwBA,MoWIE, MoA, MoI, MoEFCC, EIA, Regional water bureaus, Regional agriculture bureau, Regional investment bureau	Defining procedures for employing projects for accessing water resources
				Develop guideline for waste water disposal	%	100			35	65			MoEFCC,AwBA, MoI, MoWIE, EIA, Municipalities, MoCT	
				Develop guideline for irrigation water application system, methods, tools	%	100			25	75			MoWIE,AwBA, MoA, Regional agriculture bureau, Regional water bureau, EWTI, MoST, Universities	
		3.4.2	Organize and manage manuals (development, operation and maintenance)	Organize and manage manuals (development, operation and maintenance)	requency/yea	1	1	1	1	1	1	1	AwBA,MoWIE, MoI, MoA, MoEFCC, MoST, Universities, EWWDC, EWWCE, Regional water bureau	
		3.4.3	Developing and managing guidelines for project impact assessments.	Developing and managing guideline for project impact assessments.	%	100			30	70			AwBA,MoWIE, MoI, MoA, MoEFCC, MoST, Universities	
13	Creating nomenclature for geo-locations and water resource infrastructures	3.5.1	Encode geo-locations for water resource infrastructures, schemes and gauging/monitoring station	Encode Geo-location of water resource infrastructures, schemes, diversion points and return flow points	%	100			100				AWBA,MoWIE, MoA, Reginal Bureaus, MoI, EWWDC, EWWCE,	
				Encode Geo-location of hydro-met gauging and surface water quality monitoring sites	%	100			100				AwBA,MoWIE, NMA, MoI, MoEFCC	
				Encode Geo-location of ground water wells and quality monitoring sites	%	100			35	65			AwBA,Regional water bureau, MoWIE, NGSI	
				Encode Geo-location of non agricultural water uses	%	100			40	60			AwBA,MoWIE, MoI, MoEFCC, MoCT, EPCO, EIA, Regional water bureau, Regional investment agaecy	
		3.5.1	Encode Geo-location of institutions and social services	Encode Geo-location of institutions and social services	%	100			30	70			AwBA,CSA, Regional adminstrations, MoH, MoE, ERA, ETC, Municipalities	
		3.5.2	Encoded geo-locations on Google web services/Google earth (Upload KMZ and KML files)	Encoded geo-locations on Google web services/Google earth (Upload KMZ and KML files)	%	100					100		AwBA,MoST, Universities	
14	Enhancing capacity on data and database mgmt.	4.1.1	Implement capacity building program on Hydrographic survey and infrastructure data management	Conduct training on hydrographic survey of reservoirs and lakes	Participant (s)/institution	3			3			5	MoWIE,AwBA, MoEFCC, Regional water bureaus, ELWRC, EWWDE, Universities, EWRI	Institutions = Action owner + Other actors
				Conduct and/or conduct capacity building on water resource infrastructure data management	Participant (s)/institution	2			2				AwBA,MoWIE, MoI, MoA, ELWRC, EWWDC, EPCO, EWWCE, Regional waterbureau , Regional agricutlure bureau, Universities	
		4.1.2	Implement capacity building program on Water resource monitoring system	Conduct/organize training/workshop on water resource monitoring system (water quantity & quality, sedimentation, wastewater discharge)	Participant (s)/institution	5			5			5	MoWIE, MoI, MoA, EWWDC, AwBA,EWWCE, Regional waterbureau, Regional agricutlure bureau, Municipality, MoEFCC, EWRTI, Universities	
				Conduct/organize training/workshop on water resource monitoring data handling (water quantity & quality, sedimentation, wastewater discharge)	Participant (s)/institution	5			5				,MoWIE, AwBA, MoI, MoA, EWWDC, EWWCE, Regional waterbureau, Regional agricutlure bureau, MoEFCC, EWRTI, University, NMA	
		4.1.3	Implement capacity building program on statistical methods for water resource data	Conduct/organize training on geo-statistical methods of WR data analysis	Participant (s)/institution	10			5	5			EWRTI,AwBA, MoWIE, ELWRC, EWWDC, Regional water bureau	

			management	Conduct/organize training statistical methods of hydro-met data analysis	Participant (s)/institution	6		2	2	2			AwBA,MoWIE, ELWRC, EWWDC, Regional water bureau, Universities, EMA, EWRTI,	
		4.1.4	Implement capacity building program on Geo-spatial database management	Implement capacity building program on Geo-spatial water resource database management	Participant (s)/institution	6			2	2	2		ELWRC,AwBA, MoWIE, ELWRC, EWWDC, Regional water bureau, University, NMA, CSA, EWRTI, NGOs	
		4.1.5	Implement capacity building program on database management and database software's	Implement capacity building program on water resource database management and database software's	Participant (s)/institution	6			3	3		3	AwBA,MoWIE, EWRTI, ELWRC, EMA, CSA, Universities, MoST, Regional water bureau, NGOs	
15	Technical capacity building on generation/producing information	4.2.1	Implement training programs on GIS and RS information (acquiring - downscaling, retrieving, ,,,)	Conduct/organize advanced technical training on GIS and RS applications for water resource management system	Participant (s)/institution	4			2		2	4	ELWRC,AwBA, MoWIE, EWRTI, EMA, EWWDC, NMA, Universities	
				Conduct/organize medium level technical training of the application of GIS and RS for water resource management	Participant (s)/institution	6			3		3	6	ELWRC,MoWIE, AwBA, EWRTI, EMA, EWWDC, NMA, Universities	
		4.2.2	Implement training programs on Water resource modeling	Conduct/organize technical training and workshop on water allocation model application	Participant (s)/institution	1		1					Universities (AAIT), AwBA, MoWIE, Regional water bureau, Municipalities, MoI, MoA, EPCO	
				Conduct/organize technical training and workshop on water quality model application	Participant (s)/institution	1		1					Universities (ASTU),AwBA, MoWIE, Regional water bureau, Municipalities, MoI, MoA, EPCO	
				Conduct/organize technical training and workshop on sedimentation model application	Participant (s)/institution	1		1					Universities (HU),AwBA, MoWIE, MoA, MoEFCC	
				Conduct/organize technical training/ workshop on reservoir modeling and model application	Participant (s)/institution	1				1			Universities,AwBA, MoWIE, MoA, MoEFCC, EWRTI, EWWDC, EPCO, Municipalities, Regional water bureau	
				Conduct/organize technical training and workshop on drainage and sewerage system model application	Participant (s)/institution	3				3			Universities,AwBA, MoWIE, Municipalities, EWRTI, ELWRC	
		4.2.3	Implement training programs on Spatial and temporal water resources availability and water quality analysis	Conduct/organize technical training on water resource potential assessment	Participant (s)/institution							4	AwBA,MoWIE, MoI, MoA, EWRTI, ELWRC, EWWDC, Regional water bureau, Regional agriculture bureau	
				Conduct/organize technical training on water quality testing and data analysis	Participant (s)/institution	8		2	2	2	2	10	Universities (ASTU),AwBA, MoWIE, Regional water bureau, Municipalities, MoI, MoA, EPCO	
		4.2.4	Implement training programs on Agricultural and socio-economic information producing	Conduct/organize technical training on agricultural water (irrigation) information handling	Participant (s)/institution	3			3			5	MoA,AwBA, MoWIE, Regional water bureau, Regional agriculture bureau	
				Conduct/organize technical training on socio-economic data analysis	Participant (s)/institution	2			2			2	CSA,AwBA, MoA, MoI, Regional administrations, EIA, Universities	
		4.2.5	Implement capacity building program on project impact evaluation techniques and methods	Implement capacity building program on project impact evaluation techniques and methods	Participant (s)/institution	2			2			2	AwBA,MoWIE, MoA, MoI, MoEFCC, Universities, EWWDC, Municipalities	
16	Implement capacity building program on information management technologies and researches	4.3.1	Implement capacity building program on Modern technology application for water resource information management	Facilitate technical training and experience sharing program on modern technology application for WR mgmt.	Participant (s)/institution	10			2	3	5	10	MoST,AWBA, MoI, MoA, MoWIE, EWRTI, Universities, Research centers, NGOs,	
		4.3.2	Implement capacity building program on Water resource research methodologies	Conducting technical training on water related study and research methodologies	Participant (s)/institution	2		2				4	Research center(s),AwBA, MoI, MoA, MoWIE, EWRTI, MoEFCC, Universities, Research centers	
17	Develop publications	5.1.1	Producing publication for water quality	Produce newsletter on water quality issues	Freq/year	1		1	1	1	1	1	AWBA,MOID,MoWIE,RWB,city admonistrations,MOEFCC,MoA	
				Produce and disseminate briefing article/leaflet on water quality	Freq/year	2		2	2	2	2	2	AWBA,MOID,MoWIE,RWB,city admonistrations,MOEFCC,MoA	
				Develop digital signage advert on water quality management	No	2				1		1	MoEFCC,MoI, AwBA, MoWIE, RWB, City administartions	
				Issue press release on water quality themes	Freq/year	2		2	2	2	2	2	AwBA,MoI, MoWIE, MoEFCC, City administartions,RWB	
				Produce short promotional clips on water quality management	No	2			1			1	MoWIE,MoI, AwBA, RWB, MoEFCC, City administartions	
		5.1.2	Producing publication for infrastructure and	Organize press release	Freq/year	2		2	2	2	2	2	AWBA,MoWIE,RWB,MoCT,MoFLD ,EWWCC	
				Produce leaflet	Freq/year	4		4	4	4	4	4	AMoWIE,AwBA,RWB,EWWCC	

			reservoirs	Produce newsletter	Freq/year	12		4	4	4	4	24	AWBA,MoWIE,RWB,MoCT,MoFLD ,EWWCC	
				Short video Production	Freq/year	1				1		2	MoWIE,AWBA,RWB,EWWCC	
		5.1.3	Producing publication for research outputs , project interventions related	Produce set of journals/booklet	Freq/year	1	1	1	1	1	1	1	AWBA,Unverstis,MoWIE,EWTI ,EWWCC	
				Organize press release	Freq/year	4	4	4	4	4	4	4	AWBA,MoST,MoWIE,EWTI, MoST, Universities	
18	tablish media relation	5.2.1	Implement media relation for hydro-met (early warnings and hazards)	Web-based (Website) information dissemination	Percent/year	100			100	100	100	100	AWBA,MOWIE,RWB,MOANR,NMA,Walta information center, Ministry of information & communication	
				Information dissemination using Mobil APPS	Percent/year	100				100	100	100	AwBA,MoWIE,RWB, NMA, DEWPC,	
				Radio and/or Television announcements for hydromet information	Freq/year	8		8	8	8	8	8	EBC,WALTA Information center, AwBA, MoWIE, NMA, DEWPC, Regional radio services	
		5.2.2	Implement media relation for water use, water permit and water charging	Radio announcements for water use, permit and charging information	Freq/year	4		4	4	4	4	4	EBC,WALTA Information center, RWB, AwBA, MoWIE, NMA, DEWPC, Regional radio services	
				web based(website) information communication	Percent/year	100			100	100	100	100	AwBA,WALTA Information center, RWB, AwBA, MoWIE, NMA, ETC, DEWPC, Regional radio services	
				Information communication using Mobil APPS	Percent/year	100				100	100	100	AwBA,WALTA Information center, RWB, AwBA, MoWIE, NMA, DEWPC, Regional radio services	
		5.2.3	Implement media relation for water and waste water quality	Produce documentary on industry waste water management	Freq/years	1				1		1	MoI,AWBA,MoWIE,RWB, MoEFCC	
				Television and Radio program on waste water management and sewerage system	Freq/year	3			3	3	3	3	EBC,AWBA,MoWIE,MoI,MoEFCC, Municipalities, RWB	
				Television and Radio program on agricultural waste water management	Freq/year	2			2		2	2	AWBA/NMA,AWBA/NMA,AWBA,MoA,RWB,NMA,Irrigation water users	
				web based(website) information dissemination	Percent/year	100			100	100	100	100	AwBA,MoWIE,MoI,RWB,MoEFCC, MoA, Irrigation water users	
		5.2.4	Implement Media relation for watershed management and irrigated agriculture	web based(website) information communication	Percent/year	100			100	100	100	100	AwBAMOWIE,RWB,MOEFCC,RAB ,AWBA, MoA	
				Radio/TV Media release or announcements	Freq/year	4		4	4	4	4	4	EBC,MOWIE,RWB,MOEFCC,RAB ,AWBA,MoA	Each media takes 2 turns
		5.2.5	Implement Media relation for research outputs and new technology	Communicate research output and technologies using website	Percent/year	100			100	100	100	100	AwBA,AWBA,MoWIE,EWTI,universties	
			Implement Media relation for flood and	radio/TV media realizes	Freq/year	1		1	1	1	1	1	EBC,AWBA,MoWIE,EWTI,universties,privet medias	
		5.2.6	Implement Media relation for flood and drought	Communicate stakeholders and general public during flood and drought hazard with mobile apps	Percent/year	100				100	100	100	AWBA,MOWIE,RWB,NMA,EWPC,RWPC	
				Organize TV/radio announcement on flood and drought hazards	Percent/year	100		100	100	100	100	100	AWBA,MOWIE,RWB,EWPC,RWPC,NMA,national/local meadias,the public	
				Communicate drought and flood using website	Percent/year	100			100	100	100	100	AwBA,MOWIE,RWB,EWPC,RWPC,NMA,	
19	Establish and manage website	5.3.1	Developing interactive website	Developing interactive website	Percent				100				AwBA,MoWIE, INSA, ETC, Universities	
		5.3.2	managing website and disseminate information	managing website and disseminate information	Percent/year				100	100	100	100	IAwBA,NSA, ETC, MoWIE, WALTA information center	
		5.4.1	Develop learning and feedback platform on effectiveness of a communication strategy	Develop and conduct web based feedback survey system	Percent/year	100			100	100	100	100	MoWIE,MoA,EWPC,MoFECC,AwBA,ALTA information center,universities,RWB,city Administrations,water users,general public	
				Develop and update learning and feedback standard questionnaire	Freq/year	1		1	1	1	1	1	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public	
				organize explanatory audience interviews	Freq/year	1			1	1	1	1	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public	

				Establish media archive/library	Percent/year	100			100	100	100	100	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
20	Establish feedback and learning mechanism	5.4.2	platform impacts of water and water related information communicated	organize focus audience discussion	Freq/year	1		1	1	1	1	1	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				conduct impact assessment survey Interviews	Percent/year	100					100	100	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Organize Television or Radio direct/Live/ audience consultation forum	Freq/year	1			1	1	1	1	AWBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Develop and implement standard feedback system (sheet, box, ...)	Percent/year	100	100	100	100	100	100	100	AWBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
		5.4.3	Develop learning and feedback platform on the implementation of the strategic river basin	conduct institutional consultation	Freq/year					1		1	AWBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Perform web-based (online) consultation or community user forum	Percent/year	100			100	100	100	100	AWBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Conduct strategic river basin plan performance survey	Percent/year	100					100	100	AWBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
21	Awareness creation on water resource management system and water laws	6.1.1	Raising awareness on water laws, policies, proclamations, regulations, guidelines	Briefing on stakeholders workshops	Freq/year	4	4	4	4	4	4	4	AwBA,MOWIE,RWB	
				Provide information using website	Percent/ye ar	100			100	100	100	100	AwBA,MOWIE,RWB	
				Provide information using Television and Radio	Freq/year	1		1	1	1	1	1	AwBA,MOWIE,RWB	
				Organize TV/radio talk show	Freq/year	1			1	1	1	1	EBC,AWBa,RWB, MoWIE	
		6.1.2	Enhancing awareness on water uses, applications, values and costs	Curricularize water resource management on schools (up to medium level),	Percent/ye ar	50					50	100	MoE,MoWIE,AwBA, MoSTU,EWRI,REB,MoI,MoA	
				Organize radio/TV program on water and water related issues	Freq/year	1			1	1	1	1	EBC,AWBA,MoWIE,RWB	
				Provide briefing using stakeholder meetings/local communities	Freq/year	100			100	100	100	100	AwBA,AWBA,RWB, MoWIE	
				Information dissemination using mobile apps	Percent/ye ar	100				100	100	100	AwBA,MOID,MOWIE,RWB,,MOEFCC,MOI	
				Information dissemination using web based/website meanness	Percent/ye ar					100	100	100	AwBA,MOID,MOWIE,RWB,,MOEFCC,MOI	
				Produce documentary videos	Freq/year	1		1				1	AwBA,AWBA,MoWIE,RWB,MoEFCC	
				Establish Volunteer youth advocacy ambassadors	Percent/ye ar	100					100		AWBA,MoWIE,RWB,MoCT,MoEFCC,EPC	
			Improve awareness on water resource	Organize TV/radio announcement	Freq/year	2		2	2	2	2	2	MoWIE,AWBA,RWB,MoCT,MoEFCC,EPC	
				Information dissemination using web based/website meanness	Percent/ye ar	100				100	100	100	AwBA,AWBA,MoWIE, MoA, MoI,EBC,Reginal media,privet media	

		6.1.3	Infrastructure and reservoir management (development, maintenance and operation, risks,)	Organize media release	Freq/year	4		4	4	4	4	4	AWBA,AWBA,MoWIE, MoA, MoI,EBC,Reginal media,privet media	
				Organize face to face community consultation	Freq/year	4		4	4	4	4	4	RWB,AWBA,MoWIE, MoA, MoI,EBC,Reginal media,privet media	
				Provide information with booklet	Freq/year	1				1		1	EWWCE,AWBA,MoWIE, MoA, MoI,MoCT,MoFECC	
22	Establish stakeholder consultation system	6.2.1	Advocate the strategic basin plan	organize workshops	Freq/year	2		2	2	2			AwBA,AWBA,MoWIE, MoA, MoI,MoCT,MoFECC,EBC,Regional media,privet media	
				produce media releases	Freq/year	2		2	2	2	2	2	AwBA,AWBA,MoWIE, MoA, MoI,MoCT,MoFECC,EBC,Regional media,privet media	
				Develop newsletters	Freq/year	2		2	2	2	2	2	AwBA,AWBA,MoWIE, MoA, MoI,MoCT,MoFECC,EBC	
				Conduct advocacy with website	Percent/year	100			100	100	100	100	AwBA,AWBA,MoWIE, MoA, MoI,MoCT,MoFECC,EBC,Regional media,privet media	
		6.2.2	Awareness raising on stakeholders roles, and responsibility	Produce newsletters	Freq/year	2		2	2	2	2	2	AwBA,RWB,AWBA,MoWIE, MoA, MoI,MoCT,MoFECC,EBC,Regional media,privet media	
				Organize face to face consultation in public events	Freq/year	4		4	4	4	4	4	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Information dissemination with website	Percent/year	100			100	100	100	100	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Organize Tv/radio announcement	Freq/year	1		1	1	1	1	1	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
		6.2.3	Branding interventions on basin strategic water resource management issues (flooding, watershed management, water allocation, water quality)	Organize Tv/radio/print promotion	Percent/year	100		100	100	100	100	100	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Information dissemination with website meanness	Percent/year	100			100	100	100	100	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Produce magazines and newsletters	Freq/year	2	2	2	2	2	2	2	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Produce articles	Freq/year	3		3	3	3	3	3	AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water	
				Produce 3D models (Video, Printing)	Percent	100					100		AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Organize experience sharing field visit of demonstration sites	Freq/year	1			1		1	1	MoA, AwBA, MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	Every two years
				Perform public mobilization with TV/radio announcement	Freq/year	2		2	2	2	2	2	MoA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	At physical and biological activities periods

		6.2.4	Raising awareness on watershed management	Produce documentary video	Freq/year	1					1	1	MoA,MoWIE,AwBA, MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Organize exhibitions using public events at national days	Freq/year	1		1	1	1	1	1	MoA,MoWIE, AwBA,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
				Information dissemination using web based/website meanness	Percent/year	12			12	12	12	12	MoA,AwBA,MoWIE,MoA,EWPC,MoFECC,WALTA information center,universities,RWB,city Administrations,water users,general public,EBC	
23	Enhance Capacity on communication and associated techniques	7.1.1	Organize training/experience sharing on major communication strategies for water resources information	Organize training/experience sharing on major communication strategies for water resources information	Participant(s)/institution	3		3				3	MoICT,AWBA,MoWIE,RWB,medias	
		7.1.2	Organize short term training on communication techniques for water resources information	Organize short term training on communication techniques for water resources information	Participant(s)/institution	4			2		2	2	EWTI,AWBA,MoWIE,RWB,medias	Every two years
24	Enhance capacity on communication tools and technologies for experts	7.2.1	Facilitate/conduct technical training on web, software technologies	Facilitate/conduct technical training on web, software technologies	Participant(s)/institution	1				1		1	MoICT,AWBA,MoWIE,RWB,medias	
		7.2.2	Facilitate/organize short term training/experience sharing on print and electronic media management	Facilitate/organize short term training/experience sharing on print and electronic media management	Participant(s)/institution	5		2			3	5	MoFCAO,AWBA,MoWIE,RWB,medias	
25	Enhance capacity on IWRM and water resources systems for communicators and media experts	7.3.1	Organize workshop on principles of IWRM and its implementation mechanisms	Organize workshop on principles of IWRM and its implementation mechanisms	Participant(s)/institution	5			5			5	EWTI,AWBA,MoWIE,RWB,medias	
		7.3.2	Organize training on water resources system analysis	Organize training on water resources system analysis	Participant(s)/institution	2			2			2	EWTI,AWBA,MoWIE,RWB,medias	
		7.3.3	Organize training/workshop for national and regional media centers	Organize national and regional media training workshop	Participant(s)/institution	2			2			2	AAU, AWBA,MoWIE,RWB,national/local medias	

6. Risk management

The Awash BIMCS up on implementation supports water resource administration as it provides platform for facilitating informed planning, management and informed decision. However, on process it can come across various challenges, and there always exists risk of attaining the desired goals. This can arise from numerous circumstances that alter the predetermined scenarios and assumptions at the time of planning. Generally, the risk management of the Awash BIMCS are described considering planning assumptions, expected challenges and possible solutions.

6.1. Planning assumption

This BIMCS plan is doubtlessly expected to be the plan of the basin itself, with the in-depth thought that AwBA is authorized to initiate basin plan and other policy matters. So, it is believed that the plan as much as possible centers on the interests of stakeholders and wider public, in that it stakeholders plan will be reconciled in this plan. Again, all the stakeholders, actors and collaborators, of the plan are expected to have shared vision for the implementation IWRM in the basin. This entails keen attentions in planning, monitoring and evaluation of success and failures together. As far as the plan is thought to be implemented together, the contribution of resources as: financial, human and technical by each executing and collaborating organs of the basin plan will happen. Since the plan is well-thought-out to realize significant advancements in application of ICT for water resource management, the augmentation of capacity: technical and technological has to come to effect. Generally, the plan is presumed accepted and implemented being the plan of all constituting stakeholders that promotes implementation of IWRM in the basin.

6.2. Expected challenges and possible solution

Having the aforementioned planning assumptions in mind there exist key expected challenges while going to the implementing the Awash BIMCS plan. So, it is apparent to design the risk management plan screening the risks and their consequences with strategic mitigation responses. The risk management plan matrix (Table 3) below tallies the risks – consequences – responses relationship of the plan. Accordingly, risks like: the issues of owning the plan, resource limitation and limited technical capacity are highlighted with their priorities, while implementing monitoring

and evaluation mechanisms with notion iteration, promoting institutional cooperation and forming learning alliances are listed as mitigations measures.

Table 3. Risk management plan matrix

No	Risks and consequences	Probability (%)	Impact (1-10)	Priority	Mitigation Responses
	a	b	c	b x c	
1	Action Owners and collaborators not taking this plan as a road map – affects the complete implementation of the plan	60	10	600	Advocate the plan, collect feedback and encourage shared ambitions to build ownership, then develop the plan iteratively
2	Unavailability of resources as: financial and technological – lessens the quality of the work and produce delays in schedule	30	3	90	Promote institutional collaboration (national and international) for supports and technology transfer; Perform prioritize and rescheduling of tasks
3	All activities and all actors not exhaustively listed and tallied or corresponded – the basin plan not achieving the desired goal	20	5	100	Fully implement the monitoring and evaluation plan and make timely factual decisions and measures; Implement the iterative plan approach
4	Incapability of institutions (in terms of technical and human) on implementation of the strategic plan – Lowering quality works and delay of schedules	40	6	240	Implement continuous capacity building programs at each step; Coordinate national and international efforts/skills/capacity; Build partnership with international knowledge institutes

7. Monitoring and evaluation mechanisms

Monitoring and Evaluation (M&E) is key in keeping track of the progress and results in the process of implementing Awash BIMCS plan. The M&E mechanism generally outlines the method employed, means of verification, the team or actor monitoring and evaluating, and the time schedule. Thus, the M&E process consists of the following mechanisms.

I. The M&E approach employs a continuous check on the progress and results (intermediate and final) obtained at stages through collection and analysis of data on

the performance of implementation. This can be realized with detail and agreed M&E plan which have complete sketch of actors, indicators, criteria, budget and calendars.

II. The M&E task will be done by a multidisciplinary collectively established team from executing organs (action owners and collaborators – as per the plan). In this regards AwBA will hold the leading actor for initiating and implementing the M&E plan, and the team will be accountable to AwBA.

III. Periodical and seasoned reports on the achievements of sectorial and multi-sectorial goals, objectives or measures will be the hard element of the M&E plan

IV. Finally, all essential information will be provided to the BHC to fine tune the strategic basin plan with the national and regional growth and transformation plan.