Awash River Basin

Flood and Drought Management

Strategic Plan

December 2016

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List of Abbreviation

IWRM = Integrated Water Resource Management

FDRE = Federal Democratic Republic of Ethiopia

MoWR = Ministry of Water Resource

MoWIE = Ministry of Water, irrigation and Electricity

AwBA = Awash Basin Authority

OWWDSE = - Oromia Water Works Design and Supervision Enterprise

WWDSE = Water Works Design and Supervision Enterprise

AMDA = Annual maximum daily average

EDPPC = Emergency Disasters Preparation and Preparedness Commission

NASA = National Aeronautics and Space Administration

GIS = Geographical Information System

GTP = Growth Transformation Program

FRL = Full reservoir level

MCM = Million Cubic Meter

DAP = Detail Action Plan

M&E = Monitoring and Evaluation

Ha = Hectare

1.Background

1.1.Introduction

Throughout time throughout the world, floods have altered the floodplain landscape. These areas are continuously shaped by the forces of water—either eroded or built up through deposit of sediment. More recently, the landscape has been altered by human development, affecting both the immediate floodplain and events downstream. Historically, people have been attracted to bodies of water as places for living, industry, commerce and recreation. During the early settlement of communities, locations near water provided necessary access to transportation, a water supply and water power. In addition, these areas had fertile soils, making them prime agricultural lands. This pattern of development continued as communities grew. In recent decades, development along floodways and shorelines has been spurred by the aesthetic and recreational value of these sites. Floods provide a variety of services and help to develop fulfilling livelihoods and meet the nutritional needs of human beings. The beneficial aspects of floods, which provide crucial water resources, rich biodiversity, abundance of fish and fertility of soil to the flood plains, are taken for granted, overlooked or often forgotten. These benefits are brief y discussed below for inclusion in the context of IFM.

Recharging water sources: Floods are natural hydrologic processes and provide variable river flows and are an intermittent source of freshwater supply, filling natural depressions and recharging groundwater. Inundation of the flood plains helps recharge the groundwater, which is an important source of drinking water and is essential for agriculture. They are an important source for restocking local man-made water sources such as ponds, reservoirs, dams and irrigation channels, meeting round-the-year demand.

Agriculture: Floodwaters carry nutrients and sediments, which are deposited on flood plains, enriching the soil; artificial nourishment such as fertilizers is not required. Rice paddies are sometimes flooded deliberately to take advantage of this natural fertilization process.

Fishery: A river basin is an ecological unit interconnecting upstream spawning habitats with downstream rearing habitats for a variety of species and other aquatic systems. Seasonal habitats on the flood plain, created by variable flow regimes, are essential for various stages of the life cycle of species. Floods provide an ecological trigger for both the spawning and migration of certain species. Some species spawn on the flood plain itself, whereas others migrate up-

stream to spawn in the river channel, providing an abundant supply of fish and alternative income sources at the household level.

Rejuvenation of the river ecosystem: The river ecosystem is a critical habitat for the biota: fish, wildlife and waterfowl. Seasonal variability and variable sediment and flow regimes help maintain ecological biodiversity in rivers and flood plains. Wetlands or swamps located in flood plains serve as natural buffer zones for excessive flood flows and play host too many birds, fish and plants. Supplementary livelihoods in the form of recreational and eco-tourism activities can be made possible by the presence of the rich river ecosystem, bestowed with abundant flora and fauna. Surface runoff and flooding can help wash down pollutants and contaminants deposited on land caused by the intensive use of pesticides and fertilizers. They also flush out accumulated organic substances brought by untreated drainage water from farmlands, stockyards, factories and domestic use and restore the ecological health of stagnant rivers and streams by diluting them and providing clean water.

Ethiopia is composed of nine major River basins, among which Awash River basin is one of them. The drainage systems of these basins originate from highlands and make their way down to the peripheral or outlying lowlands. owing to its topographic and altitudinal characteristics, flooding as natural phenomena is not new event for Ethiopia especially during the rainy season, extreme floods in the major perennial Rivers and extreme floods of their several tributaries coincide in forming peak discharge and as a result overflow or breach out their banks and inundate downstream flood plain area.

Awash River Basin is seriously susceptible for extreme floods. It is also Ethiopia's most utilized and industrialized basin. Foreign investment in horticulture, textile, leather and steel and manufacturing industries are found particularly in the upper basin. Large state-owned sugarcane irrigation schemes are found middle and downstream parts other than large numbers of small to medium holder's farms. Irrigation development in this basin quite advanced and is located in the flood plains on either side of the river, with close to 70% of the country's large-scale irrigated agriculture; thus, high Environmental and socio-economic damage occurs during flooding.

Flooding poses one of the greatest natural risks to sustainable development. Flood losses reduce the asset base of households, communities and societies through the destruction of standing crops, dwellings, infrastructure, machinery and buildings, quite apart from the tragic loss of life. Therefore, it is required to have effective and integrated management so that the harm is minimized.

1.2.Objective of the plan.

The objective of Flood and Drought Management plan is to advocate fundamental reorientation of social perception of floods from the "need to control" to the "need to manage" by shifting the focus from a reactive to a more proactive response.

1.3.Vision

The ultimate Vision of this plan is to make Awash River Basin the model in Africa in Flood and Drought Management practices.

1.4.Scope

The plan addresses the whole basin (Six Planning Areas) with prioritization of identified hot spots both for flooding and drought. It is multi-sectorial, participatory and iterative plan implemented until 2017 Ethiopian Physical year. All the regional and federal institutions shall take the part of this plan as per their respective mandates to implement within the time horizon.

The planning unit is the hydrological boundary and should cover the entire river basin area and promote the coordinated development and management of actions regarding water, land and related resources by respective sectors.

2. Situation Analysis

2.1.Legal and Institutional Framework

Policies and Institutions serve as instruments for human cooperation and for reducing uncertainty by establishing a stable structure to human interaction. Accordingly, Policy and institutional frameworks are of paramount significance, in the context of river basin/flood/, since

coordination among various human efforts to use the water available within a basin is at the heart of IWRMor addresses the interdependence of the different uses and users of water resources. This water resources management policy is based on the constitution of the FDRE Government Macro Economic and Social policies and development strategies as well as objectives accepted by the Federal Democratic Republic of Ethiopia and the principles of water resources development objectives that would enhance the socio-economic development of the peoples of Ethiopia. Furthermore, in consideration of the inclusion of all felt needs and mutual interests of all the peoples of Ethiopia, the policy was discussed in depth and enriched at the grass roots level with representative participants from all Regional States up to Wereda level and relevant bureaus.

Accordingly, policies are essentially selected options to be used as instruments for achieving intendedFlood and drought managementfor more beneficial uses of flood water goals and objectives/why because Combating and regulating flood waters is one of the Water Resources Management policy/ and as such this policy will serve only as a general and directive principle in a wider scope and therefore does not consist of an elaborated action plan. Consequently, it is essential to immediately adapt development strategies and policies for implementation, methodologies and pertinent action plans to translate the policy into basin plan practice. These activities shall be pursued by the MoWR and all concerned/Stakeholders/ as soon as the policy is approved and endorsed by the government.

Therefore, the fundamental purpose of policy and institutional analysis is to explore this coordinating role of institutions.Strategiesare tools to be developed for the implementation of policies for flood and drought management to meet/reach/the goal and objectives of the targeted basin plan. These constitute the general framework of activities to be undertaken through time to meet previously defined objectives and endorsed policies.

The institutional framework for water resources management in a river basin consists of established rules, norms, practices and systems that provide a structure to actions related to water management. Laws, Policies and regulations are the three pillars of the institutional framework for IWRM. Constitution of The Federal Democratic Republic of Ethiopia (FDRE) states that all national policies, laws and institutional arrangements of the country, including

those related to the management and administration of water resources must be in line with its provisions. Among these provisions is the utilization of rivers and lakes linking two or more regional states or crossing the boundaries of the national territorial jurisdiction [Article 51(11),]. This provision gives the Federal Government the mandate to manage and administer such rivers and lakes determining of the use and protection of water resources. The Constitution also provides the Federal Government (or its executive arm, MoIWE) with the right to delegate its powers and functions given to it to Regional States and/or any other water resources management institution [Article 50(50), Article 50 (9)].

The Ethiopian Water Resources Management Policy, coined with constitutional provisions or Water resources development, utilization, conservation, protection and control that incorporates physical, social, economic as well as environmental interdependence, andIWRM addresses the interdependence of the different uses and users of water resources, is essential instrument to further articulate and elaborate the overall principles and directions the country should follow regarding water resources management. One of such principles is to take the hydrologic "basin" boundary as the fundamental planning unit and water resources management domain. The Policy provides a step-by-step establishment of River Basin Organizations for efficient, successful and sustainable joint management of the water resources of the basins through concerted efforts of relevant parties by providing the legal basis for active and meaningful participation of all stakeholders.

Proclamation (197/2000) and Regulation (115/2005); - Ensures that the water resources of the country are protected and deployed for the highest social and economic benefits of the people of Ethiopia. It also lays down fundamental principles that water resources management and administration in the country should be based on the Policy and the Water Resources Laws of the country and that the Supervising Body, defined as the Ministry of Water, irrigation and Energy (MoWIE), shall ensure that any water resources related activities in the country are conducted accordingly.

The Council of Ministers established River Basin Authority for the Awash Basin by proclamation (534/2007) and the MoWIE delegated a substantial portion of its administrative power in the Awash Basin to the Awash Basin High Council and Awash Basin Authority (AwBA).

Accordingly, the central objective of AwBA, as supra-regional organization, is to promote and monitor the integrated water resources management in its jurisdictions for the socio-economic welfare of the people in an equitable and viable manner, without compromising the sustainability of the aquatic ecosystems through building knowledge for informed decisions, networking with stakeholders and regulating and enforcement of water use for sustainable and equitable development in the basin.

2.2. Significant Pressures

Floods are recurrent phenomena in Ethiopia from time immemorial/ancient. Floods of varying magnitude, affect some or the other parts of the country, almost every year due to different climates and rainfall patterns. With the increase in population and developmental activities in the country, suchas, Anthropogenic, Urbanization, Industrialization, and Large Scale Irrigation Expansions have changed the natural environment within Awash River Basin andthere has been a tendency to occupy the floodplains, often resulting in serious flood damages and loss of lives over the years. Of late, some areas, which were not traditionally prone to floods, also experienced severe inundation. Floods cause severe bank erosion if the river banks are fragile and not protected against the heavy flood discharges.

Many floods are caused by heavy rains, usually during summer Season of the year. This is especially common in highland, Escarpment and mountainous areas of the Awash River Basin. Rivers, Stream, Creeks, ditches, and storm sewers can only carry so much water. Even in natural settings, Rivers, Streams, creeks and overflow every year when rains overload the channel. Flooding can be further aggravated when debris or urban poor solid waste management that blocks the drainage system of the water way.

Flooding urban settlements, especially in Addis Ababa, Adama, Kamise, Kombolch and Dire Dawa, annually causes damages to property along streams coming down from the nearby hills. In most cases, such damages occur on illegal settlement at the banks of the streams. Urban settlement in buffer zoning and protection of river banks from obstructive structures to allow flood passage can curtail unnecessary damages of property due to floods. Our pattern of streets/city/ and buildings has interrupted some of the natural drainage ways and reduced the width of some channels. As a result, more water runs off more quickly, and the drainage sys-

tem becomes overloaded more frequently. The combination of heavy precipitation and base flow/Lake Baseka/Cs Ethiopia. Full/ an overloaded drainage system can result in four types of flooding: overbank flooding, irrigation ditch/canal flooding, base flow which increases the lake level and street flooding. Each type of flooding is associated with somewhat different hazards.

2.2.1. Social Pressures

According to the forecasted Population of 2016, the total population of Ethiopia was estimated to be 92,206,005.00. Out of that 20 % (18.3Millions) of the total population is estimated to be in the Awash Basin. Out of the total population in A wash basin 37.3 % (6,825,900 Millions) and 62.7% (11,474,100 Millions) reside in rural and urban areas of the basin respectively (Addis Ababa University water allocation, 2016). Population concentration and pressures on natural resources is apparent in the upper part as well as closing to the major cities in the basin.

Absence of enough and modern sewerage line accessibility in line with the increased population density and rapid expansion of urbanization is a factor for improper solid wastes realizing that blocks the nearby water conveyance systems from different sources and city settlement in the Buffer zoning and protection of river banks fromobstructive structures to allow flood passage can curtail unnecessary damages of property due to floods. Our pattern of streets/city/ and buildings has interrupted some of the natural drainage ways and reduced the width of some channels.

2.2.2. Economic Pressures

The main driving factors that exacerbate the extent and intensity of the economic pressures in Awash River Basin are expansion of agricultural development, change from pastoralist to traditional farming system of the people or frompastoral way of life to a more settled lifestyle based on the cultivation of crops/thereby cutting flood protection dykes and river embankment to conveys water to their farms, industrialization and fragmented approaches to water resources management system. In addition, mechanized state farms are widely expanding in this basin compared to the other basins in the country. Wonji-Shoa, Metahara, Kessem and TendahoSugar Factory and Farm as well as Middle Awash Agricultural Development are

among the major ones. As a result, the extent and intensity of socio-economic development activities in the basin is very wide and immense, and impose significant pressures on natural resources. Due to the stated pressures above, Land degradation,Erosion andsedimentation problem has been occurred. Excess/over irrigation water from these farms has been causing rising of the ground water level denying free passage of the subterranean flow under the lake. Thus, water from this subterranean flow rises and enters the lake raising its level/Enlargement of Lake Besseka.

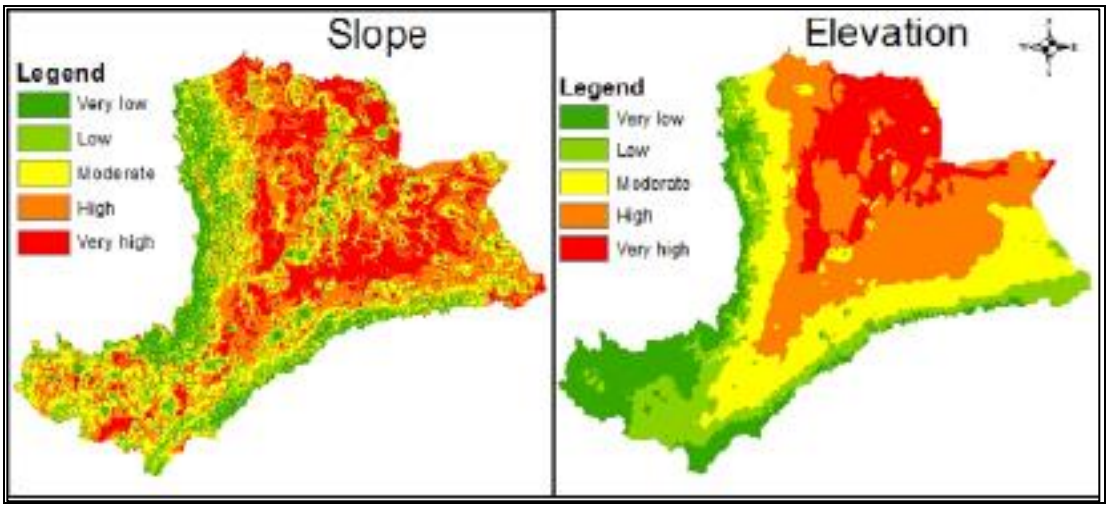
2.2.3. Environmental Pressures

The industrial and agricultural expansion in Awash River Basin is high and dynamic for socio economic development. For that reason, emphasis is given to economic growth than to dealing with environmental issues. Though environmental institutions are established and laws are enacted in the basin which seems a commitment from the government. Most relevant institutions which deal with environmental issues lack the necessary power to fulfill their duties. Since the existing laws do not have enforcement mechanisms, they are not dynamic; they are feeble and easily circumvented by economically oriented legislations. As a result, it is widely noted that agricultural and industrial development in the basin together with population growth is causing increased environmental pressure.

3. Scenario Analysis

3.1. Current Scenario

The Awash River Basin frequently floods in summer specifically in June-September following heavy rains in the eastern highland and escarpment areas of north Shewa, Wollo, Western Hararge and Upstream of koka Reservoir. A number of tributary rivers draining the highlands eastwards can increase the water level of the Awash River in a short period of time and cause flooding in the low-lying alluvial plains along the river course.



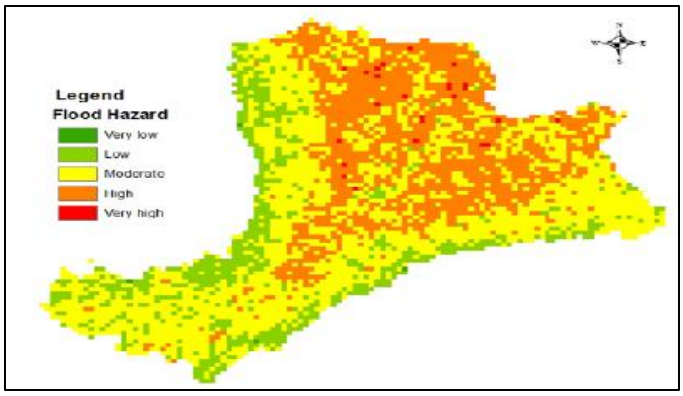


Figure-1 Flood hazard map of Awash River Basin

The hazard map indicates that the high and very high flood hazardthreats are in the down-stream part of the basin, which is low-lying flat areas of the Awash River basin. The flood hazard assessment map shows as presented in Table.1 below that 2103 km2, 35406 km2,59272 km2, 162829 km2, and 1492 km2 were correspond to very high, high, moderate, low, and very low flood hazard, respectively (Getahun andGebre, 2015).

Table .1 Awash River Basin flood hazard level area coverage and percent change.

Flood Hazard Level	Area (km^2)	Percentage (%)
Very high	2103	1.8
High	35406	30.9
Moderate	59272	51.7
Low	16289	14.2
Very low	1492	1.3

sub-basins	Key issues	Cause of flood	Level /	Examples/Illustrations/Impacts
Upstream Koka	Urbanization, land use change,anthropopeia	The high intensity of rainfall in the catchment area, inadequate drainage works and Urbanization	medium	Awash River flooded affecting many areas around Koka including Alem Tena town (Dugda Bora woreda)
Awash Awash	Over population, Mechanized agriculture	The high intensity of rainfall Sedimentation of river, inadequate urban drainage system and Urbanization	medium	whole Wonji sugar factory AdamaWoreda Administration suggests that the cost was in excesses of ETB 20 million Wolanchite and Adama town
Awash Halidebi	Dead Slope of the area,Anthropogenic	Obstructions on the river flow, Sedimentation, morphology of the River and the high intensity of rainfall in the western and catchment area.	high	Amibara (Awash Halidebi) in 2014 year >5000ha inundated area, Gewane and Gele'alo wereda in 1996 year > 75,000 people were displaced
Awash Adaitu	Rare Anthropogenic activities, Rare urbanization and the topography of the tributaries.	The high intensity of rainfall in the western and catchment area, morphology of the River and Sedimentation of river	medium	kemise zone such as teref, mutefecha, merewa and chefarobit kebele are affected by flood.
Awash Terminal	Anthropogenic, rare urbanization in the upper part , agricultural development and topography of the tributaries of the sub basin	The high intensity of rainfall in the western catchment area (Abassel and kalu wereda), morphology of the River, obstructions on the river flow and Sedimentation of river	high	Dupti,Asaita and Afambo 1993=> 144,400 1994=> 154,900 people were placed 1995=> 145,700 displased
Eastern catchment	Urbanization and topography of the tributaries.	The high intensity of rainfall in the catchment area, inadequate drainage works and topography of the area.	medium	Displacement of 9,956 and 244 people missing, presumed dead. The report further high-lights the subsequent homelessness of 2,685 households

Table.2 Scenario Analysis

3.2. Future Scenario

It is concluded that, the flood frequency was happened seasonally and will expect that the event will increase since the climate change is predicted to increase the frequency and intensity of flood events let alone anthropogenic influences, and so increase people's vulnerability to poverty and food insecurity. In the next 20 and above years, climate change could further increase the already high inter-annual and intra-annul variability of average wet and dry season flows, as well as the frequency and intensity of floods and droughts. The expected future scenarios in flood are briefly discussed below.

In future development plan, such as urban developments and expansion such as Addis Ababa and Oromia especial zone, population growth and Land use/type change exacerbate the intensity and frequency of floods. However, the nationally undergoing watershed management through public mobilization will have significant impact in reducing the flood hazards through time. On upper catchment, biological and physical conservation measures plan, River training plan and GIS based flood hazard assessment which are going to implement in next two GTP will expect highly to alleviate flood related catastrophe. On the other hand, the proposed Dam at MelkaKunure, will have an important role in detaining the flood water during rainy seasons.

TheMiddle awash feasibility study and detail design of multipurpose dam project and its associated reservoir, River training plan (e.g.: - feasibility study and detail design of the middle Awash flood control project) and other diversion structures are to be designed for flood protection and control besides serving for irrigation, water supply and this will expect highly to reduce flood inundation and drought of Awash Halidebi sub-basin flood plain area.According to WWDSE -2016, gross storage of Middle awash feasibility study and detail design of multipurpose dam at FRL after 50 years 534.75 Million cubic meters.

On upper catchment, biological and physical conservation measures plan, River training plan (e.g.: - feasibility study and detail design of the lower Awash River flood protection and control project) and the Lowerawash feasibility study and detail design of multipurpose dam pro-

ject designed for flood protection and control besides serving for irrigation, water supply and power generations and this will expect highly to reduce flood inundation and drought of flood plain area. According to WWDSE -2016, gross storage of Middle awash feasibility study and detail design of multipurpose dam at FRL after 50 years 454MCM.

4. Goals, objectives and measures

4.1. Goal

The Goals of Flood and Drought Management planare: -

a. Reduce flood hazard.
b. Maximize benefits of flood.

4.2. Objectives

The general objectivesare: -

a. Reduce the social, economic and environmental impact of flood on life and property.
b. Promoting beneficial use of flood water

Specific objectives

a. To protect flood prone areas against flood hazards.
b. To reduce the risk of flood (During and post flood) damages.
c. To improved cooperation, accountability and Response.
d. To improved awareness and preparedness.
e. To create and improve awareness.
f. To improve flood water management.
g. To sustain flood plain ecosystem.

4.3. Measures to achieve the objectivesare:

a. Plan, initiate andimplementflood protection measures.
b. Implement integrated land use plan.
c. Implement integrated land use plan.
d. Establishment of pilot schemes.
e. Strengthen networking with stakeholders.
f. Improve consultation, participation and networking with stakeholders.
g. Improve awareness and participation of stakeholders.
h. Promoting sustainable flood risk management measures.
i. Create legal, administrative and economic frameworks.
j. Provide information, data and guideline.
k. Capacity building.

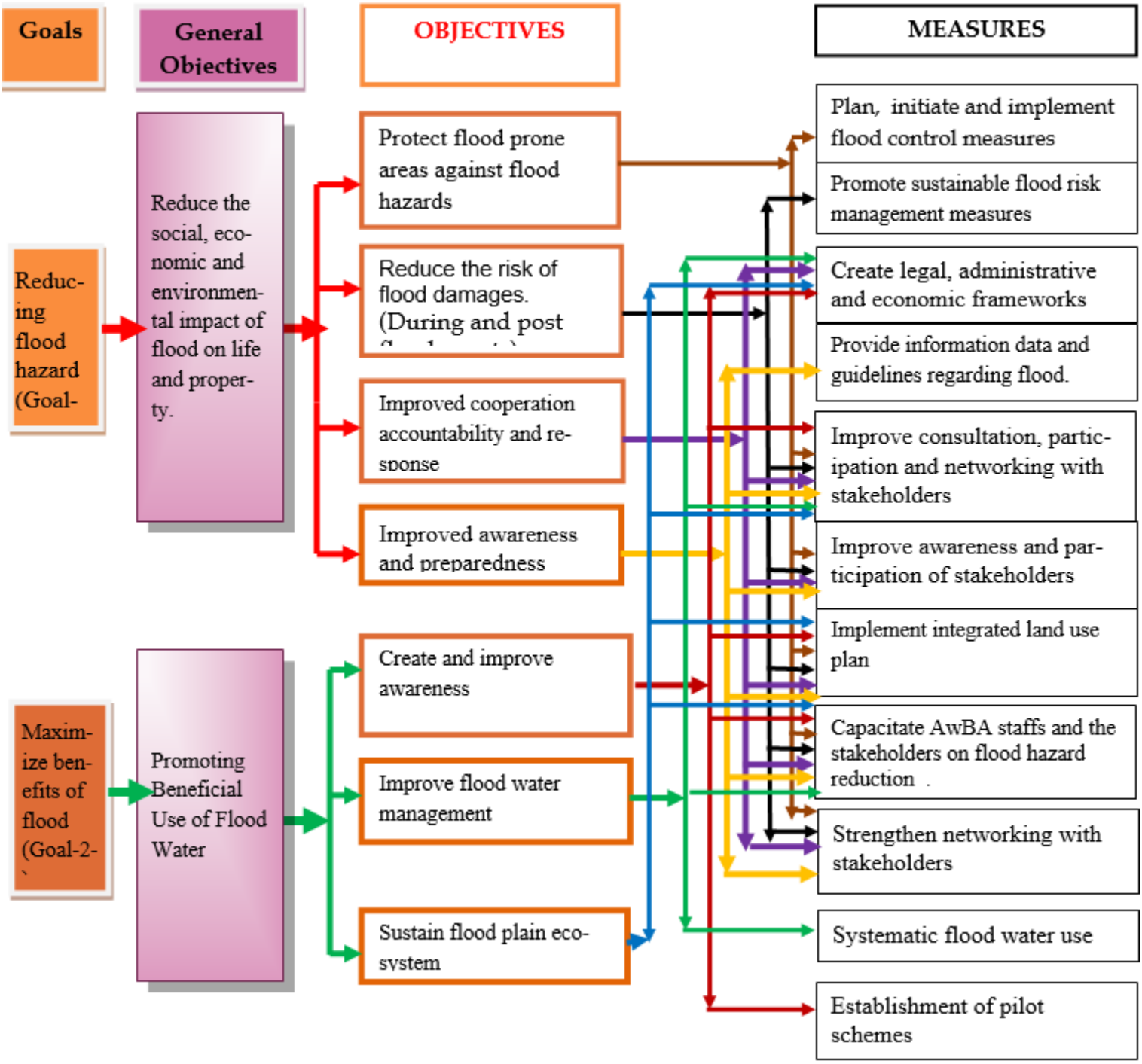


Figure 2. Objective tree of flood and drought management

No	Goal	General Objectives	Specific objective	Measures
1	Reducing Flood Hazard	Reduce the social, economic and environmental impact of flood on life and property	To protect flood prone areas against flood hazards.	Plan, initiate and implement flood protection measures.
				Implement integrated land use plan.
			To Reduce the risk of flood (during & post) damages	Strengthen networking with stakeholders.
				Improve consultation, participation and networking with stakeholders.
			To Improved cooperation, accountability and Response to flood events	Improve awareness and participation of stakeholders.
				Promoting sustainable flood risk management measures.
				Create legal, administrative and economic frameworks.
			To Improve awareness and preparedness of the society	Provide information, data and guideline.
				Capacity building
2	Maximizing benefits of Flood	Promoting Beneficial Use of Flood Water	To Improve awareness and preparedness of the society	To create and improve awareness.
			To improve flood water management	To improve flood water management.
			|To sustain flood plain ecosystem	To sustain flood plain ecosystem.

Table 3. Summary of Goal – Objective – Measure Relationship

Table 4. Goal – Target – Evaluation Criteria

Goal	General objective	Specific objective	Target	Evaluation Criteria
Reducing Flood Hazard	Reduce the social, economic and environmental impact of flood on life and property	Protect 3,750,900 Ha flood prone areas against flood hazards	71% of flood prone area	% protected area
		Reduce the risk of flood (during & post) damages	75 % of damage	% of flood damage
		Improved cooperation, accountability and Response	high level of cooperation and accountability	feedback
		Improved awareness and preparedness	high level of awareness and preparedness	feedback
Maximizing benefits of Flood	Promoting Beneficial Use of Flood Water	Create and improve awareness	high level of awareness	feedback
		Improve flood water management	60 % flood water for use	% of flood water used
		Sustain flood plain ecosystem	Improving the condition of 3 existing flood plain ecosystems on Awash Halidebiand Awash Terminal	no. of ecosystems improved

5. Detail Action Plan(DAP)

6. Risk management

6.1. Planning assumption

- High commitment of all stakeholders
- Necessary budget is released
- Timely decision making from decision makers
- Strong Collaboration and Cooperation
- The Undergoing Projects will be completed
- Good governance

6.2. Expected challenges

- Securing livelihoods for growing population of the basin through economical use of floodplains.
- The need for a basin approach taking into consideration interactions between the land and water environments.
- Absolute safety from flooding is ideal. Because it is difficult to manage all floods as expected by the flood plain society.
- The effects of proposed flood management interventions on the floodplain aquatic ecosystem as these depend on flood events for survival.
- Effects of climate change and variability.
- Balancing development needs with risks as people will not (and in some instances, will not) abandon flood prone areas.
- Industrialization and development expansions (Big cities in the basin selected for Industry zone, 4 sugar factories, infrastructure. expressway, railway, …etc.) may cause change in land use aggravates the flood.
- Reduced capacity of Koka Dam to handle the excess flood generated at upstream Koka

6.3. Possible solution

- Provide all stakeholders, including the public, with full opportunities to share their views and influence the outcome;
- Raise awareness at the basin level and develop a host of preventive and mitigation measures against flood and droughts.
- Build consensus and public support for the outcomes;
- Build stakeholders commitment;
- Ensure implementation of basin flood management plans with full public support;
- Ensure sustainability of plans and associated decisions;
- Build resilience of flood-prone communities

7. Monitoring and Evaluation Mechanisms

Flood and drought management has the task of establishing sufficient controls over a project to ensure that it stays on track towards the achievement of its objectives. This is done by monitoring (internal), which is the systematic and continuous collection, analysis and use of information for management control and decision-making. In this instance implementation is seen as a continuous learning process where expense gathered is analyzed and fed back into planning and updated implementation approaches.

Flood and Drought Management monitoring is an integral part of day-to-day management. It provides information by which management can identify and solve implementation problems, and assess progress. The Logical Framework, the implementation schedule, activity schedules, and the river basin plan budget provide the basis for this monitoring. There are a number of different levels of monitoring, each related to what kind of information is relevant, and the regularity of monitoring.

Monitoring Level	Regularity
Which Activities are underway and what progress has been made?	Weekly
At what rate are means being used and cost incurred in relation to progress in implementation?	Monthly
Are the desired Results being achieved?	Quarterly
To what extent are these Results furthering the flood and drought management Purpose? What changes in the project environment occur? Do the Assumptions hold true?	Six-Monthly

The table 5 Flood Drought and management will act monitoring River Basin Plan.

Flood and Drought Management Evaluation is an assessment, as systematic and objective as possible, of an ongoing or completed river basin plan, program or policy, its design, implementation and Results. The aim is to determine the relevance and fulfillment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible/reliable/ and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors.

Monitoring and evaluations are interactive and mutually supportive processes. Monitoring and evaluation of development activities therefore provides government officials, development managers, and civil society with better means for learning from past experience, improving service delivery, planning and allocating resources, and demonstrating results as part of accountability to key stakeholders.

Effective Flood and drought management is therefore crucial to successful development river basin plan, and hence monitoring and evaluation. To manage adaptively, river basin plan implementers and managers will need to: -

- Understand the whole basin plan design
- Gather and analyze relevant information to make good decisions.
- Facilitate learning with all key stakeholders; and
- Negotiate required changes to basin plans and processes

Table 6. River basin plan monitoring methods.

Method	Description
Stakeholder Analysis	Identifies participants and information to be included in M&E.
Documentation Review	Helps to track and understand the evolution of a project. It can help establish a baseline, or information on a specific indicator.
Biophysical measurements	Used to measure physical changes over time related to a specific indicator. It provides reliable, statistically verifiable data.
Direct Observation	Used to obtain useful and timely information by observing what people do. This often complements statistical data.
Cost-Benefit Analysis	Used to analysis and enumerate the range of benefits and costs surrounding a decision. Comparisons are often made within a project, or with other projects to determine efficiency.
Surveys and Questionnaires	Used to gain data from a large number of people in a structured way. The data derived from surveys often require statistical analysis.
Semi-Structured Interviews	Used to gain information from an individual or small group, using a series of broad questions to guide conversations. These allow for building an in-depth understanding of issues.
Case Studies	Used to document the sequence of events, or story related to a person, location, group or any other unit of investigation. This provides useful information into impact
Focus groups	Used to collect general information, clarify details or gather opinions on issues. This is useful to build consensus and validate data in a group.
Group Ranking	Used to generate ideas and consensus from a group in developing a ranked list of problems, issues or actions. It often is used to complement other methods.
Mapping	Used to generate information on areas, resources, or social relationships. These are often useful visual data methods that can generate primary data.
Timeline data	These are used to generate data over time, through using journals, diaries, trend analyses, seasonal calendars etc. The data generated gives useful trend data, rather than static pictures.

No	Measures	Activities	Sub-activities	Unit	Target	Activities Action Plan U/S Koka						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Study the level and frequency flood occurrence and its impact	Assess, survey and analyze flood related datas	Doc	1				1			1.AwBA 2.Ethipopian Metreology agency 3.Regional & Federal Water Works Design & Supervission Enterprises 4. MoWIE 5.Universities in the Basin	
		Programming, discussing and selecting measures for flood control and/or benefit	Develop and select alternative measures with stakeholder consultation and participation.	Doc	1					1		1.AwBA 2.Regional Goverments (concerned offices) 3. Federal Disaster Prevension and Prepardnes 4.Major irrigation Development Agencies	
			Prioritizing and programming of projects	Doc	1					1		1.AwBA 2.Regional Gevorments (concerned offices) 3.Major irrigation Development Agencies 4. MoWIE	
1	plan, Initiate and Implement flood control/benefit measures	Develop a policy and strategy for participatory flood control mechanisms	Discussion on possible measures, for example provide recognition for those engaged on flood control activities	Frq/yr	1		1	1	1	1	5	1.AwBA 2.Oromia Region (concerned offices) 3. MoWIE	
			Develop solutions for anthropogenic caused floods	Doc	1/GTP			1			1	1.Oromia Region 2.AwBA	
		Design flood control structures	Designing of dams and other regulating structures.	Doc	1						1	1.AwBA 2.Regional Goverments (concerned offices) 3. MoWIE 4.MoFED	
			Designing of Detention Basins	Doc								1.AwBA 2.Regional Goverments (concerned offices)	
			Designing of River training works	Doc	1					1		1.AwBA 2.Regional Goverments (concerned offices) 3. MoWIE 4.MoFED	

No	Measures	Activities	Sub-activities	Unit	Target	Activities Action Plan U/S Koka						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	plan, Initiate and Implement flood control/benefit measures	Implement flood control measures	Construction of dams and other regulating structures.	No							1	1. MoWIE 2..AwBA 3.Regional Goverments (concerned offices) 4.Major irrigation Development Agencies 5.MoFED	
			Construction of Detention Basins	No								1.Regional Goverments (concerned offices) 2.AwBA	
			Construction of new dikes	km	5					5		1.AwBA 2.Regional Goverments (concerned offices) 3.MoFED	
			construction of cut-offs for meandering river reachs	km								1.AwBA 2.Regional Goverments (concerned offices) 3.MoFED	
		Maintenance of flood control structures	Maintenance of dikes	fre.	1/yr		1	1	1	1	5	1.AwBA 1.Regional Goverments (concerned offices) 2.Major irrigation Development Agencies 3.MoFED	
			Maintenance of River Banks, removal of debris and sediment along the main river and tributeries	fre.	1/yr						5	1. AwBA 2.Regional Goverments (concerned offices) 3.Major irrigation Development Agencies 4.MoFED	
1		Prepare flood risk management plan	Rainfall pattern prediction ahead of two to three months and disseminate information to concerned sector.	Frq/yr	3		3	3	3	3	15	1.AwBA 2. Federal Meteorological agency 3.Regional Goverments (concerned offices) 4.MoFED 5. Universities	
			Collecting and dissemination of information on amount of predicted release discharge from reservior during rainy season	No.of pridiction /year	2	2	2	2	2	2	10	1. MoWIE 2..AwBA 3.Major irrigation Development Agencies 4..MoFED	
			Develop and improve early warning system to provide timely and reliable flood warning,	Doc	1		**1**					1. MoWIE 2..AwBA 3.Ethipopian Metreology agency 4. Federal Disaster Prevension and Prepardnes 5.Universities in the Basin	

No	Measures	Activities	Sub-activities	Unit	Target	Activities Action Plan U/S Koka						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
2	Implement integrated land use plan	Identify flood prone areas	Prepare flood hazard map (delinate)	Doc	1				1			1. MoWIE 2..AwBA 1.Uiversities in the Basin 2.Regional Goverments (concerned offices) 3.MoFED	
		Check Compatibility of landuse plan	Identify current land use of area	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Oromia region 6.MoFED	
			Identify wheather landuse of area matches with landuse plan	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments (concerned offices) 6.MoFED	
		Enforce landuse plan	Enforcing using flood hazard map together land use map	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments (concerned offices)	
		Identify flood plain areas	Delinate flood plains and buffer zone	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments (concerned offices) 6.MoFED	
		Conserve flood plain ecosystem	Create awarness and participation b/n all stakeholders	No forum/year	4	28	1	1	1	1	5	1. Regional Goverments (concerned offices) 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. Federal Disaster Prevension and Prepardnes 6. Ethiopian Land use administration agency	

No	Measures	Activities	Sub-activities	Unit	Target	Activities Action Plan U/S Koka						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
3	Sytematic flodwater use	Introduce/improve floodwater management structures	Identify potential sites for spate irrigation, groundwater recharge, range land and forage production, domestic and livestock water supply	Doc	1					1		1.Regional Goverments (concerned offices) 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. MoWIE 6. Ethiopian Land use administration agency	
			Plan and design floodwater management structures (example gabion diversion, flood harvesting ponds, spillway)	Doc							1	1.Regional Goverments (concerned offices) 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. MoWIE 6. Ethiopian Land use administration agency	
			Construct floodwater management structures	No/year							1	1. Regional Goverments (concerned offices) 2..AwBA 3.Uiversities in the Basin 4.MoFED	
			Prepare operation and maintenance manual	Doc.							1	1. Regional Goverments (concerned offices) 2..AwBA 3.Uiversities in the Basin 4.MoFED	
		Ensure better scheme management	Produce agronomic and field water management manual for DA's	Doc.							1	1. Regional Goverments (concerned offices) 2.MoAgr. 3.Uiversities in the Basin 4.MoFED 5. .AwBA	
			Follow-up, monitoring and support	time/year	4		1	1	1	1	5	1. Regional Goverments (concerned offices) 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council 7. MoFED	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Study the level and frequency flood occurrence and its impact	Assess, survey and analyze flood related datas	Doc	1				1			1.AwBA 2.Ethipopian Metreology agency 3.Regional & Federal Water Works Design & Supervission Enterprises 4. MoWIE 5.Universities in the Basin	
		Programming, discussing and selecting measures for flood control and/or benefit	Develop and select alternative solutions with stakeholder consultation and participation.	Doc	1					1		1.AwBA 2.Regional Goverments (concerned offices) 3. Federal Disaster Prevension and Prepardnes 4.Major irrigation Development Agencies	
			Prioritizing and programming of projects	Doc	1					1		1.AwBA 2.Regional Gevorments (concerned offices) 3.Major irrigation Development Agencies 4. MoWIE	
		Develop a policy and strategy for participatory flood control mechanisms	Discussion on possible measures, for example provide recognition for those engaged on flood control activities	Frq/yr	1		1	1	1	1	5	1.AwBA 2.Oromia Region (concerned offices) 3. MoWIE	
			Develop solutions for anthropogenic caused floods	Doc	1/GTP			1			1	1.Oromia Region 2.AwBA	
		Design flood control structures	Designing of dams and other regulating structures.	Doc	2	1	2					1. AwBA 2.Regional Goverments (concerned offices) 3. MoWIE 4.MoFED	
			Designing of Detention	Doc								1.AwBA 2.Regional Goverments	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	plan, Initiate and Implement flood control/benefit measures	Implement flood control measures	Construction of dams and other regulating structures.	No	2				2		1	1. MoWIE 2..AwBA 3.Regional Goverments 4.Major irrigation Development Agencies 5.MoFED	
			Construction of Detention Basins	No								1.Regional Goverments 2.AwBA	
			Construction of new dikes	K.M								1.AwBA 2.Regional Goverments 3.MoFED	
			construction of cut-offs for meandering river reachs	K.M								1.AwBA 2.Regional Goverments 3.MoFED	
		Maintenance of flood control structures	Maintenance of dikes	fre.	1/yr		1	1	1	1	5	1.AwBA 2.Regional Goverments (concerned offices) 3.Major irrigation Development Agencies 4.MoFED	
			Maintenance of embankments, removal of debris and sediment	fre.	1/2yr		1		1		3	1.AwBA 2.Regional Goverments (concerned offices) 3.Major irrigation Development Agencies 4.MoFED	
		Prepare flood risk management plan	Rainfall pattern prediction ahead of two to three months and disseminate information to concerned sector.	Frq/yr	3		**3**	3	3	3	15	1.AwBA 2. Federal Meteorological agency 3.Regional Goverments (concerned offices) 4.MoFED 5. Universities	
			Collecting and dissemination of information on amount of predicted release discharge from reservior during rainy season	No.of pridiction/ year	2	2	2	2	2	2	10	1. MoWIE 2..AwBA 3.Major irrigation Development Agencies 4..MoFED	
			Develop and improve early									1. MoWIE 2..AwBA 3.Ethipopian Metreology agency	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
2	Implement integrated land use plan	Identify flood prone areas	Prepare flood hazard map (delinate)	Doc							1	1. MoWIE 2..AwBA 3.Uiversities in the Basin 4.Regional Goverments 5.MoFED	
		Check Compatibility of landuse plan	Identify current land use of area	Doc							1	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Oromia region 6.MoFED	
			Identify whether landuse of area matches with landuse plan	Doc							1	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments 6.MoFED	
		Enforce landuse plan	Enforcing using flood hazard map together land use map	Doc							1	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments 6.MoFED	
		Identify flood plain areas	Delinate flood plains and buffer zone	Doc							1	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments 6.MoFED	
		Conserve flood plain ecosystem	Create awarness and participation b/n all stakeholders	No forum/year	4		1	1	1	1	5	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. Federal Disaster Prevension and Prepardnes 6. Ethiopian Land use administration agency	
			Identify potential sites for									1.Regional Goverments 2..AwBA	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Study the level and frequency flood occurrence and its impact	Assess, survey and analyze flood related datas	Doc	1		1					1.AwBA 2.Ethipopian Metreology agency 3.Regional & Federal Water Works Design & Supervission Enterprises 4. MoWIE 5.Universities in the Basin	
		Programming, discussing and selecting measures for flood control and/or benefit	Develop and select alternative solutions with stakeholder consultation and participation.	Doc	1			1				1.AwBA 2.Regional Goverments 3. Federal Disaster Prevension and Prepardnes 4.Major irrigation Development Agencies	
			Prioritizing and programming of projects	Doc	1			1				1.AwBA 2.Regional Gevorments 3.Major irrigation Development Agencies 4. MoWIE	
		Develop a policy and strategy for participatory flood control mechanisms	Discussion on possible measures, for example provide recognition for those engaged on flood control activities	Frq/yr	1		1	1	1	1	5	1.AwBA 2.Regional Goverments 3. MoWIE	
			Design possible solutions for anthropogenic caused floods	Doc	1/GTP			1			1	1.Regional Goverments 2.AwBA	
		Design flood control structures	Designing of dams and other regulating structures.	Doc	2		2					1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	
			Designing of Detention Basins	Doc	2			1	1			1.AwBA 2.Regional Goverments	
			Designing of River training works	Doc	2	34	2					2.AwBA 2.Regional Goverments (concerned offices) 3. MoWIE 4.MoFED	

			Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Implement flood control measures	Construction of Detention Basins	No	2				1	1		1.Regional Goverments 2.AwBA	
			Construction of new dikes	km	20		20					1.Regional Goverments (concerned offices) 2.MoFED 3.AwBA	
			construction of cut-offs for meandering river reachs	km	1		5	5				1.Regional Goverments (concerned offices) 2.MoFED 3.AwBA	
		Maintenance of flood control structures	Maintenance of dikes	fre.	1/yr		1	1	1	1	5	1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
			Maintenance of embankments, removal of debris and sediment	fre.	1/yr		1	1	1	1	5	1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
		Prepare flood risk management plan	Rainfall pattern prediction ahead of two to three months and disseminate information to concerned sector.	Frq/yr	3		**3**	3	3	3	15	1.AwBA 2. Federal Meteorological agency 3.Regional Goverments 4.MoFED 5. Universities	
			Collecting and dissemination of information on amount of predicted release discharge from reservior during rainy season	pridictio	2	2	**2**	2	2	2	10	1. MoWIE 2..AwBA 3.Major irrigation Development Agencies 4..MoFED	
			Develop and improve early warning system to provide timely and reliable flood warning, flood forecasting and information.	Doc	1	35	**1**					1. MoWIE 2..AwBA 3.Ethipopian Metreology agency 4. Federal Disaster Prevension and Prepardnes 5.Universities in the Basin 6.Regional Goverments (concerned offices) 7.MoFED	
												1. MoWIE 2..AwBA 3.Ethipopian Metreology	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
2	Implement integrated land use plan	Identify flood prone areas	Prepare flood hazard map (delineat)	Doc	1		1					1. MoWIE 2..AwBA 3.Uiversities in the Basin 4.Regional Goverments (concerned offices) 5.MoFED	
		Check Compatibility of landuse plan	Identify current land use of area	Doc	1		1					1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Oromia region 6.MoFED	
			Identify whether landuse of area matches with landuse plan	Doc	1		1					1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments 6.MoFED	
		Enforce landuse plan	Enforcing using flood hazard map together land use map	Doc	1		1					1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments 6.MoFED	
		Identify flood plain areas	Delinate flood plains and buffer zone	Doc	1		1					1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Regional Goverments 6.MoFED	
		Conserve flood plain ecosystem	Create awarness and participation b/n all stakeholders	No forum/year	4	36	1	1	1	1	5	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. Federal Disaster Prevension and Prepardnes 6. Ethiopian Land use administration agency	
			Improve existing flood plain									1.Regional Goverments 2..AwBA 1.Uiversities in the Basin	

Detail Awash Adaytu

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Study the level and frequency flood occurrence and its impact	Assess, survey and analyze flood related datas	Doc	1			1				1.AwBA 2.Ethipopian Metreology agency 3.Regional & Federal Water Works Design & Supervission Enterprises 4. MoWIE 5.Universities in the Basin	
		Programming, discussing and selecting measures for flood control and/or benefit	Develop and select alternative solutions with stakeholder consultation and participation.	Doc	1				1			1.AwBA 2.Regional Goverments 3. Federal Disaster Prevension and Prepardnes 4.Major irrigation Development Agencies	
			Prioritizing and programming of projects	Doc	1				1			1.AwBA 2.Regional Gevorments (concerned offices) 3.Major irrigation Development Agencies 4. MoWIE	
		Develop a policy and strategy for participatory flood control mechanisms	Discussion on possible measures, for example provide recognition for those engaged on flood control activities	Frq/yr	1		1	1	1	1	5	1.AwBA 2.Regional Goverments (concerned offices) 3. MoWIE	
			Develop solutions for anthropogenic caused floods	Doc	1/GTP			1			1	1.Regional Goverments 2.AwBA	
		Design flood control structures	Designing of dams and other regulating structures.	Doc								1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	
			Designing of Detention Basins	Doc					1			1.AwBA 2.Regional Goverments	
			Designing of River training works	Doc	2							1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	plan, Initiate and Implement flood control/benefit measures	Implement flood control measures	Construction of dams and other regulating structures.	No								1. MoWIE 2..AwBA 3.Regional Goverments (concerned offices) 4.Major irrigation Development Agencies 5.MoFED	
			Construction of Detention Basins	No	1					1		1.AwBA 2.Regional Goverments	
			Construction of new dikes	km							10	AwBA 1.Regional Goverments 2.MoFED	
			construction of cut-offs for meandering river reachs	km	3							AwBA 1.Regional Goverments 2.MoFED	
		Maintenance of flood control structures	Maintenance of dikes	fre.	1/yr						5	1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
			Maintenance of embankments, removal of debris and sediment	fre.	1/yr							1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
		Prepare flood risk management plan	Rainfall pattern prediction ahead of two to three months and disseminate information to concerned sector.	Frq/yr	3		**3**	3	3	3	15	1.AwBA 2. Federal Meteorological agency 3.Regional Goverments (concerned offices) 4.MoFED 5. Universities	
			Collecting and dissemination of information on amount of predicted release discharge from reservior during rainy season	No.of pridiction/year	2	2	**2** 38	2	2	2	10	1. MoWIE 2..AwBA 3.Major irrigation Development Agencies 4..MoFED	
			Develop and improve early warning system to provide									1. MoWIE 2..AwBA 3.Ethipopian Metreology agency	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
2	Implement integrated land use plan	Identify flood prone areas	Prepare flood hazard map (delinate)	sub-basin	1				1			1. MoWIE 2..AwBA 3.Uiversities in the Basin 4.Regional Goverments 5.MoFED	
		Check Compatibility of landuse plan	Identify current land use of area	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Oromia region 6.MoFED	
			Identify whether landuse of area matches with landuse plan	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Enforce landuse plan	Enforcing using flood hazard map together land use map	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Identify flood plain areas	Delinate flood plains and buffer zone	Doc	1				1			1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
			Create awarness and participation b/n all stakeholders	Doc	3		39	1	1	1	3	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. Federal Disaster Prevension and Prepardnes 6. Ethiopian Land use administration agency	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
3	Sytematic flodwater use	Introduce/improve floodwater management structures	Identify potential sites for spate irrigation, groundwater recharge, range land and forage production, domestic and livestock water supply	Doc	1			1				1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. MoWIE 6. Ethiopian Land use administration agency	
			Plan and design floodwater management structures (example gabion diversion, flood harvesting ponds, spillway)	Doc	1				1			1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED	
			Construct floodwater management structures	No/year	1					1		1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5.MoFED	
			Prepare operation and maintenance manual	Doc.							1	1. Regional Goverments 2.MoAgr. 3.Uiversities in the Basin 4.MoFED 5. .AwBA	
		Ensure better scheme management	Produce agronomic and field water management manual for DA's	Doc.							1	1. Regional Goverments 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council 7. MoFED	
			Follow-up, monitoring and support	ime/year	4		40	1	1	1	5	1. .Dire Dawa City Administration 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council 7. MoFED	

Detail action plan of Awash-terminal

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Study the level and frequency flood occurrence and its impact	Assess, survey and analyze flood related datas	Doc	1		1					1.AwBA 2.Ethipopian Metreology agency 3.Regional & Federal Water Works Design & Supervission Enterprises 4. MoWIE 5.Universities in the Basin	
		Programming, discussing and selecting measures for flood control and/or benefit	Develop and select alternative solutions with stakeholder consultation and participation.	Doc	1			1				1.AwBA 2.Regional Goverments 3. Federal Disaster Prevension and Prepardnes 4.Major irrigation Development Agencies	
			Prioritizing and programming of projects	Doc	1			1				1.AwBA 2.Regional Gevorments (concerned offices) 3.Major irrigation Development Agencies 4. MoWIE	
		Develop a policy and strategy for participatory flood control mechanisms	Discussion on possible measures, for example provide recognition for those engaged on flood control activities	Frq/yr	1		1	1	1	1	5	1.AwBA 2.Regional Goverments (concerned offices) 3. MoWIE	
			Develop solutions for anthropogenic caused floods	Doc	1/GTP			1			1	1.Regional Goverments 2.AwBA	
		Design flood control structures	Designing of dams and other regulating structures.	Doc		1						1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	
			Designing of Detention Basins	Doc		41					1	1.AwBA 2.Regional Goverments	
			Designing of River training works	Doc	2		2					1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
3	Implement integrated land use plan	Identify flood prone areas	Prepare flood hazard map (delinate)	Doc	1		1					1. MoWIE 2..AwBA 3.Uiversities in the Basin 4.Regional Goverments 5.MoFED	
		Check Compatibility of landuse plan	Identify current land use of area	Doc	1			1				1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Oromia region 6.MoFED	
			Identify whether landuse of area matches with landuse plan	Doc	1			1				1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Enforce landuse plan	Enforcing using flood hazard map together land use map	Doc	1			1				1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Identify flood plain areas	Delinate flood plains and buffer zone	Doc	1			1				1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
			Create awarness and participation b/n all			42						1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. Federal Disaster Prevension and Prepardnes 6. Ethiopian Land use	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
3	Sytematic flodwater use	Introduce/improve floodwater management structures	Identify potential sites for spate irrigation, groundwater recharge, range land and forage production, domestic and livestock water supply	Doc	1					1		1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. MoWIE 6. Ethiopian Land use administration agency	
			Plan and design floodwater management structures (example gabion diversion, flood harvesting ponds, spillway)	Doc							1	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED	
			Construct floodwater management structures	No/year							1	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5.MoFED	
			Prepare operation and maintenance manual	Doc.							1	1. Regional Goverments 2.MoAgr. 3.Uiversities in the Basin 4.MoFED 5. .AwBA	
		Ensure better scheme management	Produce agronomic and field water management manual for DA's	Doc.		43					1	1. Regional Goverments 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council 7. MoFED	
			Follow-up, monitoring and support	ime/yea	4		1	1	1	1	5	1. .Dire Dawa City Administration 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency	

Detail action plan of Eastern catchment

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Study the level and frequency flood occurrence and its impact	Assess, survey and analyze flood related datas	Doc	1		1					1.AwBA 2.Ethipopian Metreology agency 3.Regional & Federal Water Works Design & Supervission Enterprises 4. MoWIE 5.Universities in the Basin	
		Programming, discussing and selecting measures for flood control and/or benefit	Develop and select alternative solutions with stakeholder consultation and participation.	Doc	1			1				1.AwBA 2.Regional Goverments 3. Federal Disaster Prevension and Prepardnes 4.Major irrigation Development Agencies	
			Prioritizing and programming of projects	Doc	1			1				1.AwBA 2.Regional Gevorments 3.Major irrigation Development Agencies 4. MoWIE	
		Develop a policy and strategy for participatory flood control mechanisms	Discussion on possible measures, for example provide recognition for those engaged on flood control activities	Frq/yr	1		1	1	1	1	5	1.AwBA 2.Regional Goverments 3. MoWIE	
			Develop solutions for anthropogenic caused floods	Doc	1/GTP			1			1	1.Regional Goverments 2.AwBA	
		Design flood control structures	Designing of dams and other regulating structures.	Doc	2							1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	
			Designing of Detention Basins	Doc	2	44			1	1		1.AwBA 2.Regional Goverments	
			Designing of River training works	Doc	2							1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	
												1. MoWIE 2..AwBA	

No	Measures	Activities	Sub-activities	Unit	Tar	Gen						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	plan, Initiate and Implement flood control/benefit measures	Maintenance of flood control structures	Maintenance of dikes	fre.	1/yr							1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
			Maintenance of embankments, removal of debris and sediment	fre.	1/yr							1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
		Prepare flood risk management plan	Rainfall pattern prediction ahead of two to three months and disseminate information to concerned sector.	Frq/yr	3		**3**	3	3	3	15	1.AwBA 2. Federal Meteorological agency 3.Regional Goverments 4.MoFED 5. Universities	
			Collecting and dissemination of information on amount of predicted release discharge from reservior during rainy season	No.of pridictio n/year	2	2	**2**	2	2	2	10	1. MoWIE 2..AwBA 3.Major irrigation Development Agencies 4..MoFED	
			Develop and improve early warning system to provide timely and reliable flood warning, flood forecasting and information.	Doc	1		**1**					1. MoWIE 2..AwBA 3.Ethipopian Metreology agency 4. Federal Disaster Prevension and Prepardnes 5.Universities in the Basin 6.Regional Goverments 7.MoFED	
			Develop flood emergency plan	Doc	1	45	1					1. MoWIE 2..AwBA 3.Ethipopian Metreology agency 4.Federal Goverments (concerned offices) 5.Universities in the Basin 6.Regional Goverments	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
2	Implement integrated land use plan	Identify flood prone areas	Prepare flood hazard map (delinate)	Doc							1	1. MoWIE 2..AwBA 3.Uiversities in the Basin 4.Regional Goverments 5.MoFED	
		Check Compatibility of landuse plan	Identify current land use of area	Doc	3			1	1	1	3	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Oromia region 6.MoFED	
			Identify whether landuse of area matches with landuse plan	Doc	3			1	1	1	3	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Enforce landuse plan	Enforcing using flood hazard map together land use map	Doc	3			1	1	1	3	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Identify flood plain areas	Delinate flood plains and buffer zone	Doc	3			1	1	1	3	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
			Create awarness and participation b/n all stakeholders	Doc	3	46		1	1	1	3	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. Federal Disaster Prevension and Prepardnes 6. Ethiopian Land use administration agency	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
3	Sytematic flodwater use	Introduce/improve floodwater management structures	Identify potential sites for spate irrigation, groundwater recharge, range land and forage production, domestic and livestock water supply	Doc	1				1			1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. MoWIE 6. Ethiopian Land use administration agency	
			Plan and design floodwater management structures (example gabion diversion, flood harvesting ponds, spillway)	Doc	1					1		1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED	
			Construct floodwater management structures	No/year							1	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5.MoFED	
			Prepare operation and maintenance manual	Doc.							1	1. Regional Goverments 2.MoAgr. 3.Uiversities in the Basin 4.MoFED 5. .AwBA	
		Ensure better scheme management	Produce agronomic and field water management manual for DA's	Doc.							1	1. Regional Goverments 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council 7. MoFED	
			Follow-up, monitoring and support	time/year	4	47	1	1	1	1	5	1. .Dire Dawa City Administration 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council	

Detail action plan of All- Subbasins

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Study the level and frequency flood occurrence and its impact	Assess, survey and analyze flood related datas	Doc	6	-	3	1	2	-	-	1.AwBA 2.Ethipopian Metreology agency 3.Regional & Federal Water Works Design & Supervission Enterprises 4. MoWIE 5.Universities in the Basin	
		Programming, discussing and selecting measures for flood control and/or benefit	Develop and select alternative solutions with stakeholder consultation and participation.	Doc	6	-	-	3	1	2	-	1.AwBA 2.Regional Goverments 3. Federal Disaster Prevension and Prepardnes 4.Major irrigation Development Agencies	
			Prioritizing and programming of projects	Doc	6	-	-	3	1	2	-	1.AwBA 2.Regional Gevorments 3.Major irrigation Development Agencies 4. MoWIE	
		Develop a policy and strategy for participatory flood control mechanisms	Discussion on possible measures, for example provide recognition for those engaged on flood control activities	Frq/yr	24	-	6	6	6	6	30	1.AwBA 2.Regional Goverments 3. MoWIE	
			Design possible solutions for anthropogenic caused floods	Doc	1/GTP	-	-	6	-	-	6	1.Regional Goverments 2.AwBA	
		Design flood control structures	Designing of dams and other regulating structures.	Doc	6	2	4	-	-	-	1	1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	
			Designing of Detention Basins	Doc	3	-	-	1	3	1	1	1.AwBA 2.Regional Goverments	
			Designing of River training works	Doc	4	48-	4	-	-	2	-	1.AwBA 2.Regional Goverments 3. MoWIE 4.MoFED	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
1	Plan, Initiate and Implement flood control/benefit measures	Implement flood control measures	Construction of dams and other regulating structures.	No	4	###	####	2010	####		2	1. MoWIE 2..AwBA 3.Regional Goverments 4.Major irrigation Development Agencies 5.MoFED	
			Construction of Detention Basins	No	5	-	-	-	2	3	1	1.AwBA 2.Regional Goverments	
			Construction of new dikes	km	40	-	20	10	-	5	15	1.AwBA 2.Regional Goverments 3.MoFED	
			construction of cut-offs for meandering river reachs	km	13	-	5	8	-	-	-	1.AwBA 2.Regional Goverments 3.MoFED	
		Maintenance of flood control structures	Maintenance of dikes	fre.	1/yr	-	4	4	4	4	25	1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
			Maintenance of embankments, removal of debris and sediment	fre.	1/yr	-	3	2	3	2	18	1.AwBA 2.Regional Goverments 3.Major irrigation Development Agencies 4.MoFED	
		Prepare flood risk management plan	Rainfall pattern prediction ahead of two to three months and disseminate information to concerned sector.	Frq/yr	18	-	18	18	18	18	90	1.AwBA 2. Federal Meteorological agency 3.Regional Goverments 4.MoFED 5. Universities	
			Collecting and dissemination of information on amount of predicted release discharge from reservior during rainy season	pridictic	12	12	12	12	12	12	60	1. MoWIE 2..AwBA 3.Major irrigation Development Agencies 4..MoFED	
			Develop and improve early warning system to provide timely and reliable flood warning, flood forecasting and	Doc	6	-	6	-	-	-	-	1. MoWIE 2..AwBA 3.Ethipopian Metreology agency 4. Federal Disaster Prevension and Prepardnes 5.Universities in the Basin 6.Regional Goverments	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
2	Implement integrated land use plan	Identify flood prone areas	Prepare flood hazard map (delineat)	Doc	4	-	2	-	2	-	2	1. MoWIE 2..AwBA 3.Uiversities in the Basin 4.Regional Goverments 5.MoFED	
		Check Compatibility of landuse plan	Identify current land use in area	Doc	7	-	1	2	3	1	4	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5.Oromia region 6.MoFED	
			Identify whether landuse of area matches with landuse plan	Doc	7	-	1	2	3	1	4	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Enforce landuse plan	Enforcing using flood hazard map together land use map	Doc	7	-	1	2	3	1	4	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Identify flood plain areas	Delinate flood plains and buffer zone	Doc	7	-	1	2	3	1	4	1. MoWIE 2..AwBA 3. Ethiopian Land use administration agency 4.Uiversities in the Basin 5..Regional Goverments 6.MoFED	
		Conserve flood plain ecosystem	Create awarness and participation b/n all stakeholders	No forum/ year	19	50 -	3	6	5	5	21	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. Federal Disaster Prevension and Prepardnes 6. Ethiopian Land use administration agency	
												1.Regional Goverments 2..AwBA	

No	Measures	Activities	Sub-activities	Unit	Target	General activities Action Plan						Action owner	Remarks
						2008	2009	2010	2011	2012	2013-2017		
3	Sytematic flodwater use	Introduce/improve floodwater management structures	Identify potential sites for spate irrigation, groundwater recharge, range land and forage production, domestic and livestock water supply	Doc	6	-	-	1	3	2	-	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5. MoWIE 6. Ethiopian Land use administration agency	
			Plan and design floodwater management structures (example gabion diversion, flood harvesting ponds, spillway)	Doc	4	-	-	-	2	2	2	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED	
			Construct floodwater management structures	No/year	2	-	-	-	-	2	4	1. Regional Goverments 2..AwBA 3.Uiversities in the Basin 4.MoFED 5.MoFED	
			Prepare operation and maintenance manual	Doc.	-	-	-	-	-	-	6	1. Regional Goverments 2.MoAgr. 3.Uiversities in the Basin 4.MoFED 5.AwBA	
		Ensure better scheme management	Produce agronomic and field water management manual for DA's	Doc.	-	-	-	-	-	-	6	1. 1. Regional Goverments 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council 7. MoFED	
			Follow-up, monitoring and support	ime/yea	24	51 -	6	6	6	6	30	1. .Dire Dawa City Administration 2..AwBA 3. MoAgr. 4.Ethiopian Land use administration agency 5. MoWIE 6. Basin High Council 7. MoFED	

Basin Wide Action Plan

No	Measures	Activities	Sub-activities	Unit	Target	Total Awash basin						Action owner	Remarks
						General activities							
						2008	2009	2010	2011	2012	2013-2017		
1	Capacity Building	Improve the manpower of flood hazard reduction team	Improve the coordination and capacity building gap of AWBAs staff	time	1/yr		1	1	1	1	5	AwBA & Stakeholders	
			Recruit skilled new staff	no	3			3				AwBA & Civil Servcice	
		Building Technical Knowledge	Short term Training	no. of Training	1/yr		1	1	1	1	5	AwBA & Stakeholders	
			Long Term Training Education for AwBA staffs	no. of Trainee	4		2		2		10	AwBA & Stakeholders	
			Workshop and Seminars	No	16		4	4	4	4	20	AwBA & Stakeholders	
		Sharing indegenous/ international knowledge and experience	Farm to Farm, Expert to Expert etc…experience sharing within and outside of the basin	no	1/yr		1	1	1	1	5	AwBA & Stakeholders	
			Field Visit and Discusion	no	1/yr		1	1	1	1	5	AwBA & Stakeholders	
2	Improve consultation participation of stakeholders and Strengthen networking	Increase participations of stakeholders	Develop mutual understanding between AwBA and stakeholders.	when needed								AwBA & Stakeholders	
			Continious contact and comunication on flood issues	when needed								AwBA & Stakeholders	
			Jointly plan, monitor and evaluate flood flood issues	no	1/yr		1	1	1	1	5	AwBA & Stakeholders	
		Increase the awarness level of stakeholders	Provide advice and relevant information to institutions and decision-makers on flood management issues.	when needed								AwBA & Stakeholders	
			Identify gaps in present flood management practices, and to stimulate partners to meet critical needs within their available human and financial resources	doc	1				1			AwBA & Stakeholders	
			Organise basin wide stakeholders forum(meetings) to create awareness and cooperation	No of Forums	4	1	1	1	1	1	5	AwBA & Stakeholders	
				when								AwBA &	

No	Measures	Activities	Sub-activities	Unit	Target	Total Awash basin						Action owner	Remarks
						General activities							
						2008	2009	2010	2011	2012	2013-2017		
3	Create legal, administrative and economic frameworks	Improve institutional set up	Restructing IWSMRT Directorate	Doc	1		1					AwBA	
			Develop internal Directive for Integration within AwBA Diractorates and external stakeholders	Doc	1		1					AwBA	
		Develop enforcment tools	Develop flood management guidelines	Doc	1			1				AwBA & Stakeholders	
			Develop and prepare flood insurance plan	Doc				1				AwBA & Stakeholders	
			Prepare rules and regulations on flood water uses	Doc	1				1			AwBA & Stakeholders	
4	Promote sustainable flood risk management measures	Create awareness and know how about sustainable flood risk management with stakeholder	Training	no.	1/year		1	1	1	1	5	AwBA & Stakeholders	
			Discussion with Stakeholders	no.	1/year		1	1	1	1	5	AwBA & Stakeholders	
			Through Other communication means/phone	no.	as needed							AwBA & Stakeholders	
		Demontration of flood risk management measures	Site vist and visual aid	No.	1/year		1	1	1	1	5	AwBA & Stakeholders	
			Experience Sharing b/n Farmers	No.	1/year		1	1	1	1	5	AwBA & Stakeholders	
5	Provide Guidelines, information, and data abou flood	Establish a framework for the assessment and management of flood risks,	Prepare directive for flood risk management among regional states and institutions	Doc	1			1				AwBA, Regional States and Fedaral institutions	
			Prepare Development control enforcment tools	doc	1			1				AwBA & Stakeholders	
		Strengthen the collaboration and coopration among stakeholders	Develop communication strategy among institutions	when needed								AwBA & Stakeholders	
			Prepare standards/guidelines for crisis management and early warning systems	Doc				1				AwBA & Stakeholders	