School of Economics and Commercial Law
GÖTEBORG UNIVERSITY
Department of Economics
Environmental Economics Unit

Ethiopia Environment and Climate Analysis[1]

Feb 8, 2008

This Environment and Climate Analysis for Ethiopia has been written as an input to the formulation of the new Swedish cooperation strategy with Ethiopia. The purpose is to briefly summarize key issues pertaining to environment and climate change in Ethiopia and the related challenges for poverty reduction and sustained economic development. Issues to consider in Swedish development cooperation with Ethiopia are also identified.

Executive Summary

This Environment and Climate Analysis for Ethiopia briefly summarizes the largest environmental challenges facing Ethiopia. It addresses links between environment and poverty, public health, economic development, human rights, inequities, gender equality, and conflicts, respectively. It also addresses the role and policies of the government and environment-related key institutions, and the needs for capacity building. It places a particular focus on the risks and vulnerability associated with climate change, and describes some environmental problems with regional and global implications.

The most important environmental problems in Ethiopia include land degradation, environmental vulnerability due to climate variability, indoor air pollution and water pollution. Other issues such as biodiversity loss, spread of invasive alien species, urban air pollution, and toxic and household wastes are considered less important. Land degradation is mainly characterized by physical soil loss, soil nutrients depletion, overgrazing and deforestation. Climate variability frequently causes droughts and floods, which are likely to increase due to climate change. Indoor air pollution is a very serious problem causing acute respiratory illnesses. It hits the poorest the most, particularly women and children. The problems are mainly caused by the poor households' use of traditional polluting stoves and woody biomass, such as fuelwood, dung and crop residues. Water pollution is mainly caused by agricultural run-off compounded by the extremely limited supply of safe water in rural areas (11%). It facilitates spread of a range of pollutants and water-borne diseases and results in e.g. very high child mortality (12.7%).

The government's response to these problems includes primarily the formulation and approval of the Environmental Policy of Ethiopia (EPE), establishing an Environmental Protection

[1] At the request of the Swedish Embassy in Ethiopia and Sida Stockholm, this Environment and Climate Analysis was written as a desk study, by Emelie Dahlberg and Anders Ekbom at the Environmental Economics Unit (EEU), Department of Economics, Göteborg University, and Menale Kassie and Mahmud Yesuf, Environmental Economics Policy Forum in Ethiopia (EEPFE) at the Ethiopian Development Research Institute (EDRI), as part of Sida-EEU's institutional collaboration on environmental economics and strategic environmental assessment. Comments are welcome and can be sent to anders.ekbom@economics.gu.se. The views expressed in this Environmental and Climate Analysis are those of the authors and do not necessarily represent the views of Sida.

Environmental Economics Unit,
Department of Economics,
Göteborg University, Box 640
S-405 30 GÖTEBORG, Sweden

Telephone: +46-31-786 4817
Telefax: +46-31-786 4154
E-mail: anders.ekbom@economics.gu.se
Website: www. handels.gu.se/eehelpdesk

Authority (EPA), prepared a Climate Change National Adaptation Plan of Action (NAPA), formulated the national action plan to combat desertification, and addressed environmental issues in the *Plan for Accelerated and Sustained Development to End Poverty* (PASDEP), in the Sustainable Development and Poverty Reduction Program (SDPRP) as well as in the Rural Development Policy. A major effort to counter-act land degradation is the *Country Pilot Partnership on Sustainable Land Management (CPP-SLM) project*.

Although the government has taken important steps to address the key environmental challenges, there is a significant gap between the official commitments and objectives, and practices on the ground. The issue becomes particularly troublesome since Ethiopia is one of the most vulnerable countries in Africa to climate change with the least capacity to respond and adapt to the risks associated with it. Consequently, reforms and interventions are necessary in a large set of areas and sectors. First and foremost, there is a pressing need to formulate and implement adaptation action plans for key sectors and – coupled with this – to develop and implement specific programs and projects addressing the risks associated with climate change.

Moreover, there are needs to develop the capacity in environmental education and awareness; many of the local environmental issues can only effectively be addressed by the poor people themselves given that they have/are provided with an understanding of the issues. Nationally as well locally there are short- and long-term training needs in areas such as climate modeling, climate change detection, and climate vulnerability and adaptation assessment.

Linked to this there is also a need to raise the awareness within key ministries and government agencies on (i) the costs of environmental degradation, (ii) the benefits of sound environmental management, and (iii) designing and implementing economic policy instruments for pollution mitigation and cost-effective natural resource exploitation. Potentially, Environmental Fiscal Reforms may be introduced which make use of market-based incentives such as pollution taxes, levies, fines, natural resource extraction fees and environmental subsidies in order to promote environmentally *and economically* sustainable natural resource management as well as adaptation to climate change, in addition to necessary legal reforms and new cost-effective technologies. This applies in particular to the agricultural sector, where the opportunities to enhance tenure, technologies and land use practices are large.

Regarding environment and conflicts, competition over natural resources has increased tension between pastoralists, agro-pastoralists and sedentary farmers in several areas of the country. Implementation of past and recent resettlement programs have resulted in bio-physical changes of, and reduction in, forest areas. Tension has lead to civil unrest and violent conflicts over natural resources prevail in eight of eleven studied resettlement areas.

Potentially, conflicts over internationally shared natural resources (water) also exist. However, the Nile Basin Initiative (NBI) has worked as an institutional mechanism to address the risks associated with the management of the water resources of the Nile. In view of the risks and challenges associated with climate change, this and other initiatives addressing equitable and sustainable use of national as well as regional natural resources are of utmost importance for Ethiopia's prospects to reduce poverty, ensure human rights and sustain economic growth.

Ethiopia Environment and Climate Analysis

Poverty and environment relationships

Environmental quality and sustainable management of natural resources play important roles for the people of Ethiopia and the country's prospects to reduce poverty, enhance welfare and sustain economic growth. However, the linkages between poverty and environment in Ethiopia are complex and multi-faceted. Although the causal linkages are not easily identified or established, rural poverty is strongly associated with unsustainable land use practices, soil loss and soil degradation, deforestation, environment-related diseases, poor access to safe water and household energy, and vulnerability to climate variability. Ethiopia's *Plan for Accelerated and Sustained Development to End Poverty* (PASDEP; Government of Ethiopia, 2006) recognizes the link between poverty and environment in general, and land degradation in particular. The poor are most dependent on their natural resources for their survival. However, they are also deprived of decent livelihoods manifested by very low access to safe water, sanitation, reliable energy sources and rainfall, declining access to common property biological resources provided by e.g. forests, and other essential environmental goods and services. Key poverty related issues in the rural areas also include soil erosion, deterioration of vegetative cover, biodiversity loss, salinization and soil compaction.

Reducing poverty relieves the poor from some environment-related hardships, but the non-poor farmers may also contribute to environmental degradation. Households relatively richer in assets (e.g. livestock and land) depend more on private resources, whereas the poorest depend more on commons such as forests for food and energy and public land for livestock grazing. Hence, hill-side closures for land reclamation hit the poor relatively more in the short run.

Although some knowledge has been attained, careful empirical analyses are still needed in this area to clearly understand who exploit and depend on what environmental resources in order to formulate appropriate environment-poverty related policies. The economic costs of environmental degradation on poor are clear as the poor are unable to protect themselves adequately against environmental hazards such as drought, afford to take sufficient remedial actions, to engage in alternative livelihoods which can protect them from the environmental risks, or to provide themselves with alternative sources of income and employment.

Climate change influence in Ethiopia and implications for development cooperation

According to a recent assessment by the Ethiopian Meteorological Agency (EMA, 2006), among others, the major adverse effects of climate change in Ethiopia include increased climate variability, which will increase the occurrences of droughts and floods. These are not new problems of Ethiopia but the effects are likely to be accelerated and aggravated. Impacts of increased climate variability include (i) increased food insecurity; (ii) outbreaks of diseases such as malaria, dengue fever and water borne diseases such as cholera and dysentery due to floods, and (iii) respiratory diseases associated with droughts; (iv) heavy rainfalls which tend to accelerate land degradation and damage to communication infrastructure. Other climate related hazards in Ethiopia include strong winds, frost, heat waves (high temperatures) and lightning.

Recent mappings and impact analyses of climate change risks pertaining to Ethiopia (ILRI, 2006; Dougherty and Crick, 2007) puts Ethiopia as one of the countries in Africa, which is most vulnerable to climate change and with least capacity to respond and adapt. Ethiopia already suffers from climatic extremes, manifested in terms of frequent droughts during the last couple of decades and recent floods (in 1997 and 2006). Agriculture is the source of livelihood to an overwhelming majority of the Ethiopian population and is the basis of the national economy. Agriculture employees more than 80% of the labor force, accounts for 45% of GDP and makes up 85% of the export revenues (MoFED, 2007). Ethiopia's agriculture is heavily dependent on natural rainfall, with irrigation agriculture accounting for less than 1% of the total cultivated land. Thus, temperature, the amount and temporal distribution of rainfall and other climatic factors during the growing season are key determinants to the crop yields and, in turn, food shortages, malnutrition and famine (Yesuf, 2007; Yesuf and Kassie, 2007).

Cost-effective adaptation measures are recognized as critical and necessary responses to the impacts of climate change, primarily due to the fact that current international agreements to limit emissions, even if implemented, will not stabilize atmospheric concentrations of greenhouse gas emissions and prevent the medium-term impacts of climate change. Hence adaptation ought to be considered as an integral part of the government's current and future key national policies and practices, at all levels of implementation. Here overseas development assistance has an important role to play as catalyst and facilitator; eqully important is the important role that could be played by Ethiopia's civil society organizations and representatives in this process.

Following the recommendations from UNFCC, the Ethiopian government has prepared a Climate Change National Adaptation Plan of Action (NAPA). The scope of adaptation proposed is wide and complex, and requires involvement of a large set of individuals and institutions at all levels. Among others, this action plan indicates the urgency of the need to integrate climate change adaptation into the development process; enhance awareness and knowledge on adaptation at the policy- and decision-making levels; and the need to collect baseline data and build analytical capacities. Supporting such activities are of utmost importance for Ethiopia's opportunities to attain pro-poor and environmentally sustainable growth.

Most important Environmental problems in Ethiopia

The most important environmental problems in Ethiopia include (i) land degradation, mainly due to physical soil loss and depletion of soil nutrients, overgrazing and deforestation, (ii) environmental vulnerability due to climate variability causing droughts and floods and (iii) indoor air pollution and (iv) water pollution. Other, somewhat less important environmental problems include the potentially negative effects on livelihoods and food security of agro-fuel investments, loss of biodiversity, spread of invasive alien species, urban outdoor air pollution (mainly in Addis Abeba), and toxic and household wastes (European Commission, 2007b).

Regarding *land degradation*, the Food and Agricultural Organization (1986) estimated already in the 1980'ies that 50% of Ethiopia's highlands (which cover 45% of the country and is home to 80% of the country's population) were *significantly* eroded, 25% were *seriously* eroded, and 4% were *beyond reclamation*. Since then, the problem has only become worse, with an erosion-induced productivity decline estimated at 2.2% per year. The average annual

rate of erosion on croplands is estimated to be 42 tons per hectare per year (Hurni, 1993). By far this exceeds the soil formation rate of 3 to 7 tons per hectare per year (Gebremedhin and Swinton, 2003). In 2000, fertilizer applied to cultivated land was 15.8 kg of nutrients per ha (World Bank, 2000) while nutrient losses were projected to reach 47 kg N /ha by the year 2000 (Stoorvogel et al., 1993). Current fertilizer application amounts to only 15.1 kg per ha (World Bank, 2007b).

In a country with a fast-growing population vulnerable to frequent famines, loss of any food-production potential is a concern for both present and future generations. Less than 3% of the country remains forested, down from an initial estimate of 40% forest cover. The deforestation rate between 1990-2005 has averaged 0.9%. The effects are linked: The fuelwood shortage due to deforestation has direct implications on soil fertility, since animal waste and crop residues are collected as fuel rather than left as natural fertilizers and stabilizers in fields.

Although actual records on *indoor air pollution* are sparse, it is indeed a very serious environmental problem causing acute respiratory illness (ARI). It hits the poorest the most, particularly women and children. To exemplify, prevalence of ARI among children under five is 13%. These problems are mainly caused by the poor households' use of traditional polluting stoves and woody biomass, which is their major source of energy for cooking, heating and lighting. About 95% of Ethiopia's energy supply comes from woody biomass, mainly fuelwood (77%), dung (8%), crop residues (9%) and charcoal (1%). Electrification mainly for lighting is concentrated in the urban areas. Electrification of the rural areas is limited.

Water pollution constitutes a large risk to Ethiopia's public health, mainly caused by high levels of organic pollutants and water-borne diseases. Access to safe water in terms of improved water sources is very poor. In rural areas only 11% of the population have access to safe water. Compounded with the extremely limited access to improved sanitation (7%) in rural areas, the prevalence of water-borne diseases is therefore very high. A consequence of this is the high under-five mortality rate (12.7%) and prevalence of diarrhea among children under five (23.6%) (World Bank, 2007b).

The direct causes of land degradation and vulnerability to climate variability include production on steep slopes and fragile soils with inadequate investments in soil conservation or vegetative cover, erratic and erosive rainfall patterns, declining use of fallow, limited recycling of dung and crop residues to the soil, limited application of external sources of plant nutrient, deforestation, and overgrazing. Underling these proximities causes are many factors including population pressure; poverty; high cost and limited access to agricultural inputs and credit; missing or incomplete input and output markets; low profitability of agricultural production and many conservation practices; high risks facing farmers; fragmented land holdings and insecure land tenure; short term horizon of farmers; farmers' lack of information about appropriate alternative technologies; lack of alternative energy sources and improved stoves (Hagos et al. 1999; Desta et al. 2001). Recurrent droughts and extreme weather events associated with climate change are also compounding the land degradation problem.

In response to the key land degradation issues, governments and development agencies over the last four decades have invested substantial resources in promoting land management practices such as soil conservation, application of fertilizers and afforestation. These activities have been promoted with the aim of improving the environmental conditions in the rural

areas, ensure sustainable land use and increase agricultural productivity. A major effort to counter-act land degradation is the *Country Pilot Partnership on Sustainable Land Management (CPP-SLM) project*. This initiative uses mainly capacity building and up-scaling of SLM technologies in order to reduce land degradation and improve land use.

Moreover, a relatively smaller carbon project (Humbo carbon project) is also initiated in the southern part of the country, which will allow natural regeneration of forest resources through protecting the degraded areas. The community will benefit from income of sequestered carbon sale. This intervention is expected to yield two-fold benefits in terms reduced environmental degradation and poverty reduction. This initiative can serve as an example for small scale land rehabilitation, which can be used for similar purposes elsewhere in the country since the need for land rehabilitation is vast. However, at present human capacity and financial resources are insufficient for an up-scaling of interventions of this kind.

The establishment of the *Environmental Protection Authority,* the formulation of a National action plan to combat desertification and the effects of drought, and the ongoing land certification program are other key the initiatives to reduce land degradation. In particular, the land certification program is a novel initiative aimed at increasing productivity and investments in land by securing land rights. The program, which does not allow land to be used as collateral and land sale, remains to be assessed in terms of its effects on productivity and long-term land investments.

Environmental issues as reflected in PASDEP

PASDEP recognizes the importance of environmental resources to facilitate sustainable economic growth and poverty reduction. Moreover, PASDEP recognizes the obstacles raised against attaining these objectives by environmental degradation such as soil erosion, deterioration of vegetative cover, biodiversity loss, salinization and soil compaction. Surprisingly indoor air pollution is not addressed in the PASDEP document. Given the importance of this issue from an integrated poverty perspective - which includes public health and environmental sustainability - it is of great importance that the extent, consequences and determinants of indoor air pollution are properly assessed and addressed. Likewise, developing, implementing and disseminating energy saving measures like improved stoves and fuel systems for cooking, heating and lighting purposes are key means to reduce poverty, improve public health and environmental quality, and reduce natural resource depletion.

PASDEP mentions water and soil pollution due to agrochemicals, but in our view these issues are relatively smaller problems (compared to e.g. indoor air pollution) because of the extremely low use of chemical fertilizer, pesticides and other chemicals by the majority of land users of the country.

PASDEP also reflects the following environmental issues:

- Natural resource management and conservation activities (such as soil and water conservation, forest management, water management, wild protection sand development and biodiversity protection) and its objectives;
- Although not directly, links between health and the environment are discussed through sanitation, water management and vector-borne diseases. However, environmental health problems due to indoor air pollution are not discussed at all.

- Environment-related achievements during the SDRP are mentioned thoroughly which can serves as an input for PASDEP to achieve environmental goals and targets.
- Finally, poverty–environment indicators are not spelled out adequately. This may create a problem for monitoring and adequate evaluation of the Plan.

Capacity Building in Environment Related Issues

Ethiopia is one of the countries in Africa which is most vulnerable to climate change with the least capacity to respond and adapt to the risks associated with it. This poses a major challenge to Ethiopia. Reforms and interventions are necessary in a large set of areas and sectors. Due to the magnitude of the issue it places the responsibility for changed practices on many key actors. First and foremost, there is a pressing need to formulate and implement adaptation action plans for key sectors and – coupled with this – to develop and implement specific programs and projects addressing the risks associated with climate change.

Moreover, there are also vast needs to build capacity in the area of environmental education and awareness; many of the local environmental issues can only effectively be addressed by the poor people themselves given that they have/are provided with an understanding of the issues. This applies for instance to the negative downstream effects of soil erosion which contaminates water courses with silt, sediment and other agricultural run off. It is therefore necessary to increase emphasis on environmental awareness programs and environmental education in schools. Nationally as well locally there are short-term as well as long-term training needs in areas such as vulnerability and adaptation assessment, climate variability, climate change detection, climate modelling, and mitigation analysis.

Linked to this there is also a need to raise the awareness within key ministries and government agencies on (i) the costs of environmental degradation, (ii) the benefits of sound environmental management, and (iii) how economic policy instruments can be used more broadly for pollution mitigation and sustainable and/or more cost-effective natural resource exploitation. Potentially, Environmental Fiscal Reforms may be introduced which make use of market-based incentives such as pollution taxes levies, fines, natural resource extraction fees and environmental subsidies in order to promote environmentally *and economically* sustainable natural resource management as well as adaptation to climate change, in addition to necessary legal reforms and new cost-effective technologies. This applies in particular to the agricultural sector, where the opportunities to enhance tenure, technologies and land use practices are large.

Besides a shared responsibility across ministries to mainstream environment in their policies, plans and practices, it is essential that the capacity is strengthened within key ministries and government agencies, notably the Ministries of Agriculture and Rural Development, and Natural Resources Development and Environmental Protection (MONREP), respectively, and the Environmental Protection Authority (EPA). at the general level to respond to Ethiopia's environmental challengesThe establishment of

Health, environment and climate change

Environmental degradation and hazards such as indoor air pollution, droughts, floods, poor sanitation are closely associated with Ethiopia's relatively high prevalence of respiratory

diseases (acute respiratory infections, middle-ear infection, lung cancer, asthma), malnutrition and diarrhea. Biomass fuel such as wood, charcoal, dung and crop residues remains the principal energy source of the country. A number of empirical studies (e.g., Ezzati and Kammen, 2002; Smith et al., 2004) confirm the links between exposure to indoor air pollution and the incidence of respiratory diseases and a variety of peri-natal health hazards arguably due to maternal exposure during pregnancy.

Examples of health, climate and environment linkages are manifested by the recurring displacement of people, disease and death caused by heavy rains. For instance, recent heavy rains resulted in flash floods and overflow of rivers during October, December, and August 2006. They affected over 670,000 people across the country. Eight of the country's eleven regions were affected causing loss of life, displacement of (mainly poor) people, and damage to infrastructure, livelihoods, and private property (Central Emergency Response Fund, 2006; Mail and Guardian Online, 10 August 2006). Over 700 people were reported to have died and about 240,000 were displaced. In addition, the floods contributed to an increased incidence of water-borne disease including acute diarrhea. Ethiopia's recurrent droughts typically cause prolonged food insecurity and malnutrition. For instance, drought was experienced in the first half of 2006 affecting approximately 2.7 million people in the country, particularly in the pastoral and agro-pastoral areas of southern Somali region and Borena zone of Oromiya Region. The failure of two successive rainfalls in these areas resulted in severe food insecurity and increased malnutrition rates. Moreover, the drought exacerbated the spread of communicable disease such as measles, which hit the children particularly hard.

Vulnerable areas and populations from an environmental and sustainability perspective

Two areas are particularly vulnerable from an environmental and sustainability perspective: (i) the erosive fertile highlands and (ii) the arid and semi-arid lowlands. Consequently, the majority of the populations residing in these areas are subject to significant environment-related risks.

The people living in the erosive fertile highlands constitute the majority of the country's population and depend on small-scale agriculture for their survival. As indicated above, crop production in these areas is subject to massive soil degradation, which threatens productivity, food security and medium-long term welfare, for the country's entire population in general and for the people in these areas in particular. Future climate change will place *additional* burdens on the current hardships of erratic rainfall and large variations in crop production. Unless the soil loss and the other land degradation problems are mitigated, welfare, livelihoods and sustainable development are seriously at risk in these areas (European Commission, 2007a).

The arid and semi-arid lands – mainly eastern, southern and south-western Ethiopia - are particularly prone to climate variability (e.g. drought, desertification and occasional floods). The vast majority of the people in these areas live in abject poverty. Their livelihoods and welfare are directly dependent on, and affected by, climate variabilities. To a large extent they have developed livelihoods which can cope with *some* variabilities in the climate, but accelerated climate change will speed up *environmental changes* - such as reduced vegetative cover, soil degradation, water scarcity, changes in water quality, losses and changes in biodiversity – which will put their livelihoods at risk. Since the people residing in these areas *already today* have very limited opportunities to cope with, and adapt to, climate variability, they are likely to suffer even more (the most) under the predicted effects of climate change in

the short- and medium-term. Hence, implementing measures which can facilitate enhanced capacity to cope with, and adjust to, climate change is of utmost importance to these people and in these geographical areas.

How do legislation, government agencies and institutions contribute to or lessen environmental problems?

Specific environment related policies exist, and most economic and sector development policies contain environment provision and regulations. However, there is a tendency for most government rural development policies and programs to be designed and implemented without sufficient consideration of the comparative advantages prevailing in each geographical area and with systematic emphasis on crop production and agriculture livelihood at the expense of forestry and livestock-based and pastoralist livelihood (European Commission, 2007b).

The Ethiopian Government actively pursues privatisation of natural resources (minerals, spring waters, fossil fuels, tourism development etc). However, there is a lack of consideration of the environmental impacts of these initiatives, e.g. the expansion of the flower industry and its impacts on the soil and water resources. To ensure environmentally *and economically* sustainable flower production there is a need to address issues related to the soil and water contamination caused by the industry's unregulated use of fertilizers, herbicides and pesticides (European Commission, 2007b).

Environmental considerations are included in several components of the Rural Development Policy, although rather superficially. In the Sustainable Development and Poverty Reduction Program (SDPRP), priority areas for action pertaining to environment and development include land degradation, strengthening regulatory and institutional capacity, and biodiversity protection. Some important environmental (mostly conservation) issues are included in the SDPRP as crosscutting issues, but they are not properly integrated in the main chapters. In practice there are significant gaps between the SDPRP policy and its implementation on the ground. Writings on resettlement refer to the need for assessing land resources and disease problems in the resettlement sites and urges communities to take responsibility for environmental protection and rehabilitation within resettlement areas. However, the negative environmental impact of the resettlement and commercial farming schemes appear to have been underestimated while the short term direct benefits have been over-emphasised (European Commission, 2007b).

A joint feature of SDPRP and PASDEP is the focus on environmental *problems*. Although very important, there is a need to increase the attention to the economic values inherent in Ethiopia's natural resources and ecosystem services (e.g. biodiversity and non-timber forest products such as food, fuel, fiber and fodder), and their direct as well as indirect impacts on poverty reduction and economic production.

PASDEP emphasizes accelerated growth in agriculture and the rural areas, and development of the private sector. Economic development is the priority while environmental sustainability concerns are given much less priority. The Ethiopian government is pursuing a policy of privatisation of its natural resources (forested areas, rangelands, minerals, spring waters, fossil fuel, game parks, etc). On some important environmental and rural development issues such

as Integrated Pest Management (IPM), PASDEP represents a significant step backwards compared to the SDPRP. Moreover, recent and significant developments in the agro-fuel sector have highlighted the need for clarifications on a number of critical issues, for instance whether the in-country bio-diesel refinery capacity is going to be upgraded to absorb local agro-fuel production, thereby contributing to reduce fuel imports (European Commission, 2007b).

The current water and sanitation policies and strategies are highly relevant and reflect best Ethiopian and international practice. However, implementation is lagging behind policy. Moreover, regulations and guidelines, although rapidly developing, are still missing in important areas (European Commission, 2007b).

Key links between human rights, inequities, gender equality and the environment

Environmental degradation and natural resource depletion disproportionally hit the poor the hardest. This applies to people in Ethiopia living in the economically marginal areas such as the remote arid and semi-arid lowlands, at the steepest hill-sides where farming is practiced, and in the peri-urban slum areas, where water pollution, waste and sanitation hazards are rampant. Due to poverty, inequities and policy failures, rights to water and adequate housing are frequently violated, in the urban slums as well as in most of the rural areas. Only to some extent can environmental entitlements be solved by reducing inequities. The largest challenge and the key to the deprivation of rights are to reduce poverty and facilitation of pro-poor environmentally sustainable growth.

Women and children are particularly vulnerable groups in Ethiopia. Women are disadvantaged in several ways regarding land use and access to land in the rural areas (Teklu, 2005).

Women and girls are also particularly vulnerable to environment-related diseases due to their increased exposure to in-door air pollution and the heavy burden of fetching water and biomass on a daily basis. Consequently, girls are deprived of their right to schooling due to their responsibilities to do household chores. Moreover, around 15,000 women carry approximately 35% of the fuelwood requirements of Addis Ababa city. For more than 80% of these women, this is their only source of income (WBISPP, 2004), and the activity severely reduces the Ethiopia's scarce forest resources, especially around Addis Ababa, and places an extra-ordinary burden on a vulnerable sub-group among Ethiopia's urban poor.

Conflicts, Environmental Quality and Natural Resource Scarcity

Ethiopia has a history of inequalities of power, status, class, ethnicity and gender, followed by almost two decades of military rule under the Derg, and civil war. Relations with neighbouring countries have been stressful with open hostility and war. Though the war with Eritrea ended in 2000, tension still remains with the unresolved border dispute (DFID, 2006). Existence of landmines, especially in the Northern districts bordering Eritrea, kills and maims people as well as animals, and threatens the sustainability of agriculture and grazing lands (European Commission, 2007a). During 2006 further tension in the Horn of Africa due to the deterioration of the situation in Somalia. The area along the Sudanese border was for a long time unstable due to the conflicts in Southern Sudan. The relation between Sudan and

Ethiopia improved after the war between Ethiopia and Eritrea. The World Bank (2007a) recognizes that "there are prospects of a more favorable regional context in the Horn, though this remains unconsolidated and tension in Sudan and Somalia, at the time of writing, is symptoms of the continuing potential for instability".[2]

Competition over natural resources has increased tension between pastoralists, agro-pastoralists and sedentary farmers in several areas of the country. Implementation of past and recent resettlement programs have resulted in reduction and/or bio-physical changes in forest areas. Forest areas have in the resettlement programs have been perceived as unoccupied and unused. Confrontation between agricultural smallholders, who are mostly recent settlers, and forestry/agro-pastoralists have occurred due to direct competition over natural resources (water, grazing and timber). Tension has lead to civil unrest and armed conflict. Conflicts over natural resources prevail in eight of eleven studied resettlement areas, with incidences even leading to death in some cases. The increase in forest depletion also creates further tension over the remaining forest resources. Further, a forest clearing rush became an unwanted side effect of the implementation of the Land Proclamation Act. Farmers cleared as much prime forest land they could in anticipation of its registration as private land (European Commission, 2007b).

The Ogaden conflict

Conflict between the Ethiopian government and the Ogaden National Liberation Front (ONLF) has essentially made the Ogaden region a closed conflict zone for over a decade. In the region, already plagued by severe droughts and a fragile ecological balance, forests have been exploited for military purposes. The exploitation puts the fragile ecosystem at risk compounded by severe pressure from overpopulation and overgrazing. Further, the Ethiopian government has given concessions to foreign companies to explore oil, natural gas and other minerals in the region creating a situation where a large number of pastoralists have been forced to leave their ancestral grazing lands.

Economic Development and Environment

The value of production of goods and services of Ethiopia is less than a quarter of the sub-Saharan Africa average with a GDP per capita of only US$ 160 (World Bank 2007b). The Ethiopian economy is highly dependent on rain fed low productivity agriculture and exploitation of other natural resources. As much as 85% of the employment depends on agriculture. Rightly, agriculture forms the center of the Government's development strategy. However, compared with international standards, the agricultural productivity is very low. Development in this sector is badly needed for poverty reduction and sustained economic growth (World Bank, 2007a). The low productivity is aggravated by environmental degradation, low levels of technology and limited supply of inputs, which replenish the soil capital and boost crop production, such as manure and inorganic fertilizers. These conditions are major sources of vulnerability to the economy's sustainability - at the national level as well as the household level, particularly in rural areas (Government of Ethiopia, 2006).

The productivity of the Ethiopian economy has been seriously undermined by the degradation of its environmental resources. The high population growth rate poses an additional challenge

[2] World Bank, 2007a. *Country Economic Memorandum*, Washington DC

for sustainable economic growth. During much of the 1980ies and 1990ies the net adjusted savings have been negative. This is a serious indicator of non-sustainable economic growth and depreciation of the country's total capital. Only recently have the net adjusted savings turned positive. In 2006, the accumulated gross savings, adjusted for education expenditures, costs of natural resource depletion and air pollution, were estimated to be around 12% (World Bank, 2007b). Although such a figure reflects improvements in relation to the historical records, studies from the World Bank also estimate the cost of environmental degradation to amount to 4% of GDP.

The SDPRP focuses on the following building blocks (European Commission, 2007b):

- Agricultural Development Led Industrialization (ADLI)
- Reform of the civil service and the justice system
- Decentralization and empowerment
- Capacity building in the public and private sector

It emphasizes that industrial development and increased exports are required for agricultural growth. Although ADLI emphasizes increased agricultural productivity as the main engine for Ethiopia's economic development and industrialization, there is a need to sustain production through use of appropriate technologies *and sustainable land management* (World Bank, 2005). For Sida and other development partners it is important to ensure that implementation of SDPRP and ADLI integrates environmental concerns and safeguards, and prevents that economic growth and poverty reduction are attained at the expense of the country's natural resources, which are *absolutely necessary for sustained* economic growth and poverty reduction.

Ethiopia and International Environmental Problems with Regional and Global Implications

Two environmental issues are of particular relevance and importance to Ethiopia from an international perspective: regionally shared water resources and climate change. For the purposes of this paper, the key aspects of importance to Ethiopia regarding climate change are addressed above. Regarding regional water resources, Ethiopia is home to the Blue Nile, which is one of the two sources of the Nile. The Blue Nile, originating at Lake Tana, joins the White Nile in Sudan to form the main Nile, contributing in average to 85 % of the flow arriving in Egypt. Ethiopia's role as a major upstream water source constitutes an opportunity as well as a potential source of international conflict. Generally, the downstream countries are vulnerable to changes in water flows induced by action in the upstream countries.

Consequently, Ethiopia is a member of the Nile Basin Initiative (NBI) and participates together with the governments of Egypt and Sudan in the Eastern Nile Subsidiary Action Programme (ENSAP). The Nile Basin Initiative was formally launched in 1999 with the aim to "achieve sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile Basin water resources". Specifically, ENSAP has the following long term objectives:

- Ensure efficient water management and optimal use of resources through equitable utilization and no significant harms;

- Ensure cooperation and joint action between the Eastern Nile countries seeking win-win goals; and
- Target poverty eradication and promote economic growth.

The Initiatives' first tangible investment is the Ethiopia-Sudan Transmission Interconnection Project, a new transmission line connecting Ethiopia's to Sudan's power grids. It was approved in December, 2007 (World Bank, 2007a). If all goes well this investment will lead to power trading between Ethiopia and Sudan which will generate benefits for both countries at the national as well as the regional level, respectively.

This regional/trans-national investment constitutes an opportunity to promote economic development while pro-actively addressing a potential source of regional conflict – that over regional water resources. Regarding environment-related risks and uncertainties, increased incidences in extreme climatic events, such as heavy rainfall and flooding, due to climate change, would have serious negative impacts on the power installations if these are built in vulnerable areas. An Environmental and Social Impact Assessment has been carried out for this project, but risks associated with climate change are not considered/mentioned (Dougherty and Crick, 2007).

Planning and implementation of investment projects under the Subsidiary Action Program, e.g. the Ethiopian-Sudan transmission interconnection project, require decisions to be made at different levels based on scientific information. It is for this reason the Water Resource Planning and Management (WRPM) project has initiated the development of the Nile Basin Decision Support System (DSS). Currently, the WRPM project is in the process of finalizing the DSS needs assessment and conceptual design, which is expected to be completed by the end of April 2008. Projects currently being planned aim at (i) increasing agriculture productivity through irrigation development, (ii) reducing damages and loss of life from major floods, and (iii) promoting regional power trade through coordinated planning. These projects are all planned by the NBI Eastern Nile Technical Regional Office as a part of ENSAP (Dougherty and Crick, 2007).

References

Desta, L., Kassie, M., Benin, S. And Pender, J. (2001). *Land Degradation in The Highlands of Amhara Region and Strategies for Sustainable Land Management*, Working Paper No. 32, International Livestock Research Institute (ILRI), Livestock Policy Analysis Program, Addis Ababa.

DFID, 2006. "*Ethiopia Country Assistance Plan 2006-10 Consultation Draft"*

Dougherty, Bill and Florence Crick, 2007. *Poverty Reduction at Risk in Ethiopia: An Assessment of the Impacts of Climate Change on Poverty Alleviation Activities*, the Netherlands Climate Assistance Program, Netherlands Ministry of Foreign Affairs

EMA (2006). *Climate Change National Adaptation Plan of Action* (draft). Ethiopian Meteorological Agency.

European Commission, 2007a. *Ethiopia – European Union; Country Strategy Paper and Indicative Programme(s) - Towards a Joint Response Strategy for the period 2008-2013,* European Commission

European Commission, 2007b. *Ethiopia – Country Environmental Profile*, European Commission

Ezzati, M., and Kammen, M. D. (2001). *Indoor Air Pollution From Biomass Combustion And Acute Respiratory Infections In Kenya - An Exposure-Response Study*. **Lancet** 356(9282): 619-24.

Gebremedhin, B., and Swinton. S.M. (2003). *Investment in Soil Conservation in Northern Ethiopia: The Role of Land Tenure Security and Public Programs*," **Agricultural Economics** 29: 69–84.

Government of Ethiopia, 2006. *Ethiopia: Building on Progress - A Plan for Accelerated and Sustained Development to End Poverty (PASDEP),* Ministry of Finance and Economic Development (MoFED).

Hagos, F., Pender, J. and Gebreselassie, N. (1999). *Land Degradation In The Highlands Of Tigray And Strategies For Sustainable Land Management*. Socioeconomic and Policy Research Working Paper No. 25. Addis Ababa: Livestock Analysis Program, International Livestock Research Institute.

Hurni, H. 1993. "*Land Degradation, Famines, and Resource Scenarios in Ethiopia*." In *World Soil Erosion and Conservation*, edited by D. Pimental, Cambridge University Press.

ILRI (2006). *Mapping Climate Vulnerability and Poverty in Africa*, International Livestock Research Institute (ILRI), Addis Ababa.

MoFED (2006). *Survey of the Ethiopian Economy*. Addis Ababa, Ethiopia.

Nile Basin Initiative, 2007. http://www.nilebasin.org/index.php

Stoorvogel, J.J., Smailing, E.M., and Janssen, B.H. (1993). *Calculating Soil Nutrients Balances In Africa At Different Scales I. Supra National Scale*. **Fertilizer Research** 35, 227-235.

Teklu, Askale, 2005. *Land Registration and Women's Land Rights in Amhara Region, Ethiopia*, Research Report 4, IIED.

United Nations, Central Emergency Response Fund(CERF) (2006). *CERF in Ethiopia 2006*. Accessed on February 2008 at http://ochaonline.un.org/Default.aspx?tabid=1755.

WBISPP (Woody Biomass Inventory and Strategic Planning Project). 2004. *A National Strategic Plan for the Biomass Energy Sector*. Government of Ethiopia, Ministry of Agriculture, Addis Ababa.

World Bank., 2000. *World Development Indicators Database*, July 2000.

World Bank, 2005. *Ethiopia Country Environmental Analysis*, Washington DC

World Bank, 2007a. *Ethiopia Accelerating Equitable Growth; Country Economic Memorandum*, Washington DC

World Bank., 2007b. *World Development Indicators*, Washington DC.

World Bank, 2007c, http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/ETHIOPIAEXTN/0,,contentMDK:21594950~menuPK:295949~pagePK:2865066~piPK:2865079~theSitePK:295930,00.html

WHO (World Health Organization). (2002). *The World Health Report 2002: Reducing Risks, Promoting Healthy Life*. Geneva: WHO.

Yesuf, M. (2007). *The Impact Of Climate Variability On Agricultural Production: The Case Of Nile Basin, Ethiopia*. Draft paper presented on Climate Change Workshop, organized by EDRI and IFPRI, under a collaborative project "Global Food and Water Security Under Global Change: Developing Adaptive Capacity with a Focus on Rural Africa".

Yesuf, M and Kassie, M. (2007). *Reducing Vulnerability In Ethiopia: Addressing The Implication of Climate Change*. Unpublished report.