Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.8, No.3, 2017

Status, Challenges and Opportunities of Environmental Management in Ethiopia

Lemlem Tajebe
Researcher at Ethiopian Environment and Forest Research Institute

Abstract
Our planet's capacity to prolong life is eroding due to the wide disparity between consumption, production and waste assimilation capacity of the environment. Ethiopia is situated in the Horn of Africa about 79% are employed in the agricultural sector. Since the mass of Ethiopian population is totally dependent on limited natural resources as their primary source of income and strive to test nature by unlimited human growth. Looking into Ethiopian history one might come across a few stories of environmental management by the state. The easiest evidence indicating some form of protection of natural resources was found in the fourth century AD. However, the first professionally organized forest management intervention started in Ethiopia during the brief period of Italian annexation (1936–41). Yet, the country faces many environmental challenges including deforestation, soil erosion, declines in soil fertility, loss of water quality and biodiversity. Other, important environmental challenges include spread of invasive and alien species, urban outdoor air pollution (mainly in Addis Ababa), and toxic household wastes. As various figures estimated, about 1.24 million ha of natural high forests cleared for agricultural expansion between 1990 and 2014. The average annual deforestation rate is 1% which is high compared to other Sub-Saharan African countries (0.6%). It is estimated that unless action is taken to change the traditional development path, an area of 9 million ha might be deforested between 2010 and 2030. The major opportunities that obtained in environmental management includes improve governance. The Climate Resilient Green Economy (CRGE) is probably the major fundamental initiative Ethiopia adopted recently. CRGE is attached in the GTP and designed with a vision of achieving a middle-income status by year 2025 (FDRE, 2011). It attempts to systematically combine attaining sustainable economic growth, with combating adverse impacts of climate change.
Keywords: Status, challenges and opportunities, environmental management

1. Introduction

At this time our planet's capacity to prolong life is eroding due to the wide disparity between consumption, production and waste assimilation capacity of the environment. Major industrial pollution challenges were experienced in the developed world mainly during the industrial revolution period in the late 18th and early 19th centuries (Marambanyika and Mutekwa, 2009). However, at present this challenge has shifted to the developing countries, where the majority of the populations are at horrible life. The world's poorest people, particularly those living in rural areas, often rely on a variety of natural resources (biodiversity) and ecosystem services as a direct source of livelihood, which make them particularly sensitive and vulnerable to environmental challenges (WRI, 2005).

Ethiopia is situated in the Horn of Africa with a geographically diverse developing nation occupying 1.1 million square kilometers of land. The country has the 2nd largest population in Africa, next to Nigeria with an estimated population of 95,045,679 in 2014 with an annual growth rate of 2.58% (Getachew, 2008). About 79% are employed in the agricultural sector (Cheever *et al.,* 2011). It is considered one of the most important biodiversity hotspots of the world, but also one of the most degraded (FFE, 2011b). Since the mass of Ethiopian population is totally dependent on limited natural resources as their primary source of income and strive to test nature by unlimited human growth (HoAREC, 2011). Ethiopia's economy and ecological system are fragile and vulnerable to various challenges (Cesar and Ekbom, 2013) including declines in soil fertility and water quality, loss of biodiversity, deforestation and soil erosion (Bekele, 2008). These problems pose significant risks for the citizens since as emphasized in the 1997 Environmental Policy of Ethiopia "natural resources are the foundation of the economy."

The Environmental Policy of Ethiopia (EPE) and the 2002 Sustainable Development and Poverty Reduction Program (SDPRP) attribute the prevalence of poverty in part to low growth and low productivity of agriculture and to the populace's dependence on agriculture and natural resources (Cheever et al., 2011). The EPE states that the environment will continue to be one of the most important determinants of Ethiopia's welfare in the future (EPE, 1997). The manner in which environmental issues are addressed in the coming years will have a significant influence on the well-being of the Ethiopian people, and on surrounding nations whose ecosystems are dynamically interlinked with Ethiopia (McKee, 2007). In this context, the development of strong institutions and networks is necessity for environmental management. Moreover, in order to achieve sustainable development, resources and environmental considerations must be integrated into the planning and decision making process. These prompt most developmental activities to shift from being reactive to environmental

problems that they instigate towards proactive. Therefore, the aim of this paper is to review the status, challenges and opportunities of environmental management in Ethiopia.

2. Evolution of Environmental Management in Ethiopia

Viewing into Ethiopian history one might come across a few stories of environmental management by the state. The easiest evidence indicating some form of protection of natural resources is found in the records of a traveler called Nonnus, who in his journey to Aksum from the coast in the fourth century AD, saw multitude of elephants, about five thousand pasturing in a broad field, none of the natives were allowed to come close to them nor to drive them from pasture (Bekele, 2003). The other indicators come from the 14th and 16th century oral accounts about king David (1365-1395) and King Yacob (1597-1603) respectively (Bekele, 2003). The first was said to assign guards to protect wild games from poachers, while king Yacob conserved the forests of Woff Washa and Jibat, and reforested Menagesha and Yerer mountains (TESFA, 2007).

For centuries, the Ethiopian Royal Court and regional lords did not have a permanent political seat. They moved from one place to another for political and military reasons, and more for lack of provision of firewood, as many European travelers from 16th century on noted (Bekele, 2003). When scarcity of fuel and construction wood became critical even for the Royal Courts as was the case at end of the 19th century, Emperor Menilik (1889-1913) declared "*all forests including trees on private lands State property*". Some tree species (Cordia, Juniper, etc) were identified and felling them was forbidden. The declaration was not more than an expression of concern over a rapid deforestation at the time. Nevertheless, the decree had made a point by creating awareness among the people about the State's concern or property claim to the country's forest as public asset. There was also some attempt during this period to protect wild games and regulate hunting for export of ivory and wild animals skins were State monopoly.

Prior to the period of Italian occupation (1936-41), while there were rules that addressed aspects of the environment in Ethiopia, formal environmental ruling were rare (Bekele, 2008). The resource laws during the Italian occupation focused on the economic potential of Ethiopia's natural resources rather than their ecological value. During this period, the Italians issued over twenty forest decrees and implemented destructive forestry programs to fuel infrastructural development (Bekele, 2008). The policy of Ethiopian imperial government (1941-1975), focused on the development of the agricultural sector for domestic consumption and export; as a result, national forest land was redistributed for conversion to agricultural land. While the 1955 Constitution introduced the principle of conservation, it took years for forestry policies to develop and even longer for any implementation to take place. The period of 1955 - 1968 is described by Bekele (2008) as "*probably one of the most distressing phases in forestry management*" in Ethiopia, where the highland forest estimated in 1937 at nearly six million hectares was reduced by almost half to three million hectares in the early 1960s.

In 1975, the militaristic Derg regime succeeded the imperial government, drastically changing Ethiopian environmental management. Environmental policies produced during the Derg era (1975-1991) were grounded in the socialist ideologies of the regime (Bekele, 2008). The state's focus during the Derg periods was on wildlife protection. This policy direction led to the establishment of a number of parks and sanctuaries in different parts of the country and the delineation of hundreds of hectares of forestland. Although they often incorporated extensive conservation and tree-planting initiatives, were accompanied by the disintegration of customary institutions of natural resource management (Ogbaharya and Tecle, 2010). This resulted in situations where thousands of hectares of land belonging to communities and individual households came under plantation by force without regard for local participation or community empowerment.

The turning point in the environmental movement took place during the Derg regime, provoked by the famine of 1973/74. The degraded landscapes of the northern (particularly Wello), central and eastern provinces became the testimony for the expatriate experts who have long been ringing the warning bell for the environmental crisis in Ethiopia. The outbreak of famine in 1973 led to the joint operation of the Relief and Rehabilitation Commission. As a result of these collaboration field activities in the famine affected regions began, where the Food-For-Work (FFW) scheme was initiated in the country. Food-For-Work based conservation activities increased over the years after the 1973 famine, which was followed by that of the 1984/85 famine. To change the situation, the concept of watershed management was implemented in 1980s as a way of redressing the degradation of the natural resource base and increasing land productivity (Gete, 2006). This phenomenon intensified the state's environmental activities (Slegers *et al*., 2004).

After a brief period of transitional government, the current federal republic system, led by the Ethiopian People's Revolutionary Democratic Front (EPRDF), was instituted in 1995 (Ogbaharya and Tecle, 2010). The violent change in government from the Derg regime to the current EPRDF was accompanied by a drastic ideological shift in environmental management that was manifested in the administrative structure of the government and the development of formal environmental institutions. The EPRDF's approach to land management, which views land as a common property resource owned by the state and by the people, exemplifies the recent shift towards a more inclusive approach to environmental policy in Ethiopia.

The 1995 Constitution of the federal government declared (Article 40) the ownership of rural and urban land and all natural resources, as being "*exclusively vested in the State and in the peoples of Ethiopia*." And "*land is a common property of the Nations, Nationalities and People of Ethiopia and shall not be subjected to sale or to other means of exchange*" (Ethiopian Constitution, 1995). Article 92 declares "*Government shall endeavor to ensure that all Ethiopians live in a clean and healthy environment*." and "*the design and implementation of programmes and projects of development shall not damage or destroy the environment*" (FDRE, 1995). In recognition of the significance of environmental sustainability to the pursuit of food security and economic development the Environmental Policy of Ethiopia was issued in April 1997. The policy aimed to enhance the quality of life of Ethiopians by promoting sustainable development through sound management and use of natural resources (Cheever *et al*., 2011). Policy goals include preserving essential ecological processes, life support systems, and biological diversity; encouraging sustainable exploitation of nonrenewable resources; improving the environment of human settlements; and promoting understanding of the essential linkages between environment and development (Cheever *et al*., 2011).

3. Status of Environmental Management in Ethiopia

After the Derg regime, a breadth of environmental legislation was written addressing many environmental sectors. Beginning as early as 1994 with the Water Policy Law, until the more recent 2007 Wildlife Policy, a number of sectoral policies were written, covering areas such as forests conservation, rural land use, and impact assessment, among others (Bekele, 2008). The strength of these policies varies significantly: some, like the Environmental Policy of Ethiopia (EPE) and its predecessor the Conservation Strategy of Ethiopia (CSE), are widely regarded as well-written and comprehensive environmental policies (Bekele, 2008).

Development, Conservation and Utilization of forests Proclamation No 542/2007 has come into force through repealing of the old law namely, Forest Conservation, Development and Utilization Proclamation No, 94/1994 (FDRE, 2007). The permeable indicate that the development, conservation and sustainable utilization of forests play an important role for fulfilling the needs of the society as well as for the improvement of the national economy. Moreover the permeable articulate the crucial role of forest in preventing soil erosion, expansion of desertification, disturbance of ecological balance, depletion of biodiversity and reduction of agricultural production due to the alarming situation of forest degradation in the country (FDRE, 2007). To conserve and manage the deforested and degraded areas, forest management plans have been prepared for 1.4 million hectares of natural forests and about 2.9 million hectares of land has been afforested with different tree species. Moreover, about seven million hectares of degraded area has been rehabilited using area closure. In years 2011 through 2013, a total of 16.8 million seedlings of different indigenous and exotic tree species have been planted in different parts of the country (EBI, 2014).

Ethiopia possesses an estimated number of 284 species of wild mammals and 861 species of birds (EBI, 2014). In addition, data on other wild animals are scanty; and the number of reptile, fish, amphibian and arthropod species identified so far are 201, 200, 63 and 1,225, respectively. Of these faunal resources, 29 wild mammal, 18 bird, 10 reptile, 40 fish, 25 amphibian and seven arthropod species are endemic to Ethiopia (EBI, 2014). Development, Conservation and Utilization of Wildlife Proclamation No 541/2007 has come into force through repealing two old laws namely, Wildlife Conservation Regulation No 416/1972; and Forestry and Wildlife Conservation and Development Proclamation No 192/1980 (FDRE, 2007). The Proclamation recognized that the unplanned and inappropriate utilization of wildlife and the previously protection measures were found to be unsuccessful. Ethiopian Wildlife Development and Conservation Authority Establishment Proclamation No 575/2008 (Article 353(3)) states that Ethiopia possesses diverse, rare and endemic species of wildlife which are of great value to tourism, education and science. The Preamble also indicates that establishing a government body at federal level is helpful to provide proper attention for the development, conservation and utilization of the country's wildlife resources and maximize their benefits (FDRE, 2008b). Therefore, to protect and conserve the country's wildlife resources, 9 national parks, 8 wild animal reserve areas, 3 wildlife sanctuaries, 18 game reserves and 51 bird areas have been designated in different parts of the country. Rehabilitation and restoration of degraded areas, afforestation and practices of sustainable management of natural resources have resulted in increased forest cover and enhancement of the associated biodiversity (EBI, 2014).

Ethiopia is the home for various plant and animal species, no less than 6,000 different higher plant species out of which about 10 percent are endemic. Moreover, the country is the centre of origin for various crop species such as Coffee, Teff, Noug, Enset, etc (EBI, 2014). Due to direct and indirect pressures, ecosystems and a number of wild plants and animals including endemic species, as well as farmers' varieties and indigenous animal breeds are declining. Therefore, 103 tree and shrub species are threatened (EBI, 2014). To conserve for those resources the former Institute of Biodiversity Conservation and Research (IBCR) has been re-established as Institute of Biodiversity Conservation (IBC) by Proclamation No. 381/2004. The Institute is engaged in undertaking ex-situ, and in-situ conservation of biodiversity. The materials acquired by the gene bank in IBC

through collection, repatriation and donation over the years (about 62851 accessions of some 105 species) are being conserved using appropriate ex-situ, conservation practices (EPA, 2004). Currently in the country, conservation and sustainable utilization related activities are being conducted vigorously. As a result, significant improvements in the status of some biodiversity resources have been achieved (EPA, 2003).

4. Major Environmental Challenges in Ethiopia

Ethiopia is known for its wealth of natural resources and biodiversity, which results from extreme altitudinal variation and a tropical location. However, the mass dependence upon natural resources, 5,000 years of land cultivation and demographic expansion have degraded the natural environment (HoAREC, 2011). As a result, Ethiopia faces many environmental challenges including deforestation, soil erosion, declines in soil fertility and water quality and loss of biodiversity (Bekele, 2008). Besides, European Commission, (2007) adds major environmental challenges together with indoor air pollution and climate change. Other, important environmental challenges include spread of invasive and alien species, urban outdoor air pollution (mainly in Addis Ababa), and toxic household wastes (European Commission, 2007). Political, social, and economic challenges can both contribute to and aggravated by environmental degradation. This leads to a cycle of poverty: to survive, people are forced to disregard the long-term well-being of the environment and thus degrade it further (MoFED, 2002). Therefore, recurrent droughts, famines, poor infrastructure and periods of political unrest serve as additional challenges for environmental management within Ethiopia (Ogbaharya and Tecle, 2010).

The increment in population leads to the increased demand for agricultural land and fuel-wood, people vastly encroached into forest area, resulting in a high rate of deforestation (Taye Bekele *et al*., 1999). As various figures estimated, about 1.24 million ha of natural high forests cleared for agricultural expansion between 1990 and 2014 (WBISPP, 2004). The average annual deforestation rate is 1% which is high compared to other Sub-Saharan African countries (0.6%) (World Bank, 2012c). It is estimated that unless action is taken to change the traditional development path, an area of 9 million ha might be deforested between 2010 and 2030. Over the same period, annual fuel wood consumption will rise by 65% with large effects on forest degradation (Government of Ethiopia, 2012).

Deforestation and the resulting environmental degradation has remained a major problem in Ethiopia and a key challenge to food security, community livelihood and sustainable development (Winberg, 2010). The removal of trees and other land cover exposes soil to the consequences of water and wind erosion (Pimentel et al., 1986). This leads to the problem of land degradation, the most serious environmental challenges in Ethiopia Ehrlich, (1988) and worldwide (UNEP, 2002a). It is a basis for loss of vegetation cover, biodiversity and ecosystem services. In 1990 approximately 17 per cent of the potential agricultural GDP that estimated to be 59 million Birr was lost because of physical and biological soil degradation (EPE, 1997). Therefore, countries like Ethiopia, where the lives of many rural communities are directly related to natural resources, natural resources mean everything. But, all efforts, towards conservation and sustainable use of its products are a challenging task.

In Ethiopia, peoples heavily relay on traditional sources of energy such as fuel wood, charcoal, animal dung, and crop residues. Traditional sources of energy accounts for about 94% of total energy demand; while the share of modern sources (mainly Petroleum and electricity) is just 6% of the total demand (Hilawe, 2010). These biomass fuels are burnt using smoky and inefficient traditional stoves with very poor combustion in unventilated kitchens producing a high concentration of dangerous pollutants (WHO, 2007). This leads to the death of many people especially women, children and elderly are the most at risk.

The other Environmental challenges in Ethiopia are livestock. Livestock are estimated to contribute to the livelihoods of 60-70% of the Ethiopia population (Halderman, 2004). The Ethiopian livestock herd is the largest of any African nation and help to perform a wide variety of functions and are among the most important commodities of the country. However, the major production systems cause multiple environmental impacts including erosion, soil degradation, greenhouse gas (GHG) emissions, deforestation, and water pollution (Halderman, 2004). Methane is a potent greenhouse gas with a global warming potency of more than 20 times that of carbon dioxide (IPCC, 2007). Nitrous oxide emissions, whose primary source is manure management, have more than 300 times the global warming potential of carbon dioxide (IPCC, 2007). Ruminants, including cattle, goats and sheep, emit greater amounts of methane during their digestive process than do monogastrics (chickens) (Lipson et al., 2011). Moreover, Ethiopia in terms of Livestock grazing and trampling have marked effects on vegetative cover, soil quality and nutrient loss due to erosion (Lipson *et al*., 2011).

Agriculture in Ethiopia is heavily dependent on rain. 95 percent of the total agricultural output comes from about 11.7 million individual smallholder peasant farmers (MoARD, 2010). The fact that agriculture is largely traditional and rain fed make it dependent on weather conditions (Diao and Pratt, 2007). This makes the issue of climate change particularly important for Ethiopia. Studies indicated that, over a 50-year period, the projected reduction in agricultural productivity may lead to 30 percent less average income, compared with the possible outcome in the absence of climate change (Gebreegziabher *et al*., 2012). Continued climate change is expected to bring greater variability and extreme weather events which will further drive degradation of the

country's ecosystems and exacerbate the problem of food insecurity and malnutrition (World Bank, 2012).

The problem of water scarcity and pollution worsens as a result of climate change (IPCC, 2001). Water availability in Ethiopia has dramatically reduced in rivers, streams, lakes and reservoirs. For instance, climate change in conjunction with human activities triggered by climate related disasters have killed Lake Haromaya (Tamiru *et al*., 2006). Lake Tana, Lake Ziway (Zeray, 2006) and River Awash water resources are also under threat (Dekiyos, 2000). There is great fear and challenge of meeting the demands of the escalating population and its demand on water needs for food production, irrigation, domestic, municipal, industrial, and energy uses (Sadoff, 2006). Besides the economic and other impacts, the other devastating impacts include emergence and proliferation of vector borne and water borne diseases (Adugna, 2002). Hence, ecosystem is shifting in a pace difficult to cope with. Bio-diversity losses are quite phenomenal (Amha, 2006). Furthermore, farm power and household fuel supply is jeopardized by changed climate, and this has led to desperate actions that culminated in de-vegetation (ICRA, 1999).

5. Opportunities of Environmental Management in Ethiopia

The major opportunities that obtained in environmental management includes improve governance, enhance the asset of the poor, improve the quality of growth and reform international and industrial country policies (DFID *et al*., 2002). Key areas for policy action to realize those opportunities include; integrate environment issues into national development frameworks, strengthen decentralization for environmental management, empower civil society, in particular poor and marginalized groups, address gender dimensions of environment issues and improve environment monitoring and assessment (DFID *et al*., 2002).

The Climate Resilient Green Economy (CRGE) is probably the major fundamental initiative Ethiopia adopted recently. CRGE is attached in the GTP and designed with a vision of achieving a middle-income status by year 2025 (FDRE, 2011). It attempts to systematically combine attaining sustainable economic growth, with combating adverse impacts of climate change. Accordingly, it set three complimentary objectives of; fostering economic development and growth, ensuring abatement and avoidance of future emissions, i.e., transition to a green economy and improving resilience to climate change (FDRE, 2011). The government also set the following major targets for the forestry sector: afforestation on 2 million ha, reforestation on 1 million ha and improved management of 3 million ha of natural forests and woodlands. Through proper management of 5 million ha of forests and woodlands, Ethiopia hopes to achieve 50% of its total domestic greenhouse gas (GHG) emissions abatement potential by 2030 (FDRE, 2011). Economically, it has an ambitious plan to grow fast to increase the current gross domestic product (GDP) per capita from the current around USD 380 to USD 1,000 and reduce the share of agriculture on GDP from more than 40% to less than 30% (FDRE, 2011).

The Humbo Community Assisted Natural Regeneration Project in the Southern Nations Nationalities Peoples Regional State of Ethiopia is the first Clean Development Mechanism (CDM) project initiated by World Vision-Ethiopia. This is the practical CDM project operating in the country since 2006. The project employed afforestation/reforestation approach on a site (2728ha) which was severely degraded due to excessive fuel wood extraction and overgrazing. The project activity provides multiple benefits including objective enhancement of GHG removal by sinks, promotion of native vegetation and biodiversity, reducing soil erosion and provision of income stream for communities. The project achieved Gold Level Validation under the Climate Community and Biodiversity (CCB) standards in 2011 and in October 2012 became the first CDM project in Africa to sell Certified Emission Reductions (CERs). The project life time is 30 years (since December 2006) and will sequester an estimated 880,295 tCO_2 with a total revenue of 3,961, 328.00 USD (estimated at 4.5USD/tone) (Humbo AR-CDM PDD, 2009).

The assets of the poor could be augmented in environmental management. Chiefly this is an enormous opportunity for the rural people. Key areas for policy action includes enhance the poor's capacity to manage the environment, expand access to environmentally sound and locally appropriate technology and reduce the environmental vulnerability of the poor ((DFID *et al*., 2002). National Biogas Program of Ethiopia, as part of the growth and transformation plan, has contribution to the electrification and energy generation. As the NBPE, (2014) report shown that in Ethiopia 10,678 bio-digester plants were constructed during 2008-2014. From this developmental activity 5336 hectare of forest was prevented from deforestation. Moreover, about 74,387MWh and net power installation of 20,717KW of energy was produced. This leads to keep 7277 tons agricultural residues, 5822 tons of dung cake, 8732 tons of charcoal and 27,162 tons of fuel wood. Again 43,662kt of organic matter is made available as organic fertilizers. 40,315 peoples (women's and children) are protected from indoor air pollution and Biogas technology reduces the work load on the women and children to 1348 persons per year by providing the daily energy demand. As a result females get time to participate in economic activities. In general the development and utilization of biogas energy improve the quality of life, and provide a dependable power supply to the rural and urban areas.

Decentralization in rural areas has given local governments to manage for the environment. According to African Development Bank (AfDB) the Ethiopian government's existing policy and institutional framework

for natural resource management and the environment is adequate and sound (AfDB, 2012). Policies are mainstreamed in sectoral programmes which are implemented at the federal and regional levels. In Woredas preparations and implementation of environmental management plans is on-going, including the scaling up of the protection and conservation practices (water, forestry) though community participation (AfDB, 2012. Therefore, managing environment has diverse opportunities to be achieved.

6. Conclusion

Ethiopia faces various challenges in environmental management. The key challenges include deforestation, soil erosion, loss of biodiversity, indoor air pollution climate change, declines in soil fertility and water quality. In the country, agriculture is the basis of survival. People to meet the increasing demand of agricultural land and fuel-wood, they constantly encroached to forests. This leads to the highest rate of deforestation and resulted climate change, loss of biodiversity and ecosystem services. Continued climate change is expected to increase climate variability and the incidence of extreme weather events (e.g. droughts, floods) which will further degrade the country's ecosystems.

The main drivers behind Ethiopia's environmental degradation include the high population growth, high urbanization rates as well as a rapid economic growth that is largely driven by agricultural production, infrastructure expansion and increasing energy demand. Furthermore, institutions have insufficient capacity to prevent and manage the major environmental issues. Although there are gaps between political environmental commitments and actual implementation to improve environmental outcomes, the Ethiopian government has shown considerable political will regarding its environmental problems. The establishment of environmental protection agencies at federal level and in all regional states, as well as formulating various environmental proclamations and passing important environmental conventions, and promoting environmental investments can be listed as some of the political will of the government. Ethiopia's high ambitions and efforts to promote sustainable development are also manifested by the establishment of the national strategy Climate Resilient Green Economy (CRGE). The strategy constitutes a particularly promising and important initiative to promote resource efficient, low-polluting alternatives to business as usual economic growth.

7. Reference

Adugna, W., Teshome, G., Ahmed, A. and Daniel K. 2002. Malaria in Addis and its Environs: Assessements of Magnitude and Distribution: *Ethiopia journal of Health Development. 2002:16 (2): 147-155.*

AfDB. 2012, African Statistical Yearbook 2012.

Amha, K. 2006. Characterization of rangeland resources and dynamics of the pastoral production systems in the Somali region of eastern Ethiopia. Thesis Submitted in partial fulfillment of the requirements for Ph.D to the University of the Free State, South Africa.

Bekele, M. 2003. Forestry property rights, the role of the state and institutional exigency: the Ethiopian experience. Department of Rural Development. Uppsala, Swedish University of Agricultural Sciences.

Bekele, M. 2008. Environmental policies, strategies and programs. In: Digest of Ethiopian policies, strategies and programs Forum for Social Studies, FSS, 2008, Addis Ababa.

Cheever, M., Graichen, K., Homeier, D., Howell, J., Kefauver, O. and Kimball, T. 2011. Environmental Policy Review: Key Issues in Ethiopia 2011. Colby College Environmental Policy Group.

CRGE. 2011. Ethiopia's Climate-Resilient Green Economy, Green economy strategy. Federal Democratic Republic of Ethiopia.

Deksyos, T. 2000. Vulnerability and Adaptation Assessment of Water Resource to Climate Change in the Abay Basin (unpublished), a report submitted to NMSA under the GEFIUNDP supported Climate Change Enabling Activities Project (ETH /971G31) of Ethiopia.

Department for International Development (DFID), European Commission (EC) and World Bank (WB) 2002. Linking Poverty Reduction and Environmental Management Policy Challenges and Opportunities. The International Bank for Reconstruction and Development/The World Bank 1818 H Street, NW Washington, DC 20433.

Diao, X., and Pratt, A. 2007. Growth Options and Poverty Reduction in Ethiopia: An Economy-wide Model Analysis. *Food Policy 32(2):205-228*.

Environmental Protection Authority. 2004. The 3rd National Report on the Implementation of the Unccd/Nap in Ethiopia.

Erlich, P. 1988. "The loss of diversity: causes and consequences." In: Wilson, E.O., Peter, F. (Eds.), Biodiversity. National Academic Press, Washington, DC.

Ethiopian Biodiversity Institute, 2014. Ethiopia's Fifth National Report to the Convention on Biological Diversity. Addis Ababa, Ethiopia.

European Commission, 2007, Ethiopia Country Environmental Profile, European Commission.

FDRE. 1995. The Constitution of the Federal Democratic Republic of Ethiopia; Proclamation No 1/1995. Pages

1 - 38.
FDRE. 2002. The Constitution of the Federal Democratic Republic of Ethiopia; Proclamation No 300/2000. Pages 1959-1966.
FDRE. 2007a. Development, Conservation and Utilization of Wildlife Proclamation: Negarit Gazeta Proclamation No 541/2007. Pages 3734 - 3744.
FDRE. 2011. Ethiopia's Climate-Resilient Green Economy: Green Economy Strategy. Federal Democratic Republic of Ethiopia, Addis Ababa.
FDRE.1997. Environmental Policy of Ethiopia.
Gebreegziabher, Z., Stage, J., Mekonnen, A. and Alemu, A. 2012. Climate Change and the Ethiopian Economy. Environment and Development Center for Ethiopia. Research Brief 12-03.
Getachew, M. 2008. A review of the National population policy of Ethiopia. Digest of Ethiopia's National Policies and Strategies and programs. Taye Assefa (ed.) Forum for Social Studies (FSS). Addis Ababa, Ethiopia.
Gete, Z. 2006. Integrated management of watershed experiences in Eastern and Central Africa: Lessons from Ethiopia. In Shiferaw, B. and Rao, K. (eds): Integrated management of watersheds for agricultural diversification and sustainable livelihoods in Eastern and Central Africa: Lessons and experiences from semi arid South Asia. Proceedings of the international workshop held at ICRIS at Nairobi, 6-7 December 2004.
Halderman, M. 2004. The Political Economy of Pro-Poor Livestock Policy-Making in Ethiopia. *Pro-Poor Livestock Policy Initiative (FAO). Series Number.19 (2004).*
Hilawe, L. 2010. Ethiopian Energy Sector Review: For Up to 2008. Ethiopian Environment Review. Sue Edwards (ed.) Forum for Environment, 2010.
HoAREC_1E. (2011). pers. comm. Waterville, ME.
Humbo Ethiopia Assisted Natural Regeneration Project 2009. Clean development mechanism project design document (PDD) form for afforestation and reforestation project activities (CDM- AR-PDD), Version 04, UNFCCC, CDM Executive Board.
ICRA. 1999. Livelihood and drought coping strategies of farm households in the Central Rift Valley, Ethiopia: Challenges for agricultural research. 1999. Prepared by Admassu Habtamu, Alfred Daka, Etagengnhu G., Lundall Magnuson Elize, Mulhall Abigail, and Mutsaers Arthur, Working document series 76. Netherlands
IPCC (Intergovernmental Panel on Climate Change). 2001. Summary for Policymakers. Climate Change 2001: Impacts, Adaptation, and Vulnerability. A Report of Working Group II of the IPCC. Geneva.
Marambanyika, T. and Mutekwa, T. 2009. Effectiveness of ISO 14001 Environmental Management Systems in Enhancing Corporate Environmental Sustainability at Unilever South East Africa in Harare, Zimbabwe. *Journal of Sustainable Development inAfrica Volume 11, No.1, 2009.*
McKee, J. 2007. Ethiopia: Country Environmental Profile. European Commission (EC) Delegation. Addis Ababa.
MoARD (Ministry of Agriculture and Rural Development). 2010. Ethiopia's Agriculture Sector Policy and Investment Framework (PIF) 2010-2020. Addis Ababa, Ethiopia.
Ogbaharya, D. and Tecle, A. 2010. Community-based natural resources management in Eritrea and Ethiopia: toward a comparative institutional analysis. *Journal of Eastern African Studies, 4:3. (2010): 490-509.*
Sadoff, C. 2006. Can Water Undermine Growth? Evidence from Ethiopia. Agricultural and Rural Development, Issue 18: The World Bank.
Singh, Y. 2006. Environmental Science. New Age International Publishers. Ansari Road, Daryaganj, New Delhi.
Slegers, M., Selamyihun, K., Hospes, O., Stroosnijdeg, L. 2004. Land tenure and soil and water conservation adoption in Ethiopia. In Selamyihun Kidanu (ed) using eucalyptus for soil and water conservation on the Highland Vertisols of Ethiopia. Tropical Resource Management Paper. Wageningen University. 57-68pp.
Tamiru, A., Wagari, F. and Dagnachew, L. 2006. Impact of water overexploitation on highland lakes of eastern Ethiopia. Ethiopia. *In journal of Environ Geol (2007) 52:147–154.*
Taye, B., Getachew, B., Elias T., Matheos, E. and Kumilachew. 2002 Regeneration status of moist montane forests of Ethiopia: Consideration for conservation. *Journal of the Ethiopian wild life and natural history society.*
TESFA (Tourism in Ethiopia for Sustainable Future Alternatives). 2007. Experience the Real Ethiopia. www.community-tourism-ethiopia.com.
UNEP. 2002a. Fisheries Subsidies and Marine Re-source Management: Lessons Learned from Studies in Argentina and Senegal. UNEP/ETU/ 2001/7 (Vol. II). Environment and Trade Unit, Geneva.
WBISPP (Woody Biomass Inventory and Strategic Planning Project) 2004. A national strategic plan for the biomass energy sector. Addis Ababa.

Winberg, Ellen. 2010. Participatory Forest Management in Ethiopia, Practices and Experiences. Rome: Food and Agriculture Organization of the United Nations.

Zeray, L. 2006. Climate change impact on Lake Ziway watershed water availability in Ethiopia. MSc Thesis, University of Applied Sciences, Cologne, Germany.