Land and Water Resources Management in Ethiopia: What did we learn, where do we go?

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Abstract

Water erosion threatens the soils of the central Ethiopian highlands. Indigenous mitigation techniques became less efficient. Modern methods were unsustainable due to unpopular top-down policies and lack of public participation. Current policies encourage social participation, but lack clear implementation plans and defined property rights. In spite of past efforts, land degradation continues to be the major challenge. To cope with the problems, Indigenous Techniques should be improved and modern ones adapted to the environment. Research should be made on the improvement of the traditional knowledge and detailed studies conducted on rainfall erosivity and climate variability to develop reliable prediction tools.

Keywords: erosion, indigenous, intervention, soil, sustainability

1 Introduction

Progressive land degradation threatens the agro-ecology, crop and pasture land in the central highlands of Ethiopia. Water erosion, aggravated by deforestation, overgrazing and land mismanagement, is the major degrading agent (FAO, 1986). The Ethiopian farmers have long traditional experience with soil and water management practices (Krüger et al., 1996; Gebre-Michael, 1998). These, however, became less and less efficient. Subsequently, modern intervention programmes were launched to compensate for the inefficiency of the Indigenous Techniques (IT) and mitigate environmental degradation (FAO, 1986; FAO, 1993). Nevertheless, the modern techniques were ineffective, environmentally not sustainable and socially neither useful nor acceptable. Former natural resource policies disregarded the socio-economic priorities of the beneficiaries. However, a critical review of

indigenous knowledge and intervention programmes with respect to their achievements and drawbacks was not documented. The current status of the water erosion problems and future trends as well as alternative solutions are not fully addressed. This paper reviews positive achievements and drawbacks of ITs and intervention measures, policies and strategies of land and water management. The aims are: 1. To critically review experiences in soil and water conservation activities in the highlands of Ethiopia; 2. To compare and contrast traditional and conventional methods of land and water management with respect to their sustainability, social acceptance, integration into agricultural practices and possible future trends; 3. To assess land and water management policies and strategies and examine their failures and possible future directions. This study focuses on the central highlands of Ethiopia (arbitrarily defined to be between latitudes 7° 02´ to 11° 46´N, longitudes 36° 27´ to 40° 12´ E and 1 500 m.a.s.l), home for the majority of the country's human and livestock population. The largest share of the country's agricultural production originates from here. Intensive archive research and literature review, exploratory social survey, field investigations and interviews with authorities as well as experts were used for the study.

2 Results and discussion

2. 1 Indigenous land and water management technologies

Ethiopians have rich experience in soil and water management. In the face of growing population pressure and increasing demand for land, farmers in the central highlands of Ethiopia have become more and more reliant on specific land and water management techniques indigenous to their environment. A series of ITs is documented by several authors (e.g., Krüger et al., 1996; Gebre-Michael, 1998). These are understood as conservation practices that have evolved over time, without any known institutional intervention. Various engineering, biological and agronomic techniques which protect the soil against the impact of erosive rainfall and runoff are encompassed by this term. Generally, biological, physical and integrated measures are extensively used in most areas of the central Ethiopian highlands. Biological techniques are

applied where there is plant growth potential, physical methods where this potential is limited and on steep slopes. These ITs are combined where topographic and soil moisture conditions permit plant growth, especially cultural plants. Farmers prefer the traditional techniques to the modern methods, since these have long been part of agricultural practices. Moreover, they compete less for cultivated land and are easy to repair and maintain, as compared with modern measures. Their disadvantage is that they are less effective where the pressure on land is high. Integrated land and water management practices are the most efficient traditional technologies. They enable to diversify the agricultural activities, including livestock production. The combination of various ITs significantly reduces the risk of soil loss in case of erosive rainfall. Repair and maintenance of the measures is combined with farming operations.

2. 2 Modern land and water management techniques

In light of overwhelming land degradation due to water erosion, experts and policy makers were convinced that ITs alone were not sufficient to conserve the ecosystem. Hence, state intervention with modern methods was justified. Institutional measures exist since the 1960s, but their application in the area reached its climax in the 1980s. The Ethiopian government, with international support, launched huge environmental protection programmes in the 1980s (e.g., FAO, 1986; EPA and MEDC, 1997). The activities predominantly focused on mechanical techniques, occasionally accompanied by afforestation and reforestation. These measures can be grouped into five major categories:

i. Benches: terracing and bunding
ii. Water diversion or drainage channels
iii. Water ways or courses
iv. Check dams
v. Tillage practices (FAO, 1986)

Most of the structures were built on hillsides so that tree planting could be carried out concurrently. Tillage practices were exclusively performed by the land-users.

Even though progresses were made through the intervention programmes of the 1980s, their environmental sustainability and social

acceptability are frequently questioned today (e.g., Campbell, 1991; Wøien, 1995; EPA and MEDC, 1997; Admassie, 1998). This is due to the nature of the technologies, wrong planning approaches and implementation policies. The measures were highly biased towards mechanical methods which involved breaking and moving of the earth, with little care of the natural setting of the soil system (FAO, 1993). They encompass activities which are inharmonious with the very concept of land and water management. Even though they enable to reduce water erosion and sedimentation in the field through safe drainage of excess surface runoff, they facilitate the detachment and transportation of soil aggregates and particles as a result of less energy expenditure required for the processes. Moreover, the drained turbid water is disposed out of the agricultural land but directed to the streams, rivers and lakes, thus causing offsite damage through sedimentation and pollution of the recipient areas. Water harvesting and recycling for agricultural use was neither thought about nor practised. Encouraged by the erected structures, not accompanied by conservation based agricultural development and extension services, land users were tempted to cultivate on steep slopes without appropriate management. This has not only enormous negative consequences for agricultural land-use, it also permanently damages the whole ecosystem. Land and water management experts, road engineers and villagisation planners have given no consideration to the impacts of soil excavation on water erosion, neither have they integrated safety measures into the construction works. The mechanical structures were not cared for once the construction was completed. Repairing and maintenance was given low priority, if any at all. Hence, most of the structures collapsed, and today deformed landscape and disturbed ecology are the heritage in most parts of the central highlands of Ethiopia. To make the situation worse, land degradation and environmental devastation due to water erosion continue at an accelerated rate.

Reforestation and afforestation programmes were triggered by the extreme ecological disaster caused by water erosion, accelerated by human pressure on the ecosystem. Accordingly, various projects with

land and water management goals, community forest development and pre-urban plantations were launched in the area. The efforts were, however, extremely biased towards planting of Eucalyptus trees (*Eucalyptus globulus* (Labillardière)), especially in the central highlands of Ethiopia.

No doubt that progresses were recorded by these programmes within the framework of land and water management. However, their achievements were unsatisfactory, compared with the extent of the problem. It was reported that the rate of deforestation was higher than that of reforestation and afforestation combined (Omiti et al., 1999). The process of accelerated deforestation in the central highlands of Ethiopia has greatly exacerbated the impact of water erosion. Consequently, soils in many areas, especially in north Shoa, are irrecoverably degraded and have lost their ecological function so that even trees which could otherwise have grown on very degraded soils, e.g., *Eucalyptus globulus* (Labillardière), failed to survive.

2. 3 Socio-economic aspects of water erosion

The socio-economic welfare of Ethiopia is dependent on the country's land resource base. However, the human and ecological interaction in the country is considered to be destructive. Increasing human and livestock pressure are frequently blamed for land degradation which is made responsible for low performance of the agricultural sector (Wøien et al., 1995; Hoben, 1997). In the central highlands of Ethiopia, land degradation due to water erosion is an obvious phenomenon which persistently impoverishes not only soil resources but also land-holders` subsistence economies. Hence, the causes of poverty in the area are interwoven with and deeply rooted in the consequences of water erosion (Shiferaw and Holden, 1999). The implications of water erosion and activities to alleviate its socio-economic impacts are quite heterogeneous in the central highlands of Ethiopia. Individual and collective reactions towards the problems and combating measures vary from one specific area to the other, depending on value judgements and the extent of problem perception. However, common features of individual and

collective reactions towards top-down water erosion mitigation programmes and strategies can be discerned (Ståhl, 1990; Campbell 1991). The authors note that little attention was given to the attitude of the farmers towards conservation programmes and to their priorities regarding land and water management. The local people were neither contacted nor included in design and implementation of the conservation programmes. Hence, both the community and individuals did not feel much sense of responsibility to manage the established land and water conservation infrastructure.

Conflicts between socio-economic interests of land-users and land and water management programmes were ubiquitous. While land-users` economic objectives were to maximise the efficient use of land, a scarce resource in the area, through cultivation and grazing, the aims of most land and water management programmes were only to conserve soil and water. However, the land-users' socio-economic decision criteria were not given due consideration. Thus, competition for land between these seemingly harmonious objectives might have led to the collapse of conservation efforts in the area. Ståhl (1990) reported that most of the construction works have considerably reduced the available land for cultivation and grazing. Admassie (1998) indicated that hill-side closure in southern Wello led to conflict on grazing land and, finally, conservation closures were destroyed.

Land and water management programmes in the central highlands of Ethiopia have created confusion and ambiguity in property and use rights of land resources, especially forests. EPA and MEDC (1997) noted that impositions which increasingly and cumulatively eroded the rights of land-users to manage their own resources might have led to a significant negative environmental impact in the area. Conservation structures were laid across several plots of land whose ownership was diverse, ranging from individual to collective ownership. However, property rights and responsibilities to maintain the structures were not clearly defined. Consequently, the land-users - without whose participation any achievement in environmental management is unthinkable - were

confused with respect to property rights and their feeling of ownership of land resource diminished. This situation led to the alienation of resource beneficiaries from their own traditional property.

The land tenure system has aggravated the ambiguity in land-use and property rights. This led to the lack of individual and public responsibility to care for land and water management structures. The FAO (1993) reported that uncertainty about land tenure was a disincentive to investments in soil conservation. A broad based conservation approach which takes into account the role of the local community in decision making was suggested for the Ethiopian highlands (FAO, 1993). However, due to the limitations of financial resources needed to implement such programmes, their realisation and achievements are far below expectations, especially in the highlands of Ethiopia.

2. 4 Land and water management policies and strategies of Ethiopia
The 1972/73 drought disaster triggered high environmental awareness, state interventionism with ecological management and political eco-fanatism. These conditioned the development of land and water management policies as well as strategies in Ethiopia which, thenceforth, stood high on state natural resource management agenda. A national policy framework within the context of environmental conservation was issued in 1987 (Ståhl, 1990).

The policy empowered the state to ensure ecological balance. Several institutional arrangements were carried out to implement the natural resource conservation policy of the country. The Office of the National Committee for Central Planning (ONCCP) was the highest state authority which co-ordinated issues related to resources management through its Department of Natural Resources and Human Settlement (NRHS). The Natural Resources Conservation and Development Main Department (NRCDMD) of the Ethiopian Ministry of Agriculture (MoA) was a major organ responsible for all conservation matters in Ethiopia. The Soil and Water Conservation Department (SWCD), and the Forestry and Wildlife Conservation and Development Authority (FaWCDA) were the

implementing bodies. The headquarter was primarily responsible for the development of indicative work targets and final distribution to regional offices for implementation. The work sites were selected by district soil and water management specialists, Development Agents (DAs) and leaders of Peasant Associations (PAs). In addition, several non-governmental institutions were involved in the implementation of soil and water management policies and strategies.

The current state policy of natural resources management stresses environmentally sustainable socio-economic development (EPA and MEDC 1997). Public, especially grassroot participation in planning as well as implementation, inter- and intra-sectoral co-ordination, collaboration, adoption, adaptation and dissemination of appropriate technology and reduction of tenure uncertainty are its important features. EPA (1999) criticised that the soil and water conservation draft policy appears to be too prescriptive in that it relies very much on legal measures as a deterring mechanism of land mismanagement.

Current institutional arrangements provide for grassroot participation and sharing of responsibility between the government and the public. The EPA and MEDC play a co-ordination and regulatory role. The MoA and the Ministry of Water Resources (MoWR) are responsible for policy and regulatory activities. Regional agricultural and water bureaux are accountable for implementation. In addition, a number of community-based national as well as international organisations are involved in land and water management.

3 Conclusions and recommendations

Ethiopia has a wealth of traditional know-how to manage natural resources. However, this became less and less efficient with increasing human population pressure on land. To compensate for the inefficiency, modern programmes were launched. Nevertheless, due to top-down policy and strategy failures, past efforts of the modern intervention programmes were ineffective. Today, farmers are not only strongly adhering to the ITs, but also have become pessimist about any

intervention programme. Notable lessons drawn from past experiences are: Increased awareness of land degradation problems, their extent and consequences for the environment and agriculture, especially with regard to food production, poverty alleviation and economic development.

The current policies stress sustainable resource management through public participation. However, clear action plans at local level and property rights are lacking. Amplified by population growth and the resulting demand for land resources, it is highly unlikely that any mitigation effort will solve the problems in the foreseeable future. In effect, land degradation will remain a major environmental threat to Ethiopia.

It is recommended that the ITs be promoted and improved. To ensure effective implementation, frequent follow-up and continuous evaluation of intervention measures should be made to immediately rectify the failures. Clear property rights and responsibilities should be stated. Farmers should be encouraged to participate in defining the research problems and the findings should be tested on the farm in collaboration with the beneficiaries. Future research should focus on fostering the ITs and adaptation of modern techniques to the physical and socio-economic environment of the target people. Basic and applied research on water erosion potential and climate variability should be intensively carried out to develop prediction tools.

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