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Wetland Degradation in Ethiopia: Causes, Consequences and Remedies

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Abstract
Ethiopia owns more than 58 different types of wetlands which provide enormous socio-economic and environmental values. Despite all those and other indispensable values, these wetlands are under severe pressure and degradation. Due to improper extraction of uses and misconceptions forwarded to wetlands, the health of the wetlands is continuously decreasing from time to time that in doubt their existence in the near future. Traditional and modern agricultural expansions, continuous land degradations, urbanizations and industrializations, lack of policies and institutional arrangements, lack of capacities, natural and ecological problems are the most dominant challenging factors of wetlands in the country. Malnutrition of children, extra loads on women and poor, absence of medicinal plants (healers), lack of water and forage, health problems and lack of recreational areas are the dominant consequences seen in parts of Ethiopia where wetlands get lost. As Ethiopia is prone to desertification and recurrent drought, the effects of wetland loss could be more visible in complicating the situation locally. In order to reverse these emerging problems and conserve these fragile but crucial wetlands, integrated problem solving approach through realizing the collaboration of relevant stakeholders from policy level down to grassroots community is indispensible opportunity to Ethiopian wetlands.
Key words: Wetland, Challenge, Opportunity

1.Introduction

More than 50 stakeholder interest biased definition and assumptions have been given to wetlands (Smith 1995). But, an international meeting held in Iran, Ramsar in 1971, has developed broadest and most international definition. Accordingly, Wetlands are: "Areas of marsh, fen, and peat land, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters" (RCB 1997). This definition has been found more holistic in types and forms and has got worldwide recognition and acceptance.

As per the Ramsar 1971 definition, Ethiopia owns different types of wetlands which provide enormous socioeconomic and environmental values and that attracts a number of users that benefit the local community directly or indirectly. They are source of water, food, feed, medicinal plants and other income generating activities for the rural community. They are vital in attracting tourists and providing ground for cultural ceremonies (Finlayson and Moser 1991). They also contribute for environmental wellbeing through recharging and discharging underground water, hosting biological diversity, sequestering carbon, mitigating flood hazards etc. In general, Wetland resources contribute billions of birr to people of Ethiopia every year in the form of clean water, pure air, soil formation and protection, crop pest control, and provision of food, fish, fuel, fiber, medicine, recreation, tourism, etc.

Despite all those and other values, Ethiopian wetlands are under severe pressure and degradation. Due to improper extraction of uses and misconceptions forwarded to wetlands, the health of the wetlands is continuously decreasing from time to time that in doubt their existence in the near future (Zerihun 2003; Yilma 2003). The values and services from wetland are decreasing from time to time. In order to develop and assure their continuity for the future, cost should be paid to understand the dilemmas that they face and in identifying the good practices which should be strengthened. The intention of this review is therefore to summarize the threats/challenges of Ethiopian wetlands that doubt their continuity, identifying the possible consequences and the possible strategies that can be opportunity in reducing these threats.

2. Wetlands potential in Ethiopian

2.1 Distribution

Ethiopia is a country located between the coordinates of 3 - 15º N Latitude and 33 - 48º E longitude. Its areal coverage is estimated to be 1,127,000 km^2 of which some 7,444 km^2 is covered by water (Leykun 2003). Climate is the function of the latitude, altitude, angle of the sun, distance from oceans or other water bodies, terrain and the like. Thus, diverse climatic conditions in Ethiopia are the result of the combination of the stated factors. This diverse climatic condition together with the terrain and physical characteristics in turn also involve in hydrological aspect of Ethiopia (UNESCO-WWAP 2004). The very high variability exhibited by the climate components of the country over time and space is the main reason behind the spatial and temporal variability in the availability of water and so to wetlands.

Detailed inventory of the wetland resource base of Ethiopia is not yet carried out. Hence, the type and inventory of Ethiopian wetlands are not fully documented. However, based on scattered information, wetlands are estimated to cover about 1.14 - 2% of the total land mass of the country (Hillman and Abebe 1993; EPA 2004). Tesfaye (1990) listed 58 major lakes and marshes in Ethiopia. Hillman (1993) listed a total of 77 wetlands in Ethiopia and Eritrea, together with their locations. Ethiopian wetlands are distributed in different parts of the country almost in all ecological zones. The Dallol depression which is located at about 110m below sea level flourishes with wetlands such as Lake Afdera (salty lake). Swamps, lakes and reverine ecosystems are also distributed in central highlands, rift valley areas and mainly in the southwest borders of the country. In general, the southwest and western parts of the country are wetter than the southeast, east and north.

2.2 Characterization and classification

Wetlands characteristics are very heterogeneous spatially and temporally. They vary from the dry season to wet season. They are also variable from place to place based on topography and climate. This made wetland study very difficult and complex. But, heterogeneity mostly minimized after classification based on criteria. Thus, different method of classification is used. From these, feature based classification is the one which is commonly used. For example, based on Origin (natural and artificial), Hydrology (precipitation source, ground water source, surface flow source), seasonally (temporary & permanent), vegetation (trees and shrubs or by reeds, grasses, sedges and mosses), salinity (saline & freshwater), pH (neutral & acidic) and soil (mineral or organic) are some of the commonly used criteria for wetland classification globally. The Ramsar Convention classified all wet lands in to five major wetland systems (RCB 1997), while others identify up to seven main groupings (Dugan 1990; Roggeri 1995). These forms are also further divided into more than 30 sub-divisions and nine man-made ones classified according to physical, chemical or biological characteristics. The major Ramsar groupings are Marine (coastal wetlands), Estuarine (deltas, tidal marshes, and mangroves), Lacustrine (lakes and associated wetlands), Riverine (rivers, streams and associated wetlands) and Palustrine (marshes, swamps and bogs).

Accordingly, various attempts have been made to classify the Ethiopian wetlands using different criteria. For instance, FAO land use map of 1984 identifies only two types of wetlands: Swamps & Marshes. But, with the exception of coastal and marine-related wetlands and extensive swamp-forest complexes, all forms of wetlands are available in Ethiopia (IUCN 1996; Tilahun *et al*. 1996; Leykun 2003). These include alpine formations, Riverine, Lacustrine, Palustrine and floodplain wetlands. Ethiopian wetlands can also be classified according to biomes (macro level). They can be grouped into different categories based on ecological zones, hydrological functions, geomorphologic formations and climatic conditions. These categories interlink to form four major biomes, which also describe climatic conditions in Ethiopia. These biomes are the Afro-tropical Highlands, the Somali- Masai, the Sudan-Guinea and the Sahelian Transition Zone groups (Tilahun *et al.* 1996; Leykun 2003).

3. Challenges of Ethiopian wetlands

Ethiopia is often referred to as the water tower of Africa mainly because of its wide variety of landforms and climatic conditions, creating an extensive wetland system throughout the country. Generally, wetland ecosystem values range from tangible subsistence uses and direct benefits to intangible goods and services and the fulfillment of human needs. The indirect uses of wetlands are their hydrological and ecological functions, which support various economic activities, life support systems and human welfare. This includes ground water recharge, flood control, nutrient cycling, erosion control and sediment traps, climate regulation, habitats for migratory wildlife and pest control (Dugan 1990). The direct use also includes fishing, fiber production, water supply, recreational opportunities and increase tourism.

While wetlands are the most productive ecosystems on earth; they are also the most threatened. Wetland destruction and alteration has been and is still seen as an advanced mode of development, even at the government level. This indicate that wetlands and their value remain little understood. Another important reason for their vulnerability is the fact that they are dynamic systems undergoing continual change. As a result, many wetlands are temporary features that disappear, reappear and re-create themselves over time (Barbier *et al*. 1997). (Matthew *et al*. 2006) summarized stating it 'most acute trade-off between environmental protection and development resulted from dynamism and complexity of wetlands'. Though wetlands face number of threats from natural factors globally, most of the threats are resulted from the directly or indirectly human interaction with the wetlands. Dugan (1990) claims that 65% of wetland disturbances are of human origin, while the remainder have natural origins. Out of these human origin disturbances 73% are thought to result from direct human actions, while the remaining 27% are believed to come from indirect sources. Ethiopian wet lands could not be different from this truth. Like in the other African countries, most of the threats in Ethiopian wetlands are result of the direct and/ or indirect un-healthy human interactions. Natural factors area also coming importantly influencing factors.

3.1 Improper agricultural practices and expansions

The debate about the future of wetlands tends to divide between those seeking to develop these areas for agricultural production (crop producers and livestock rarer) and those who believe that wetlands must be

preserved as much as possible in a stable state to maintain their ecological contributions to the ecological system (Ecologists). The perception of the premier extends up to assuming wetlands as west lands. In concentrating on the first big argument, it is very serious issue especially in developing countries that dominate the balance of debate. Accordingly, converting to agricultural land is better than keeping the wet lands and gaining their values. The flat topography, fertile soil and reliable providing of water at dry season etc. of wetlands are some the attracting factors.

In Ethiopia, the debate is between consequences on one side and the government and the farmers on the other side. The government and farmers are in need of converting the wetlands in order to gain more products at a time. The high lands of south west Ethiopia (Illubabur) and swamps of Awash valley are good examples on where the government and farmers are engaged in producing more than seeing sustainable use of the resources (Dixon 2002; Dixon and Wood 2007). In Illubabur zone, south west Ethiopia, where many and extended wetlands are found there was no act of cultivation around the periphery of the wetlands before the entrance of 20 century (Hailu 1998). But, in the years 1911-1918, wetland cultivation has extended beyond the use of wetland margins to include much larger areas. Nowadays the complete drainage and cultivation of wetlands becomes common phenomena throughout the area (Hailu 1998; Dixon and Wood 2007). For instance, approximately one third of the total valley bottom wetland area has come under cultivation for growing food crops during the Dergue Regime only 1974 - 1983 (Hailu 1998). More severely from this approximately 20% of the total wetlands in Illubabur have been cultivated each year between 1986 and 1998 and this intensity increased to 35 % in 1999 (Afework 2003). This may enable to extract adequate wealth to the owner of the converted land and to wealthy households. But, it undermines the majorities' benefits of these area which could be obtained had it been used and managed in different ways.

In case of the central rift valley river basin encompassing Lake Zway, Lake Abyata and Lake Langano, forms a complex and vulnerable hydrological system with unique ecological characteristics. Recently, the area with irrigated agriculture comprising both open-field horticulture smallholders and large scale greenhouse growers has expanded rapidly. These subsistent and large scale farming practices in the basin of Hawassa and Zway wetlands for example are disturbing the respective wetlands (Hengsdijk *et al*. 2008). Especially, since the large scale farming cites are very close to the lakes, they easily diffuse the various agro-chemicals (pesticides, herbicides, fungicides and fertilizers) to the nearby wetlands and terrestrial areas which can be easily drained to wetlands.

Eucalyptus, banana, sugarcane and 'chatt' cultivation on the periphery of the wetlands and 'teff' cropping in the wetlands has been identified as a threat for the survival of wetlands in Ethiopia. Moreover grazing by domestic stocks has also been identified as threats of wetlands. When grazing follow continuous cultivation wetlands easily become degraded and loss their natural characteristics. Livestock trample the soil and compact it and their grazing destroys natural vegetation. They erode drainage channels leading to gullies and increase water out flow. These effects often result complete degradations of wetlands by reducing the water table and by changing the original vegetations.

In summary, complete conversion and modification of wetlands to cultivated land, improper citation of large scale farming systems, improper farming methods and poor tillage systems, and planting more water requiring perennial crops and plants are some of the agriculture related threats of Ethiopian wetlands.

3.2 Continuous Land degradation

In Ethiopia, there is rapid LULC change especially the conversion of natural forests to cultivated land and grazing lands hold the widest part. Food and agricultural organization of the United Nations (FAO 2005) illustrated that, in the year between 1990–2000 the total natural forest cover of the country has decreased by 9% with the estimated rate of 40,000ha per year while plantation has been increased only by 1%. Whatever the size of historical forest cover, it has now dwindled to less than 3% through long historical process (Pohjonen & Pukkala 1990). The change in LULC can change the hydrological pattern of runoff, reduce infiltration and disturb the stream flow (Selamyehun & Tekalegn 2003). It also has paramount effect the stability of soils. These problems and like add up to the general problem called land degradation.

Wetlands are not isolated entities in the environment. They exist in close interaction with all other ecosystem components in the landscape. Thus, they are part of ecosystem process and share problems that occur in a watershed in their surroundings. Wetlands in degraded area can share biological, chemical and physical problems. For example, if the vegetation covers of a catchment drain to a wetland decline, sediment loads will be increased. This can also alter the biological chemical and physical features of wetlands and then this in turn modifies species composition, distribution, abundance and the activities of organisms that rely on these aquatic ecosystems (Abebe and Geheb 2003). For example, among wetlands which have been converted to dry lands due to siltation and unregulated water abstraction is Lake Alemaya so that the wetlands which were associated with it (EWNRA 2008).

3.3 Urbanizations and Industrialization

The importance of water for urban construction and dwellers is indispensable. They are not only source of water,

but also provide many economic, social and environmental services (Dugan 1993). Accordingly, considerable numbers of Ethiopian wetlands are near rural towns and cities, where business activities are expanding in many sectors. To mention some of these lakes and wetlands Tana, Hawassa and Zuway are a few. These wetlands near urban are suffering negative consequences from the expanding sectors sources (e.g. hotels, health centers, households and factories). For instance, the amount of solid and liquid wastes generated by different sources is increasing in size and composition. This is more severe as most of the wastes from developing societies are organic, although toxic inorganic and pathogenic wastes are not absent (Lardinois and Klundert 1993). Organic waste loading in such systems affect different ecosystem elements, including biological resources (Cunningham and Saigo 1995; Miller 1995).

Industrial centers of Ethiopia such as Addis Ababa, Mojo, Akaki, Hawassa and Bahir Dar are good example in sourcing different solid and liquid effluents to their respective nearby wetlands (EWNRA 2008). The illegal settlements in and around wetlands also affect the health and size of the wetlands significantly. Most of the problems from urban to wet lands in Ethiopia are related to the absence of systems that collect and manage solid and liquid wastes (Abebe and Geheb 2003).

3.4 Absence of appropriate policy

In Ethiopia, Wetland touching concepts is incorporated in different policies and strategies. For instance, in Ethiopian water resources, in agriculture and environmental policies. The Conservation Strategy of Ethiopia, which forms the basis for the Environmental Policy of the country, has also mentioned wetland-related issues. Unlike the national environmental strategy, the Gambella region's Conservation Strategy contains a separate section devoted to wetlands. But, Ethiopia lacks a specified policy to wetlands that enshrines wetlands of the land from deleterious actions that affect their contribution to the national development (Tietenberg 1994).

The absence of separate policy to wetland added to poor implementation of policy can let the wetlands under pressure. Though the government has expressed its promise to protect the environment in different policy documents such as the Constitution and Environment policy, various competing national priorities such as expansion of agricultural areas to increase food production, resettlement of landless people and investment activities in wetland areas are accelerating wetland loss in different areas (Abebe and Geheb 2003). Strategy documents that favor irrigation agriculture at the expense of wetland ecosystems including agricultural and water sector forward ideas with harmful implications to the wise use of wetlands. These documents encourage draining and conversion of wetlands into other forms of land use particularly for improving agricultural yield. Wetland issues are also inadequately mentioned in the Water Resource Management Policy (WRMP). It does not show the significance of wetlands such as swamps and floodplains in the development of water resources. The Environmental Policy in its general aim of protecting the environment highlights only the importance of wetlands for water resources management.

3.5 Lack of Institutional Arrangement

As wetlands are source of water, biodiversity and related resources, they attract a number of stakeholders that deal directly or indirectly. There is a need for a coordinator that harmonizes the relationship among the stakeholders and sets better management of wetlands. However, in Ethiopia different stakeholders, local communities, governmental and non-governmental organizations use wetlands in uncoordinated manner and this approach is affecting the vigor of wetlands and speeding up their degradation (Tietenberg 1994). As a result, wise use of wetlands has not yet given proper attention and priority.

Different users view wetlands from their own perspective and institutional objective (Smith 1995). For instance, agriculturalists see moist fertile soil with vast potential for growing grain; fishery managers find a support base for producing fish; hydrologists calculate capacities to provide water for industry, agriculture, and domestic use; public health specialists may see them as regulators of water quality or in contrary as transmitters of diseases such as malaria; and so on. Investment in wetland management is rarely integrated. Instead, wetlands are invariably viewed by each user as single-product systems, precluding other values, while single-purpose returns fall far short of expectations. The absence of an institution duly empowered to issue and implement wetland laws and coordinate management activities is the underlying cause for the deterioration of the wetlands of Ethiopia.

3.6 Capacity shortage

Wetland management in Ethiopia also suffers from capacity limitations such as lack of skilled manpower, finance and technology. Wetland focused training programmes are very scarce in higher learning institutions of the country. Programmes are not implemented to fill this gap nationally. As a result there is shortage of wetland specialists. There is also awareness problem from grassroots up to decision maker level. The scarcity of wetland focused institutions and weak relation of the country to wetland affiliated global institutions such as the Ramsar Secretariat has hampered its capacity building opportunities.

3.7 Natural and Ecological problems

Climate change and recurrent droughts are threats to wetland ecosystems of the country (EWNRA 2008; Matthew *et al*. 2006). An increase in temperature due to global warming is generally affecting wetlands and other ecosystems. Such phenomena adversely affect hydrological cycles, which in turn affect the biodiversity

resources and various services of wetlands. During recurrent drought and dry times, the pressures on wetlands are very serious, as they are the only major sources of water, fodder, and crop production, and save lives of humans, livestock and wild biodiversity. Though they have their own beauties and various advantages, rugged terrains and mountains of the country have their own contribution, especially in enhancing soil erosion and runoff agrochemicals into the wetland ecosystems and contributing to eutrophication and siltation of wetlands (Dereje 2003).

The incidental and intentional introduction of invasive alien species is another emerging issue severely affecting the wetlands of the country. Some of the world's worst invasive species, which are threatening Ethiopia's wetlands, include *Mimosa pigra* in the Baro-Akobo Basin, and *Eichhornia crassipes* in Koka and Abasamuael reservoirs and in Baro-Akobo Basin. M. pigra is aggressively invading wetlands and other areas in the Baro-Akobo Basin, threatening fishing, grazing and other agricultural activities by forming impenetrable thickets and hindering movements of humans and animals, and destroying and replacing natural biodiversity. E. crassipes disrupts hydropower generation (e.g. Koka dam), increases siltation and evapo-transpiration, reduces fish stocks, impairs water transport and fishing activities, and reduce water quality (Dereje 2003).

4. Consequences of wetland losses in Ethiopia

To consider the impact of wetland loss on local community, there are good examples of wetlands which are already lost (Haromaya Lake) and in loss such as Abijata and Cheffa (EWNRA 2008). Moreover considering the rapid conversion of the Illubabur wetlands is also very important. Bringing these wetlands in to mind, the communities dependent on these wetlands for fisheries, dry season food crops, raw materials for construction, water, feed for animals, medicinal plants, income from sale of the products including handicraft, have lost or is in loss of the stated uses. For example, the conversion of wetlands in Illubabur (south western Ethiopia) is a means to loss the natural sedge (which is collected for roofing), drying of about 150 springs causing extra loads to women and poor , loss the use that medicinal healers gained from medicinal plants collection (Fricker 1999 ; Wood 1996). Considerable health problems like malnutrition of children also reported for this area due to the complete conversion of the wetlands (Abebe and Geheb 2003). Thus, at community level since the significance of wetlands in poverty reduction and ensuring food security is immense, their losses cause starvation. Since wetlands are sources of water and forage for livestock at dry season, it is major asset next to land in agricultural areas and may be asset number one in pastoral communities (Wood, 1996) which will be absent due to the degradation and complete loss of wetlands.

The consequence of wetland loss extends to aggravating climatic disturbances by increasing carbon build up in the atmosphere and biodiversity loss (Abebe and Geheb 2003; EWNRA 2008). As Ethiopia is prone to desertification and recurrent drought, the effects of wetland loss could be more visible in complicating the situation locally. It can also affect hydrological cycle or rainfall patterns. Rivers and streams may lose their strength. This will create shortage of water and narrow opportunities for irrigation based agriculture. Wetlands are prominent shelter of aquatic and terrestrial biodiversity. Endemic fishes, birds and other life forms depend on wetlands. Hence, the loss of these wetlands is devastating to several endemic species and particularly to wetland dependent species.

5. Threat reducing opportunities

The question raised after discussing wetland degradation and its consequences is how can minimize the extent of degradation. No doubt at all that the wetlands of Ethiopia are facing degradation. At the same time, efforts to assure the health and normal functioning of this ecosystem are negligible. So, this section considers ways in which to reverse existing damaging trends and to improve the situation. As discussed in detail in the above sections, the underlying causes of wetland degradation and loss are multi-dimensional and interwoven. It leads to various consequences of high cost to the society and the environment. But, the problems usually receive less attention. Furthermore, due to the current socio-economic and political status of the country, addressing wetland issues in Ethiopia is a way behind and needs to be of high priority in the conservation agenda of the country. In spite of the complexity and multifaceted nature of the problems, however, there is no quick and one-off solution to redress the threats being faced to wetlands. Even, comprehensive study is not yet done Ethiopian wetlands. Nevertheless, there are studies done here and there recommending what and how if we do is an opportunity to wetlands in Ethiopia.

5.1 Building knowledge and awareness about wetlands

To manage wetlands effectively and make an informed and sound decisions that improve the livelihoods of local people dependent on wetland areas while safeguarding wetland functions, values and attributes (including biodiversity), it is necessary to have adequate knowledge of their status and functioning. In this regard, it is of high priority to assess, carry out national inventory of wetlands and compile a National Directory of Wetlands. A strong information database on wetlands, which is currently almost non-existent in Ethiopia (Mengistu 2008), is a vital basis for achieving objectives related with conservation and wise use of wetlands. Moreover, the data are

of paramount importance for monitoring purposes, to assess status, determine trends and define conservation priorities for each wetland. In addition, the information helps to facilitate determination of impacts of new development plans and land use practices, thereby avoiding and minimizing wetland threats. The desired information on wetlands can be attained through resource base assessment, which involves survey, inventory, compilation of national directory of wetlands and construction of updatable computer database.

Not only relevant information, but also knowledge and awareness on wetlands, are lacking in Ethiopia at all levels (Mengistu 2008). This knowledge gap needs to be bridged through dissemination of information and data on wetlands to the public at large, as increasing of public awareness is one of the most important ways to conserve wetlands. This objective can be achieved through a series of public awareness raising campaigns, which include: a) production and distribution of awareness raising materials (posters, flyers, fact sheets, booklets), b) making use of mass media to put out features on wetlands, c) a series of awareness raising seminars and workshops on identified knowledge gaps, d) promotion of environmental education and f) establishment of wetland clubs/support groups (Eshete 2008; Mengistu 2008). The training and education programs can be geared to wetland policies, legislation and regulation, community empowerment, pollution control, initiatives related to climate change, invasive alien species control, threatened species conservation, and programmes on adaptive management of ecosystems in response to a changing environment. Furthermore, the value and role of indigenous knowledge/practices should not be left out when setting up awareness, advocacy and capacity building programmes. Ages of accumulated knowledge systems on the perceptions and management of wetlands have to be tapped in from the ones using them rather than the other way around (Tilahun *et al*. 1996; Leykun 2003; Mengistu 2008).

5.2 Impact assessments and Continuous Monitoring of Wetlands

This entails putting in place and implementing detailed environmental impact assessments (EIAs) before any form of development (e.g. draining, damming, diversion or using for irrigation) occurs in wetland areas to ensure that the new modification will not bring hazardous consequences on the wetlands and the wider ecology of a given area (Mengistu 2008;Tsion 2008). It also involves implementing integrated management plans covering every aspect of the wetlands and their relationships with their catchments. There is a need to put wetland habitats high on the agenda of list of conservation areas that require priority in terms of impact assessment.

Monitoring is the process of measuring changes in ecological character in any wetland over a period of time. It addresses both the issue of wetland integrity, i.e. change in wetland area, and change in wetland quality. This includes assessment of changes in biodiversity, physical and chemical properties of wetlands, water quality, and social activities around wetlands and considers if there are any new development plans that will potentially affect the wetlands. It is only through monitoring programmes that the extent and causes of loss and degradation of wetlands can be determined, and the success of conservation actions be measured. It can be carried out at different levels of intensity, depending on available funding and/or technology (Mengistu 2008). Monitoring methods include simple field observations, remote sensing, quantitative sampling techniques such as annual counting of birds, and, where changes in social values and uses are concerned, participatory observation. This activity is envisaged to take place at least at selected priority wetlands.

5.4 Building partnerships with stakeholders

Some of the many stakeholders of Ethiopian wetlands are Ministry of Agriculture, Ministry of Water Resources, Environmental Protection Authority, Biodiversity Institute, Ethiopian Agricultural Research Organization and the Ethiopian Wildlife Conservation Organization and the Regional States. This would demonstrate the recognition of multi-sectoral interest in wetlands. These many stakeholders would have been an opportunity to wetlands conservation if they were work jointly.

The joint collaborative work among the concerned institutions and stakeholders is extremely vital in coming up with robust and holistic wetland management approach that supports a more natural, healthy ecosystem - one which is cost-efficient and secure - for people, businesses and wildlife. For example, experience has shown that seizing land from the people and setting aside a conventional protected area is not workable (EWNRA 2008). It has to be underlined that local communities are the most important stakeholders when it comes to sustainable utilization of wetlands. A new partnership, which must involve and directly benefit the local people who live in the wetlands is required if we are to conserve wetlands. Many advantages and synergies can be achieved because of working in partnership with all concerned stakeholders.

5.5 Monitoring of upstream-downstream user relations

Uncontrolled exploitation of a wetland that is the source of a river or other forms of water at upstream causes a serious problem to the people using it downstream (Zerihun 2003 ; Yilma 2003). Excessive consumptive use or pollution of water by upstream users may deprive the downstream users of their legitimate use of the shared resource. Therefore, upstream users must recognize the legitimate demands of downstream users to share the available water resources. This clearly implies that dialogue or conflict resolution mechanisms are needed in order to reconcile the needs of upstream and downstream users. To this end, any initiatives and development plans should take the linkages between upstream and downstream users of water into account so that the

activities will not lead to disastrous consequences.

5.6 Fostering Political Conviction (Policy)

Successful wetland conservation in Ethiopia is being challenged by absence of Wetland Policy and lack of suitable legislative frameworks as a result of insufficient political conviction to formalize wetland conservation (Abebe and Geheb 2003). Such a policy and political convections would need to be able to cope with the multiple functions of wetlands, and ensure into which wetlands are integrally managed. In addition, the policy would need to be able to deal with the multiple uses of wetlands, such as grazing, rain-fed agriculture, irrigated agriculture, conservation, recreation etc (EWNRA 2008). There is a need, therefore, to develop a National Wetlands Policy as an important integral part of Ethiopia's Land Use Policy.

In addition to the national policy, government is urged to ratify the Ramsar Convention on Wetlands, of which the country is signatory for the latter. Most importantly, priority should be given to designate at least one wetland for inclusion in the list of wetlands of international importance, promote the wise use of wetlands and create wetland reserves, as per the requirement of Ramsar Convention.

5.7 Prioritization and management plans for wetlands

Undertaking a prioritization process through consultation and full involvement of all concerned stakeholders to identify wetlands that need immediate conservation actions is important. The process helps to target limited resources or options for conservation to those wetlands in most urgent need of conservation attention. Once priority wetlands for immediate conservation actions are identified, there is a need to prepare management plans for each of the priority wetlands. This can be learnt from two wetlands, namely Berga Flood Plain (Mengistu 2000) and Abijata-Shalla Lakes National Park (Yilma 2003) for which action plan is already prepared.

6. Conclusion

Wetlands are distinctive ecosystem in between aquatic and terrestrial ecosystems or are transitional zone ecosystems between dry land and open water body. Accordingly, Ethiopia owns different types of wetlands which have national, regional as well as global ecological and socio economic significances. In spite of all their indispensable functions and values, these wetlands are in the rapid crisis of deterioration due to neglect and unplanned and skewed development needs and priorities. Consequently, wetlands are ranked amongst the most highly threatened ecosystems in Ethiopia and unfortunately the degradation and loss of wetlands are continuing. Though natural factors, ecological factors and lack of potentials are important wetland influencing factors, the most sever and coming severing threats are those related anthropogenic factors. Most of these anthropogenic factors are raised due to engaging the stakeholders on the immediate benefits and values of wet wetlands instead of the long term and sustainable benefits and values.

In order to reverse these emerging problems and conserve these fragile but crucial wetlands, integrated problem solving approach through realizing the collaboration of relevant stakeholders from policy level down to grassroots community is indispensible opportunity to Ethiopian wetlands. Government, Communities, private sector and all others who have stake in wetlands should cooperate and contribute their part. Decision makers at higher levels are required to strengthen sustainable wetland management efforts through effecting policy and legislation, improving institutional arrangements and supporting capacity building initiatives. It is appropriate to reassess the significance of wetlands and their environs for national development, and also the consequences of wetland degradation.

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