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ANNEXES

1 BACKGROUND

The Nile river is shared by 10 riparian countries: Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda. Half of these countries are among the world's ten poorest countries. Today the Basin is characterized by poverty, instability, rapid population growth, and environmental degradation. Control of Nile waters has long been a source of dispute and economic development through power generation, food production, transportation, trade, environmental conservation, and other related development activities. To realize this potential, the riparian have come to recognize that they must take concrete steps to address these challenges and that cooperative development holds the greatest prospect of bringing mutual benefits to the region.

The Nile riparians have taken a historic step towards cooperation in the establishment of the Nile Basin Initiative (NBI). Formally launched in February 1999, the initiative is a transitional institutional mechanism, which provide an agreed basin-wide framework to fight poverty and promote economic development. The NBI is guided by a shared vision "to achieve sustainable socio-economic development through the equitable utilization of, and benefit from the common Nile Basin Water resources. "The NBI is comprised of the Council of Ministers of Water Affairs of the Nile Basin States (Nile-COM). A Technical Advisory Committee (Nile-TAC), and a Secretariat (Nile-SEC) located in Entebbe, Uganda. The formation of the NBI and on-going riparian dialogue is supported by the World Bank, UNDP, and CIDA.

The NBI has articulated a shared vision, established a transitional institutional mechanism, and formulated general guidelines to facilitate cooperative development in the Nile Basin. To translate the shared vision in to action, the NBI has also initiated a Strategic Action Program, which includes two complementary components: (1) a basin-wide Shared Vision Program (SVP) and (2) Subsidiary Action Programs (SAP). The SVP will include a series of projects, such as capacity building, studies, and participatory activities to be implemented basin-wide to create an enabling environment for cooperative development. In parallel, appropriate groupings of countries (two or more) will initiate SAPs to define and implement investment projects that confer mutual benefits at the sub-basin level.

The SVP encompasses five broad theme areas, referred to as 'pillars';

- Cooperative Framework (on-going UNDP sponsored D3 Project)
- Confidence Building and Stakeholder Involvement [Pillar C]
- Socio-economic, Environmental and Sectoral Analyses [Pillar D]
- Water Resources Planning and Management [Pillar E]
- Applied Training [Pillar F]

Pillar D addresses five components: (I) Efficient water use for agricultural production; (ii) Socio-economic/poverty diagnostic study; (iii) Assessment of

opportunities for power trade and pooling; (iv) Environmental analysis and management and (v) Opportunities for integrated infrastructure development.

This report identifies the specific studies and preparatory work within the Environmental Analysis and Management component of Pillar D.

There is clear recognition within the Nile Basin Initiative that the development of Nile waters must be environmentally sustainable in the long-term. This is reinforced by the fact that the Nile is widely perceived as an environmental issue of global concern. Identifying the environment and development synergies, and thus the sustainable development opportunities, will be a major task for the initiative.

The Environmental Analysis and Management component of Pillar D will contribute to developing a strategic framework for environmentally sustainable development of the Nile River Basin, improve the understanding of the relationship of water resources development and the environment in the Basin, and provide a forum to discuss development paths for the Nile with a side range of stakeholders.

Environmental management studies and actions in the Nile Basin have thus far been largely undertaken on a national basis, and not with a transboundary vision.

The present component will help to translate existing national environmental commitments and interest into regional and basin-wide analytical frameworks and eventually basin-wide actions.

The Environmental component within Pillar D will consist of two components with one output funded by the GEF and one output funded by the USAID. The GEF resources will support the preparation of a basin-wide environment project (to be funded by the GEF), which will be presented to ICCON1. The USAID resources will support a transboundary environmental analysis which will produce a study and serve as reference for relevant information. The environmental analysis and management component of Pillar D will also coordinate with two other Pillars (Pillars C [confidence building and communication] and F [applied training and capacity building]).

2 Introduction

The Nile Basin in Ethiopia comprises three sub-basins namely Abay (Blue Nile), Baro Akobo (Sobat) and Tekeze (Attbera). It covers a total land area of about 374,950 km² which is about 33.4 percent of the country's geographic area (1,123,062 km²). (see location Map)

The basin within Ethiopia has great economic potentials. The average annual volume of fresh water obtained in the basin reaches to about 86.8 billion m³

which is about 64 percent of the total water resources of the country as a whole. Other natural resources including vegetation, soils, wildlife, minerals and cultural resources are also abundant. These together with favourable climate has influenced the settlements of human population and development of sedentary agriculture which has evolved for centuries as mixed farming.

According to the Conservation Strategy for Ethiopia (CSE, 1997), the main physical features of the basin include high mountains with some over 4200 masl, extensive plateaus with plains on the tops and bottoms, shortly dissected and narrow valleys and vast lowland plains with some extreme lowlands below 200 masl. The basin contains 21 perennial rivers. Of which 14 are in the Blue Nile basin, 4 in the Baro Akobo/Sobat basin and 3 in the Tekeze/Attbera basin. In the Blue Nile basin twelve of the fourteen rivers join Blue Nile main channel within Ethiopia while the remaining two rivers drain to the Sudan to the north of Blue Nile main channel and join the main channel below the Rosaries dam. There are also hundreds of other perennial and semi-perennial rivers which feed the above mentioned 21 rivers. These rivers originate mainly in the eastern and central highlands of Blue Nile and Tekeze rivers and northern and eastern highlands of Baro Akobo catchment and all drain to the west and south-west wards to the Sudan.

The average annual water resources obtained from the three major rivers include:-

1. Abay (Blue Nile) - The average annual water resource of this sub-basin is about 53 billion m³ or about 63 percent of the total water resources of the main river Nile. This sub-basin is the major contributor of water resources to Nile river.
2. Baro Akobo (Sobat) - The annual average water obtained in this sub-basin is about 12 billion m³ or about 14.3 percent of the main Nile waters. This sub-basin could be the second important contributor of water resources.
3. Tekeze (Atbara) - The sub-basin contributes around 8 billion m³ which is about 9.5 percent of the Nile total water.

The overall average annual water resources obtained in the Ethiopian part of the Nile basin therefore reach to about 73 billion m³ or about 86.8 percent of the total Nile waters. This resource has hardly contributed to socio economic development in Ethiopia. There are no major dams in this sub-basin except two small to medium size hydro electric dams and few small scale irrigation dams.

The diverse ecologic condition has influenced diverse ecosystems that are with unique characteristics of soils, vegetation, animals and related other resources. Vegetation ranges from extreme highland Afro-Alpine to desert scrub. The major vegetation (dominating type) consists of tropical tree, bushy and grass vegetations. Currently, these vegetation type covers about 30 percent of the basin but mixed with annual crop cultivation that they are now so patchy in here and there. Tropical grasslands are widely spread both in lowlands and highland temperate areas. The grasslands are categorized into two types - lowland tall

grasslands and highland temperate grasslands. The lowland tall grasslands occur in low rainfall areas and are characterized by rainy season tall grasses with interspread few trees, shrubs and other woody vegetations. The dominant grass species are *Hyppurhenia*, *Digitaria* and *panicum* in association with *Acacia* shrubs. These areas include south-western tributary rivers' (Didessa, Anger Gutin and Beles) valleys and are seriously infested by tropical diseases (Malaria and trypanomiasis) that little agricultural use is made of the areas except in Beles valley and hunting of wild animals over all of the areas. Although tropical disease infestation of the area has so far hampered agricultural activities, the areas have high potential for the development of irrigated agriculture.

Highland temperate grasslands are found above 2000 masl that often provide palatable and digestible grass species such as *Pennisetum*, *Andropogon*, *Eragrostis* and *Cynadon* including interspersed clover species in some areas. Most of these grasslands are intensively grazed due to the increasing shortage of grazing areas specially in the plateau highlands of Amhara region. Consequently, most of these grass lands are now suffering from overgrazing and thus serious land degradation.

The soils in the basin are primarily formed from basalt's and underlying strata. Those which are formed from basaltic rocks are deep, productive and well structured and inherently well drained agricultural soils. These soils are classified as Luvisols (FAO, 1988) and are intensively cultivated in the basin. These soils are found in the eastern parts of the basin. The soils formed from underlying strata are less productive and classified as variety of major soils including Nitosols and Vertisols. These soils occupy western parts of the basin. There is also many other soil groups such as Lithosols, Cambisols, Acrisols, Rendzinas etc.

The soils in the basin are potentially good agricultural soils specially in the Baro Akobo basin and most parts of Blue Nile basin. The irrigation potential as related to soil genus and permeability together with topographic features is very high in all sub basins, the potential reaching over 2 million hectares within stable conditions and very minimal effects on the environment.

The topography of the basin is rugged with steep mountains and hills. This together with intensive cropping and excessive grazing has exacerbated soil degradation that extensive soil erosion and land degradation has taken place on steeper sloping lands. Much of this erosion has occurred on better agricultural soils within the intensively settled highland areas. The eroded sediments are creating problem on down stream infrastructures of both within the country and in the Sudan. The productivity of water systems in these down stream areas and the continuity of water flow have been progressively disrupted with the progress of soil erosion and land degradation in these highlands. The problem of soil erosion is more serious where vigorous and perennial vegetation growing is constrained by water shortage due to the fact that soil is exposed to direct sun shine for many months in a year and is made vulnerable to rain splash and detachment.

Sediment load is illustrated in Table below of one of the tributaries of the Blue Nile rivers.

Nine years (1982-1990) mean monthly suspended sediment discharge for the Gilgel Abbay ('000 tones) with catchment area of 844 km².

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Average
Mean	2.2	1.2	0.9	1.0	5.3	83.8	782.8	106.7	663.0	158.4	20.0	5.8	1831.1
Max	3.4	1.8	1.7	2.4	16.0	192.4	1332.2	1375.8	797.3	325.4	57.5	11.0	
Min	0.1	0.8	0.5	0.3	0.4	24.6	423.2	652.3	530.3	85.6	8.3	3.0	

Source: MWR, 1997 : p.41

The run-off time July to October is very destructive (erosive) averaging about 1100t/km² showing again that erosion is a serious concern in terms of both land degradation and sedimentation problems, apart from the loss of water. The data shows mean monthly figures that may hide the most probable high sediment concentration during the beginning of the wet season as the soil physical conditions are more favourable for rain splash detachment because it has been made looser by long dry season and cultivation practices.

Along the major rivers such as Dabus and Baro Akobo and on the shores of the Lakes are numerous wetlands ranging from permanent swamps to seasonal swamps and flood plains, Dabous and Baro Akobo rivers delta are the major lacustrine wetlands. Lakes' shores of Lake Tana, Fincha and Chamon are major swamps in the basin following the Baro Akobo delta. Most of the seasonal wetlands particularly along Lake Tana, annual crop cultivation follows the water level as the Lake level drops. The emergent macrophytic vegetation like papyrus (*Cyperus papyrus*) are grown in these seasonal wetlands. The natural vegetation during this season are harvested and used for house cover and building local boats that are used by fishermen. There are also many other vegetations among which *Ceratophyllum demersum* is the most important in terms of dominance. Other important water bodies in the basin include inland lakes and water ways. Lake Tana is the largest both in Ethiopia and in the basin and it is an important water regulation feature for the river Blue Nile along with its important habitat for fish, birds and other aquatic lives. The Baro Akobo river, Dabus river and Fincha and Chamon swaps are situated in southern part of the basin.

The wetlands and shallow water bodies in the basin are important bird and wildlife areas and have significance for congregational bird species such as Flamingos, Cranes, Ducks and Gees and over wintering areas for variety of migratory palaeartic bird live.

The basin is also endowed with rich diversity of wealth of plants, animals and microbial species. Of the diverse range of flora and fauna, significant elements are endemic to the area, where isolation and adaptation to restricted environment has evolved many unique species. The wide range of habitat that includes from tropical dry land savanna along the Sudanese border to montane vegetation in the eastern highlands of the basin has favoured this large variety of species. The highlands contain largest species of birds per unit area while lowlands contain large species of higher animals. Of the country's 845 species of avian fauna, 31 have been classified as globally threatened of which 16 are endemic to

Ethiopia. The basin Master plan document (1997) divides this fauna into three biome assemblages, within the basin, as:-

1. the Afro-tropical Highland Biome with 48 species of which 7 are endemic;
2. the Somali - massai Biome with 97 species of which 6 species are endemic; and
3. the Sudan - Guinea Savanna Biome with only 16 species

However it is noted that the Somali-Massai and the Sudan-Guinea Biome in the western parts are not effectively studied due to the remoteness of the areas.

As Ethiopia is one of the routes of migratory birds, number of migratory birds rest in different locations, of which Lake Tana, Fincha, the Chomen and Dabus Swamps in the Blue Nile basin are important resting areas for the birds. According to Ethiopian Wildlife and Natural History Society (EWNHS, 1996), the migratory bird species are classified into three groups. These are:-

- a) the northern migrants - species coming from northern Europe and Central Asia;
- b) the northern migrants with some resident populations in Ethiopia; and
- c) the Inter African migrants - which move within African continent. In all the three groups, a total of 149 bird species that use the basin habitats have been identified to date.

Altitude and the proximity to the equatorial monsoonal systems primarily influence the climate of the Nile basin in Ethiopia. These factors produce a wide variety of local climates ranging from hot and semi-arid to high altitude cool alpine climate.

Since most of the Nile basin in Ethiopia lies above 1500 meters of latitude, it has in general a highland (cool) climate, but due to temperature rainfall and specially altitude, five climatic zones are known. They are:-

1. *Hot lowlands*: This is tropical and desert lowland type area usually lies below 1800 masl and has an average yearly temperature of over 26°C and rainfall of 800mm or below. The rainfall in the lowest points of some localized areas even average below 200mm. These areas are located in the western extremes of Sudan boarder.
2. *Medium altitudes* which are temperate and sub-tropical frost free zones: Because of the altitude, the climate of these zones range from temperate in their upper highlands to sub-tropical or arid near hot lowlands. These zones have a sub-tropical climate due to higher rainfall (1400mm) and lower altitude in Southern areas while the higher and drier central and northern parts have a more temperate climate.
3. *Temperate Zone*: This zone is usually found from 2400 to 2800 masl of altitude. The highest areas in the zone receive frequent heavy frost and many parts have

much lower temperature with a yearly average of about 16°C. The climate of this zone is often considered, as the predominant climate type of Ethiopia as it is the largest climatic zone with the highest population density.

4. *Alpine Zone*: This zone is found at altitudes higher than 3500 meters. Daily air temperature in the zone is often 12°C, which constrains crop cultivation.
5. *Desert Zone*: This Zone is situated in the extreme lowlands in the Sudan boarder especially in the northern parts.

Rainfall distribution patterns in both Nile basin and Ethiopia shows considerable variation. Four distribution patterns can be distinguished in Ethiopia. These are:-

- (i) In the southwest, where rain occurs nearly throughout a year. The total average annual rainfall in this area usually exceeds 1400mm. There is, however a concentration of rainfall during the summer months of June to August accounting for about 35 - 45 percent of the total annual rainfall. December and May are generally the driest months in these wettest parts of the country. These areas include most parts of Sobat headwater area (Baro Akobo) and southern tributaries of the Blue Nile.
- (ii) In the southeast, where rain occurs during April/May (spring) and October (Autumn). In these areas summer and winter months are dry, and the autumn and spring months are generally wet. The average total rainfall in these areas varies from less than 500mm to over 1000mm (Kidane 1997). These areas include part of Sobat but major part of the area is out of Nile hydrologic systems.
- (iii) The north-east areas where rainfall occurs in January and February (winter) are drier with average annual rainfall of below 500mm. These areas cover most parts of Attbera and north western parts of Blue Nile rivers.
- (iv) The rest parts of the basin where rainfalls with a maximum between in June and September are wetter receiving average annual rainfall of over 2000mm. These areas include Baro Akobo basin and eastern highlands of Blue Nile. The extreme western lowlands are much drier and desertified with average annual rainfall of 100 to 500mm.

There is limited information on the fish species and their distribution in the Nile basin aquatic systems. However from the practical point of view, Lake Tana and river Baro Akobo are the most important fish sources in the basin. Although in depth studies have not yet been conducted, the so far undertaken studies have documented two separate fish faunal provinces, which are mainly determined by water temperature. These are: (I) the nilotic lowland fauna and (ii) the Ethiopian highland fauna. The Blue Nile waterfall, just about 20kms away from Lake Tana, makes a clear separation between the locustrine Lake Tana fauna and the riverine fauna found in the middle Blue Nile. However knowledge on

species composition within the rivers tributaries is limited especially on the northern semi-perennial rivers such as the Rahad and Dinder, where it is assumed that different ichthyofaunal environments would exist in comparison to the perennial rivers in the basin.

The Nile Basin inhabits overall human population of 21.92 million (Blue Nile 14.25; Tekeze 5.49; and Baro Akobo 2.18). Of the total population 2.05 million reside in rural areas (13.07 in the Blue Nile; 5.0 in the Tekeze; and 1.98 in the Baro Akobo basin) while 1.87 million (1.17 in the Blue Nile; 0.50 in the Tekeze; and 0.20 in the Baro Akobo) are urban dwellers.

There are over 400 urban centers in the basin with population range of 3,000 to 150,000. These urban centers have no sewage disposal or stabilization facilities, that most centers discharge their domestic wastes either on public grounds or other open areas. This brings contamination threats to surface and ground water sources.

Although the irrigation potential in terms of both land and water resources is substantial, the irrigated areas are insignificant while food shortage, famine and drought are usual phenomena in the basin. The great potential for large-scale irrigation should therefore be developed and exploited with sound Environmental Impact Assessment and the participation of stakeholders in planning, implementation and management. Some areas including Baro Akobo, Dabus, Beshlo and Megetch river deltas also suffer from frequent floods. The control of flood would also need construction of dams, to mitigate the disastrous effect of floods, enhance irrigation and harness hydro-power.

3.0 Description of Natural Resources in the Nile Basin Ethiopia

3.1 Water Resources

As water is an indispensable resource for living and non-living things and it is an integral part of the whole ecosystem, all socio-economic development needs water resources. The ever increasing population in the basin has increased needs for water resources to produce food and feed; livestock watering; for domestic and industrial supply and sanitation and to mitigate the effects of the disastrous and frequent drought in the basin.

However, the failure to sustainably utilize and successfully manage the available water resources has resulted in serious soil erosion and disturbed the physical and human environment in the basin. It is also progressively becoming one of the major sources of conflicts and ethnic strifes.

Water resources in the basin therefore stand as the most important and basic input in all socio-economic endeavors and have to sustainably managed and used to sustain life in the basin.

3.2 Land Resources

Land resources include wetlands, rivers, range-lands, mountains, minerals and soils. The land area in the Nile basin in Ethiopia covers about 381582 km². This land area supports diverse flora and fauna and it is the primary resource base for human activities and provides livelihood for over 21.22 million people which is about 36 percent of the total population of the country. Over 45 percent of the country's agricultural production is obtained in this basin from these land resources. Major part of fish production of the country is also in this basin particularly in Lake Tana, the country's largest lake, and river Baro Akobo. Again it is the most important basin in terms of wildlife of both large mammals and birds as the basin contains large range of habitat. This also yields livelihood for the people in the basin and beyond. The vast lowland plains in the basin support large pastoral livestock again which is part of livelihood production. Wetlands in the basin support substantial number of wildlife. Flood plains are used for seasonal crop production and they are most important for production of seasonal crops in rainfall scarce areas. Land resources are therefore the second important physical entity next to water resources because land can produce little in the absence of water resources.

3.3 Forestry Resources

Almost all fuel wood and construction materials in the basin are based on forest resources, although cow dung and crop residues are currently being used for fuel because of forest resources scarcity. These resources are also important source of food, feed and medicine in the basin. Most local people in the basin process medicine from forest trees and wild vegetation. Forests in the basin are also the most important habitat for wildlife. They also regulate micro-climate. The western Tigray (Tekeze Sub-basin) southern Blue Nile sub-basin and most parts of Baro Akobo basin have good forest cover and the people in these areas enjoy humid and healthy climatic conditions. Disease prevalence in these areas is minimum as compared to other forest degraded areas. Soil erosion and land degradation in these vicinities is also minimal that the land and labour productivity is higher than other areas. These forests also have global significance as they contain great elements of endemic plants and animals. Endemism has been estimated to reach 12 percent in plant species and an average of 8 percent in animals.

3.4 Wildlife Resources

The large ecological diversity that influenced the existence large diversity of habitat has been the major base for the existence of diverse species of wildlife. A great number of large mammals exist in the tropical high forests of medium altitude and tropical woody tall grasslands of lower reaches while more number of birds inhabit in the upper reaches and wetlands on the basis of per unit area. It should also be noted that the majority afro-alpine highland in the Semen Mountain hosts diverse mammal species with substantial elements of endemic species.

The role of wildlife in the basin's economy, however, is insignificant due to the fact that wildlife areas are inaccessible for tourism. The wildlife areas are not well managed. But local people around the areas use wildlife for food and income earning.

3.5 Livestock Resources

The livestock population in the basin is estimated to be over 23570 TLU with dominating number of cattle (70% of the total). In the highlands of the basin where about 90 percent of the human population is concentrated, about 75 percent of livestock exist as an important part of a peasant mixed farming system. The remaining 25 percent is based in the lowland pastoral areas.

Livestock provides power (Ploughing and transport), food, cash income, fuel (dung) and manure for soil fertility enhancement. The crop and the livestock production systems are highly interdependent except in the nomadic areas. Oxen are used as draft power and they are critical component in the crop production processes. Milk, meat and manure are important products of the 70 percent of the 23570 TLU livestock. The livestock specially live animals, skins, and hides generate income for farmers. Wool and hair production from sheep in the highlands of the basin is becoming increasingly important. The livestock population in the highlands of the basin, however, decreasing due to the increasingly reduced grazing areas and feed resources. In the lowland pastoral areas, however, livestock number fluctuates according to seasonal conditions. Drought often reduces the livestock number and the incidence of disease outbreaks further aggravate the problem.

3.6 Fishery Resources

The Nile Basin in Ethiopia is well endowed with fresh water resources, important water bodies in the basin include major rivers such as Blue Nile main channel, Dabus river, Baro Akobo river and Tekeze river and Lakes such as Lake Tana, Lake Haik, Lake Ashenghe, Lake Ardib, Lake May bar, Lake Gullbo, Lake Chamon and Lake Fincha.

The available information shows that Lake Tana is dominated by three main fish families. They are cyprinidae (*Barbus* spp); Cichlidae (*Oreochromis* spp); and Clariidae (*Clarius* spp) that form the base for the small commercial fishing industry in the lake. There are also other uncommon fish species in the lake. This lake support growing fishing industry with the main fish catch of *Barbus* and *Clarius* species that make up 90 percent of the catch.

In relation to fishery habitat, all rivers entering Lake Tana are considered to provide breeding areas for the lake fish especially for the *Barbus* spp. which is the most migratory fish.

With regards to riverine fauna, many aged sets of information, some referring back to 1960s, exist. According to these sets of information, over 22 species exist in Blue Nile main river, with middle reaches being the richest in species diversity.

Fish resources in Baro Akobo river is far much important in terms of food for local people. Most people along the river use fish as staple food.

The fishery potential in the rivers and lakes is substantial that at present the utilization of these resources is minimal. But the local people along the rivers and lakes use fishes for food and income earning. The basin therefore offers a great potential for fisheries exploitation in the rivers and lakes. Fishery resources particularly in Lake Tana are, however, under ecological threat due to the fact that the lake is being engulfed by a town (capital city of Amhara National Regional Government).

4.0 MAJOR ECONOMIC ACTIVITIES

The major economic activities in the Nile basin in Ethiopia includes food crop production, livestock rearing, agro-based industries (handicraft and small industries), and fisheries in order of importance.

4.1 Food Crop Production

The highlands in the Nile Basin has experienced may be longest period of sedentary agriculture in Ethiopia. This has enhanced the evolution of cultivated crop varieties and species. The major food crops grown in the basin include wheat, barley, sorghum, teff, maize, finger millet, oil seeds, chick-peas and beans. In addition to the annual crops, perennial crops such as coffee and different tropical fruit crops are also cultivated. The cultivation is mainly carried out in the highland areas on the large areas of favourable agricultural soils occurring as Luvisols, Cambisols and Vertisols.

The production system is mainly based on subsistent peasant culture which is solely dependent on rainfall availability and pattern. This crop cultivation culture is the major source of livelihood and is an integral component of livestock which always accompany the crop cultivation in subsistence farming systems. The crop cultivation in the basin supports about 90 percent of the total population and contributes over 60 percent to the over all National Regional States economy.

4.2 Livestock Production

Livestock production in the highlands is closely bonded with food crop production. But it has to be noted that 75 percent of the 23582 TLU in the basin exists in highlands. This shows the great contribution of the livestock to socio-economic development of the highlands.

The lowland pastoral areas contain 25 percent of the basin livestock population. The production and productivity of this livestock is constrained by the feed and water scarcity. The frequently recurrent droughts often destroy the already weak vegetation in these lowlands and wipeout the livestock. Even in normal years the vegetation in dry seasons does not provide enough and digestible feed because of moisture deficiency.

4.3 Agro-based Industries and Handicrafts

There are some agro-based industries and handicrafts. There is recently established one sugar cane processing industry which is state property. Handicrafts including pottery, blacksmith and weaving are widely exercised in the basin, but in small scales and mainly in the towns. These handicrafts, although not well developed, subsist significant number of families. Their contribution to regional and national economy is minimal.

4.4 Fisheries

Although the basin has high potential in fish resources, the utilization of the resources is minimal. However, people along Baro Akobo river are using fish as staple food. This feeding tradition is reportedly growing. In addition the fish resources from Lake Tana is being used at regional and national levels. The people in the vicinities of other rivers and lakes are also benefiting from the resources.

5.0 LEGAL AND INSTITUTIONAL FRAMEWORK

A number of laws pertinent to the management and conservation of natural resources have been issued in Ethiopia since a century back. The laws were barely inter-dependant and were not inter-supportive to each other. Enforcement of these laws was not totally successful. In addition, encouraging provisions and incentives for those who successfully manage natural resources in their vicinity were non-existent. The laws did not fully address issues for holistic environmental management and conservation of resources.

Currently, there are over 100 sectoral statutes directly or indirectly pertinent to environmental management in Ethiopia. Some of these laws are listed in Table 3. The current laws are being made to reverse the glaring nature of the previous laws. Some of the basis merits of the current laws include:-

- Laws are made harmonized with the country's constitution which give great attention to improved environmental management through harmonized and coordinated actions;
- Conservation Strategy and Environmental Policy have been prepared and approved. The Strategy and Policy are made umbrella to which all sectoral laws refer to and harmonized;

- Natural resources management laws and policies are obliged to participate all stakeholders throughout their process including benefit sharing among the stakeholders.

Accordingly, the recently established laws such as Water Resources Management Legislation, Wildlife Management Legislation etc. have made heavily participate all stakeholders including local communities. The Wildlife and forest resources management laws strongly consider benefit sharing among the stakeholders that include local communities in the resources vicinity. The rest of the sectoral legislations are also following to the same direction while the sectoral agencies prepare and implement their sector specific laws.

There is a multiplicity of Government and Non-government institutions involved in environmental management. Some of the institutions include the Ministry of Agriculture (MOA), Ministry of Water Resources (MoWR), Institute for Biodiversity Conservation and Research (IBCR), Ministry of Economic Development and Cooperation (MEDaC), Ministry of Mines and Energy (MOME) and Ministry Labour and Social Affaires (MLSA). There are replicas of these Ministries at National Regional Government Levels. There are also a number of international and local NGOs involved in the environmental management.

The jurisdiction of each institution whether governmental or non-governmental on environmental matters specially the implementation of the Ethiopia's Environment Policy, is dependent on the sectoral mandates given to the institution. For instance, the MOA and Bureaus of Agriculture are concerned with the conservation and development of forest, wildlife, livestock, cultivated crops and fishery resources MWR deals with development, conservation and utilization of water resources; and Environmental Protection Authority deals with coordination and harmonizing of the sectoral and multi-sectoral environmental management issues and actions.

Ethiopia is party to most of the international treaties particularly relevant to environment and natural resources conservation and sustainable exploitation. The Government has firm commitment to these signed international and regional convention and agreements. Some of these signed and ratified conventions and agreements are listed in Table 5. The government has taken major steps in implementing the conventions. For instance, the implementation of the Convention to Combat Desertification and the Effects of Drought has progressed to the extent that the first phase has now been concluded with the preparation of 'Action Plans' and identifying 'Priority Action Areas'. Other conventions such as the Convention on Biological Diversity; International Plant Protection Convention etc. are also being implemented. The implementation of the Conventions has been to integrated in the country's sectoral and cross sectoral policies and legislations. The 'Polluter Pays' principle is made part of the draft environmental legislation; public participation in environmental management programme and project processes has been made one of the major provisions.

6.0 Environmental Management

6.1 Steps and Actions being taken to manage the Environment

Since 1995, institutional arrangement for environmental management has changed together with changes in the government structures. The Environmental Protection Authority, which is responsible for the overall coordination of the country's environmental management through the development of appropriate environmental policy, laws guidelines and standards was established in 1995.

Conservation Strategy for the country has been prepared, approved and is currently being implemented. The implementation of the strategy is the responsibility of all concerned line ministries with the overall coordination of the EPA. The management of forest, wildlife, soils, fisheries and livestock resources is carried out by the Ministry of Agriculture. This Ministry has prepared policies for the management of forests, wildlife, soils, fisheries, livestock and Land use. The policies are in the process of approval. It has also enacted legislation for plant quarantine and preparing one for fisheries management.

Water resources conservation and management is carried out by the Ministry of Water resources. Policy for water resources has been approved and is operational. A legislation (1994) on water resources utilization and management has been enacted. A water code that regulates licensing, fees establishment, charges for urban and irrigation water supply and pollution control has been prepared and is about to be enacted. Environmental Impact Assessment on water based projects of the Ministry is always being conducted.

6.2 Protected Areas in the Ethiopia part of the Nile Basin

Protected areas are environmentally sensitive areas that have significant importance as related to:-

1. the biodiversity conservation needs of both flora and fauna; and
2. the preservation of cultural and natural heritage resources.

There are several protected areas in the basin. Some of the areas are well protected and managed while some are not.

Because of the numerous protected areas in the basin, only some major areas are discussed here below.

6.2.1 Protected Areas for the Conservation of Biodiversity

With regards to vegetation, four moderately large areas of the afro-alpine vegetation exist in the basin. All the four areas are situated in the Amhara region. They are Semein Mountain in North Gonder Zone, Mt Guna in south Gonder and North Wello

zones, Mt Amba Farit in south Wello zone and Mt. Choke in East Gojam zone. The areas currently contain isolated areas of remnant alpine vegetation which retreated to these areas as the earth warmed (MWR, 1997). Although these areas have not been well studied, they are assumed to have bio-diversity of isolated gene pools that remain within these vegetation systems. The areas have fragile environment and have little agricultural use. These areas need further study to understand the characteristics of their environment and develop their management systems and plans.

As related to forest protection, there are 11 priority state forest areas with overall total area of 521,109 hectares and 26 regular state forest areas with a total of 18, 337 hectares in the Amhara region.

Priority state forest areas are mainly with natural forest cover while regular state forest areas are mixtures of natural and human made forests. The latter areas were previously forest development project areas, which were areas where serious disturbances to forest resources occurred. The tree species include *Cupressus*, *podocarpus* and *cordia* and the plantation is dominated by *Eucalyptus* in the lower to medium altitudes and *hygenia absynia* and *pinus* spp. in the upper reaches. Where as major spp. in natural forests include *Syzygium guineense*, *Cordia africana*, *Albizia*, *Croton Macrostachys* and *hygenia abyssinica*.

There are also five protected forests in Oromia region within the Nile basin. These are Gera/Sentena, Sigo Geba and Babia Fola in Jimma zone and Chato and Komto in East Wellega zone.

Gera/Sentema (174,000 ha) and Sigo Geba (28,000 ha) protected forest areas are separate forest within the vicinity of Jimma. The forests contain major tree species of *Anibigeria adolifi-frideric* and *Syzygium guineense*, which belong to the humid upland broad leaf forest category. The forest areas need proper protection and management for production and conservation purposes.

Babia Fola forest again in Jimma zone contain major tree species of *podocarpus*, *cordia africana* and *croton macrostachys*. The area of this forest is large due to the fact that the forest serves as shade for the in situ conservation of Coffee and also covers Coffee production areas.

Kamto Forest in the center of East Wellega is mainly disturbed natural forest which is enclosed and being enriched by exotic plantation especially in the buffer zones. The planted tree species include *Eucalyptus*, *Cupressus* and *pinus*.

Chato forest exists at the western part of East Wellega, occupying the bottom of western steep slopes. This forest is protected for wildlife conservation and catchment protection.

Again there are two protected forest areas in Gambella Regional State in Baro Akobo sub-basin within the Nile basin. The total area of these protected forests account for

9987 km² in which diverse tropical vegetation and wildlife exist. These forests suffer from refugee encroachment.

6.2.2 Large Wildlife Protection Areas

There are six large Wildlife Protection areas in the basin. These are Semein Mountain National Park; Dinder Wildlife area and Alatish Wildlife area in Amhara Region, North Gonder; Upper Didessa Wildlife area in Illubabour zone Oromia Region; Gambella National Park; and Dabus Valley Controlled haunting area in Benshangul-Gumuz Region, Asossa zone.

Semein Mountain National Park was established in 1966 and gazetted as National Park in 1969. The park has been recognized as World heritage site since 1978. The park is situated partly in the Blue Nile basin and partly in Atbara basins with total area of 179Km². The park contains diversity of large animals with substantial number of endemic mammals. However, it is heavily disturbed though it is one of the major tourism attraction areas in the country due to its unique landscape and diverse wildlife with rare and endemic elements.

Dinder Wildlife area is with relatively less human population and has a good potential for being promoted to a National Park. This area links to the Dinder national park in Sudan, which preserves an established migration for the movement of large animals between Ethiopia and Sudan. This area is not accessible to tourists due to poor infrastructures. The area is not currently well protected due to its inaccessibility but opportunities are available to improve the conservation status.

Alatish Wildlife area is situated near Sudan border and protection system and plan is being established jointly with the Sudan. In this area 12 species of mammals and 68 species of birds have already been identified. Of the identified 68 bird species, 36 species are rare, which may be endangered and 32 species are common. Currently, the area is not well protected but human pressure on the area is not so serious.

The Upper Didessa Wildlife area is relatively intact with substantial number of large animals. This area is also not well studied yet but an initial survey made by the Agricultural Bureau of East Wellega confirmed the existence of substantial number of large animals and bird life.

The Gambella National Park is one of the most important Wildlife conservation areas in the country. The park contains both terrestrial and aquatic ecosystems that influenced the existence of diverse large mammals, birds and other aquatic life. The park is considered as an important wildlife conservation area for decades but it is being seriously affected by refugees from the Sudan and encroachment by the people living around the park.

The Dabus Valley Controlled hunting area is extensively modified by grazing and local hunting which is seriously diminishing wild animals. The area has unique ecology that contains humid highland to arid lowland, which is a good habitat for

diverse large animals and birds. Currently, the area and the wildlife in the area are being re-assessed by the Ethiopian Wildlife Conservation Organization with financial assistance from GEF.

6.2.3 Birds Protection areas

With reference to Ethiopian Wildlife and Natural History Society (EWNHS), the Blue Nile Master plan has reported that 11 important bird areas have been identified in the Blue Nile basin.

The criteria for the selection of the bird protection areas include:

- (i) the areas could contain globally threatened species;
- (ii) the areas could support endemic species that have a “ restricted range” (globally breeding area < 50,000 Km² and are globally threatened);
- (iii) the areas could also represent significant populations of the three biomes; and
- (iv) be areas where birds may congregate like wetland areas etc.

6.2.4 Protected area as fish habitat

The most important fish habitat in the basin are Lake Tana and Baro Akobo. They are identified as home to a potential species flock of barbs (*Barbus spp*, *Cyprinidae*). The large Lake Tana barbs have evolved up to possibly 13 or more different forms (*morphotypes*) which are unique to the Lake and has included the development of hexaploidy within several of the large barbs in contrast to the diploid genetic make up of the smaller African Barbus. To date, this unique fauna has not been affected by introduction of other species to supplement fishing industries as opposed to many cases in Africa.

The *Barbus spp.* and fisheries in the Lake are now being studied by the joint Ethio- Russian Biological Expedition, which is supported by the Ethiopian Science and Technology Commission. The Baro Akobo Fish spp. and their status of existence has not yet been studied but fish is a staple food for most people along the river.

6.2.5 Protected area for Domestic Animal Genes Conservation

Fogera cattle is the most important breed in the Blue Nile basin. The Fogera plain, which is an extensive seasonally inundated grassland area, is home to this important endogenous breed of cattle. The cattle are apparently known to this area, which have existed for a considerable time within this area and well adapted to the unusual conditions of the plains. These plains are protected from possible eviction of grazers and their breeds.

7.0 Recent, Current and Planned Initiatives

There are many recent, current and planned initiatives in the Nile basin. Most of the initiatives, however, are within the government programmes and as part of NGOs country programme. This nature of the initiatives impose difficulty in identifying allocated budget to the initiatives within the basin. The government programmes are run by annual budget and the allocation of the budget varies from year to year. However, the following are some of the initiatives that exist in the basin but most of the corresponding budgets are allocations for nation-wide programs.

7.1 Preparation of Conservation Strategy

The preparation of the Conservation Strategy for Ethiopia (CSE) culminated with the approval of the Environmental Policy by the government in 1997. The strategy identifies sectoral, and cross sectoral, environmental issues. It has identified policies, strategies and priority action areas needed to manage the environment and natural resources.

The CSE was prepared through participation of stakeholders including consultations with selected communities. It is currently being tested on the ground in many respects, including on a pilot scale at a wereda level. and now it is ready for implementation.

During its third phase the CSE was funded by NORAD through the technical assistance of IUCN with a budget of US\$ 3.6 million of Regional Conservation Strategies (RCSs) preparation is also being undertaken during this phase.

7.2 Preparation of Regional Conservation Strategies (RCSs)

The preparations of RCSs is being done within the framework of the CSE and consider region specific environmental issues and priority areas and actions.

The six regions within the Nile basin have finalized their respective RCSs,

7.3 National Action Programme (NAP)

The Ethiopian Government having signed and ratified the Convention to Combat Desertification and Mitigate the Effects of Drought (CCD) has taken considerable steps towards implementing the provisions of the convention. National Action Programme, which identifies 10 different sub-programmes, has been prepared. The preparation of NAP was funded by the UNDP/UNSO, with total fund of US\$325.00. It is a nation-wide plan based on the understanding that desertification is one of the major environmental, developmental and socio-economic challenges currently affecting about 70 percent of the country's total land area. About 3/5 of the country's population residing in these arid, semi-arid

and dry sub-humid areas suffer from widespread acute poverty and the effects of the recurring drought. NAP and its sub-programmes have been prepared as an important intervention programmes for anti-desertification actions. The core objectives of the NAP include sustainable management of the natural resource and hence the environment, food security and poverty alleviation. The priority actions of the programme address actions that are directed to the root causes of this challenge. The National Action Programme identifies the most urgent action spots in the country including in the Nile basin.

7.4 Ecologically Sustainable Industrial Development (ESID) Project

This is a part of UNIDO programme planned as a three year project in Ethiopia. The project has allocated US\$ 1.5 million funded by the Netherlands/UNIDO. The project has started as of January 2000. The objective of the project is to provide technical assistance to the government of Ethiopia in developing a nation wide applicable environmental policy for the industrial sector in Ethiopia. The planned activities of the project include supporting the lead agency (EPA) in formulating the industrial environmental policy; developing standards for industrial emissions; strengthening institutional relationships with relevant sectoral institutions and stakeholders; developing regulatory system for enforcement of the policy and strengthening the capacity of the EPA to carry out inspections and monitoring of compliance

7.5 National Bio-diversity Strategy and Action Plan Project

The principal objective of this project is to assist Ethiopia in preparing a National Bio-diversity Strategy and Action Plan (BSAP). Whilst it is a national plan it has relevance to, and inputs from, the Autonomous Regions, including full participation of the grass-root communities. This project intends to define the current status of, pressure on, options for, and priority actions to ensure the sustainable management, use, and equitable share of its biological diversity.

The project is funded by the GEF, total amount of US\$ 331,930 with US\$ 75,000 matching fund from Ethiopian Government. The project started since January 2000 and will terminate in 18 months time.

7.6 Bird Life Project

The objective of this project is to identify important bird life areas specially in the Nile basin. The total fund allocated for the project is US\$ 215,000 donated by GEF. The project is implemented by an NGO - Ethiopian Wildlife and Natural History Society (EWLNHs) and has started as of January 2000 and will continue for three years. This project is expected to identify important birds and their habitats life areas, the status of the bird life and to develop strategies for the future management of the bird life areas and the birds.

8.0 ENVIRONMENTAL ISSUES/THREATS

Environmental issues in the Nile river basin are closely related to land based resources degradation, as it is true in the country in general. As resources destruction and depletion often emanate from human activities, it is related to population size and its socio-economic activities.

The major environmental issues in the Nile basin, therefore, are deforestation (loss of wildlife habitat and bio-diversity), land degradation and disruption to regular flow of water, that have resulted mainly from population growth and rural poverty which again lead to unsustainable utilization of resources. These issues need to be considered from the already a high degree of environmental disturbance that is evident in all terrestrial eco-systems, altering the environmental baseline throughout the basin which is now evidenced as a highly disturbed system. To address these issues, conservation strategies, both at federal and regional levels, and many programmes have already been designed and being implemented. Forestry Action Plans have been prepared. Soil and Water conservation Programmes are also being implemented. Wildlife Conservation and bio-diversity conservation and research programmes are operational. But the extent of the issues and problems need much more resources and efforts, may be including support from down stream riparian countries, as the problems also affect these down stream countries economy and livelihood at least in the form of siltation, disrupted water flow (irregular water flow), loss in migratory resources between the countries etc. The major environmental issues are briefly discussed below.

8.1 Land Degradation

The deforestation rate in the Nile basin has reached to an average of 600km² per year. This is the major underlying cause for the land based resources depletion and land degradation in general and to the distraction of large wildlife habitats; wildlife extinction; loss of biological resources and diversity elements, soil erosion and sedimentation; and disruption to regular flow of water.

The conversion of forest and grazing lands to annual crop cultivation and the intensive cultivation of the lands with no protection to the soils has increased soil erosion. Increasingly high pressure of livestock, which always have direct correlation with the growing rate of rural population, have created overgrazing on already reduced grazing areas and further increased the spatial expansion and severity of soil erosion. Soil erosion, in many places, is reducing soil depth by an average of 4cm/year (Hurni, 1986). As soil fertility (soil nutrients) and soil water holding capacity is closely related to the top soils, the soil erosion has reduced land productivity and biomass production and in most cases the reduced permeability of the soil is disrupting the natural process of ground water recharging.

The erosion in some places has reduced the depth of soil that these lands are no more used for any type of production. The Ethiopian Highland Reclamation Study (1986) has reported that "around half of the highlands or 270,000 km² are already significantly eroded, of which 140,000km² are seriously eroded and left with relatively shallow soils. Some 20,000 km² of agricultural lands are so seriously eroded that it is now unlikely that they will be able to sustain farming in the future. Land degradation of the highlands is getting worse and doing so at an accelerated rate". The study also projected that if the erosion rates continue at the 1980s level (by halting further acceleration), lands covered by soil less than 10 centimeters deep (thus not capable to sustain cropping) will increase by fivefold to around 100,000km² or some 18 percent of the total highlands by the year 2010.

The major part of the above mentioned lands are in the Blue Nile and Tekeze basins. The projected rate of erosion has been observed in the basin especially in the North and South Gonder, North and South Wello North Shewa and Agow Awi Zones of the Amhara Region and eastern, western, central and southern zones of Tigray Region. The degradation is increasingly deteriorating both natural and human-made resources specially water-flow and storage regimes so that the extent and frequency of flooding have been alarmingly increasing in wet seasons and drought in dry seasons. The further consequences of the land degradation being excessive sediment supply to water courses creating attendant problems of siltation in down streams and habitat interference and distraction. This has resulted in watershed degradation, which has serious adverse consequences on water development projects where the economic life of the projects will be shortened.

8.2 Loss of Habitat and Biodiversity

Ethiopia with its unique position contains large diversity of plants and animals in which a high level of endemism - 99 endemic animals and about 800 endemic plants-is contained. However, the ability of the country to maintain the high degree of inherent biodiversity is now under threat as human population increases and its needs for annual croplands, grazing lands and wood for energy, furniture and construction increase which in turn increase the deforestation and overgrazing rates. This has seriously depleted and increasingly depleting the vegetation and wetlands which are home for the diversity and endemic elements of both animals and plants.

The situation is very severe in the highlands of the Nile basin. This has been illustrated by the Ethiopian Wildlife and Natural History Society (1996) as "of the 16 endemic bird species in Ethiopia (half of these in blue Nile basin) two - the Ankober Serina and Harwood's Francolin in blue Nile basin -are catagorised as vulnerable in the list of globally threatened species". As regards to habitat, except savanna woodlands in the north west part and the areas with serious tsetse fly, almost all the wildlife habitats have been seriously disturbed.

8.3 Drought and Desertification

Although the history of drought refers back to centuries, its frequency and severity has alarmingly increased since the 1970s. Natural resources particularly vegetation and animal lives damaged in each drought period is very substantial. Economic loss is equally substantial. The vegetation and animal resources weakened during droughts take long time to recover.

According to EPA (1998), over 65 percent of Ethiopia's geographic area fall into arid, semi-arid and dry sub-humid zones. This is true for the Nile basin areas. Most of the Tekeze basin and substantial part of the Blue Nile basin fall in arid, semi-arid and dry sub-humid zones. The desertification process is increasing and further encroaching to the humid zones. Land productivity and agricultural productions in these zones are seriously declining particularly due to moisture deficiency and reduced soil fertility.

8.4 Water Supply and Sanitation

The available water resources in the Nile Basin in Ethiopia have not supported the socio-economic endeavors. The average access to clean and safe water supply does not exceed 17 percent of the basin population. On the other hand, although the basin is endowed with huge potential of irrigation, the area under irrigation is insignificant showing that water resources have made little contribution towards food production that is often constrained by the erratic rainfall. The erratic nature of rainfall and the high rate of population growth therefore make the production of sufficient food and food security almost impossible in the Nile Basin unless supported by irrigation.

On the other extreme, the majority of people engaged in farming and pasture are forced to drive their livestock long distances in search of water and green pasture. This has posed frequent socio-economic and security problems. In search of water and green pasture, farmers move away from centers of social services such as health care, education, etc. The long distance movement also results in poor health and reduced productivity of livestock reflecting on the overall economy. The wandering livestock also competes for the limited grazing and water resources, which subsequently result in ethnic strifes.

9.0 PRIORITY ACTIONS

In connection to the identified environmental issues and opportunities in the Nile Basin of Ethiopia and considering the gaps between existing actions and the needs for the basin environmental management, the following actions have been identified during the national consultation process. See Table 2 for details.

9.1 Land Degradation

The soil erosion has also reduced soil fertility and hence land productivity and agricultural production. Communities in the basin are attempting to halt the soil erosion. Supporting and expanding the community efforts in the soil conservation measures, providing agricultural inputs and technology improvement awareness creation expansion of irrigated farms, etc are the urgent action areas.

9.2 Genetic, species and ecosystems Bio-diversity

Nile basin in Ethiopia is endowed with diversity rich Genetic, species and Ecosystem resources. Currently however, the resources are seriously eroded and ecosystems being alarmingly disrupted. These are major factors for progressively reduced livelihood yields and generally disrupted environment.

Priority actions include support to communities to promote in-situ conservation, conduct of pilot projects on in-situ conservation of endangered spp., development of alternative energy, development of hydropower, fuel-wood plantations and alternative livelihood.

9.3 Mitigating Desertification and the effect of Drought

The development and conservation of vegetation require moisture that demands the development, conservation and utilization of water resources. The Ethiopian government has already prepared an action plan to combating desertification and the effect of drought, which require financial resources to implement the plan. This is one of the highest priority action areas that call for cooperation.

9.4 Water Supply and Sanitation

Nile basin in Ethiopia contains over 300 towns with population size between 300 and 150,000. The overall average water supply coverage in the towns is below 55 percent. The water supply coverages from no pipe water supply to 72 percent in few towns. This causes inhabitants of the urban centers to seek alternative water sources to meet their domestic water needs. Unfortunately, domestic wastes pollute these water sources and the contaminated water often spreads water-borne diseases. The priority actions include and improving the water supply in the towns that need adequate water supply and constructing new water's supply systems including dams and pipelines, development of springs and shallow wells, low cost sanitation systems, awareness creation.

Development of wetlands policy, provision of small scale irrigation and awareness creation are the high priority action areas, which require concerted efforts from the Government, local and international NGOs and donors.

9.4 Migration and Settlement

The highlands in the basin need to be rehabilitated and the population pressure should be reduced. The priority actions include eradication of tropical diseases from low lands, developing irrigation systems in the lowlands and development of infrastructure.

9.5 Cross cutting issues

a) Enhancing Environmental Awareness

The Nile basin environment in Ethiopia is seriously damaged by a long-period of socio-economic activities. This can only be reversed by active participation of all stakeholders specially the local communities whose elements range from school children to women and men. Environmental awareness creation activities have to be stretched among all these elements. School children should receive environmental education in their academic systems and environmental clubs should be established and flourished in schools and of course in communities as a whole. Teachers training programmes should also include environmental education in their curriculums and the environmental experience sharing systems between schools and other media's should be established. The awareness creation campaign has to be also conducted among the rest of communities. This is another most urgent action area that calls for the cooperation between partners.

b) Capacity Building

Creating enabling environment for the successful conservation, development and wise use of the natural resources is essential tool in environmental Management. Training is therefore one of the priority areas that pulls attention in this programme and calls for the cooperation.

c) Information Systems and Networking Development and strengthening

Information systems for transboundary waters is being established in the Ministry of Water Resources and hopefully this will be further strengthened in the Ministry. This should be linked to other pertinent organizations particularly to environmental information systems and should be networked between local Regional Governments and other pertinent Federal Organizations including Environmental Protection Authority. This will be one of the priority action areas.

d) Infrastructure development

There are number of important wildlife areas that are currently not accessible to conservation people and tourists. Alatish wildlife area in the Sudan border, for instance, is the area where wildlife would move between Sudan and Ethiopia.

This area is not easily accessible to conservationists and tourists. This calls for co-operation in road and other related infrastructures development.

10.0 STAKEHOLDER ANALYSIS AND CONSULTATION PROCESS

The consultation process for the Environmental Analysis and Management were conducted with the stakeholders institutions and organizations that are directly or indirectly involved in natural resources and environmental management. NGOs involved in capacity building were also consulted. The consultation included many institutions including governmental, international, NGOs, CBOs and individuals (scholars) in the national as well as regional (local regions) levels. In addition, representatives of pertinent government organizations, NGOs, international organizations (based in Addis Ababa) and experienced and knowledgeable individuals involved in environmental planning and management were consulted through a two day workshop.

The time given and specially resources for the consultation were limited, and this has limited the number of institutions and individuals that could otherwise be consulted. However, substantial information was captured through review of the available documents and reports in the country.

ANNEX 1 TABLES

Table 1 Summary of Major Environmental Issues/Threats in the Ethiopian Part of the Nile Basin (1. Blue Nile, 2. Tekezie, 3. Baro Akobo)

Issues	Symptoms/Impacts		Immediate Causes	Root Causes	Extent	Severity
	Symptoms	Impacts				
1. Land Degradation						
1.1. Soil degradation ▪ Soil erosion ▪ Soil fertility loss	<ul style="list-style-type: none"> ▪ High runoff ▪ High sediment load ▪ Sheet and rill erosion in the farm lands ▪ Gullies ▪ High fertilizer requirements ▪ Declining yield 	<ul style="list-style-type: none"> ▪ Floods ▪ Loss of land resources ▪ Declining productivity ▪ migration 	<ul style="list-style-type: none"> ▪ Crop land expansion ▪ Deforestation ▪ Overgrazing/free grazing ▪ Agricultural malpractice ▪ Topography and rainfall pattern ▪ No crop rotation ▪ Non use of biomass (cow dung and crop residues) as fertilizer 	<ul style="list-style-type: none"> ▪ increasing human population ▪ high livestock population ▪ lack of incentives for conservation ▪ Poverty ▪ Low awareness level ▪ Lack of land-use policy 	<ul style="list-style-type: none"> ▪ basin wide but much more in the highlands than low lands 	Very severe
1.2 Devegetation / Deforestation	<ul style="list-style-type: none"> ▪ Animal feed shortage ▪ reduction in vegetation cover ▪ Encroachment in forest areas 	<ul style="list-style-type: none"> ▪ Energy crisis ▪ soil erosion ▪ loss of wildlife and other natural capital ▪ change in microclimate ▪ change in health status ▪ change in runoff ▪ reduction in biomass production 	<ul style="list-style-type: none"> ▪ Over grazing ▪ Use of biomass for energy ▪ Forest fire ▪ Shifting cultivation 	<ul style="list-style-type: none"> ▪ increasing human population ▪ Poverty ▪ Low awareness level ▪ lack of alternative energy and construction materials ▪ Low level of technology to maximizing agricultural production per unit area ▪ No alternative livelihood ▪ Failure to enforce laws and regulations ▪ Dependence on biomass and in efficient use ▪ Lack of local level plantings 	<ul style="list-style-type: none"> ▪ basin wide but much more in highlands than low lands 	Very severe
1.3 Wetlands degradation	<ul style="list-style-type: none"> ▪ destroyed vegetation in dry season ▪ birds migration ▪ Wet-lands conversion to agriculture ▪ Water body 	<ul style="list-style-type: none"> ▪ water loss ▪ aquatic life loss ▪ decrease in ground water recharge ▪ loss of wetland biodiversity ▪ water quality determination 	<ul style="list-style-type: none"> ▪ Land shortage ▪ Sedimentation 	<ul style="list-style-type: none"> ▪ low level of awareness ▪ Poverty ▪ Population pressure ▪ Lack of wetland policy ▪ Water shortage 	<ul style="list-style-type: none"> ▪ All around wetlands and Lakes 	severe

1.4 River bank and Lakeshore degradation	<ul style="list-style-type: none"> ▪ - down stream siltation ▪ change in river course ▪ riverine forest disappear 	<ul style="list-style-type: none"> ▪ floods ▪ siltation ▪ Aquatic life affected 	<ul style="list-style-type: none"> ▪ dry season cultivation ▪ intensive devegetation ▪ lack of laws and regulations enforcement 	<ul style="list-style-type: none"> ▪ need for crop cultivation during dry season ▪ Shortage of agricultural lands ▪ Moisture stress in uplands 	<ul style="list-style-type: none"> ▪ Around lakes and accessible rivers 	Severe
2. LOSS OF BIODIVERSITY						
2.1 Loss of agriculture (crop) biodiversity	<ul style="list-style-type: none"> ▪ seed shortage ▪ livestock breed variety decline 	<ul style="list-style-type: none"> ▪ dependence on exotic seeds and breeds 	<ul style="list-style-type: none"> ▪ soil fertility loss ▪ exotic spp. introduction 	<ul style="list-style-type: none"> ▪ soil erosion ▪ Introduction of exotic spp. 	<ul style="list-style-type: none"> ▪ Basin wide 	Currently moderate but potentially severe
2.2 Loss of forest and other vegetation and aquatic biodiversity	<ul style="list-style-type: none"> ▪ Forest resource that are food, feed and shelter progressively decreasing ▪ Extent and quality of grass spp. declining 	<ul style="list-style-type: none"> ▪ food and feed shortage ▪ fuel and timber shortage ▪ land degradation 	<ul style="list-style-type: none"> ▪ devegetation ▪ over grazing ▪ allien spp. introduction ▪ forest fires ▪ over fishing ▪ sediment loads 	<ul style="list-style-type: none"> ▪ Low level of awareness ▪ Lack of laws and regulations ▪ Population pressure ▪ Poverty 	<ul style="list-style-type: none"> ▪ Basin wide 	<ul style="list-style-type: none"> ▪ currently moderate but potentially severe
2.3 Protected areas degradation	<ul style="list-style-type: none"> ▪ Number of previously common animals and vegetation progressively becoming rare and some have disappeared 	<ul style="list-style-type: none"> ▪ Loss of revenue 	<ul style="list-style-type: none"> ▪ Expansion of Crop cultivation ▪ Overgrazing and extension of grazing to protected areas ▪ Low capacity in protected area mangement 	<ul style="list-style-type: none"> ▪ Lack of regulations and lack of enforcing existing laws ▪ Lack of awareness 	<ul style="list-style-type: none"> ▪ Basin wide 	<ul style="list-style-type: none"> ▪ Very severe
2.4 Genetic erosion and genetic biodiversity loss	<ul style="list-style-type: none"> ▪ Disappeared local spp. ▪ Expansion of high breeds of crop and livestock 	<ul style="list-style-type: none"> ▪ Loss of local situation adaptive spp ▪ Loss of sustained production 	<ul style="list-style-type: none"> ▪ Climate change (to some extent) ▪ Introduction of exotic spp. ▪ Expansion of alien spp 	<ul style="list-style-type: none"> ▪ Lack of awareness ▪ Lack of regulations and quarantine service 	<ul style="list-style-type: none"> ▪ Basin wide specially intensive agriculture areas 	<ul style="list-style-type: none"> ▪ Currently moderate but potentially severe

Issues	Symptoms/Impacts		Immediate Causes	Root Causes	Extent	Severity
	Symptoms	Impact				
3. Drought and desertification						
3.1 The effect of Drought	<ul style="list-style-type: none"> ▪ Temporal and spatial variability of rainfall becoming increasingly serious ▪ increasingly drying springs ▪ previously perennial rivers becoming seasonal ▪ progressively reduced base flow of rivers during dry seasons 	<ul style="list-style-type: none"> ▪ famine ▪ migration ▪ shortage of food and feed ▪ loss of livestock 	<ul style="list-style-type: none"> ▪ water shortage ▪ Reduced infiltration of rain water into soil ▪ Reduced soil depth to absorb, retain and recharge ground water ▪ Reduced vegetation cover to intercept rainfall, distribute surface run-off and retain and enhance the water infiltration into the soil 	<ul style="list-style-type: none"> ▪ Global climate change ▪ devegetation ▪ soil erosion and soil loss ▪ failure to construct small scale dams to maximize perennial vegetation ▪ rainfall irregularity ▪ lack of soil conservation measures ▪ lack of efficient early warning systems ▪ lack of preparedness ▪ lack of water related infrastructures 	<ul style="list-style-type: none"> ▪ basin wide but more severe in highlands 	<ul style="list-style-type: none"> ▪ very severe
3.2 Desertification	<ul style="list-style-type: none"> ▪ Expansion of sand dune ▪ Excessively variable temperature 	<ul style="list-style-type: none"> ▪ Decline in land productivity ▪ Salinization of soils ▪ Total failure in agriculture production ▪ Unfavorable climate for human settlement 	<ul style="list-style-type: none"> ▪ Devegetation and soil erosion ▪ Over grazing 	<ul style="list-style-type: none"> ▪ Population pressure on resources ▪ Under utilization of water resources ▪ Climate change 	<ul style="list-style-type: none"> ▪ Basin wide but more serious in the lowlands 	<ul style="list-style-type: none"> ▪ Very severe

Issues	Symptoms/Impacts		Immediate Causes	Root Causes	Extent	Severity
	Symptoms	Impact				
4. Water supply and sanitation						
4.1 water supply	<ul style="list-style-type: none"> ▪ people fetching water from contaminated sources ▪ clinical statistics 	<ul style="list-style-type: none"> ▪ Diseases such as Typhoid, Diarrhoea, Schistosomiasis, Helminthiasis etc. ▪ Traveling long distances for fetching water 	<ul style="list-style-type: none"> ▪ Failure to supply potable water ▪ Inadequate waste containment and treatment infrastructures ▪ Low level of awareness among the community 	<ul style="list-style-type: none"> ▪ Poverty ▪ lack of capital investment ▪ low level of awareness 	<ul style="list-style-type: none"> ▪ Basin wide 	<ul style="list-style-type: none"> ▪ Very severe
4.2 Sanitation	<ul style="list-style-type: none"> ▪ People disposing wastes in public and open places 	<ul style="list-style-type: none"> ▪ Polluted environment 	<ul style="list-style-type: none"> ▪ inadequate sanitation infrastructures ▪ not well-planned settlements ▪ low level of awareness 	The same as above	<ul style="list-style-type: none"> ▪ Basin wide 	<ul style="list-style-type: none"> ▪ currently moderate but becoming severe
5. Settlement & migration						
5.1 Settlement pattern	<ul style="list-style-type: none"> ▪ people traveling long distances to get services ▪ Dense Population in ragged topography & steep slopped highlands 	<ul style="list-style-type: none"> ▪ Intensified devegetation ▪ Serious soil erosion and land degradation 	<ul style="list-style-type: none"> ▪ Unplanned settlement ▪ Favourable climate condition for settlement in highlands (relatively free from tropical diseases) 	<ul style="list-style-type: none"> ▪ Hostile environment in lowlands ▪ Failure to make lowland habitable ▪ Subsistent agriculture 	<ul style="list-style-type: none"> ▪ Basin wide 	<ul style="list-style-type: none"> ▪ Severe
5.2 Migration and Refugees	<ul style="list-style-type: none"> ▪ Increasing number of refugees ▪ New house holds coming from other areas ▪ New villages being established by non-resident of the areas 	<ul style="list-style-type: none"> ▪ Ecological disruption ▪ Tension between local people and new settlers ▪ Excessive pressure on lands; resource degradation specially devegetation and wild life destruction 	<ul style="list-style-type: none"> ▪ Resource degradation in their original areas ▪ Conflicts ▪ Famine ▪ Political problems 	<ul style="list-style-type: none"> ▪ Poverty and famine ▪ Political instability ▪ Land degradation and low agricultural productivity in their original places 	<ul style="list-style-type: none"> ▪ Througho ut the basin but much sever in south and south western parts of the basin 	<ul style="list-style-type: none"> ▪ Very severe

Table 2 Priority Actions in the Nile Basin Ethiopia

Environmental issues	Priority Actions	Emphasis	Scale	Urgency
1. Land degradation				
1.1. Soil degradation	<ul style="list-style-type: none"> ▪ Supporting and expanding community efforts in soil conservation - Physical soil and water conservation measures - Expansion of agro-forestry farming - Hillside reforestation ▪ Enhancing soil fertility improving measures - Agro-forestry farming - Expanding organic farming such as compost and manure using, crop residue returning to the soils. 	<ul style="list-style-type: none"> ▪ Input supply ▪ Technology improvement and expanding ▪ Awareness creation ▪ Livelihood improvement ▪ Expansion of irrigated farms ▪ Community fund establishment for conservation ▪ Area closure/depopulation of marginal lands ▪ Preparation of sites and service in the low lands 	<ul style="list-style-type: none"> ▪ Basin wide but more emphasis in blue Nile and Tekeze-sub basins 	Most urgent
1.2. Devegetation	<ul style="list-style-type: none"> ▪ Reducing biomass using through creating alternative energy and construction materials, expanding hydro-power ▪ Afforestation 	<ul style="list-style-type: none"> ▪ Dissemination cooking stoves including photo voltaies ▪ Developing household fuel wood plantation ▪ Small and large scale hydro-power development 	Basin wide	Most urgent
1.3. Wetlands degradation	<ul style="list-style-type: none"> ▪ Alternative livelihood ▪ Irrigation development 	<ul style="list-style-type: none"> ▪ Awareness creation ▪ Wetland development and conservation policy and legislation ▪ Small scale irrigation 	Basin wide	Urgent
1.4. River bank and lakeshore degradation	<ul style="list-style-type: none"> ▪ Irrigation development in uplands ▪ Enforcement of laws 	<ul style="list-style-type: none"> ▪ Enhancing moisture in upland for dry season production ▪ Awareness creation ▪ Rain water harvesting ▪ Small scale dams and irrigation 	More emphasis in blue Nile and Tekeze sub basins	Most urgent
2. Loss of Biodiversity				
2.1. Loss of agricultural crop Biodiversity	<ul style="list-style-type: none"> ▪ Promote in situ conservation efforts ▪ Support ex-situ conservation efforts. ▪ Regulations and enforcement 	<ul style="list-style-type: none"> ▪ Supporting farmers and communities to promote in - situ conservation ▪ Undertake pilot project in situ conservation on endangered spp. ▪ Support farmers effort of botanical gardens development as ex-situ conservation 	Basin wide	Urgent

2.2. Loss of forest and other vegetation and aquatic life biodiversity	<ul style="list-style-type: none"> ▪ Alternative energy development ▪ Hydro - power development ▪ Range land development ▪ Formulation of laws for aquatic resources management 	<ul style="list-style-type: none"> ▪ Developing alternative energy ▪ Developing hydro-power ▪ Developing fuel-wood plantation ▪ Alternative livelihood ▪ Awareness creation 	Throughout the basin	very urgent
2.3. protected areas degradation	<ul style="list-style-type: none"> ▪ Enforcing regulations of protected areas ▪ Intensification of crop production In existing cropland ▪ Improving existing grazing lands and water supplies 	<ul style="list-style-type: none"> ▪ Awareness creation ▪ Alternative livelihood ▪ Controlling influx to protected areas including refugees ▪ Pastoral areas improvement ▪ Capacity building for parks management 	Throughout the basin	Very Urgent
2.4. Genetic erosion	<ul style="list-style-type: none"> ▪ Awareness creation 	<ul style="list-style-type: none"> ▪ Awareness creation 	Basin wide	Urgent
3.0. Drought and Desertification				
3.1. The effect of drought	<ul style="list-style-type: none"> ▪ Improving pastoral lands ▪ Maximizing perennial vegetation ▪ Off-farm activities ▪ Water harvesting ▪ Afforestation 	<ul style="list-style-type: none"> ▪ Irrigation development ▪ Afforestation ▪ Strengthening early warning system ▪ Water harvesting ▪ Strengthening preparedness ▪ Maximizing production in productive areas ▪ Off-farm activities 	Throughout the basin	Most urgent
3.2. Desertification	<ul style="list-style-type: none"> ▪ Improving soil moisture ▪ Improving land (vegetation) cover ▪ Improving pastoral grazing lands 	<ul style="list-style-type: none"> ▪ Irrigation development ▪ Maximizing drought resistant crop and vegetation spp. ▪ Awareness creation 	Emphasis in the low lands	Very Urgent
4.0. Water supply and sanitation				
4.1. Lack of potable water supply	<ul style="list-style-type: none"> ▪ Development of water supply infrastructure 	<ul style="list-style-type: none"> ▪ Construction of storage dams and pipe lines ▪ Springs and shallow wells development 	Throughout the basin	Most urgent
4.2. Lack of sanitation	<ul style="list-style-type: none"> ▪ Construction of sewerage disposal infrastructures ▪ Supply of adequate water in towns 	<ul style="list-style-type: none"> ▪ Sewerage lines construction ▪ Solid waste disposal systems and infrastructure development ▪ Awareness creation ▪ Low cost sanitation systems development 	Throughout the basin but more in towns	Urgent
5.0. Migration and settlement				

5.1. Migration	<ul style="list-style-type: none"> ▪ Influencing migrants direction to resource potential areas by - reversing hostile environment in low lands - Settling refugees in appropriate areas 	<ul style="list-style-type: none"> ▪ eradication of tropical diseases from low lands ▪ Investing in irrigation infrastructures in the low lands 	Gambela and Benshangul	Urgent
5.2. Settlement	<ul style="list-style-type: none"> ▪ Reversing the hostile environment in the low lands ▪ Creating planned settlement conditions 	<ul style="list-style-type: none"> ▪ Development of irrigation and sustainable water supply in the low lands ▪ Eradication of tropical diseases from the low lands 	Lowland in the basin	Urgent
6.0. Cross cutting issues	<ul style="list-style-type: none"> ▪ Information systems development and networking ▪ Capacity building 	<ul style="list-style-type: none"> ▪ Information systems development in implementing agencies ▪ Information networking between sectoral agencies, local regional governments and between riparian countries. ▪ Building the capacities of federal government offices and regional bureaus by provision of training and supply of essential materials ▪ Maximizing awareness creation work 	Basin wide	Very Urgent

Table 3: Major National Laws Relevant to Environment and Natural Resources Management in Ethiopia

No	Laws and Regulations	Government Agency Concerned
1	Forest resource conservation and development Proclamation 1968	Ministry of Agriculture (MOA)
2	Semien Mountain National Park establishment Proclamation 1969	Ministry of Agriculture
3	Wildlife Conservation Proclamation 1972	Ministry of Agriculture
4	Coffee Development and Marketing Proclamation 1978	Ministry of Agriculture and State Farm
5	Peasant association establishment Proclamation 1977	Regional Governments
6	Meteorological Service Proclamation 1980	Ministry of Water Resources
7	Ethiopian constitution Proclamation 1995	All Ministries and Regional Governments
8	Federal Ministries Establishment Proclamation 1995	All Ministries
9	Environmental Protection Authority Establishment Proclamation 1995	Environmental Protection Authority
10	National Regional Governments Establishment Proclamation 1995	National Regional Governments
11	Water Resources Utilization Proclamation 1994	Ministry of Water Resources
12	National Population Policy Proclamation 1993	Ministry of Planning and Economic Development
13	National Policy on Women Proclamation 1993	Prime Minister's Office

Table 4 Protected Areas in Nile Basin, Ethiopia

No	Protected Area	Size	Year declared	Major habitats and significant species	Impacts and conflicts	management	Global
1	Semein Mountain (Gonder)	179km ²	1969	<ul style="list-style-type: none"> • Afro-alpine vegetation to tropical forest tree species • Diversity of large animals and birds with significant endemic elements 	<ul style="list-style-type: none"> • Resource conflict between people and wildlife • Destruction of habitats and animals 	<ul style="list-style-type: none"> • Efforts are being made to protect both the habitat and wildlife • Further study is proposed to be conducted with support from GEF 	<ul style="list-style-type: none"> • Global Heritage site since 1978.
2	Dinder Wildlife area (Gonder)	Not defined	proposed	<ul style="list-style-type: none"> • Diverse vegetation spp • Diverse mammals • Diverse bird spp 	<ul style="list-style-type: none"> • Conflict between pastoral its and conservation • illegal hunting 	none	none
3	Alatish Wildlife area (Gonder)	Not defined	proposed	<ul style="list-style-type: none"> • Diverse vegetation spp • Divers mammal spp • Diverse bird spp 	<ul style="list-style-type: none"> • Illegal hunting • conflict between pastoral land use and wildlife conservation 	none	none
4	Upper Didessa wildlife area (Illubabour, Oromia)	Not defined	proposed	<ul style="list-style-type: none"> • Diverse vegetation spp. • Diverse large animals spp • Diverse bird spp 	<ul style="list-style-type: none"> • Resource use conflict between wildlife and people • anticipated Serious degradation of both habitat and wildlife 	<ul style="list-style-type: none"> • Protection efforts are being made • In-depth study is proposed. 	none
5	Gera/Sentena Protected forest (Jimma, Oromia)	1740 km ²	proposed	<ul style="list-style-type: none"> • Humid upland broad leaf forest spp. • Diverse under growing vegetation with certain endemism • Diverse bird spp • Coffee spp 	<ul style="list-style-type: none"> • Conflict between the resource use specially huge demand for the trees • Serious depletion of the tree species with possible loss of some endemic tree Spp 	<ul style="list-style-type: none"> • High effort being made to conserve and develop depleted spp. 	Endemic tree and coffee have global importance

Table 4 (cont...)

No	Protected Area	Size	Year declared	Major habitats and significant species	Impacts and conflicts	management	Global
6	Sigmo Goba protected forest (Jumma, Oromia)	2800 km ²	proposed	The same as Gera above	The same as above	The same as above	The same as above
7	Babia Fola protected forest (Jumma, Oromia)	Not defined	proposed	<ul style="list-style-type: none"> • High canopy tree spp. Very important for Coffee production and conservation • Some endemic tree spp. 	<ul style="list-style-type: none"> • Serious depletion to the tree spp. is anticipated due to high demand and low supply of tree resources 	High effort is being made to conserve and develop both the tree and Coffee resources	The same as above
8	Kamto protected forest (E. Wellega, Oromia)	Not defined	proposed	<ul style="list-style-type: none"> • Diverse tree and vegetation spp. with endemic vegetation • Diverse bird spp. 	<ul style="list-style-type: none"> • Conflict between conservation and utilization 	<ul style="list-style-type: none"> • A good Effort of conservation and development 	The same as above
9	11 different bird protection areas	Not defined	proposed	<ul style="list-style-type: none"> • Vegetation and forest habitats ranging from alpine moorland highland to lowland scrub land and riverine forest. • Marshland, wetlands and grasslands. 	<ul style="list-style-type: none"> • Potential threats of destruction of habitats either converting to other uses or depleting tree and vegetation resources 	<ul style="list-style-type: none"> • A lot of efforts are being made to protect the habitats • Management plans for most areas are being prepared 	Not well known yet
10	Chato protected forest (Wellega, Oromia)	Not defined	Proposed	<ul style="list-style-type: none"> • Diverse tree and vegetation spp. With high endemic elements • Diverse large animals • Diverse bird species 	<ul style="list-style-type: none"> • Potential encroachment for both settlement and pastoralism (heavy grazing) 	<ul style="list-style-type: none"> • Not enough action but being studied 	Endemic elements
11*	11 priority state forest protected areas (Amhara)	5211km ²	proposed	<ul style="list-style-type: none"> • Diverse tree and vegetation spp With substantial endemic elements • Diverse large wild animals • Diverse bird spp. 	<ul style="list-style-type: none"> • Most areas are heavily encroached 	<ul style="list-style-type: none"> • Efforts of protection are being made. • Areas are studied and Management plans are being prepared 	Endemic spp. Have global importance

Table 4 (cont...)

No	Protected Area	Size	Year declared	Major habitats and significant species	Impacts and conflicts	management	Global
12* *	26 regular state forest protection areas (Amhara)	183 km ²	proposed	<ul style="list-style-type: none"> • Forest tree spp. And under growing vegetation spp. • Diverse bird spp. 	<ul style="list-style-type: none"> • Heavy depletion of tree spp. And anticipated destruction of the vegetation as a whole 	<ul style="list-style-type: none"> • Not enough conservation actions • Areas are studied and Management plans are being prepared 	none
13	Dabus Valley controlled hunting area (Benshangul)	Not defined	proposed	<ul style="list-style-type: none"> • Diverse forest tree and vegetation spp. • Large animal spp. • Diverse bird spp. • Endemic spp. of both vegetation and birds 	<ul style="list-style-type: none"> • The areas are seriously encroached • Serious depletion to vegetation and large animals is anticipated. 	<ul style="list-style-type: none"> • Not enough effort have been further study being conducted with support form GEF. 	Endemic species have global importance
14	Gambella National park	5061Km ²	Proposed	<ul style="list-style-type: none"> • Diverse vegetation spp • Diverse terrestrial and aquatic life • High endemic elements of both animals and vegetation 	<ul style="list-style-type: none"> • Conflict between resources abstraction and conservation 	<ul style="list-style-type: none"> • The area is studied as protected wildlife area 	<ul style="list-style-type: none"> • Endemic elements • Tourism potential
15	Mesengo protected forest (Gambella)	4760Km ²	Proposed	<ul style="list-style-type: none"> • Diverse tropical vegetation and rich endemic elements 	<ul style="list-style-type: none"> • Conflict between refugees from Sudan and wildlife 	<ul style="list-style-type: none"> • Efforts are being made to protect the areas to keep refugees out of the protected areas 	Endemic elements
16	Akoba Goa protected forest (Gambella)	5227Km ²	Proposed	<ul style="list-style-type: none"> • Diverse mammal and bird spp 	<ul style="list-style-type: none"> • Conflict between resource use and conservation specially refugees settlement in the forest areas. 	<ul style="list-style-type: none"> • 	

* All, in the category, have with similar nature and conservation purposes

** All, in the category, have similar resources, problems and

Table 5 Environment related International Conventions/Agreements to which Ethiopia is a Party

Convention	Signature	Ratification	Accession
Convention on Biological Diversity (1992)	*	*	
United Nations Framework Convention on Climate Change 1992	*	*	
International Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification particularly in Africa (1994)	*	*	
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)	*	*	
Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)			
Convention Concerning the Protection of the World Cultural Heritage (1972)	*	*	
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (1971)			
Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (1991)	*	*	
Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora (1994)	*	*	

Table 6 Recent, Current and Planned Environmental Initiatives, Programmes and Projects in Ethiopia

Programme/Project	Period	Budget US\$	Implementing Agency
Conservation Strategy for Ethiopia (CSE) project	Ten years (1989-to date)	500,000	NORAD/IUCN and Environmental Protection Authority (EPA)
Regional Conservation Strategy Projects	Five years (1994-1999)	1.5 million	NORAD/IUCN and National Regional Governments with the Technical Support from EPA
National Action Programme (NAP)	Three years (1997-1999)	325,000	UNDP/UNSO and EPA
Ecological Sustainable Industrial Development Project	Three years (2000-2002)	1.5 million	Netherlands Government/UNIDO and EPA
National Bio-diversity Strategy and Action Plan Project	Three years (2000-2002)	406,930	GEF and Institute for Bio-diversity Conservation and Research (IBCR)
Bird Life Project	Three years (2000-2002)	215,000	GEF and Ethiopian Wildlife and natural History NGO (EVLNHS)

Annex 2

The key consulted stakeholders in the consultation process include:-

- I. Government Organizations: water Resources, Agriculture, Environment, IBCR, Mines and Energy Conservation Strategy Projects, Wildlife Conservation Organization, Transport and Communications, and local Government institutions.
- II. NGOs (International and Local) and CBOs dealing with natural resources environment management, water supply and sanitation. Some these NGOs include:
 - EWNHS
 - CRDA
 - SC-Sweden
 - SC-UU
 - HUNDEE
 - Ethiopian Aid
 - CISP
 - JACH
 - ASE
 - OXFAM-GB
 - EENGO
 - CARE - Ethiopia
- III Development partners/donors with programmes and projects in the basin like UNDP, SIDA and GTZ.
- IV. Research institutions like Ethiopian forestry research, biodiversity research and Addis Ababa University Flora Research project
- V. TAC of the Nile Basin Initiative Shared Vision Programme in Ethiopia: Dr. Mohammed Hagos, was consulted.
- VI. Technical advise and editing were provided by Ato Gedion Asfaw, IUCN Technical Advisor Conservation Strategy of Ethiopia, Phase III Project.
- VII. Key Peoples
 1. Dr. Tewelde Brhan Gebere Egziabher -General Manager, EP
 2. Ato Gedion Asfaw, Advisor, Conservation Strategy of Ethiopia
 3. Ato Worku Damena, Head Policy and Legislation Department of EPA
 4. Ato Girima Hailu, Dupty Representative UNDP Country Programme
 5. Ato Deselegne Mesfin
 6. Dr. Mohammed Hagos, Chief Engineer, Ministry of Water Resources

7. Ato Getachew Eshete, Senior Forester and A/Head of Administration and Finance, EPA
8. Ato Kifle Lemma
9. Ato Tesfay Hundessa, General Manager of Ethiopian Wildlife Conservation Organization
10. Dr. Abebe Demissie, General Manager of the Institute for Biodiversity Conservation and Research
11. Ato Abay Asefa - Manager, Ethiopian Wildlife and Natural History Society
12. Ato Lakew Desta - Team Leader of Natural Resources Management in Amhara National Regional Government
13. Ato Yonis Berkele, Partnership Coordinator, CARE - Ethiopia
14. Ato Akalewold Bantirgu, NGOs Networking Coordinator, CRDA
15. Ato Zegeye Asfaw, General Manager of HUNDEE local NGO
16. Ato Assefa Addisu, Programme Coordinator of CISP, NGO
17. Ato Akalewold Shewaken - Coordinator of SC- UU NGO
18. Ato Bekele Hambissa, Executive Director of the EENGO
19. Ato Hossaena Adin, Project Coordinator of the SC-Seweden
20. Ato Yeshiwas Belul, Executive Director of the Ethiopian Aid NGO
21. Ato Hailu Tefera, Programme Officer of the JACH NGO
22. Metselal Abrha, Programme Monitoring and Evaluation Senior Expert in the ASE NGO
23. Ato Regassa Feyissa, Institute for Biodiversity Conservation and Research
24. W/o Alemtehay Wolde-Ab Environmental Impact Assessment Section, EPA
25. Dr. Aynalem Abebe, Pollution and Hazardous Waste Control Section, EPA
26. Ato Gashaw Gebre, Regional Environmental Coordination Section EPA
27. Ato Keykun Abune, Ethiopias Wildlife Management Team Leader, EWCO
28. W/o Mebrate Alem, Fishery Development and Conservation Expert, MOA
29. Ato Shimelis Fekadu, Plan and Program Division, EPA
30. Ato Ermias Haile, Ecosystem Study Section, EPA
31. Ato Brhanu Tekalgne, Environmental Impact Assessment Section, EPA
32. Ato Kidane Mengistu, Natural Resources Management, MOA
33. Ato Legesse Gebre Meskel, Ecosystem Study Section, EPA
34. Ato Mohammed Ali, Pollution and Hazardous Waste Control Section, EPA
35. Ato Melis Teka, Ecosystem Study Section, EPA
36. Ato Gosaye Mangistie, Ministry of Mines and Energy
37. Ato Betru Nedessa, Coordinator of WPF Programme, MOA
38. Ato Daniel Danano, Soil and Water Conservation Senior Expert, MOA
39. Ato Tadele Biratu, Soil and Water Conservation Senior Expert, MOA
40. Ato Berhanu Solomon, Environmental Education and Training Division, EPA
41. Ato Tequam TesfaMariam, Ecologically Sustainable Industrial Project Advisor, UNIDO

Annex 3

Key References and Sources

1. BCEOM, 1996 and 1997 Abbay River Basin Integrated Development Master Plan Project, Phase 1 and 2 Volume I-III.
2. CSE, 1997 Conservation Strategy of Ethiopia, Volume I-IV
3. EFAP, 1994 Ethiopian Forestry Action Programme, Volume I-III
4. EPA, 1997 Environmental Policy
5. EPA, 1997 Environmental Impact Assessment Guideline Volume I-IV
6. EPA, 1998 National Action Programme To Combat Desertification, Volume I-III
7. EWNHS, 1996 Important Bird areas of Ethiopia, A first Inventory - Ethiopia Wildlife and Natural History Society (NGO) with Bird Life International, Addis Ababa.
8. FAO/UNESCO, 1988 Soils Map of the World
9. NEDECO, 1999 Tekeze River Basin Integrated Development Master Plan Project, Volume I-III, Netherlands Engineering Consultants
10. RCS, 1997 Regional Conservation Strategies for Amhara; Tigray; Oromia; Southern Nations, Nationalities and Peoples; Gambella,; and Benshangul-Gumuz regions, Volume I-III each.
11. TAMS, 1999. Baro Akobo River Basin Integrated Development Master Plan Project, ULG Consultants Limited Volume I-III.