Sustainable Agriculture and Rural Development
MOUNTAIN POLICY PROJECT

A Study on Mountain Externalities in Ethiopia

(Final Report)

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Contents

Acronyms

ADLI	Agricultural Development Led Industrialization
AEZ	Agro-Ecological Zones
CEPWD	Community Based Participation Watershed Development
CGAAS	Clean and Green Addis Ababa Society
COM	Council of Minsters
CRA	Cooperative Regional Assessment
ECX	Ethiopian Commodity Exchange
EHRS	Ethiopian Highland Reclamation Study
ENSAP	Eastern Nile Subsidiary Action Program
ENTRO	Eastern Nile Technical Regional Office
FFW	Food For Work
GDP	Gross Domestic Product
GMP	Global Mountain Programme
IDEN	Integrated Development of the Eastern Nile
LLPPA	Local Level Participation Planning Approach
NBI	Nile Basin Initiative
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
PES	Payment for Environmental Services
PIP	Policies Institutions and Processes
PME	Participatory Monitoring and Evaluation
SAP	Subsidiary Action Program
SAV	Shared Vision Program
SCRP	Soil Conservation Research Project
SDPRP	Sustainable Development and Poverty Reduction Program
SLM	Sustainable Land Management

SMNP	Simen Mountain National Park
SWCD	Soil and Water Conservation Department
TAC	Technical Adviser Committee

1 Introduction

1.1 Background

Mountains cover about 22% of the terrestrial land area of the Globe, hold about 12% of the global human population, and about 50% of the human population depends on freshwater resources from mountains. They are important sources of biodiversity and livelihoods and also important regulators of climate. However, mountains have been characterized as one of the world's most vulnerable bio-geographic areas susceptible to land degradation, that has suffered from loss of indigenous culture and traditions that embody thousands of years of lessons learned about sustainable mountain environment management. This process on mountains coupled with high population growth in the world (growing at some 70 million per year, (WWAP, 2006)) will result in an increasing demand for fresh water, biodiversity and other resources for livelihoods from mountains. All these chain of processes are resulting further degradation and deterioration of mountain environments and livelihoods dependant on them.

According to an analysis by the United Nations University & the University of Bern degradation of mountain ecosystems threatens to seriously worsen global environmental problems such as floods, landslides and famine. The International concerns mentioned above gave rise to Agenda 21 Chapter 13 with two priority areas:

- Generating and strengthening knowledge about the ecology and sustainable development in mountains (Estimated investment need: 50 million USD/annum)
- Promoting integrated watershed development and alternative livelihood opportunities. (Estimated investment need: 13 billion USD/annum)

The recent climate changes affect mountain regions disproportionately and add further importance to the above priority areas (Trutmann, 2006). The impact of all these processes on mountains is affecting millions of lives in both upstream and downstream areas.

Moving out of the vicious cycle of degradation and poverty will require better forms of production and maintenances of the mountain ecosystem, such as Sustainable Land Management (SLM) techniques which can foster a more efficient use of mountain resources such as water, biodiversity and reduce pollution problems, contributing to increase the quantity and quality of these resources, thus remarkably improving agricultural productivity and availability of essential resources both in upstream and downstream areas. However, one of the key barriers for wider adoption of SLM is designing the proper incentives to stimulate the adoption of such practices. It is important to create a mechanism where upstream and downstream resource users are involved on joint planning, implementation and resource mobilization efforts. Among a range of suitable instruments, Payment for Environmental Services (PES) schemes have potential to bridge this gap by providing incentives to upstream land users and other natural resource managers that are consistent with the downstream consequences of their actions. PES also ensures accountability of both actors (upstream and downstream communities) to each other and their environment.

The overwhelming proportion of the Ethiopian population lives in rural areas (85%) and about 90% lives in the Ethiopian highlands and directly depends on subsistence agriculture which is entirely dependent on natural resources. Thus, agricultural development is vital to the achievement of food security and sustainable economic development in the country. This implies sustainable management of land and environmental resources of the highlands and mountain regions of Ethiopia. Recognizing this, the government has given a lead status to the sector through its Agriculture Development Led Industrialization (ADLI) strategy. The Plan for Accelerated and Sustainable Development to End Poverty (PASDEP), which represents the second phase (2005-2010) of the Ethiopian Sustainable Development and Poverty Reduction Program (SDPRP), also focuses on agriculture centred rural development. The success of economic development with agriculture as the engine for change hinges on sustainable management and utilization of land resources. However, the recent case study conducted by GMP-SARD-M reveals that there are some policy implementation gaps in addressing the natural resources management issues in the country (GMP, 2009)

Land degradation is a major contributor to food insecurity and rural poverty in the country. Hence, investment on sustainable land management and rural development is very much desired in Ethiopia. The current assessment on PES to ensure better land and environmental resource management is therefore relevant to national goals, policies and priorities related to poverty reduction. It is also directly relevant to two of the MDGs: poverty reduction and environmental sustainability.

In the frame of an agreement with FAO, project for Sustainable Agriculture and Rural Development in Mountains (SARD-M) and having regard to the key issues identified by the Adelboden Group, an inventory has been undertaken identifying mountain environmental services and externalities which may benefit from payments, in Ethiopia: This paper explores unique natural, cultural and historical resources within the mountains such as water, biodiversity (in this case highland coffee), natural heritage sites, cultural heritage sites, and SLM activities by communities in the highlands. The paper appraises current status of each and discusses opportunities and constraints to be addressed in order to realize the potential of PES towards sustainable management of mountain resources to improve livelihoods and reduce poverty through sustainable management of environmental resources (productive assets) by creating harmonized highland–lowland interaction.

1.2 The Ethiopian Highlands – highlights of current situation

About 50 percent of Ethiopia can be defined as mountainous, be it because of altitude above about 1500m, or because of steep slopes. The country's highland areas include about 90% of its arable lands and are occupied by 90 percent of the human population and 60 percent of all livestock. The mountains of Ethiopia offer excellent conditions for natural diversity and human development, be it on the one hand as the 'cradle of mankind' with early hominids some 3-4 million years ago, or on the other hand as the origin of Homo sapiens who started to spread over the globe from this region

some 150,000 years ago. Since then population has expanded all over the highland parts of Ethiopia as they are very suitable places for living and agriculture than the malaria-infested harsh lowland areas surrounding the highlands. The Ethiopian Highlands, once endowed with rich natural resources, are agriculturally used since millennia and now heavily degraded. As a result only very few places in the Ethiopian highland/mountain complex have remained unaffected by human land use until the present time. These include mountaintops above 3700 m as well as the steepest slopes in the highland escarpments, where some natural vegetation patches and a few original wildlife species have been able to survive.

Land use and cover changes have been particularly dynamic in the 20th Century due to accelerated population growth and land tenure policy changes since 1975. At the same time climate change began showing its effects, and wildlife in its natural habitat has become restricted to those few areas that were preserved naturally due to rugged topography or natural aridity. Soil erosion has been severe throughout the highlands, but mainly on cultivated land, and today's severity and extent of soil degradation is seriously threatening food security.

Ethiopian highlands/mountains are not only sources of livelihood from agriculture but they are sources of fresh water to millions of people in Ethiopia and neighbouring countries such as Egypt, Sudan, Somalia and Kenya. They are also sources of rich biodiversity (flora and fauna) with many endemic species including wide array of crop genetic diversity such as Barley, Wheat, Coffee, *Enset*, and many spices. Apart from this the Ethiopian highlands holds significant historical /cultural sites and monuments from many thousands of years to the present. All these resources are under heavy threat of population pressure, land degradation and poverty.

Agricultural evolution in the Ethiopian highlands began several thousand years ago, resulting in excessive negative impacts on natural vegetation, wildlife and soil and water resources over time, but particularly during the 20th century, when the dynamics were strongest. Agriculture has remained the primary activity of the Ethiopian people up to the present day, with over 82% of the current population of nearly 80 million still engaged in the primary sector.

Agriculture contributes substantially to the overall Ethiopian economy. On a nominal GDP of $19.4 billion USD, 44 percent was driven by the agricultural sector[i]. Crop production accounts for 29 percent, with livestock at 12 percent, followed by the forestry sector with four percent. The sector contributed $1.6 billion USD in 2008 to export earnings crops and forestry account for 60 percent of overall export value, livestock for 28 percent, and remaining exports, a combination non-agricultural industry, primarily extractives and industrial production.

Almost all contribution of agriculture is mainly from subsistence farming which is the dominant farming system, with little integration into the market system apart from the moderate modernisation taking place in towns. Hence, over 95 percent of agricultural output is driven by smallholder farmers and this is mainly from the highlands. Without expanding cultivated land, and given forecast population growth, the average land holding size in highland areas will be reduced to

0.7 hectares by 2020, placing further pressure on rural incomes and food security but also on the overall environment of the highland ecosystem.

Despite the above mentioned challenges on the Ethiopian highlands and challenges of food insecurity (six to seven million chronically food insecure, and up to 13 million seasonally food insecure), the Government of Ethiopia is striving to achieve middle income status by 2025. This is the main strategic direction of the government, to achieve this goal the government has designed cross-sector, five-year development plan (PASDEP), where agriculture was set to be the major focus. PASDEP-I has been implemented and PASDEP-II is expected to be launched end of 2010. The initial PASDEP, launched in 2006, identified investment priorities by sector and acted as the primary government document as an input to align external financing and internal strategy development within line ministries. This was driven by the Agriculture Development Led Industrialization (ADLI) strategy developed in the 1990s.

From the above background information it is possible to make the following two essential conclusions: (a) all the above facts indicate the importance of the Ethiopian Highlands for the overall economy and livelihoods of its people – a driver to push the country to middle income countries status in 2025; (b) the pressure on the highlands is already high and is going to mount as there are all forms of efforts to increase agricultural production to feed the growing population. These two conclusions on the other hand call for designing a mechanism which will ensure the sustainable management and utilization of the highland ecosystems with close partnership and full participation of land users, government at different levels and development partners alike.

1.3 Sustainable Land Management (SLM) to Maintain/Improve Mountain Externalities

The current level of land degradation in the highlands of Ethiopia and the pressure it is now holding requires following serious discipline on the use of predictive assets such as land, water and biodiversity. FAO / SARD-M project and Global Mountain Programme assessed in 2 Ethiopian highland regions the present status of Policies, Institutes and Processes (PIP) relating to SARD and suggest some recommendations: (i) **Review of laws and regulations**: There are policies and strategies formulated at federal level and trickled down to regions. Most of them are sound in paper but need care when they are to be implemented at grass root level; (ii) **Review the criteria of classifying woredas as FS and FIS**: current classification of woredas as FS and FIS is creating resource provision disparity for works that are important to mitigate natural resources degradation as well as provide preventive assistance to those whose assets in rural agricultural areas are denuding due to natural catastrophe; (iii) **Basic infrastructure provision**: Water, roads, and electricity are far from being adequate in the mountainous regions hence attention should be given by all stakeholders (Government, NGOs, donors, as well as the community) to improve such infrastructure/services; (iv) **Need for efficient and effective action on trade and industry promotion:** For sustainable ARD in mountainous areas serious strategic thinking is required in the area of trade and industry. Private sector capacity building, promotion of MSE,

standardizing rural agricultural products and creating well integrated markets for the many small producers should be the driver of the future interventions in rural area; (v) **RUL should be strengthened:** The linkage between development in small urban centers and investments designed to bring SARD has to be looked from the RUL perspective. Currently RUL in mountainous regions is weak because of lack of social and economic infrastructure. In mountainous areas linking agriculture with rural development initiatives and both to the emergence and growth of small urban, and where feasible to large urban centers, is inevitable; (vi) **Promote diversification, intensification, and alternative livelihood:** In order to promote SARD-M the future policies and strategies should embrace issues of diversification, intensification and alternative livelihoods; (vii) **Review of institutional relations and capacity**: Institutional arrangements should be carefully revised and institutions should exist with appropriate capacity; (viii) **Continue to embrace participatory approach**: Participatory approach is core in promoting programmes and projects that can bring SARD-M (ix) **Have sound planning, monitoring and evaluation (PM&E) system**: Good practices of PM&E need to be instituted in at all levels of government and non-government agencies..

These resources have to be used and managed in a manner that ensures their current productivity and future use by applying and following the principles of sustainable land management practices. Sustainable Land Management (SLM) is defined as 'the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions (UNCED, 1992). SLM aims at maintaining ecological integrity and long term productivity of ecosystems (land, water, and biodiversity), increasing productivity (quality, quantity and diversity) of goods and services (FAO, 2008c) and conserving natural capital. SLM encompasses a wide range of farming systems that aim to conserve natural resource, minimize negative environmental impacts, and better capture and maintain water in the root zone, following several approaches and strategies.

Application of SLM practices on the highlands of Ethiopia will have two equally important benefits: (a) it will significantly reduce all forms of land degradation thereby enhance land productivity, improve efficiency of input use and ultimately reduce input costs and associated economic returns; (b) it will also significantly improve quality and quantity of environmental resources and services to downstream users such as water, agricultural products, biodiversity for various uses and other services such as proper maintenance of historical and cultural assets and scenic values.

The government of Ethiopia has been trying its level best to apply SLM on all parts highlands of Ethiopia. This effort traces back from the great sahelian drought in the seventies and the approach has been greatly improved since then. It evolved from following purely technocratic and top-down approach towards more participatory and bottom-approaches. Since 2009 the government has designed a comprehensive Sustainable Land Management Programme (SLMP) on potential areas of the country and the implementation is underway.

1.4 PES as a Mechanism to Support Sustainable Management of the Highland Ecosystem

Payments for Environmental Services (PES) are an economic instrument designed to provide incentives to land users, on behalf of service beneficiaries, for agricultural land, water, biodiversity, special products and services, coastal, or marine management practices, that are expected to result in continued or improved service provision, so users will benefit more broadly.

Poor agricultural producers in rural areas of developing countries are among the main suppliers of environmental services. Channelling payments to these communities in return for the provision of these services could generate benefits both in terms of improved natural resources management and increased livelihood. PES can provide incentives for improved resource management by individuals and communities, which enhances flows of environmental resources to downstream users but also to contribute to poverty alleviation within the upstream areas, thus working as "win-win" multipurpose instruments. PES is a mechanism where resources from users (public or private sources) help cover establishment and maintenance costs of land management practices, and may also provide continuous payments to compensate recurrent opportunity costs, if the changes in land management do not offset these by increasing productivity immediately in the upstream areas.

Current demand for watershed services originates mainly from public payments. Public watershed payment schemes currently represent by far the largest market for watershed services and are well established in the United States, Mexico, Costa Rica, Switzerland and China, for example. In addition, the private sector is increasingly becoming involved in purchasing watershed services: in fact, there is often the need to top up public payments with contributions from private companies in order to meet the entire costs of service provision.

Although there are very few experiences on PES in Africa, the agreement between Lesotho and South Africa on water supply is a notable example. South Africa pays for the water it gets from Lesotho highlands. Part of the payment goes to the land users within the catchment area of the water supply system to help them manage their land properly so that the siltation of dams will be minimal, quality of water improved and the amount of power being generated continues without problem.

Similarly there is very little experience in Ethiopia except some PES (direct and indirect) schemes such as the payment arrangement for organic coffee producers in the Southern part of Ethiopia, the watershed project of the Eastern Nile Technical Regional Office (ENTRO) of the NBI, support to local communities for managing their smaller watersheds by the Government and Donors such as MERET and SUN watershed management projects coordinated by MoARD. Thus, this paper explores current experiences in Ethiopia and pinpoints areas that need to be supported by PES in order to induce sustainable use and flow of environmental resources such as water, biodiversity, mountain products and services.

1.5 Objective

The objective of this survey is to undertake an initial survey in Ethiopia to identify mountain externalities which have the potential to, or already benefit from payments such as watershed management, biodiversity preservation, carbon fixation, quality (food) products, services, cultural goods, etc ., which have the possibility to be valorised/rewarded.

2 Individual Studies

2.1 PES as a Tool for Addis Ababa Water Supply System

2.1.1 Introduction

The quality and quantity of water available to downstream users in a watershed depends on the particular type and distribution of vegetation, the underlying geology, the soil types present and the way that land is used and managed. By applying SLM practices, upstream farmers and communities may contribute to water security for downstream water users and enhance watershed services. These practices can improve water quality (e.g. reducing pollution and sediments) and help manage water quantity (e.g. improving rainwater retention and recharge of the water table, guaranteeing stable water regime in streams and rivers, improving wetland function and reducing risk of flooding and landslides), thus improving the water supply available for specific uses such as drinking water, agriculture, transport and other downstream services (Smith, de Groot and Bergkamp, 2006; Calder et al., 2007; WOCAT, 2007).

Urbanization is expanding at an alarming rate, while its environmental consequences and requirements from the surrounding rural areas have not been studied. Consequently, environmental catastrophes in flooding and pollution have been encountered in several urban towns of Ethiopia. Monitoring of environmental flows among rural and urban spatial units is essential not only to design equitable Payment for Environmental Services (PES), but also early warning systems for floods and other catastrophic environmental hazards, particularly for urban settlers.

Addis Ababa is one of the few capital cities in the world which is located at high altitudes. The city is a true primate city with a population of about 4 million, accounting for nearly 24% of the total urban population of the country (Figure 1). It is also unique in terms of its urban agriculture that relies heavily on untreated waste water and its major water supply system comes from reservoirs with unprotected catchments.

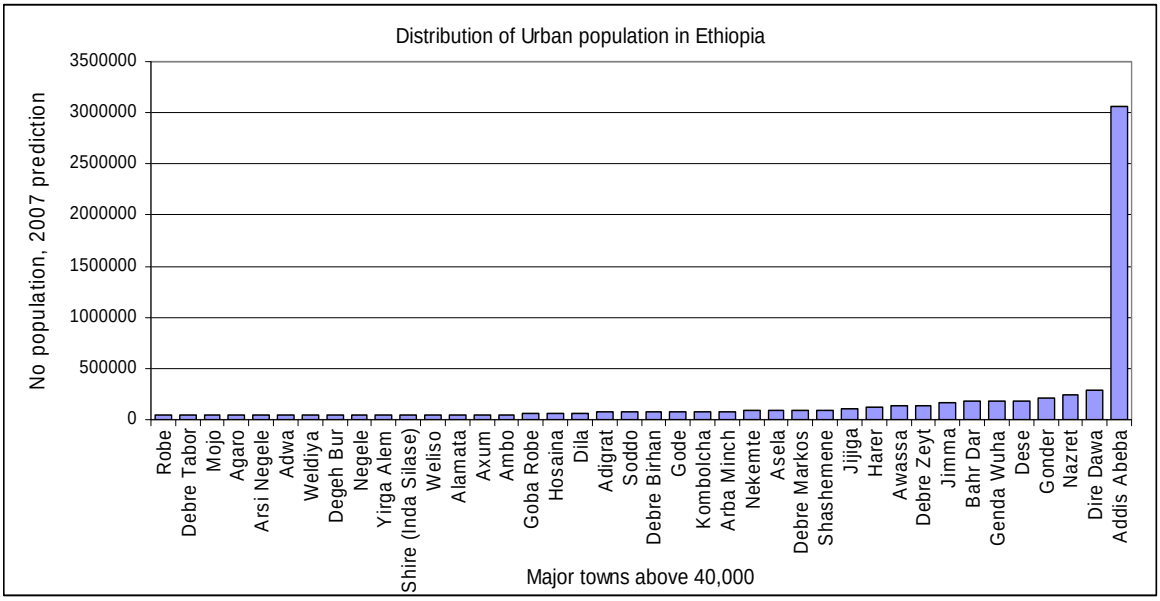

Figure 1: Distribution of urban population in Ethiopia taking urban centers above 40,000 inhabitants (4.5% of the number of urban centers in the country) clearly showing importance of Addis Ababa. (Source GMP, 2008)

This particular section will assess current situation associated with water supply system of Addis Ababa within the context of valorisation of mountain externalities and will suggest possible direction towards establishing PES mechanism. It will suggest what course of actions to be taken to establish an effective PES that will ensure better water supply for Addis Ababa and at the same time better livelihoods linked to better environmental management in the upper catchments. We feel that this is one of the thematic areas where PES needs to be implemented.

2.1.2 Environmental Challenges Related to AA Water Supply

The water supply system for the city, which is predominantly from agricultural environments (82% of annual water supply is from the two reservoirs, i.e., Legehedadae and Gefersa), highly suffers from sedimentation, potential pollution from agro-chemicals and increasing urbanization (see Figure 2 and 3). As a result, Addis Ababa municipality is investing millions of dollar every year to clean the water and shortage of water has become a serious challenge which is partly related to the reduction of reservoir capacity by heavy siltation.

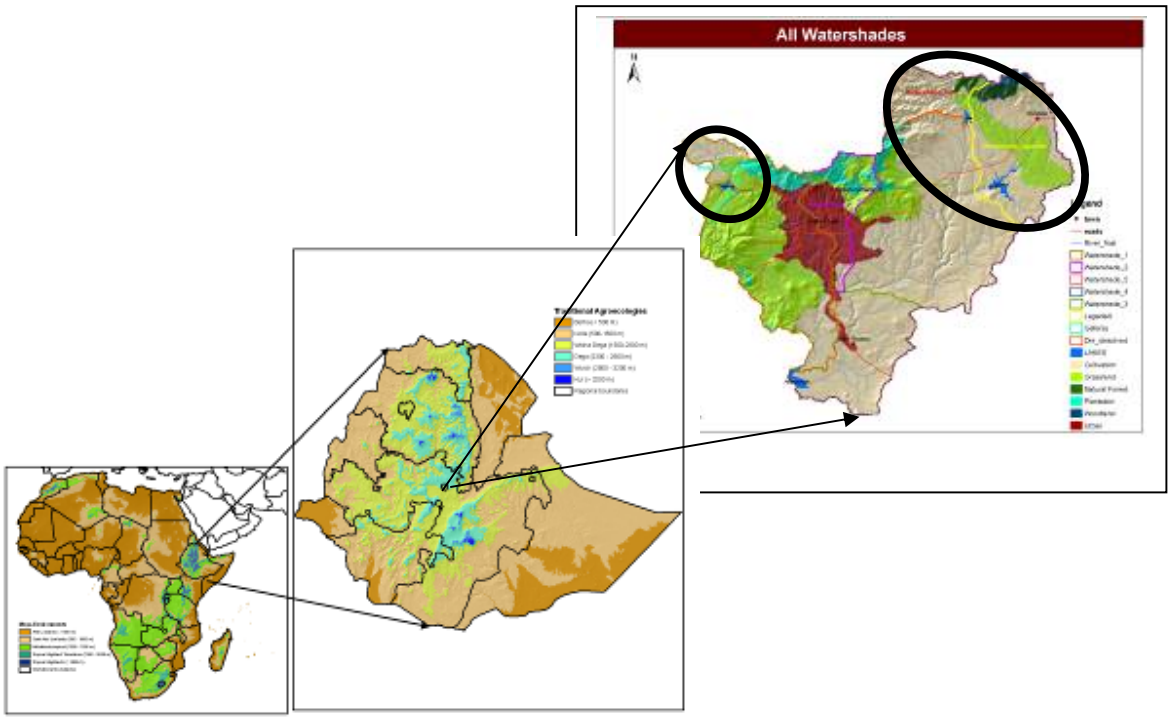

Figure 2: Location map of the two major reservoirs supplying 77% of water to Addis Ababa Town. The red colour on the watershed map is Addis Ababa town and the two black rings show the two upstream watersheds that provides water to the two reservoirs.

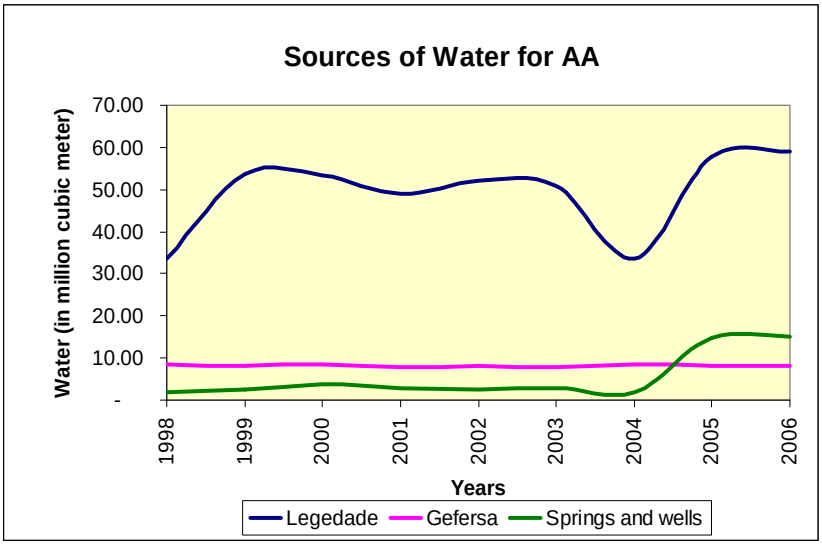

Figure 3: Sources of water for Addis Ababa city. About 82% of the total water supply is from the two reservoirs, Leghdadi being the highest (about 72%). (Source: Addis Abeba Water Supply Office, 2008)

Due to many factors the watershed currently is affected by serious land degradation problems. The overall impact of the current land degradation could be aggregated into two: on-site and off-site impacts. The on-site impacts are manifested by the low level of agricultural productivity and very low vegetation cover in the watershed. This also results in the serious level of poverty within the watershed. The off-site impact is clearly manifested by the high level of siltation and chemical pollutants in the reservoirs. Throughout the year the colour of the reservoirs is muddy and sluggish (see Figures 4 & 5). Therefore, the major objective of the project is to stop on-site and off-site impacts of environmental degradation and thereby improve rural livelihoods and sustainable supply of clean and adequate water for Addis Ababa, reduced cleaning cost and improve life of the two major reservoirs.

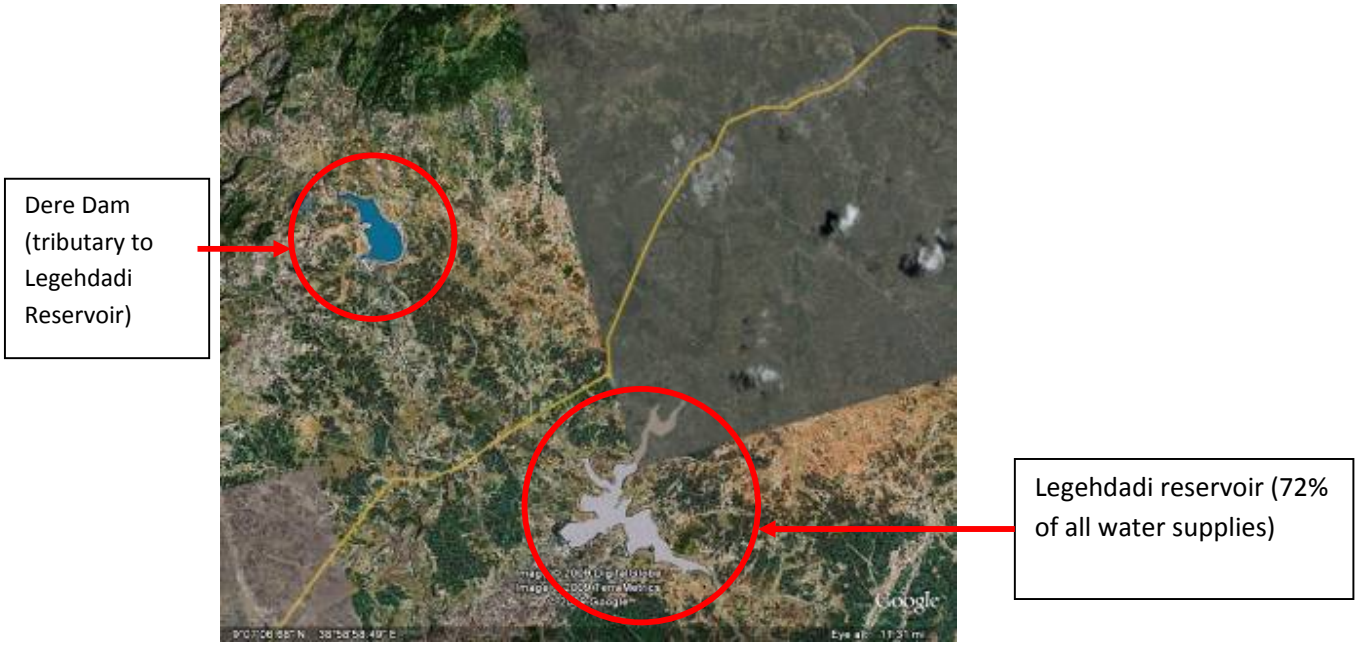

Figure 4: A clip from Google showing the two reservoirs within the red circle with the same seen and resolution. The lower reservoir which is the largest (Legehdadi) is highly polluted by sediment and other pollutants and lost its water colour. This picture by itself shows the seriousness of the problem.

Figure 5: The upper most area of the watershed for Legehdadi reservoir without any vegetation cover and intensively cultivated without any soil and water management practices (1st picture) and part of the Gefersa reservoir showing the heavy sedimentation (2nd picture).

(Source: Gete Zeleke, 2009)

2.1.3 PES as a Future Mechanism to Address Environmental Challenges

All the above environmental problems are interlinked with one other and their management is complex and requires integration of interventions both in rural and urban administrative units. There needs to be monitoring of land use changes, soil erosion, flooding, drought and the impact of one on the other but also the need for an introduction of proper environmental resources management system to curve the problem.

Solutions have so far been little addressed with very little or no coordination. For instance, land management is the responsibility of forestry and agriculture offices; water supply has its own special offices; while liquid and solid waste disposal is largely uncontrolled, except some attempts by some government agencies like Addis Ababa municipality, Addis Ababa Environmental Protection Authority, Clean and Green Addis Ababa Society (CGAAS), Clean Development Mechanism of the Science and Technology Ministry, and others.

However, there may exist an opportunity through payment for environmental services to curb the two major problems by systematically applying the two principles, namely polluters-pay and beneficiaries-pay principles. This will have dual impacts: i) the urban system could be highly beneficial from proper management of natural resources in upstream areas and supply of clean products, both from upstream and downstream rural areas. The growing urban centers enhance high consumer demand for high value horticultural products and this often stimulates production of the same by rural communities. The quantity and quality of product to meet the growing demand in the urban centers, however, needs critical attention for the maintenance of the resource base and natural environment in upstream areas. This helps to maintain and improve the natural

environment in the upstream areas and helps to prevent land degradation (which affects water supply system and soil productivity). It also ensures supply of better quality products to the urban system. . ii) Delivery of clean water to downstream peri-urban agricultural areas, also a result from a well maintained resource base and natural environment in upstream areas, helps to prevent the entry of pathogens, hazardous chemicals and heavy metals generated from urban system into the food chain through the direct use of polluted water for irrigation. The two actions have wider implications and could be done in many different ways, either directly through public awareness and controlling mechanisms or indirectly through incentive mechanisms particularly to high polluters.

Hence, there is a need for establishing PES mechanism to ensure sustainable supply of water to Addis mega city with required quality and quantity but also to ensure improved livelihood in the upper catchments of the two reservoirs following a win-win approach. The design requires pre detail assessment of baseline information and monitoring system, assessment of impacts, detail estimation of group and individual willingness to pay for environmental services, development of negotiation processes with major stakeholders including institutional arrangements, initiation of implementation of technological and financial solutions on a test basis, and develop human and institutional capacity.

2.1.4 Scope, Main Outputs, and Outcome of the Proposed PES

The scope of the proposed PES is to address water-related problems in the watersheds of Addis Ababa and pursue opportunities for sustainable watershed management by (a) establishing a baseline information system to clearly understand the challenges and opportunities (both bio-physical and socio-economic) in upstream areas and water users including the institutional system, (b) estimating the group and individual level valuation of different environmental services that include clean water and appropriate land management both in the downstream and in the upstream sections of the watershed, (c) developing appropriate technological measures, financial mechanisms, and management procedures for sustainable watershed management, cost-effective water treatment and (d) testing their feasibility, efficiency and effectiveness in pilot actions in different sub-locations for wider application.

The main outputs of the proposed PES will be, i) detailed baseline information developed and used for decision making; ii) designing a suitable and well-tested mechanism to reduce environmental pollution, such as point-source contamination as well as non-point source pollution in the overall watershed that feeds the two reservoirs with special focus to establishment of a system for controlling non-point sources of soil erosion and sedimentation into the reservoirs, which serve as drinking water source for the municipality; iii) suitable economic instruments to attain and secure the necessary environmental actions will be developed and installed, and respective monitoring systems, institutional mechanisms and capacities put in place; iv) alternative livelihood opportunities that will reduce pollution on downstream reservoirs developed and linkage with the

urban system strengthened. v) policy improvement at national/ local level; vi) capacity building, institutions' improvement

The outcome of the proposed PES will be (a) reduced land degradation and environmental pollution in the watersheds and improved land productivity and livelihoods of people in the watersheds that feed the two reservoirs; (b) better and sustained supply of water and reduced costs of water cleaning for the municipality; (c) development of institutional mechanisms and experiences to effectively apply PES for sustainable utilization of environmental resources by both downstream and upstream communities

2.1.5 Key Processes in Designing the AA water supply PES

Identification of key stakeholders: it is essential to know key actors both in the upstream and downstream areas. These groups can be broadly categorised as sellers (provider) of environmental services and buyers (users) of such environmental services. In the AA water supply case, providers / sellers are upstream rural communities residing in the upper watershed of Addis Ababa watershed supplying water to the two reservoirs of Addis Ababa City (i.e., Legehdade and Gefersa). Whereas, users / buyers are citizens of Addis Ababa represented by Addis Ababa Municipality. It includes Addis Ababa dwellers, factory owners, international community in Addis Ababa (region, sub-regional, continental and international organizations), etc, those who benefit from the water and other services from the upstream watershed.

Possible system for the remuneration / payment: Payment can be easily generated without burdening beneficiaries so that Addis Ababa citizens will pay on a per litter utilization basis (like one cents additional cost per litter of water utilized). The municipality's water supply authority will be responsible for collecting the remunerations and institutional mechanisms will be developed within the watershed for managing the fund and controlling its utilization. Additional funds will be also generated from funding agencies to support proper management of the upstream watershed and the development of alternative livelihood opportunities which will be developed as part of the overall watershed management plan. Although the detail work plan including all institutional mechanisms is expected to be done during the design phase, it is assumed that the fund will be utilized for the overall management of the watershed targeting improvement of livelihoods of communities (direct benefit), reduction of pollution and siltation to the reservoirs and changing the

overall ecosystem so that it will be model site for Africa towards remuneration of mountain externalities.

Steps in designing a PES Mechanism: the design process will at least have three phases, some of the major tasks in each phase are:

1) Phase I: baseline survey, project design and negotiations are the three tasks under Phase I
    a. Baseline survey
        i. Detail socio-economic survey of the watershed to identify key socio-economic challenges and opportunities
        ii. Detail biophysical survey including land use, soil, land degradation, mapping point and non-point pollutant sources (all supported with remote sensing and GIS analysis and mapping and modelling)
    b. Project design
        i. Detail watershed management plan disaggregated to smaller community-based watershed plans
        ii. Detail plans for alternative livelihood options (recreation, hand crafting, organic farming, afforestation, carbon trading, etc;
        iii. Detail plans for institutional arrangements - under the municipality and within the communities (at different levels such as overall watershed, sub watershed and community level) including methods of resource mobilization such as few coins extra on each litter of water consumed and fund collection and channelling system
    c. Negotiation – plan presentation and awareness creation
        i. Local workshops and discussions
        ii. National workshop and discussions
2) Phase II: Implementation and management (cost will be determined during the project design phase)
    a. Inception
        i. Resource mobilization
        ii. Organizational arrangement
        iii. Detail action plan
        iv. Workshops on action plans
    b. Start actual implementation as per action plan

3) Phase III: ME – The ME will be designed encompassing four major components
    a. Regular monitoring of PES performance
    b. Midterm evaluation
        i. Local workshops
        ii. National workshop
    c. Final evaluation
        i. Local workshop
        ii. International workshop
    d. Scaling-up: experiences will be carefully documented and scaling-up strategy and guideline will be developed.

Exit strategy: except for the design phase the major source of PES implementation and management will be directly from beneficiaries. The institutional arrangement will also be designed in such a way that both the upstream and downstream beneficiaries will have greater negotiation power on the resources generated out of this initiative. Moreover, the PES will be designed in such a way that both upstream and downstream communities directly benefit from it. Particular attention will be given during the design phase to ensure that the upstream communities will improve their livelihoods without compromising the safety of the two reservoirs. Another dimension of this initiative will be ensuring sustainability of the economic linkage that will be established between upstream communities and Addis Ababa citizens and business groups. For instance, one of the focuses of the initiative will be changing the cereal production towards organic high value fruit and vegetable production, packaging and marketing with strong self-regulating system in place. This will create strong economic linkage which is a key factor for sustainability. Capacity building at all levels will be an essential component of the initiative starting from the beginning. The government will withdraw systematically when such capacity is built and both communities are in position to run the system by themselves.

Possible institutes that will have direct role: since the site for the proposed PES is directly linked to Addis Ababa which is the capital city of the country and sit of African Union and many other continental and international organizations it is expected that many high-level organization will be involved. From our preliminary consultation the following organizations have shown strong interest: Addis Ababa Municipality, Addis Ababa Environmental Protection Authority and water supply, Addis Ababa University, Oromia Regional Government, Ministry of Agriculture and Rural

Development, Ministry of Science and Technology, Ministry of Water Resources, District Administration and local communities, FAO Regional Office, University of Bern Switzerland, Horn of Africa Canter and Network for Environment, many other environment based civic societies such as Forum for Environment and others. It is also expected to involve UNEP, Africa Union, Ministry of Tourism and Culture, etc.

Possible impacts:

- Economy: the initiative will have three major economic benefits: (i) it will enhance productivity in the upstream areas and thereby economic wellbeing of communities; (ii) the initiative will generate huge employment opportunities for the rural communities (upstream) and urban unemployed force; (iii) it will also create job opportunities in the marketing sector, agro-processing, super-market chains, and handicraft, eco-tourism and hotels and transport organizations. Overall the project will have very huge multiplier effects in enhancing employment in different forms at different levels.

- Other social issues: through the initiative the upstream rural communities and Addis Ababa city will have strong linkage both economically and institutionally. This will improve the social ties and bargaining power of local institutions in the upstream watersheds. The expansion of Addis Ababa and its pressure on pre-urban areas will also be carefully managed together with upstream communities who have been affected (negative/positive) by the rapid urban expansion in the recent past. It will also significantly address unemployment, improve basic social services such as schooling, health, rural finance, rural infrastructure, etc which will be easily incorporated as part of the watershed management project.
- Environmental impact: as mentioned above the watershed currently is affected by serious land degradation problems (Figure 3 & 4). This has twofold environmental impacts: (i) it reduces productivity of the upper watershed and (ii) reduces the water supply to Addis Ababa both quality and quantity. The implementation of the proposed PES will have three positive environmental impacts: (i) reduce land degradation in the upstream areas thereby enhancing physical and chemical properties of the soil, (ii) reduce siltation and chemical pollution in the reservoirs and (iii) this will also reduce the use of water purifying chemicals which means reduction of chemical residues in downstream water system.
- Capacity and experience: the proposed PES initiative will have extensive capacity building component both at personal and institutional level. It will enable institutes to manage PES

projects systematically which has a win-win benefit between downstream and upstream communities. Similarly the communities at all sides will have better capacity in managing land, environmental resources, improved agricultural production, agro-processing and marketing. Both communities and institutes will also develop useful experience in managing environmental resources and PES schemes.

Possible risks: there are two possible risks in the area – urban expansion and climate change. The expansion of Addis Ababa is very fast and is almost engulfing the watersheds of the two reservoirs. There are also about three smaller towns within the watershed that are showing significant growth without any form of control. On the upper part Geferesa reservoir, current high expansion of industries of various kinds is a major risk. Similarly expansion of intensive flower and horticulture farms in the upstream part of Lehgedadi reservoir is another risk which is linked to urban expansion. These are indeed the most challenging part of the proposed PES scheme in relation to urban and industry expansion. Although global in nature, the impact of climate change is also another risk that should be taken seriously during the planning phase.

2.1.6 Anticipated Benefits of the Proposed PES Mechanism

Environmental degradation is one of the major challenges in the Ethiopian Highland/mountain ecosystems seriously contributed to the current level of poverty. The service provided by these ecosystems have not also well understood and valued. Often it is either public or funding agency resources used to support efforts to rehabilitate such areas. In such experiences, it is not only the shortage of resources but ownership feeling of both upstream and downstream communities for such projects has been very low. There is also no visible experience or workable system in place in the country where beneficiaries contribute for sustainable generation of services from the mountain ecosystems. Thus, in the proposed PES arrangement the following benefits are expected:

- Beneficiaries (mainly Addis Ababa dwellers and private companies) will contribute for sustainable development of the upstream watershed and they will benefit from the different services such as clean water, quality agricultural products and market;
- The watershed management will be strongly linked to livelihoods improvement of upstream communities and that of downstream communities;
- Development of alternative livelihood opportunities that will reduce pressure on the land and downstream pollution will improve social bondage between rural-urban g

- The system that will be established will improve institutional linkages between urban and rural systems;
- Since the project is around Addis Ababa, which is the sit of Africa Union and many continental and international organizations, the proposed PES arrangement will be used as a demonstration and learning site for Africa's high level officials and professionals. In this regard it has very huge continental and international strategic importance towards addressing valorisation of mountain externalities in Africa. In this regard mobilizations of additional resources to support community's effort during implementation will not be a problem.

2.1.7 Basic Analytical Works Required Prior the Establishment of PES for AA

There is no dispute that better agricultural management will lead to better water quality and reduced water pollution, however, whether and to what extent (and at which scale) it will happen and will be able to lower water treatment costs remains an important question. The answer depends on demonstrable scientific evidence to linking land use to water quality and quantity.

The uncertainty surrounding hydrological processes within and beneath the soil makes it difficult to quantify the amount of water (and its qualitative properties) provided by a specific land manager upstream to a specific water user downstream. Water travelling downstream can move between basins, remain underground or leak through deep soil. The larger and more well-defined the catchment, and the fewer and larger the downstream users, the less is a problem, since the users will eventually receive all the water produced (DFID, 2005

Establishing where and when the benefits from watershed services occur is fundamental to understand the basis of demand and payments for them. It is relatively easy to identify the users or beneficiaries of watershed services (e.g. municipal water suppliers, hydroelectric facilities, industrial users, and irrigation systems), although they might not be easy to organize if there aren't already associative bodies in place.

Buyer's willingness to pay is estimated as the reduced cost of providing clean, reliable water sources using reservoirs, treatment systems and filtration plants (treatment cost). In situations where water users are already bearing heavy costs associated with the degradation of watershed services, the demand and willingness to pay for watershed services may be substantial and beneficiaries may become increasingly aware of the importance and cost-effectiveness of improved management in the upper parts of watershed for the maintenance of water provision downstream (FAO, 2007a). Water treatment costs are a significant component of overall supply and sanitation costs. Where water treatment infrastructure is in place, the savings from improved ecosystem management may reduce the variable costs of treatment. Where water treatment infrastructure is

not yet in place, savings from improved ecosystem management may also postpone capital investments in water treatment infrastructure, or avoid expensive upgrading of the existing system.

2.2 PES from the Context of Transboundary Water Resource Systems: Watershed Management Project of Nile Basin Initiative

2.2.1 Introduction

The Nile is the world's longest river that flows about 6,600 kilometers, traversing more than 35 degrees of latitude. It drains an area of about 3.1 million square kilometers, one-tenth of African continent (see Figure 6). The Nile Basin has extraordinary ecological and physical features and is a home to about 160 million people where the majority lives in rural areas and depends directly on land and water resources. Despite the basin's extra ordinary natural, cultural and historical heritage, its population faces greater challenges due to a combined result of land degradation and poverty. The regional population is expected to double within the next 25 years, placing an additional strain on already scarce water, land and other natural resources. Accordingly, six of the ten Nile Basin countries are among the world's poorest, with a per capita Gross Domestic Product (GDP) of less than US$250/year (WB, 2001). Yet the Nile holds significant opportunities for win-win development that could enhance energy availability, food production, transportation, industrial development, environmental conservation, and other related development activities in the region. Efforts to reduce poverty and stimulate sustainable growth in the basin are complex and beyond the reaches of single country. It needs a joint effort of riparian countries and the Nile Basin Initiative was an attempt towards this end.

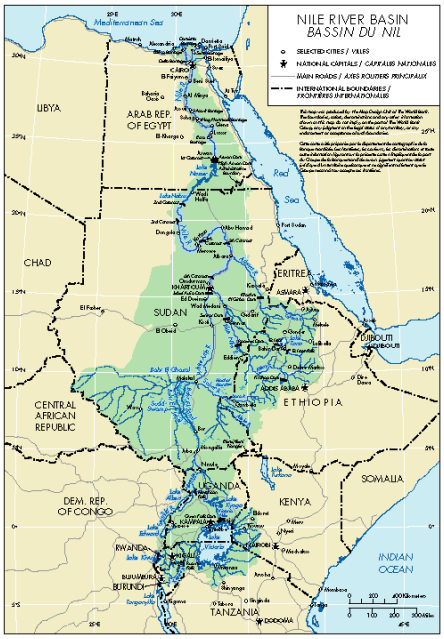

Figure 6: Map of Nile Basin

Recognizing the need to take concrete steps to realize the development potential of the Nile, the riparian countries took a historic step towards cooperation in establishing the Nile Basin Initiative (NBI). The Nile Basin Initiative (NBI) is a partnership of the riparian states of the Nile: Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda. The NBI seeks to develop the river in a cooperative manner, share substantial socio-economic benefits, and promote regional peace and security. Launched in February 1999, the NBI provides an agreed basin-wide framework to fight poverty and promote economic development in the region through improved integrated water resources management at the basin level. It is guided by a shared vision "to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources". The NBI is led by a Council of Ministers of Water Affairs of the Nile Basin (Nile-COM) assisted by a Technical Advisory Committee (TAC) and a Secretariat (Nile-Sec) based in Entebbe.

2.2.2 Components of NBI

To translate the shared vision of the Nile riparian countries into concrete action, the NBI has developed strategic action program comprising of two complementary programs: A shared vision Program (SVP) and Subsidiary Action Program (SAP) While the SVP has the objective of laying basin wide foundation for joint management and development of the basin through building trust and confidence across the basin, the SAP aspire for the realization of transboundary development through initiating concrete investment on the ground. Two subsidiary action programs (Nile Equatorial Lakes Subsidiary Action Program and Eastern Nile Subsidiary Action Program) operating at sub-basin level have been launched to identify and prepare cooperative investment projects. The later is the focus of this assessment.

The Eastern part of the Nile Basin alone covers some 1.7 million square kilometres and comprises four sub-basins: the Baro-Sobat-White Nile, the Abbay-Blue Nile, the Tekeze-Atbara and the Main Nile from Khartoum to the Nile delta. It is home to some 108.6 million people and includes parts of Ethiopia, the Sudan and Egypt. The Eastern Nile sub-basin encompasses an extraordinary range of ecosystems from high mountain moorlands, montane forests, savannah woodlands, extensive wetlands and arid deserts. It has been the location of some of the ancient world's most advanced civilizations. The annual Nile flood that carried fertile sediment from the Ethiopian Highlands transformed the deserts of Sudan and Egypt into rich agricultural lands along its course. The majority of the people in Ethiopia and Sudan are rural, largely depending on the natural resource base for their livelihoods. Whilst in Egypt nearly half the population is urbanized dependant of the Nile River which provides the basis for agriculture, power generation and water transport. The peoples of the sub-basin pursue a wide range of livelihood systems, which include (but are not limited to) camel herding in the arid deserts of northern Sudan and the Red Sea hills of Egypt, flood-

retreat cattle grazing and cropping on the flood plains of the Baro, Sobat and White Nile, mixed livestock and cropping systems in the Highlands of Ethiopia and a wide range of irrigated cropping systems in the Sudan and Egypt.

As part of this the Eastern Nile countries (Ethiopia, Sudan and Egypt) are pursuing cooperative development at the sub-basin level through the investment oriented Eastern Nile Subsidiary Action Program (ENSAP). The Eastern Nile encompasses the sub-basins Baro-Akobo-Sobat, Blue Nile, Tekezze-Settit-Atbara, portions of the White Nile in Sudan, and the Main Nile. ENSAP seeks to realize the NBI Shared Vision for the Eastern Nile region, and is aimed at the reduction of poverty in the sub-region, economic growth, and the reversal of environmental degradation. Towards this end, the EN countries have identified their first joint project, the Integrated Development of the Eastern Nile (IDEN), which consists of a series of sub-projects addressing issues related to flood preparedness and early warning, power development and interconnection, irrigation and drainage, watershed management, multi-purpose water resources development, and modelling in the Eastern Nile.

As indicated above the Eastern Nile Watershed Project is one of the seven areas of cooperation agreed by the Eastern Nile countries. The objective of the proposed Watershed Management Project under the ENSAP umbrella is to improve the standard of living of the populations residing within the watersheds of the Nile basin, reduce soil and water loss, improve agricultural productivity and increase food security, reduce sediment transport and siltation of infrastructure, reduce erosion and morphological changes along the river, decrease pressures on natural resources and prepare for sustainable development oriented investments. While project interventions will be largely on a national scale, watershed management in the Eastern Nile has local, sub-regional and downstream/regional implications and benefits and is directly linked to the sustainability of multipurpose infrastructure (WB, 2001, Geoffrey and Leul, 2005). This project has strong element of upstream and downstream interaction of transboundary nature.

2.2.3 The Watershed Management Project of EN in the Context of PES

2.2.3.1 Challenges of Land Degradation and Anticipated Benefits of Watershed Management in EN

Land degradation in the form of de-vegetation, soil erosion and especially loss of nutrients, overgrazing and exhaustion of soils, desertification and sand encroachment – have been rated as the number one common environmental threats in the Nile Basin countries in general and the

Eastern Nile Sub-Basin in particular. Ongoing land degradation is a major factor in perpetuating rural poverty in the sub-region.

The gravity of the threat posed by watershed degradation on the livelihood of millions of people residing in the sub-region and its negative impact on the efforts being made to reduce poverty and ensure sustainable development in the region has been realized at the outset by the Eastern Nile countries (Egypt, Ethiopia, and Sudan). This realization has led to identifying watershed management project as one of the key component of a first integrated development program for the Eastern Nile. Furthermore, the cooperating countries have adopted a shared understanding that watershed management in the Eastern Nile is a regional undertaking due to the transboundary nature of the watersheds and substantial regional benefits are expected to accrue over time as a result of sound watershed management interventions in the upstream areas.

Watershed management interventions in the Eastern Nile Sub- Basin have both direct and indirect benefits at local, regional and global level. Expected direct benefits from improved watershed management are decreased soil erosion, increased land productivity and agricultural production resulting in improved standard of living and enhanced food security. Substantial regional and global benefits are expected to accrue over time from watershed interventions in upstream regions. Global benefits include carbon sequestration and increased biodiversity. Obvious long-term regional benefits of watershed interventions in the Eastern Nile Basin will be erosion control leading to decreased siltation and sedimentation in downstream river/reservoir reaches, which will increase reservoir life, improve hydropower production and irrigation efficiency, as well as protect critical aquatic habitats.

2.2.3.2 Project description and components

To achieve the development objective, the watershed management project adopted a two track approach: Cooperative Regional Assessment (CRA) study and a fast track projects.

Cooperative Regional Assessment (CRA) Study: is a practical tool for identifying, assessing, and fostering opportunities for cooperative actions among sub-basin countries, for promoting the recognition and maximizing the benefits of cooperation, and for looking at synergistic effects of the program across sectors. The specific objectives of the CRA study for the watershed project are to:

- on the national level to analyze the root causes that have resulted in the present situation of elevated land degradation, high population pressures in the highlands, low agricultural productivity and high pressure on the natural resource base, which reduces the potential for sustainable management of the natural resource base. The root cause analysis will factor in underlying causes for constrained access to financial resources, analysis of appropriateness of institutional and policy environments, and social and socio-economic and environmental factors;
- on a sub-regional, watershed scale, through aggregation and analysis of the national level information and examination of people-livestock-land-water interaction, provide a sub-

basin-wide understanding of the dynamics and behavior of the watershed system (trans-boundary analysis);
- identify potential opportunities for, and benefits of, cooperative watershed management activities and costs of inaction (distributive analysis);
- identify through analysis the next round of watershed management projects, that are promising from a local livelihoods as well as a regional benefits point of view and are rational in view of anticipated multipurpose developments in the Eastern Nile region .
- design long-term CRA activities to ensure continued exchange of experiences, professional exchanges, monitoring of program impact, as well as capacity building activities to sustain a successful program of action.

Fast track projects: are selected, small, but strategic sub-set of already identified sectoral projects for accelerated preparation and appraisal to be ready for implementation on the ground within a short period of time. The purpose is to show tangible benefits from cooperation on the ground. While the proposed fast-track projects form part of the overall NBI initiative in watershed management, and should contribute to that aim, they are intended to provide leverage for funding the multi-purpose track projects, through rapid demonstration of benefits. While multi-country benefits will come primarily from improved water management and reduced river sediment loads, it is recognised that this cannot be achieved without the support and action of the people who occupy the land of the watersheds, and draw their livelihoods from it. Therefore, the primary focus of the projects is improved rural livelihoods, with water and sediment management assumed as an outcome. Therefore, the fast-track projects were designed to demonstrate:

- local action and control, by the local communities involved
- livelihood improvements within the target population
- an integrated/ holistic approach to watershed management, which goes beyond simple soil and water conservation
- activities which address the root causes of local land management which leads to land degradation and erosion
- improved water management and/or reduced river sediment loads, as an outcome of the projects
- the above to provide first visible results within about three years from project start-up, which can be used as demonstration to other countries and donors of the value of cooperation in watershed management in the Ethiopian Nile highlands
- the whole should be sustainable, based on local action and management

All project components and activities planned by the project are either implemented (eg. CRA) or are under implementation (the watershed component). The cooperative regional assessment study has tried to establish the cost of land degradation at different scales (local, national, sub-regional and global) and the benefit that integrated watershed management accrue. According to the study, most of the environmentally hot spots areas requiring urgent intervention are located within Ethiopia and the benefit of intervention is significant in the downstream countries as well as globally. One key issue here relates to cost sharing mechanism where the downstream countries as well as the international community will share the cost burden in an equitable manner for the benefit of all. This is exactly in line to PES principles and strategies.

Based on the challenges identified the study has proposed a long term program for watershed management in the basin. The main focus areas will be knowledge generation, monitoring of impacts, and information sharing; preparing projects for investment (priority is on hot spots); and institutional and capacity building

Accordingly under the fast track component, the project had planned to select up to four pilot watersheds in Sudan and Ethiopia from among the list of potential sites proposed by the national governments and prepare investment ready projects of the selected sites as well as prepare a Management Framework for Lake Nassir/Nubai. Accordingly proposed sites were prioritized based on agreed criteria. Through discussion with national governments, seven sites (four in Sudan & three in Ethiopia) were selected for detailed preparation in an investment ready format. The sites selected were basically based on the priority list with minor adjustment to accommodate national priorities and needs. This was particularly so for the sites in Ethiopia. In Ethiopia it was decided to concentrate the sites within the Lake Tana Basin. The sites selected in Ethiopia are Rib, Gumera and Jama/gilgel Abay watersheds with a total area of 450, 000 ha (see Figure 7). Preparation to initiate implementation of the prepared projects (set-up of focal institution, negotiation with financing agencies, fund flow arrangements, etc) has been done and implementation of pilot watersheds within the three sub-basins has started since September 2008. Although success is much to be desired the beginning of the implementation is a step forward.

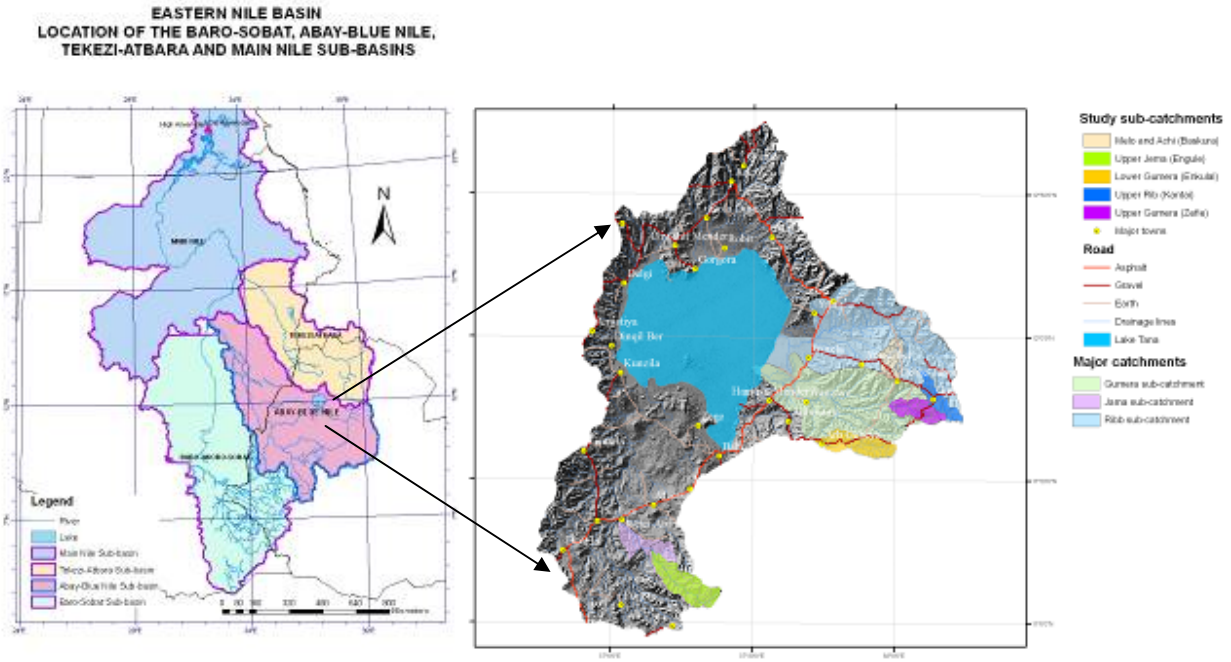

Figure 7: Eastern Nile Basin and Lake Tana Sub-Basin with selected watersheds and sub-watersheds for the watershed project (Source ENTRO, 2006 and RAMBOLL, 2009)

2.2.3.3Possibilities of Expanding the Watershed Project through PES

The primary objective of the watershed management project is to improve livelihoods of target communities through increased crop and livestock productivity, enhanced income generation activities and improved infrastructure. It has three major development components, each of which is made up of a few inter-related sub-components. These development components have been identified through needs assessment consultations with local communities. This is a highly commendable aspect of the project preparation and design process. The project fits well with national priorities of food security and sustainable natural resources management and its relevance to poverty reduction is obvious. Besides, from implementation of the project practical experience will be gained about participatory watershed management which will be useful for up-scaling and replication to other areas in the country. The project also has positive implications for regional cooperation among the three EN countries as it will contribute towards reduced problem of reservoir sedimentation and regulated water flows.

Sustainability of the current watershed management pilot intervention depends not only on its successful implementation of micro projects but also other aspects within and outside the watershed. Key issues that need to be considered are (i) the need for a flexible approach that is based on learning from experiences within and outside the basin on an ongoing basis; (ii) addressing policy and development issues that curb incentives for farmers investments, including lack of land security and access to credit (iii) the necessity for truthfully participatory planning and implementation; (iv) the need for creating alternative and complementary employment to subsistence agriculture; (v) creation and functioning of markets – nationally, through increased small town development - and internationally - as well as ensuring access to markets, which involves development of transport infrastructure ; (vi) the need for investments in watershed management to address rural poverty and stable ecosystems as well as, in the long term, to prevent economic losses due to downstream impacts of sedimentation leading to inefficient hydraulic infrastructure operation and loss of lives and assets from increased flood damages.

Although the very joint initiative by the three countries to manage upstream natural resources for the benefit of both upstream and downstream users is a commendable effort, sharing of costs following the principle of PES is yet to be realized. So far implementation is carried out by donor support. Downstream countries should share part of the cost of watershed management in upstream areas through PES mechanism. This was also one of the recommendations of the CRA study. Therefore, it is important to create common understanding and design a PES project where the three countries jointly manage their upstream watersheds to improve livelihoods while reducing offsite impacts of watershed degradation downstream. Thus the current watershed management project should be used as a stepping stone towards bigger joint PES projects.

2.3 Agricultural Products in Mountains: the Case of Coffee Arabica

2.3.1 Overview of coffee sector in Ethiopia: its implication for Payment for Ecosystem Services (PES)

2.3.1.1 Introduction

The most important service provided by the agricultural ecosystems in the Highlands is the production of food, feed, fuel and fibre. The Ethiopian highlands are economically valuable repositories of biodiversity which has global dimensions, especially of wild *Coffee Arabica* is one of the products originated form these areas. The wild coffee is mainly found in the montane forests of the East, South and South Western parts of the highlands of Ethiopia. Ethiopian montane forests belong to the Eastern Afromontane Biodiversity Hotspot, which is one of the recognized 34 biodiversity hotspot areas in the world (Gatzweiler et al., 2007). In addition to having high species diversity with a large number of endemic species, Ethiopian montane rainforests are of global importance because they contain the world's only wild population of wild *Coffea arabica*. Around 75% of the world's coffee production is from *Coffea arabica*, and genetic information contained in Ethiopian highlands is important as a reservoir of genetic diversity, crucial for coffee breeding (Gatzweiler et al., 2007). These forests, however, are now under heavy pressure of deforestation and so also the wild coffee and other biodiversity within them.

The most important drivers of deforestation in most part of the country are related with the conversion into agricultural land driven by population growth, establishment of plantations, and in some areas resettlement programs (Gatzweiler et al., 2007; Million Bekele, 2001).

In principle these forest areas deserve proper protection and management not only by the national government but also by local government , by international community as they are beneficiaries of agricultural products from these forests. One possible way of mobilizing resources from beneficiaries of products is through price adjustment for such products. The added value will have to go to sustainable management of the resource base and enhancement of livelihoods in these areas. This is another form of PES where beneficiaries pay extra few cents to ensure supply of better product quality and sustainability of the environment. This section reviews the situation of *Coffee Arabica* including its historical background, challenges and efforts initiated to ensure producers paid better to enable them protect their environment and maintain the quality of coffee they produce.

2.3.1.2 Historical backgrounds of coffee

Settled agriculture began in Ethiopia some 3,000 years ago. Since time immemorial, *coffee arabica* has been grown in the wild forests of the south-western massive highlands of the Kaffa and Buno districts of the country and later expanded to the South East Highlands of the country. Ethiopia is the primary centre of origin and genetic diversity of the Arabica coffee plant, earlier known as *jasminum arabicum laurifolia*. With coffee thus a commodity crop earlier than 1500, Ethiopia is the oldest coffee exporter in the world, though external invasions and internal conflicts have at times had a negative impact on the country's coffee export history.

Coffee export in Harar and Gerri goes back to earlier than 1810. In 1838, Rupell recorded the export of 100 quintals of Enarea-coffee (now Liumu-Seka, Jimma) via Massawa. In the 19th century, two coffee types, "specialty coffee", were exported as first and second grade Harari coffee and Abyssinia coffee to London, Marseille, and New York. Ethiopian Muslim merchants transported coffee and other goods in caravans of mules, camels and donkeys. Export was dominated and facilitated by foreigners of more than 140 different nations, including Greeks, Armenians, Germans, Belgians, Indians, Lebanese, Turks and Yemenis.

Coffee classification and grading systems in Ethiopia were developed and licensed for the first time in 1952 and then modified in 1955. Ethiopian coffee certification began after the establishment of the National Coffee Board of Ethiopia in 1957. The NCBE's aims were to control and coordinate producers, traders, and exporters interests and to improve the quality of Ethiopian coffee. In 1960, Ethiopia became a member of the Inter-African Coffee Organization. The same year, it also became a member of the International Coffee Organization and allocated a 2.5 per cent share of the global market.

2.3.1.3Major biophysical and socio-economic situation of coffee growing areas

In its natural habitat (center of origin and diversity) in the south and south west tropical high rainforests of Ethiopia, *Arabica coffee* grows as an under-storey species between altitudes of 1000 and 2400 m.a.s.l. (see Figure 8). This part of the country has sub-humid to humid and to per-humid moisture regimes and warm to cold thermal regimes. However, coffee can adapt to agro-ecologies of sub-moist to moist moisture regimes provided that the rain is well distributed with optimum temperature regimes (mean between 15oC and 24oC). It may also be grown in hot areas with enough moisture but may not be potentially productive. The minimum requirement of precipitation is 1000 mm with a good distribution over the growing period.

Out of the eighteen major agro-ecological zones (AEZs) of the country, seven are believed to be suitable for coffee production. These zones have coffee types of their own (quality and market origin). The sub humid zones (within the range of mid to high altitude, 1500-2000 m.a.s.l.) are highly suitable and the bulk of Ethiopian coffee comes from these areas. Currently, all the coffee growing AEZs (Table 2) are addressed by coffee research centers of various status, though there are some pockets which need further attention (EARO, 2000).

Figure 8: Coffee Arabica grown under shade and mixed with Inset in the Southern Part of Ethiopia

Table 1 Description of the major agro-ecological zones (AEZs) suitable for coffee production in Ethiopia

	Total area coverage			
Major AEZ	ha	% of the country	Representative sites (locations or areas)	Major soil types suitable for coffee (pH 4.2-6.8)
H2-Humid tepid to cool high lands	2,796,000	2.48	Bedele, Gore, Gera, Hagere selam, Aleta Wondo, Limu, Jima, Agaro, Mizan	Dystric *Nitosols,* Orthic *Acrisols*, cambic *Arenosols* & Eutric *cambisols*
H1- Humid hot to warm low lands	1,016,000	0.90	Tepi, Jinka	Same as above (*Nitosols, Acrisols* & *Cambisols*)
SH2-Sub humid tepid to cool mid high lands	8,612,000	7.60	Jima, Agaro, gimbi, Areka, Gelemso, Deder, Mechara, Anfilo, Awassa	Same as above (for H2)
SH1-Sub humid hot to warm low lands	8,396,000	7.45	Metu, Anfilo, Dembi dolo, Kembata & Timbaro areas, Sawla, Waka	Dystric *Nitosols*, *Ortic Acrisols* & *Cambic Andosols*
M2-Moist tepid to cool mid high lands	12,620,000	11.20	Bensa, Awada, Yabelo	*Nitosls, Acrisols* & *Regosols*
SM2-Sub moist tepid to cool mid high lands	8,588,000	7.48	Mechara, Gursum, North Wollo areas	Cambic *Arenosls* & *Calcaric Regosols*
PH1-Per humid hot to warm low lands	488,000	0.43	Mizan, Bench Maji zone (Partly Maji)	Dystric Nitosols & *Ortic Acrisols*

Source: EARO (2000)

2.3.2 Coffee culture in Ethiopia

Ranking eighth in the world and first in Africa, Ethiopia's annual coffee production is approximately 280,000 metric tons (MT), almost half of which is consumed domestically, often in the culturally rich traditional coffee ceremony. There are four types of production systems in Ethiopia: forest coffee, semi-forest coffee, garden coffee and plantation coffee. Ninety-five per cent of the coffee produced under these systems is organic.

2.3.2.1 Forest Coffee

Forest coffee is found in south and south-western Ethiopia (Bale, West Wolega, Bench- Maji, Keficho-Shekicho, Metu and Jimma). These are the centers of origin of *coffee arabica*. Forest coffee is self-sown and grown under the full coverage of natural forest trees, and has a wide diversity for selection and breeding for disease resistance. It offers high yields and top-quality aroma and flavour. Forest coffee accounts for about 10 per cent of Ethiopia's total coffee production.

2.3.2.2 Semi-Forest Coffee

This production system is also found in the south and south-western parts of the country (Sidamo, Gedeo, South and North Omo. Hararghe, Wolega and Gurage Zones, East and West). Farmers acquire forest land for coffee farms, and then thin and select the forest trees to ensure both adequate sunlight and proper shade for the coffee trees. They slash the weeds once a year to facilitate the coffee bean harvest. Semi-forest coffee accounts for about 35 per cent of Ethiopia's total coffee production.

2.3.2.3 Garden Coffee

Garden coffee is grown in the vicinity of farmer's residences, mainly in the southern and eastern parts of the country. The coffee is planted at low densities, ranging from 1,000 to 1,800 trees per hectare, is mostly fertilized with organic waste and is intercropped with other crops. Currently, garden coffee accounts for about 35 per cent of Ethiopia's total coffee production but this is set to increase with the introduction of the system into south-west Ethiopia mainly in Kaficho, Shekicho and Bench-Maji area.

2.3.2.4 Plantation Coffee

Plantation coffee includes that grown on plantations owned by the former state farms and some well-managed smallholder coffee farms. In this production system, recommended seedlings are used, and proper spacing, mulching, manuring, weeding, shade-regulation and pruning are practiced. Only state-owned plantations use chemical fertilizers and herbicides and this

accounts for only about five per cent of total production. Well-managed smallholder coffee farms account for about 15 per cent of Ethiopia's total production.

2.3.3 Production and marketing issues of coffee – challenges and opportunities

Coffee harvesting: the time of flowering determines the time of the maturing of the coffee fruit. In coffee plantations, flowering does not usually occur all at one time. Usually there are two, three or sometimes four independent flowerings when successive rains occur. In most coffee-growing areas, the flowering period is between December and April and the harvesting period falls between August and January, i.e. seed maturity occurs mostly six to nine months after the blooming period triggered by rainfall. This ensures continuous production throughout the year. The coffee-harvesting is done mostly by family labour, as the size of the average coffee farm is as small as 0.5ha.

Coffee Harvesting and Processing: coffee is processed by two widely-known methods - dry and wet. Ethiopia exports 80-85 per cent natural or sun-dried coffee and 15-20 per cent wet-processed coffee.

a) **Sun-dried coffee**: natural coffee is dried much more slowly than wet-processed coffee, because it is harvested with a variable moisture content that sometimes requires water to be removed from throughout the whole fruit. Natural coffee is dried in about three to four weeks in the sun, longer in cloudy or damp weather. The coffee cherry is allowed to dry to about 11.5 per cent moisture in the whole fruit, after which all the outer layers are removed together by hulling and the commercial bean obtained and delivered to the central market. After the dried cherries arrive at the hullery, they are cleaned and stoned before they enter the huller. Undersized cherries are separated for reprocessing. The basic raw materials required from successful hulling are fully-dried cherries of reasonable and even size.
b) **Wet-processed coffee**: since consumer preference is for wet-processed coffee, Ethiopia intends to increase the quantity of this commodity it produces. There are currently more than 400 coffee-washing plants in the country, owned by co-operatives, former state enterprises and private companies. At full capacity, these plants can produce about 52,000 tonnes of washed coffee per annum. The country is well-known for its high-quality wet-processed coffee because there is a well-established and linked structure that connects coffee farmers, processing -plant owners, governmental organizations and coffee-purchasing enterprises, leading to effective quality control and efficient marketing.

   The extension program, which includes experienced professionals at all levels, disseminates processing extension services to all producers. In particular, coffee harvesting and handling techniques are passed on by extension agents, and technical support is provided by professional processing experts at each plant. Besides, each year, before the start of wet-processing operations, training is given to all operators engaged at each washing plant. Each specialized operator knows his duties and responsibilities well, and this is supported by strict supervision.

It is well-known that top-quality coffee is produced only from freshly picked, fully ripe cherries, and farmers are always advised to pick only these. Harvesting is done carefully, under close supervision. In addition, the cherries are sorted before pulping and unsuitable cherries are removed. The final sorted and clean cherries are pulped the same day they are harvested.

The pulped wet parchment coffee goes to the different fermentation tanks to ferment naturally. The process is carefully supervised to avoid under- or over-fermentation.

The fermented coffee is finally washed with clean running water and soaked in clean water to degrade and remove the remaining mucilage and acids and to improve the color of the beans. The wet parchment coffee is dried in the sun on raised drying tables and sorted at 11.5 per cent moisture.

c) Export Processing: it is a precondition for all exporters that they process their coffee to the country's export standard. The Coffee Processing and Warehouse Enterprise is a modern, state-owned enterprise, whose objective is to render high-standard coffee-processing and warehousing services. The Enterprise has three production lines, each with the capacity to process five tonnes of coffee an hour, and with a storage capacity of 30,000 tonnes.

2.3.4 Intervention for improved benefit from coffee

Actions being taken to gain better benefit from coffee in Ethiopia are related with promotion of organic coffee along with wild coffee certification and branding of speciality coffee.

2.3.4.1 Promotion of Organic coffee

The important components of the Ethiopian coffee production system are forest and semi-forest coffee, with important role of wild coffee. Along with improving smallholder coffee producers' livelihood, promotion of organic coffee is expected to support to protect the destruction of the few remaining wild and forest coffee in the country. Moreover, there are researchers who support the certification of wild coffee harvested from the last wild coffee forests of Ethiopia that are under great threat of deforestation (Christine Schmitt and Ulrike Grote, Undated). This is justified as a means to increase economic value of these forests and thus encourage farmers to avoid forest destruction. Further, these authors argue that forest conservation in the strict sense should consider not only the protection against deforestation, but also the conservation of forest authenticity, i.e., the conservation of the authentic species composition and forest structure as well as original biodiversity functions and processes.

2.3.4.2 Branding Ethiopian coffee in the international markets

Along with organic coffee promotion, different interest groups have been promoting the international branding of the different coffee in the country like Yirga Chefe, Harar and Sidama coffee. This is expected to benefit farmers not only in terms of accessing sustainable market but also insuring the sustainability of the existing production systems.

2.3.4.3Improving the coffee marketing systems though Ethiopian Commodity Exchange (ECX)

Coffee is one of the commodities traded through ECX. ECX is a national multi-commodity exchange which provides market integrity, by guaranteeing the product grade and quantity and operating a system of daily clearing and settling of contracts; enhancing market efficiency by operating a trading system where buyers and sellers can coordinate on the basis of standardized contracts; enabling market transparency by disseminating market information in real time to all market players; and allowing risk management by offering contracts for future delivery, providing sellers and buyers a way to hedge against price risk.

2.3.5 Way forward

Ethiopian coffees occupy a special place in the world coffee industry and different analysts agree that there is no deficit in demand provided that quality and consistency are guaranteed. The path to 'success' lies in exploiting the unique aspects of Ethiopian coffee which, combined with improvements in harvest and post harvest practices, can supply consistently high quality coffee and maintain or increase its competitiveness on the world market (Petit, 2007).

The existing challenge is mainly in promoting afforestation and maintaining the existing forests, especially in most part of Ethiopian highlands, and the need to insure sustainable livelihood for those who are dependent on these resources. This can be partly addressed through a well designed payment for environmental services mechanism building on what has been started on coffee. These are:

a) Integrating natural resource management interventions with forest coffee production
b) Strengthening the promotion of organic coffee production along with robust certification system
c) Strengthening international branding of Ethiopian forest coffee
d) Strengthening the market linkage through ECX through promotion of farmers' group action

The above initiatives are more or less in line to PES principles and can be used as a stepping stone towards designing a robust PES mechanism to support the production of quality products such as coffee and other important products in the highlands of Ethiopia.

2.4 Natural Heritage Sites: The Case of Simen Mountains

2.4.1 Introduction

The Simen Mountain massif is an impressive landscape located in the North-western part of Ethiopia (about 846 km away from Addis Ababa) with the highest peak in the country rising to 4533 masl and has a breathtaking scenic beauty. The extreme escarpments appeared to be preconditioned by an extended uplift of the whole massif during the Tertiary, comprising major faults, which can be attributed to the rift system extending over most of East Africa to the Red Sea (Hurni, 1986). After such faulting processes, the Simen Massif was reshaped some 25 million years ago and the igneous basalts have since been eroded to form precipitous cliffs and deep gorges. Some cliffs reach 1500 m in height and extend for long distances (IUCN, 2000). The Simen Mountain is home for unique and diverse biodiversity (both flora and fauna) where many of them are endemic to Ethiopia. For instance it provides a refuge for some of Ethiopia's endemic mammals like the Walya ibex, the Simen fox and Gelada baboon (See Figure 9).

Figure 9: Some of the endemic wildlife in Simen Mountains (Walia Ibex, Simen Fox (upper part), Rodent and Chilada Babon (lower part).

Source: Zelalem (2007)

Simen Mountain has also favourable climatic and agro-ecological conditions that enabled agricultural development to flourish since 2000 years. The farming system is basically conditioned by the geological formation: there is predominantly mixed farming with crop and livestock subsystems linked with each other. Shifting cultivation is a common phenomenon both in the highland and lowland villages. It has a breathtaking landscape that has attracted travellers for many centuries, and more recently tourists from around the world. The Simen Mountains holds also one of the World Heritage Sites, the Simen Mountains National Park (SMNP). To preserve the wildlife heritage, the vegetation and the scenic splendour of Simen, the Ethiopian Government formally proclaimed the Simen Mountains National Park (SMNP) in 1969 and this was inscribed in the list of World Heritage Sites by UNESCO in 1978, thereby ensuring its global significance as a natural heritage. SMNP covers an effective area of 136 km2, and comprises some of the most spectacular escarpments of Simen, with a wide area of natural vegetation covering a broad undulating plateau of vast grassy plains and a wide variety of animal species, as well as rich cultural landscapes both in the highlands and in the lowlands (Hurni and Ludi, 2000).

2.4.2 Natural and socio-economic characteristics

Ecosystem of the Simen Mountains is characterized by four agro-climatic zones:

- Afro-alpine above tree line or timber line > 3700 masl characterized by high terrain of the escarpment and high plateau extending up to mount Buwahit and vicinities of mountain peaks around Ras Dejen. Dominant plant species; Helichrysum spp, everlasting flower and shrub Erica arborea.

- The sub-Afro-alpine / ericaceous moorland/ 2700-3700 masl dominated by Erica arborea and main part of escarpment. Dominant plant spp: Erica arborea, Giant St. John's Wort (Hypericum revolutum), Giant lobelia, Abyssinia wild rose, Giant sphere Thistle, Rosularia simensis, dianthus longiglumi etc and small mammals: soft-furred rat, harsh furred rat, swamp rat and common mole rat, large mammals: Walia ibex, Gelada, Golden jackal, Klipspringer and Gray duiker; common bird spp are: Abyssinian cat bird, near endemic, wattled ibis, near endemic, thick billed raven , near endemic and bearded vulture and has less human settlement because of the steepness of escarpment.

- Montane forest belt: altitude ranges from 1900-2700 masl. Dominant tree spp l;ike Juniperus procea, Hagenia abyssinica, Syzygium guineense, Acacia abyssinica, Cordia Africana, Dombeye schimeriana, olea fricana etc .. And dominant large mammals: vervet monkey, bushpig, Gray duiker, Black and white colobus, Leopard, crested porcupine, Spotted hyena, serval cat, hamadrias baboon, Anubis baboon, Columbus monkey, bush pig, bush buck and Civet cat. Small mammals: Groove-toothed rat and soft-furred rat. Different colorful birds like Abyssinian woodpecker, Abyssinian catbird, Black headed oriole.

- Savannah belt: found at the lower margin to the around Adiarkay largely outside the park and extended from the park in west and north west of the park below 2000 masl . this ecological zone dominated by Africa wood land of acacia abyssinica animals hyena, leopard, and other small mammals.

In general, Simen Mountain comprises unusual botanical phenomena and characterized by high but yet un-quantified level of plant and animal endemism and is part of eastern Afromontane hotspots of plant diversity. Vegetation cover varies 100 % at the sheltered areas to less than 10 % at the highest most exposed altitude. Uprooting by snow needles /soliflucation is common around Ras Dejen, Tefawlezer, Mateba and mount Buwahit.

Simen Mountains are not only sources of biodiversity and livelihoods but they are an important water catchments too from which many rivers emerge and join Tekeze River. The river system is generally characterized by long and rapid narrow water fall at the sources relatively with low volume of water. Rivers and streams emerged from Simen that forms the major part of Tekeze Basin are Belegez, Ansia, Jinbar, Angora, Loma, Mesheha, Zarima, Inzo, Anesia, Buya and Beyeda are few of them. The rivers and streams are important sources of fresh water both for drinking and agriculture in downstream areas. After they join Tekeze they are used to generate hydropower (recently) at the foot of Simen Mountain and extensive irrigation both in Sudan and Egypt.

The Simen mountains massif was originally part of the old trade routes between Axum, Lalibela, mekele and Gondar. The mountains have been inhabited by settlers and cultivars for at least 2000 years, with the first recorded inhabitants being Ethiopian Jews. Currently Christians and Muslims are living.

The people in Simen are using mixed farming system, where nearly 95% are dependent on rain fed subsistence agriculture. Major crops are barley, wheat and pulses in the high land and sorghum in the low land. Livestock is important engagement; sheep rearing being dominant one followed by goat in the lowlands. Traditional irrigation practice is observed in the low land part and valley parts. There are some parts of the society who support their livelihood from tourism and artefact production mainly around SMNP. However, due to the ragged topography, the rainfall system (which is torrential) and the poor land management associated with high population growth, land degradation is the major challenge affecting food security and livelihoods. As a result most people are dependent on food aid from the government and there is also a persistent push towards marginal lands including the SMNP which is now endangering some of the unique biodiversity of Simen Mountains.

2.4.3 The Simen Mountains National Park (SMNP): the other form of PES

Historical background: the history of SMNP is traced back to 1966 when there was no any protected area as a national park in the country, except Menagesha Suba forest, which is designated the oldest protected area starting from the fifteenth century. The Ethiopian Government formally proclaimed the Simen Mountains National Park (SMNP) in 1969 and this was inscribed in the list of World Heritage Sites by UNESCO in 1978, thereby ensuring its global significance as a natural heritage.

When SMNP was established, the total area was 136 km2, but now the area is expanded to 412 km^2, which lies in five Districts, namely Debark, Adiarkay, Janamora, Beyeda and Tselemet. The primary objectives of SMNP were to conserve the endemic species of Walia Ibex and places with endemic species of animals and plants with wide range of composition and habitats, and an area of spectacular landscape and scenic beauty (see also Figure 9 and 10) which is an ideal place for environmental conservation, education, scientific research and eco-tourisms. The area also covers major water catchments, high range of altitude and cultural landscapes.

Figure 10: Some of the spectacular views of SMNP
(Source: Gudrun and Hans Hurni)

Major challenges: the major challenge for SMNP is the existence of people inside the park. There are about 30 villages in and around the park that are directly or indirectly dependent on natural resources from the park. The residents are subsistence farmers dependent on agriculture, charcoal making and weavery. This causes serious land degradation mainly through soil erosion, deforestation and overgrazing. In general they pose great pressure on the park's biodiversity and its unique landscape. This has been part of the history of SMNP since its establishment and the solutions are yet to be desired. Particularly, the park was almost in the verge of collapse during the civil war in the eighties where the park management was not functional, except the guidance of some elderly people from the different villages.

Efforts of rehabilitation: since the beginning of the nineties, the government together with development partners have taken various measures to improve the management of the park and reduce pressure on the park by designing push and pull factors.

Some of the actions include voluntary resettlement to the lowlands, natural resources management through PSNP, provision of modern agricultural inputs to increase production so as to stop further encroachment, diversification of livelihood, including creating a mechanism to benefit the community from tourism. This has required taking of concrete actions such as improving park management, designing a mechanism that enabled communities to have direct say on the management of the park (such as their involvement on park management, service provision and benefit sharing protocols, etc.), a mechanism where communities generate income from tourism and capacity development. This approach seems working as there are good signs of improvement both in the biodiversity and flow of tourism and benefits from it (see Figure 11 & 12).

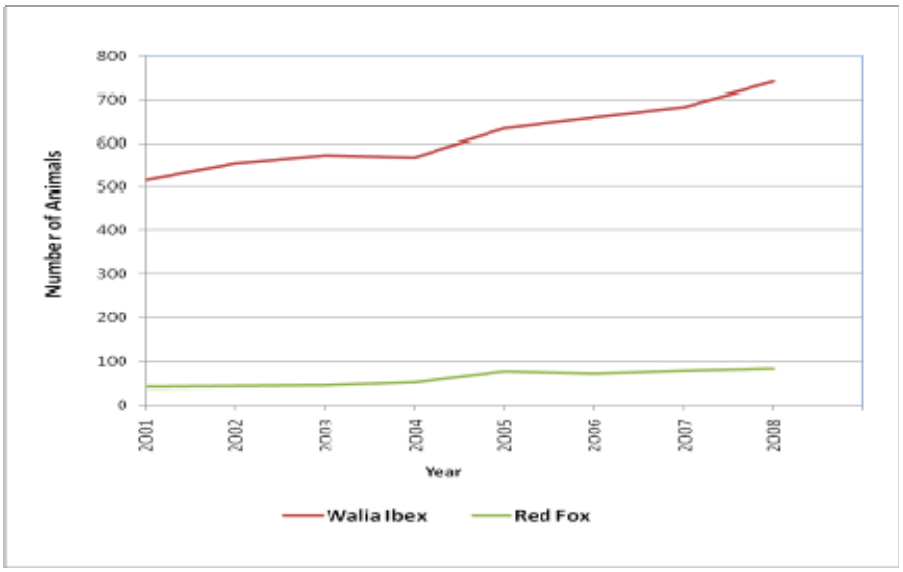

Figure 11: the figure shows an increasing trend of the Walia Ibex & Red Fox since 2001 (Source: ANRS Bureau of Tourism & Park Development, 2010)

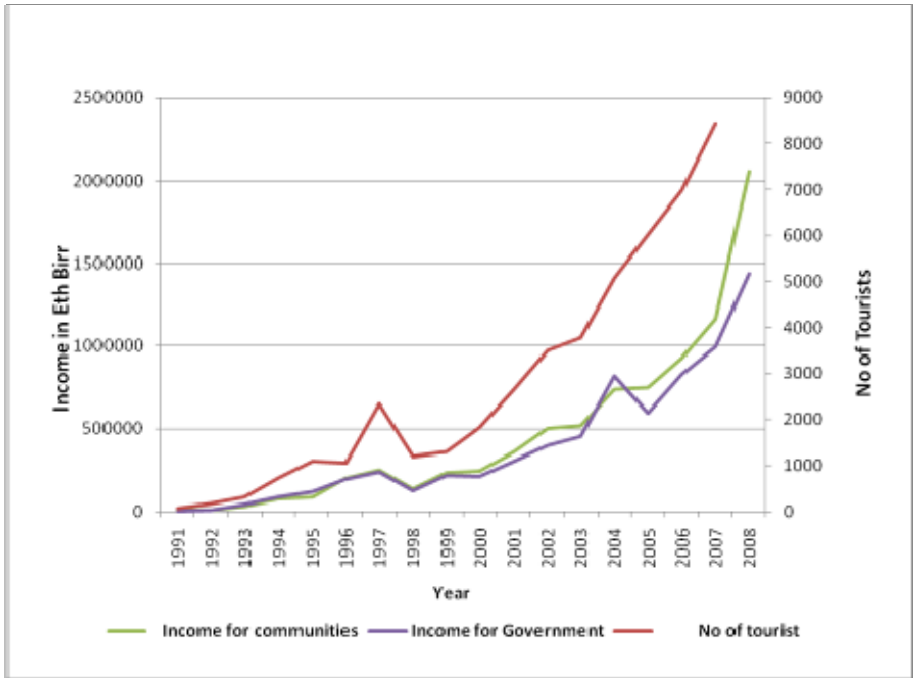

Figure 12: Tourist flow over the years and income generated from it

(Source: ANRS Bureau of Tourism & Park Development, 2010)

Note: Since 1999 income generated by communities seems surpassing income by the government. This is the time when the government started modifying the management of the park and involvement of communities on joint park management and benefit sharing. Communities designed a system among themselves on giving service to tourists and thereby getting benefits.

Other interventions: there are at least three players that brings in external resource to the park: Government, Donors and private investors. The Government mainly involves on improving rural infrastructure such as road (eg. the main road that cross the National park from Debark to Janamora), implementation of PSNP to improve food security through protecting the natural environment and support to agricultural extension to improve agricultural productivity. The support from Austria Government focussed on Eco-tourism development is one of the major specific donor support other than the PSNP. The project started in 1996 is running until now with periodical modification of its name to SMNP-IDP and finally, at present to Sustainable Development in North Gondar. Its involvement ranges from infrastructural development of the park, building office for the park, construction of toilets, and organizing the local people by providing training on eco-tourism, cooking, guiding and many other activities related to tourism management and income generation form it.

Although the involvement of the private sector was mainly restricted to tour services (transport and guiding), recently a modern tourist lodge was opened and is providing better services both for tourists and local communities. Its impact on the environment and biodiversity is yet to be investigated.

In general, the current efforts in participating local communities in managing and sharing benefit from the park should continue in more innovative way as this will be the key for sustainability of the park and its biodiversity in the short term. In addition introduction of modern agricultural technologies that can reduce dependency of local communities on income and natural resources from National park, improving housing and energy status, provision of more developmental intervention in the area that decreases park dependency and creating awareness and environmental friendly income generating activities have paramount importance from long term park conservation perspective. Expansion of education and creating out employment opportunity for the park residence decedents have long term impact in making park with no people idea.

2.4.4 Way forward

Apart from being used as a source of livelihoods for millions living in different parts of the mountain and surrounding lowlands, its unique biodiversity and the water system makes the Simen Mountains important global ecosystems and deserves proper protection and management both by the national government and international community. This can easily be done if properly functioning PES mechanism is established through which downstream beneficiaries within the country and outside the country mainly Sudan and Egypt as well as international community, as it holds unique biodiversity of global significance including one of the World Heritage sites, i.e., SMNP, can contribute for better management of environmental resources. This will reduce the current serious land degradation and improve livelihoods of communities and thereby ensure better flow of environmental resources for downstream users and preservation of its unique biodiversity. The intended PES could build on existing positive initiatives linked to the SMNP and its environs.

2.5 Cultural Heritage Sites: the Case of Lalibela Rock-Hewn Church

2.5.1 Historical Background

Lalibela is a small town on a mountain slope between 2500 and 2800 meters above sea level. Previously known as Roha (place of saints) it is named after the king well known for its rock hewn churches that are believed to have been carved to replace for a New Jerusalem after the Muslim conquest halted the Christian pilgrims to the Holy Land. The creation of the churches is ascribed to one of the last kings of the Zague Dynasty, Lalibella (1167-1207 AD).

The home of 11 rock-hewn churches, the unique and one the world's wonders, Lalibela is an ancient town in lasta Woreda of north wollo zone, 642 KM from Addis Ababa to the North, 529 KM from Bahirdar to the east, 529 km from Axum to the south, 283 km from Dessie and 120 Kms North east of Woldea.

Lalibela, the second capital of the ancient Ethiopia Empire of the north (next to Axum) and graced with beautiful setting on the mountains of Lasta has 11 churches inscribed by UNESCO

as world heritage sites in 1978. The eleven churches are; Bete- Gologota, Bete-Michael, Debre-Sina, Bete-Mariam, Bete-Amanuel, Bete-Mercurios, Bete-Abba- Libannos, Bete-Medahenialm, Bete-Gabriel–Rufael, and Bete Giworgis (see Figure 13). The eleven churches were intricately sculpted out of rock and interconnected by a series of tunnels and trenches. Some of the structures are free standing, connected to the bedrock only at the base, while others have only freed from the parent rock.

Figure 13: One of the 11 carved churches – Bete Giworgis

(Source Gete Zeleke, 2003)

2.5.2 Some of the unique features of Lalibela

Religion: Lalibela is one of the major centres of Christen Orthodox religion in the country. Lalibela is alive and active as opposed to most areas in the world places of worship as it has been when it was built in the 12th century. The past unique and interesting culture of the people is still kept alive and is manifested in Lalibela during Christmas and Epiphany celebrations. It is said that the birth day of king Lalibela coincides with that of Jesus Christ at Christmas. This heightens the zeal of the celebrants and the aura of the celebration at Lalibela. More than 150,000 pilgrims participate on the yearly colourful celebration of Ethiopian Christmas, which picks up the number of foreign tourists in the area.

Natural and socio-economic characteristics: King Lalibela is expected to choose this area to build these edifices partially because of the geology. The region is naturally fortified with towering mountains of the flood basalts of middle tertiary age (30 million years) and deep

canyons that have been cut into them through erosion. Fortification was necessary as over many millennia; religious battles taken their toll on Ethiopian churches.

The socio-economic structure of Lalibela and the surrounding is characterized by subsistence agriculture and very poor economic base. The rural population exposed to repeated extreme weather events (i.e., recurrent drought) since the great Sahelean Drought in 1972-75, which caused death of millions of people and livestock, degradation of biodiversity and topsoil, reduced soil fertility and deterioration of the hydrological regime of the area. Since then the populations struggles to survive and is heavily dependent on external support in the form of food aid. The total population of the city is expected to be 20,000 which have struggled to survive similar to its rural population during the past recurrent drought events. Now, tourism activity seems changing the economic structure of the city, where recently, modern hotels and tourist services delivery activities has been booming.

In general, Lalibela has multifaceted importance beyond its religious originality and being center of Government in 12th century. One thing, Lalibela is one of the religious centers in the World, where it serves at its originality, and still kept that trend active and live. This provides great spiritual and religious satisfaction for the Ethiopian Orthodox Christians. On the other hand, it is also serving as living history for showing the past, without any change, which surprise the world and increased its tourist attraction.

Tourism: The increasing number of tourist flow and diversity of tourists is putting impact on Lalibela citizen that pave social and economic betterment. The strong exposure to external society is increasing the value of Lalibela by the domestics, which also further increasing the interest of conserving this valuable religious heritage. The trickle-down economic effect is clearly shown in Lalibela, as the number of tourist flow is increasing. There is considerable number of citizen's who are earning their income from tourism related activities such as tourist guiding, transport services, handicrafts and hotel services of different kind.

Major challenges: there are at least three major challenges linked to this magnificent world heritage site: i) looting of religious resources and artefacts in different forms was a major chllange in the past. Although this has been subsided through a number of arrangements, such as benefit sharing mechanisms and increasing awareness about the valuable religious items there is still a long way to go to curve the problem; ii) the deterioration of the structures of the different churches associated to weathering, other extreme climatic factors is the other challenge; iii) tourism management is the other challenge – while it is important to get income from tourism, care must be taken to protected the resource, social and cultural values. This requires extensive capacity building and awareness creation on tourism management at different levels of the community; iv) environmental degradation and associated high level of poverty in the surrounding rural areas is the other challenge that deserves better attention as this will have implications on the sustainability of the rock-hewn churches.

2.5.3 Recommendations for the way forward

Lalibela Rock-Hewn Churches have not only national but also global significance. They are historical, cultural and religious monuments. The government has been trying to address some of infrastructural problems such as road, electricity, telecommunication and airport. Together with development partners it has also tried to address the food insecurity issue through a number of interventions such as PSNP and others related to agricultural extension. However, the churches require proper maintenance and protection from both human interference and extreme natural events. The churches should maintain their scenic quality, religious and cultural values. This requires strengthening of the current effort on eco-tourism, development of rural and urban infrastructure, and various attempts to improve rural livelihoods. The current maintenance effort on some of the churches lead by UNESCO need to be further strengthened with better technological innovation and speed. This can be arranged through a PES mechanism where benefits from religious celebrations, tourism and other incomes can be diverted towards rehabilitation of the churches and its surrounding. As the site is one of the world heritage sites, it also deserves the support from international community to help maintain the status of its global quality. This can also be part of the proposed PES mechanism. Apart from the maintenance and area development efforts, the PES mechanism can also have Archaeological proceeding as one of its components. This is because Lalibella and the surrounding area are expected to contain many archeologically valuable items that need further investigation.

2.6 Natural resources management activities by communities: The Case of MERET Watershed Management Project

2.6.1 Introduction

Watershed development is a continuous process and requires time and log-term commitment. The returns from watershed development efforts have different maturity periods depending on the type of interventions and there are also activities that follow sequential orders. Moreover, it needs strong follow-up, ownership by communities starting from the planning processes, sufficient ecological diversity, proper management of all implemented activities, value adding to make all interventions economically attractive to the farmer, rural infrastructure such as market and rural roads, well focussed capacity building, proper institutional linkages, availability of resources including rural finance, and innovative approaches.

MERET project at its current stage has more or less all the above mentioned elements, hence fulfil major requirements of watershed development. Although MERET works on very challenging areas in the country, it showed many successful results with significant impact on improvements on rural livelihood in project areas. It developed its own planning and implementation approach that has remarkable evolution, widely known as LLPPA, it has been operational for about two and half decades, has strongly attached with Ministry of Agriculture

(despite all sorts of restructuring), it covered more than 750 communities and 600 smaller community watersheds in 74 food insecure Woredas (Figure 14) with different ecological diversity. Most important of all, it gave hope to communities for possibility of change in their life.

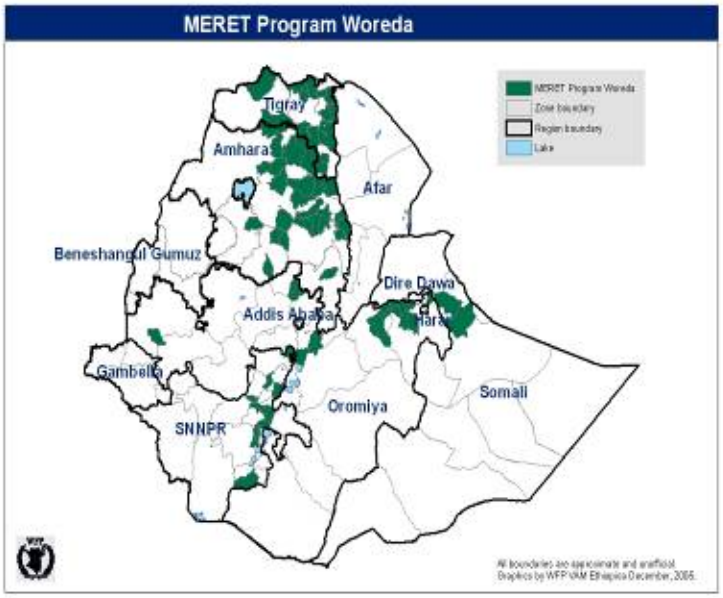

Figure 14: MERET Project woredas covering greater ecological diversity
(Source: WFP 2005)

One of the reasons for reviewing MERET experience is to look into the possibility of rewarding communities for their effort in rehabilitating their environment, which is instrumental both for their wellbeing and downstream resource beneficiaries. This section will review MERET's experience and will discuss possibilities of further expansion through special PES mechanisms.

2.6.2 Historical background

Following the 1974 famine that killed about a million people, the Government launched a massive soil and water conservation programme in many parts of the country as a way of redressing the degradation of the natural resource base and increasing land productivity. Led by the Soil and Water Conservation Division (SWCD) of the then MoA, relief food aid was used to undertake soil and water conservation and aforestation work, mainly in areas hit by the drought. However, apart from the limited technical experience in SWC in the country, there was serious methodological limitation. It started as purely top-down technocratic approach with very little participation of communities. After few years of experience there was a need to reorganize the massive SWC effort in the country. Thus in 1980, the MoA and WFP began implementing a land rehabilitation project with Food for Work (FFW) being the major component to implement project activities, known as Project ETH 2488 (Sonali, 2000). As stated by Beteru, 2004, the formulation of Project ETH-2488 indeed marked the beginning of large-

scale soil and water conservation and land rehabilitation programmes linked to watershed development in the country. This project has passed four phases between 1980 and 2002, until it acquires its new name, MERET in 2003.

The activities of Project ETH 2488 were concentrated on selected large watersheds located mainly in the highly degraded parts of the highlands of Ethiopia. The selection of these watersheds was based on severity of land degradation and exposure to drought rather than on understanding both the biophysical and socio-economic condition of these areas. After some serious considerations, in 1982 it becomes clear that the scale of land degradation required a much clearer understanding of biophysical and socio-economic factors affecting land rehabilitation programmes. That was when two major studies were initiated by the then MoA to provide with basic information for the extensive soil and water conservation and aforestation effort of the country through a deeper understanding of the root causes of environmental degradation.

The Soil Conservation Research Project (SCRP) started in 1982 by University of Bern, Switzerland in Maybar, Wollo and later on expended to the rest of the country by opening six more research stations representing major productive agro ecological zones of the country. Similarly, the Ethiopian Highland Reclamation Study (EHRS), under the auspices of FAO with World Bank and UNDP support, began in 1983. These two projects produce substantial scientific information on the extent and severity of land degradation in the country. The findings of these two studies provided the core diagnostic information for the project and the country for succeeding years; even todate. Accordingly, by 1984 project areas had been expanded to over a hundred sub-catchments from the initial 19 sub-catchments. Moreover, attempts were made to improve technical quality and implement a people–based approach. To realize this, the UNDP-funded FAO technical assistance project (Assistance to soil conservation in Ethiopia, ETH/85/016) was started to upgrade the technical capacity of experts of the SWCD of MoA through short term and long term training, provision of technical guidelines, study tours, etc at different levels. These initiatives were instrumental for the current success of the MERET project.

Over its 25-years life span, MERET has undergone several variations in its approach. With its origins in relief food aid, the development-centered objectives of the project had to contend with successive periods of drought and famine. In addition, the political and socio-economic changes over this period have strongly influenced the project's ability to promote sustainable livelihoods. Government policies, institutional structures and capacity, as well as farmers' organization and empowerment have all played a role in the evolution of the project.

The focus of the initial and first expansion phase (1980-87) was influenced by the need to assist poor, food-insecure farmers and to support prevailing government rural policies. At the national level catchment plans were made covering up to 40,000 hectares each. The work quotas handed down to the regions were based on area treatments of up to 1,500 hectares. At the local level, mass mobilization campaigns and the urgent need to make food available to communities overshadowed the technical design and sustainability of works (Sonali, 2002).

The second phase was designed and implemented during the civil strife that followed the other famine and drought period of 1984-86. While better integration of the various conservation works was sought, the need to achieve centrally-set targets remained the driving force behind the project. Up to the middle part of phase II, this approach, i.e., the "top -down" planning approach where quantity played significant role rather than sustainability and acceptance by communities, largely prevailed with some improvements here and there.

However, at the end it became apparent that the "top down" planning approach to development that focused on technical and physical works alone would not lead to the desired environmental objectives. Moreover, focusing on large watersheds has resulted in less participation and ownership feelings of communities, dilutes efforts and creates problem on sustainability of activities. It was then realized that watershed development needed to be more participatory, taking into account community and household concerns and shall focus on smaller watersheds.

Accordingly, between 1988 and 1990, the FAO project (ETH/85/016) began to focus training programmes and the planning process more on addressing community needs, improving technical measures and establishing demonstration sites, mainly model watersheds. However, the technical sophistication of these community-based watershed plans meant they were unsuitable for replication on a wider scale, especially given the low institutional capacity of project areas. Nevertheless through this technical assistance the first work on developing a participatory planning approach began in earnest. Based on this understanding, in 1990 FAO/MoA had developed a "minimum planning" bottom-up approach and provided initial training for hundreds of staff. This opens lots of rooms in the thinking of experts behind the need for community participation starting from the planning process who would otherwise consider this as wastage of time. Although the design of the approach was a success, given the civil strife at the time, this approach could not be widely implemented. However, this condition gave a chance for MoA/FAO to test the approach in different sites and they were able to gather essential information for further improvement in the approach.

While the situation was calm and the relatively favourable to pursue participatory approaches, in early 1992, the FAO project was cancelled by UNDP. The abrupt cancellation of the FAO project and the need for continued work and development of a bottom-up approach led WFP to take on the funding of this aspect of the FAO project. By the end of 1992, WFP and the Ministry of Agriculture based upon the experience on the field and the guidelines in minimum planning developed the Local Level Participatory Planning Approach (LLPPA), and produced a set of Guidelines (Volli Carucci, 1999). With WFP support, the LLPPA was tested in various agro climatic and socio-economic conditions (in eight selected pilot sites between 1992-1993) before being scaled up in 1994-95 through large-scale training of trainers and grassroots level development agents (DAs) in over 60 Districts (Sonali, 2002). Todate this is expanded to 74 woredas.

The focus of LLPPA was on people-centred watershed development aimed at tackling severe problems of land rehabilitation. The methodology was elaborated by taking into consideration the existing limitations of institutional capacity at grassroots level. Based on field experience, this approach was revised four times, i.e., in 1994, 1996, 1997 and 1999, to accommodate new technologies and methods until it heavily contributed to the birth of the National Community Based Participatory Watershed Development (CBPWD) guideline in 2005. The LLPPA guideline incorporated good practice such as awareness raising, participatory planning, community participation and the latest version incorporated InfoTech's[1]. This approach changed the whole picture of soil and water conservation in the country where quality, sustainability, livelihood and environmental impacts of measures were highly valued than fulfilling quotas.

Although the participation of communities was improved, the project was largely biased towards natural resources conservation and rehabilitation. Towards the end of the 1990s the concept of "sustainable livelihoods" began to emerge, with a focus placed on better understanding of household dynamics livelihood sources and the coping strategies used within the rural community. A greater awareness was reached that food security and rural development could only be addressed through actions aimed at increasing food availability and access at household level. The livelihoods focus saw people displacing technical solutions as the focus of development efforts, and resulted in the introduction of a broader and more diverse set of interventions that meet people's livelihood and environmental objectives (Barry et al., 2005).

This background paved the way and at the end of 2002, still within the fourth phase of the project, the name of the project was changed from number to MERET with strong 'people centred' focus on participatory natural resource management and income generation (Barry et al, 2005). Within the new MERET project design special effort was given to enhancing the

[1] Info techs are a summarized version of technical specifications for important land management measures incorporated within the LLPPA and CBPWD guidelines to help experts and development agents (DAs) choose the best option during the planning process.

capacity of rural communities to organize them to plan, manage and implement broad-based, community-wide activities for conservation and land rehabilitation. In comparison to previous land rehabilitation initiatives strong emphasis was placed on household income-generating activities and innovative approaches towards conversion of degraded landscapes to productive lands (See Figure 15). The focus on household and community asset building proved to be an important stage in the evolution of the project itself and the thinking behind participatory watershed management.

Figure 15:

Distribution of degraded hillsides in Ambasel woreda to community members and its result in different kinds of remarkable woodlots with very good grass cover. (Photo by Gete Zeleke, 2005)

2.6.3 Highlights on Project Achievements and Impacts

Although the project lacks an inbuilt impact assessment mechanism, it has shown considerable impacts both on biophysical and socio-economic conditions of project target areas. One of the biggest achievements of the project has been the focused capacity building component for regional and wereda technicians and DAs. This has been considered as an essential element in the rehabilitation of degraded lands starting from the outset. Accordingly, thousands of MoARD staff members have been trained in local level participatory planning (LLPPA), soil and water conservation, natural resource management, community infrastructure development and on participatory monitoring. Apart from various kinds of in-service trainings, the project also supports long-term trainings, study tours (in-country and international), and field days to upgrade capacity and increase level of exposure for field staff. Training has also been given for project beneficiary community members to upgrade their skill through on the job on both natural resources management and related various income generating activities including fruit tree management and grafting.

Given the extent of the area coverage, the different kinds of approach it passed through and the length of intervention period, it could be difficult to undertake comprehensive impact

assessment covering all sites. However, a cost benefit study by carried out by FAO/WFP (2004/05) on 11 selected project sites showed remarkable impacts of the project. Some of the impacts registered on biophysical condition, socio-economic situations including food security and capacity building are indicated on Table 1 and Figures 16 to 18 below.

Table 1: Impacts of MERET project (adopted from FAO/WFP, 2005)

Registered impacts		
On biophysical condition improvement	**On socio-economic improvement**	**On capacity building and system development**
• 77% reduction in soil erosion • 83% improvement in soil fertility • 71% improvement in forage availability • 76% improvement in vegetative cover of degraded areas	• 40 percent reduction in food shortages, • 85% are better able to cope with drought; • 84% have increased production of 150-400 kg/yr; • 72% report an increase in income; • 73% are able to invest more in education, health, shelter, and clothing; • 60% improved access to markets and other services because of feeder roads constructed by the project • 42% increment in drinking water availability • 44% increment in women participation	• Reached nearly 1.3 million people • Technical Training → 2500 field staff – rolling • Technical and planning Guidelines → over 15 manuals and guidelines, major guidelines translated in 3 languages - 20,000 copies duplicated • Improved work norms prepared for 53 different labour intensive activities • Performance Evaluation Profile (PEP) and RBM established for M&E • Group Formation for improved management of assets and income generation • Homestead Development scaled up • Seed networking-diversification (biodiversity) ongoing • Training of 30,000 beneficiaries on-the-job, field tours organized, etc • Linkages with research established (ICRAF, EARO, IFPRI, EDRI, etc) • Contribution to the Community Based Participatory Watershed Dev. Guideline for National Implementation CBPWD (2005) • Technical support to other food security programmes • Attitude change through various methodological trainings and study tours

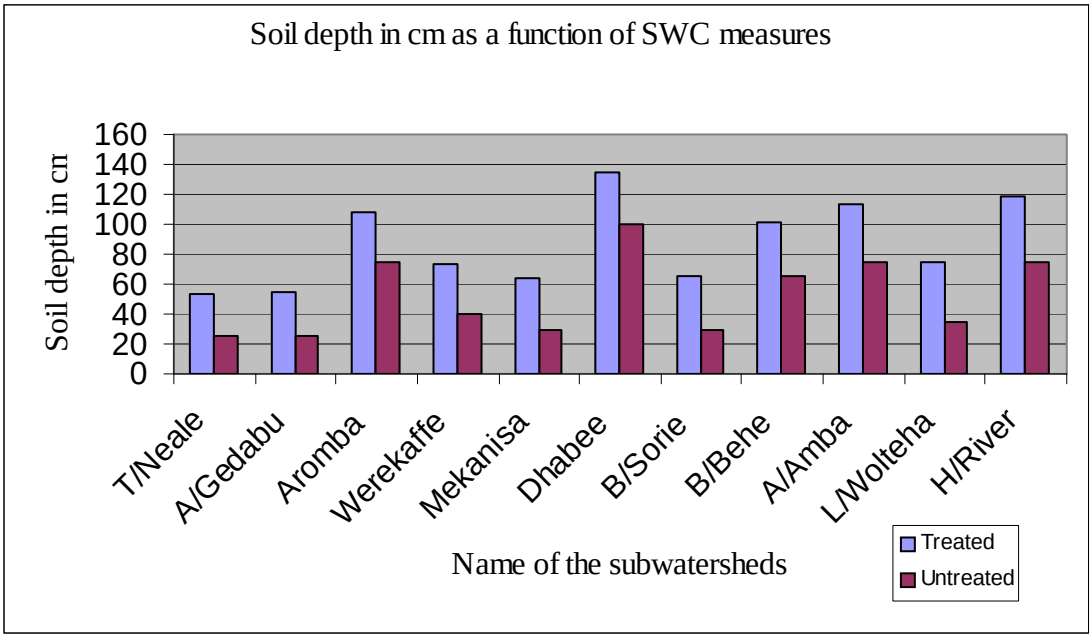

Figure 16: *Soil Depth in CM as a function of SWC measures in 11 watersheds of MERET project covered by CBA study. Source, FAO/WFP, 2004.*

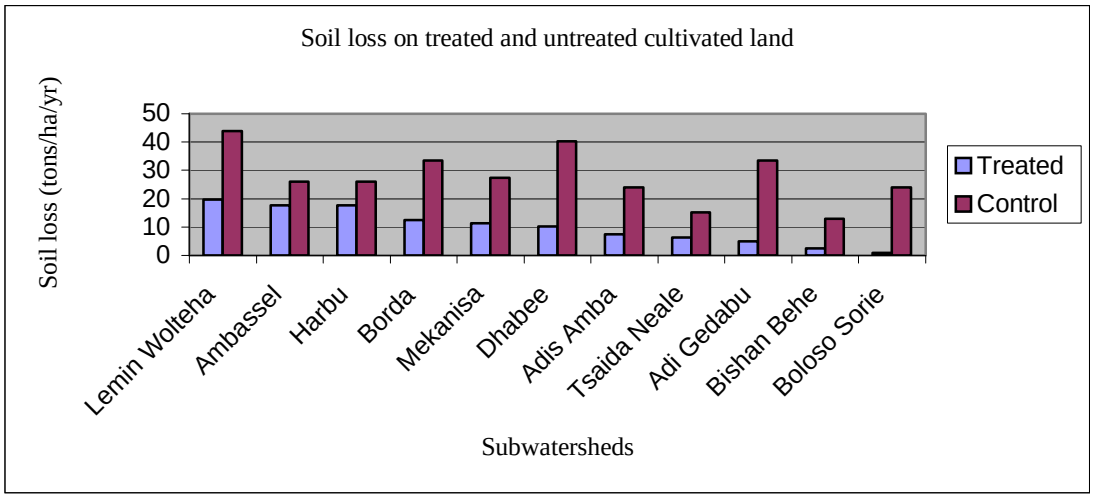

Figure 17: *Soil loss on treated and untreated cultivated lands in the 11 watersheds covered by CBA. Source, FAO/WFP, 2004.*

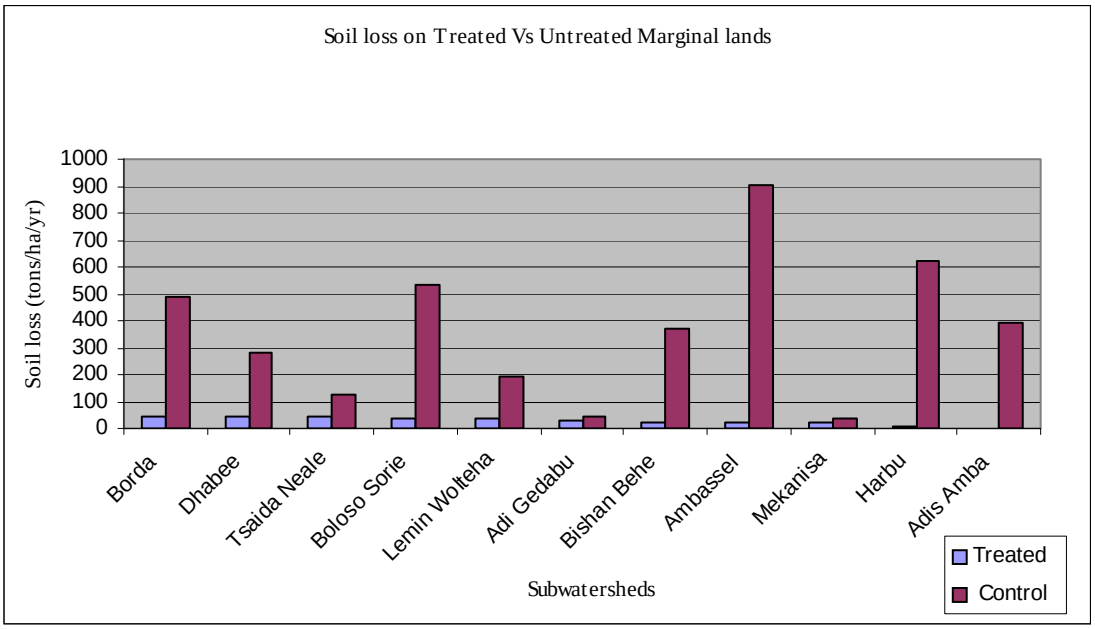

Figure 18: *Soil loss on treated and untreated marginal lands in the 11 watersheds covered by CBA. Source, FAO/WFP, 2004*.

In general, the CBA showed that an economic rate of return of 13.5 percent over a 25 years' time frame in MERET project. The figure strongly suggests that the project as a whole is economically viable. At farm level, the results were also positive, showing that many of the soil and water conservation measures on cultivated land were profitable from the farmers' perspective (FAO/WFP, 2005). However, it is believed that the impact of the project in areas that are not part of the impact study is also quit high.

2.6.4 Factors Contributed for the Attainment of Intended Objectives

The successes of MERET project are attributed from many factors such as strong institutional linkage and set-up, effective and sustained capacity building, use of appropriate participatory planning and implementation approach and improvements over time based on field feedbacks and observations, availability of users friendly methodological and technical guidelines, wide area coverage with greater ecological diversity, proper monitoring and follow-up, availability of different kinds of resources with proper management procedures and long term commitment, linking conservation with income (see Figure 19), flexibility in linking technical knowledge with farmers needs and aspiration, rooms for innovative ideas and techniques, and others.

Figure 19:

Remarkable homestead development using small stream developed and diverted by the project as can be seen in the picture in Ambasel Woreda. (Photo by Gete Zeleke, 2005)

Such photo isas good as 3 pages text

2.6.5 Lessons Drawn From the MERET Project

From the last 25 years journey of MERET project thorough challenging ecological and socio-political environment, it is possible to draw many useful lessons that would help successful implementation of the watershed development projects in the highlands of the country. The lessons are broadly categorized into two, i.e., positive (those that can be directly taken with only modifications according to local conditions) and lessons that require further improvement (those that were not properly addressed within the project or were constraints and need serious attention for the future). They are briefly discussed in the following sections.

A: Positive Lessons

There are many useful experiences that can be directly applied for the designing and implementation of the intended watershed initiative in Ethiopia. These experiences are results of many years of experimentation and dedicated efforts to reduce sophisticated methods of planning to simple and easily understandable methods and approaches by the field staff without losing quality and information. Moreover, they are also results of high degree of flexibility to accommodate diverse ecological and socio-economic and cultural settings. Although some of them are mentioned as factors contributing for the success of the project, it will be attempted to briefly indicate some of these lessons as follow:

i. ***The use of Local Level Participatory Planning Approach (LLPPA) as a planning and implementation tool:*** This was backed by easy-to-use guideline; well organized InfoTech's to give more options and flexibility for the field staff in recommending development alternatives, other reference materials and appropriate in-service training.
ii. ***Focussed and efficient capacity building at all levels:*** the use of various forms of capacity building programmes for beneficiary community members, field staff and implementing institutions was an essential lesson from the project. The new initiative should devise a strategy for capacity building starting from the preparatory phase and the lessons from MERET will greatly help along this line.
iii. ***Institutional arrangement:*** as mentioned above the institutional arrangement of the MERET project was very efficient where the mandates of the donor (WFP) and implementing agency (MoARD at all levels) has been clearly demarcated and accepted by each party. The establishment of PSU at federal level and focal units at lower level (region and woreda) and WFP's effort to give hands-on support at all levels results greater opportunity for the success of the project. Often many Donors involve on direct implementation of projects through their project office and this resulted in lack of ownership by local institutions, poor transfer of knowledge and poor sustainability of the project in general. However, the lesson for MERET along this line is remarkable and the new initiative should consider this seriously with a possibility of involving some additional sectors appropriate for rural development.
iv. ***The need for resources and long-term commitment:*** depending on the local condition of the watershed, various forms of resources are needed starting from the preparatory phase up to the implementation and ME stages. The type and amount of resources needed could vary depending on the stage of the development process but certainly it needs well organized planning and long-term commitment. The lesson from MERET along this line is quite impressive and worth considering for the new initiative.
v. ***The need for flexibility and continuous learning to accommodate new thinking and needs of beneficiary communities:*** MERET has evolved from purely top down and fairly unsuccessful start to the current level through continuous learning from field experience and high degree of flexibility to accommodate new ideas and adoption of them to local conditions. One would not attempt to have a perfect start but establish a system that allows learning and modifications overtime accordingly. In this case the lesson from MERET project is quite substantial.
vi. ***Linking conservation with improving land productivity and household income:*** MERET demonstrated that pure technocratic approach doesn't work for watershed development in Ethiopia. The main objective of the watershed initiative should not be reducing or stopping soil loss to reduce negative downstream effects and for the sake of environmental protection but enhancement of rural livelihood through sustainable land management. This builds more confidence and ownership feeling of communities on the watershed development measures. It also resulted in better ecological stability of

watershed in general. Introduction of natural resources based income generating activities, value adding, linkage with market and effective integration among the various activities are some of the possible course of actions that could give the above mentioned result. The homestead development and other IGAs component of MERET and their impacts are a perfect lesson along this line.

vii. ***PME and plan revision:*** Monitoring and Evaluation systems are important elements of any project. Often, however, they are conducted in a kind of command and control system. Most often, they are neither flexible nor participatory. MERET over the years developed a participatory monitoring and evaluation system (PME) where communities play active role in the process and use it as a learning process to revise their plan for the best. This process helped many communities to learn from each other and to observe effects of better doings and undoing. Therefore, having an inbuilt but simple PME system is an essential lesson that can be drawn from MERET project.

viii. ***The importance of following watershed logic and identify smaller units within the larger unit:*** it is possible to prepare best watershed plan using different modern techniques with faire consultation of communities of larger watersheds. However, according to MERET's experience this approach, though less challenging to do it, didn't give successful results. There was a need to disaggregate the bigger plan into smaller watershed plans to allow greater participation of communities, improve their ownership feeling, and successful implementation of the project. Moreover, each smaller plan was revisited in accordance to the adjacent plans and the greater unit for better synergetic effect and maximum impact. This is the most important lesson that need to be seriously considered for the new watershed development initiative of ENSAP

ix. ***Gender consideration:*** Starting from the planning process attempts has been made to keep gender balance in the project. It has been applied and respected to keep the community planning team 50% women and 50% men. Nearly 45% of project beneficiaries have been women (WFP, 2000) and over time improvements have been observed.

x. ***The need for HIV mainstreaming and involving schools as resource centres of the project:*** MERET recently developed an innovative programme called CHILD (Children in Local Development) where selected schools that have school feeding programme in project areas were linked with project activities and benefited from the project. This is an attempt to expose the young generation to sustainable land management and use the school as a resource centre (source of seed, seedlings, reference materials and knowledge) for the community (Volli and Joseph, 2003, WFP V1, V2, V3 and V4, 2005). Moreover, there has been an attempt to mainstream HIV/AIDS. Though these two initiatives are seriously considered by the project they need to be strengthened farther. Accordingly, this is a good lesson for the new initiative to consider starting from the initial phase.

B: Lessons that Require Further Improvement

These are lessons either not seriously considered by the project but had serious negative impact on the success of the project or could be considered as lost opportunity. Lack of consideration of these factors certainly affected project success and are important lessons to be recognized for the new initiatives like the one under consideration.

i. ***Weak partnership:*** although many projects have the same objective they tend to have their own area and closed the door for experience sharing and joint efforts. Often they ended up founding negative sides of the different projects (Gete 2004). However, WFP recently saw the value of partnership for MERET project and attempted to establish linkages with various food security projects funded by different donors. Even though it is not yet successful, the attempt showed green lights from many donors and NGOs. This is an area where the new watershed development project should be cautious about and work towards better partnership starting from the very inception phase.
ii. ***Lack of inbuilt impact studies:*** as can be seen some of the results from this case study, WFP/MoARD tried to undertake impact assessment studies using different techniques. Some of the studies were very costly. This is because there was no an inbuilt impact monitoring system in the project. Therefore, the new initiative could learn from this and would design low cost and inbuilt impact monitoring system from the onset.
iii. ***Impacts of institutional instability***: this is the kind of lesson that could be taken as a possible risk for the success of the project. MERET suffered a lot from institutional instability and attributed impacts (staff turnover, lack of capacity, weak awareness, instability in the system, etc), even though, it managed to maintain the link with the same institution for long time. The strong elements of MERET's institutional arrangement contributed for the continuation of the project despite the institutional situation in the past.
iv. ***The need for additional resources:*** one of the limitations of MERET project that hinders expansion and achieving better results is the limitation of resources, mainly the non-food component. Although the problem was identified long ago, the effort applied to solve this problem form both the donor and implementer side has been very weak and uncoordinated. Devising different mechanisms of generating additional resources to have successful watershed development and address incremental community needs is an essential lesson that needs to be considered on this initiative. For instance, the required financial resources could have been generated through effective partnership with other donors (Gete, 2003).
v. ***The need for addressing wider stakeholders***: MERET has been narrowly attached with specific government and non-government organizations and this hinders sharing of its ample experience and learns from others as well. Proper identification of stakeholders and attempting to inform progress and allowing them to take part in the different stages of the project helps to achieve desired results. Often the scientific community is

neglected in these kinds of projects but it has important power in publicizing project results, resource generation and showing areas of improvement. Therefore, this is another critical issue that need to be considered by the new initiative starting from the inception phase.

vi. ***Limiting the project in food insecure woredas***: although land degradation is a major problem all over the country with even high rate of degradation in the so called food secure areas currently, MERET had been limited only in food insecure woredas. The methodology and the approach would have been applied everywhere irrespective of artificial boundaries. One would also assume better economic rate of return in these areas that could have spill over effects to the rest of the country. In any case this is one area where careful assessment of situation is needed during selection of watersheds. Representation of all areas, i.e., high and low potential, is important.

2.6.6 The Way Forward in the context of PES

Although MERET is relatively successful in most of the project sites (because it would have been possible to achieve more), it needs to be viewed against the complex nature and overall scale of the food insecurity and environmental degradation problems in the country. Accordingly, the magnitude of the task in arresting land degradation at national level is still enormous. The size of the problem and the rate, at which it is growing, taken within the context of the resource constraints in Ethiopia, implies the need for massive external assistance and up scaling of MERET's IWM experience to the rest of the country (Gete, 2005). However, there are more one could learn from MERET project as a model for successful participatory watershed development within the Ethiopian context. Some of the components are results of many years of experimentation with lots of ups and downs story and can be taken directly during the design of any PES mechanism. This could be done through adoption of successful lessons from the project but modified to project local conditions and taking serious consideration on some of project limitations that hinders better results. For instance, many of the income generating activities being promoted through the project's homestead development initiative come out of the investments made in the natural resource base and in particular the opportunities provided by increased availability of soil moisture and stored water. However, amongst some rural households agricultural land and livestock may generate only a portion of their rural livelihood and there are other opportunities that are not primarily agrarian or land-based that also needs to be promoted. Rural cottage industry could play a more important role in the project areas than at present, but this again depends on the availability of project resources and local capacity (Barry et al, 2005).

In general the experience of MERET project (both its technical and methodological innovation) can be taken as a stepping stone towards establishing a more robust PES mechanism where the efforts of communities are better supported and recognized.

3 Partner Institutes Key in Supporting PES Related Activities

This chapter gives brief assessment of partner institutes that have been involved in support of PES related activities in the past and those that need to be involved in supporting the new proposed PES mechanisms. Looking back to past efforts related to arresting land degradation problems (such as MERET watershed management project), transboundary watershed management (such as NBI), restoration of natural heritages (such as the Simen Mountains National Park), restoration of the cultural and historical heritage sites (such as Lalibela Rock-Hewn Churches), and efforts towards maintaining quality agricultural products (such as Ethiopian Coffee) are some of the key efforts assessed. The assessment of institutes may not be limited to only the above mentioned few exemplary initiatives. Although it will not be exhaustive, it will include institutes dirtily or indirectly involved on similar efforts related to many protected areas and national parks in the country, efforts related to preservation of traditional agro-forestry systems (such as Wonago), watershed management projects (such as SUN and SLMP and many smaller projects), joint forest management and rural energy projects (such as GTZ supported projects) and many others (see Table 2).

Table 2: List of institutes and partner organizations supporting current PES related activities

PES or related projects (programmes)	Partner institutes (directly or indirectly involved)		
	Government	Donors/partners	NGOs
MERET watershed management project	MoARD at all levels (federal, regional, district and DC level)	– WFP and all its donors – FAO – UNDP (supporting FAO in pushing the initial watershed management project) – SDC and University of Bern (supporting SCRP and the initial SWC research)	
SUN watershed management project	MoARD at all levels (federal, regional, district and DC level)	– GTZ – KFW (financer)	
SLMP	– MoARD at all levels (federal, regional, district and DC level) – EDRI – EPA	– WB – GTZ (Technical Support) – KFW (financer) – FAO – Finland – SIDA – USAID (land administration component) – And many other donors	
NBI Watershed Project	– MoARD at all levels (federal, regional, district and DC level) – MoWR	– WB – Finland – ENTRO (facilitators) – NBI (facilitators)	
SMNP	– MoARD at all levels (federal,	– UNESCO	Many NGOs

	regional, district and DC level) – Ethiopian Wildlife Authority – ANRS Bureau of Tourism and Park Management	– Austria Development Cooperation – University of Bern and Zurich in Switzerland (analytical works) – All partners supporting PSNP	
Lalibela Rock Hewn-Churches	– Ministry of Tourism and Culture – ANRS Bureau of Tourism and Park Management	– UNSECO – All partners supporting PSNP	– Many NGOs involved on different livelihood and health related activities
Promotion of Ethiopian Highland Coffee	– MoARD at all levels (federal, regional, district and DC level) – MoFED	– WB (RCBP) – SIDA – UNDP – DEFID	– Oxfam USA
Joint Forest Management Projects	– MoARD at all levels (federal, regional, district and DC level)	– GTZ	
Household Energy Projects	– MoARD at all levels (federal, regional, district and DC level) – Ministry of Mines and Energy	– GTZ	
Traditional Agro-Forestry Sites (Wonago)	– MoARD at all levels (federal, regional, district and DC level) – Ministry of Tourism and Culture		– SLUF

Note: this table should be used with precaution as it may not be exhaustive on the list of partners

Looking forward attempt was made towards better and enhanced PES mechanism for the highlands of Ethiopia. These include designing new mechanisms that has a potential for successful PES mechanism (such as Addis Ababa water supply system) and expansion of current good experiences. The later is meant fine-tuning the existing initiatives to redesign better PES mechanisms with all its standard principles and components (see Table 3).

Table 3: List of institutes and partner organizations proposed to support new and strengthen ongoing PES related activities

PES or related projects (programmes)	Partner institutes (directly or indirectly involved)		
	Government	Potential Donors/partners	NGOs
Addis Ababa Water Supply	– MoWR at all levels (federal, regional, district and DC level) – Addis Ababa Municipality – Addis Ababa EPA – Addis Ababa University – MoARD at all levels (federal, regional, district and DC level)	– University of Bern (analytical works) – FAO – AU – WB – DFID – WFP	
All Projects mentioned in Table 2 above	– All GOV institutes mentioned in Table 2 above and – Academia – EIAR at different levels	– All donors mentioned in Table 2 above and others	

4 Summary of existing agreements/strategies including certification

This section gives very brief overviews of existing agreements or strategies related to ongoing PES related activities discussed in the document. In so far PES agreement is concerned it is mainly related to the new initiative in promoting organic coffee in the south and south-western parts of the country. This is between coffee producers' cooperatives in Oromia Regional State and that of international companies such as Starbuck and Oxfam USA for Fare Trade labelling. All government strategies related to environmental protection and management, protection of cultural and historical sites, protected area management, sustainable land management, sustainable water resources management, biodiversity conservation laws and strategies, and wetland management policies and strategies are parts can be included as major guiding frameworks. The key challenge in Ethiopia related to such strategies and agreements is implementation. Therefore, more focus should be given towards refinement of agreements and strategies and but most importantly mechanisms for implementation of the same.

5 Conclusion and Recommendation

This report is a preliminary assessment of positive mountain externalities that are being financed and or need to be financed in Ethiopia. Indeed the Ethiopian Highlands and Mountain regions are important ecosystems that have both national and international significance. They have unique biodiversity, the support agricultural production for millions within the country and outside, they hold very important and unique cultural, historical and natural landscapes. They are also important water catchments which have transboundary elements such as the Blue Nile and Tekeze basins which supports 86% of water supply of Nile. Though the Ethiopian highlands have such significance and holds wealth of ecological resources, they are one of the poorly managed ecosystems linked to population growth entirely dependent on exploitative type of subsistence agriculture. Environmental degradation and poverty the key challenges among other factors affecting the key environmental, historical and cultural resources.

It is true that there are some notable initiatives with PES elements from which experiences can be tapped for wider application towards sustainably managing the highlands and its resources. However, most of them also requires upgrading and redesign of better PES mechanisms for enhanced livelihoods in the highlands and increased flow of environmental resources and products to downstream areas. There are also many new areas that deserve immediate intervention and designing of PES mechanisms for the same results mentioned above, such as the Addis Ababa mega city water supply.

It is, therefore, recommended detailed investigation of all forms of mountain externalities and associated institutional and legal frameworks. It is also important to start designing PES mechanisms where not only public and donor resources are used but beneficiaries (national and international) pay for the all forms of environmental service they got from the highlands (upstream areas). Easy to apply mechanisms should also be designed to use part the resources generated from PES to maintain and improve mountain externalities with required quality and standard.

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