

Challenges and Strategies towards Challenges and Strategies towards Sustainable Land Use in “North Wollo” Zone of the Amhara National Regional State

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Abstract: Current pressures of population (both human and livestock) growth and natural resources degradation are having very adverse impacts on food production capacity in Ethiopia. In line with that, sustainable agriculture is an urgent need in the highlands of this country.

North wollo zone of the Amhara National regional state covers an area of 12,706 km²; population is estimated at 1.4 million (density of about 111 person per km²).

More than 90% of the zone's population is dependent upon the land resources for their fulfillment of basic needs (food, fodder, fuel, fiber and timber). The zone is characterized by rugged terrain, short but torrential rainfall pattern and consequently by advanced land degradation. In line with that the soil erosion is severe, deforestation is very high and crop production is low and unstable.

The Ethio-Dutch supported “Environmental support project” conducted a reconnaissance survey of the physical land resources as well as the socio-economic situation of the area with the aim of improving management of natural resources and mapping out strategies that lead to wards sustainable land use in the study area.

The paper discusses the potentials and constraints of the socio-economic and physical land resources of the zone and demonstrate the use of assembled natural resource and socio-economic information as a tool to institute sustainable land use in the Zone.

1 Introduction

Land resources of Ethiopia have long been seriously threatened by complex degradation problems. Over large areas of the Ethiopian highlands, soil erosion and deforestation continue to be the main cause of land degradation. Land degradation in turn has contributed to the reduction of yield and at times to a complete loss of land productivity and human suffering in the highlands of the country where over 95% of the regularly cropped lands of the country are known to exist. Since the country's development is totally dependent on its land resources, the loss of productivity due to degradation has serious implication on social and economic development endeavors.

The Ethio-Dutch supported ‘Environmental support project’ originated out of the need for better Environmental and natural resources information to underpin policy /strategy formulation, development planning and decision making is trying to seek means of reversing the degradation process with the ultimate goal of achieving a sustainable use of natural resources in the study area in particular and in the country in general.

A target Zone (model area) was required in which to pioneer this process. North Wollo zone of Amhara National Regional state was in several ways an appropriate choice since. This zone is characterized by advanced land degradation.

The paper discusses the potentials and constraints of the socio-economic and physical land resources of the zone and demonstrate the use of assembled natural resource and socio-economic information as a tool to institute sustainable land use in the Zone.

2 Materials and methods

The materials used included: - Aerial photographs, topographic maps and Land sat imageries supported by ground checking and verifications.

The study followed a resource based, integrated approach in which the constraints and opportunities for conservation and development are addressed from biophysical, social, economic and institutional angles. High emphasis was placed on the interaction between rural land use and the natural environment with the aim of surfacing out opportunities for improved Environmental management as well as agricultural development within the present socio-economic context and taking into account the expected population growth in the study area in the foreseeable future.

The first step in the preparation of the thematic reports was to review and analyze the information from existing sources and fill the gap by conducting the survey and generating data.

The methodology for the above mentioned data collection consisted of both primary and secondary sources of information. Primary information was collected from study sites through conventional field survey. Secondary information was collected through review of available existing literature, formal and informal meeting with local people and government staff. Accordingly, the following baseline data were collected, analyzed and assembled:

Soil and terrain, Agro-climate, Land use/cover, Socio-economy, Forestry, Livestock and range resources and Hydrology data at a scale of 1:250000.

3 The study area

The study was carried out in the North Wollo Zone of the Amhara National Regional state (lat.11° 30 N, long.38° 30 E) Located 525 km North of Addis Ababa and is situated in the north-eastern part of the Amhara National Regional State (ANRS) and is bordered in the north and east by the Tigray and Afar national Regional States, respectively. The southern border is shared with South Wollo Zone, the western border with South Gondar Zone.

4 Results and discussion

The study revealed that nearly two-thirds (63%) of the Zone comprises land too steep to cultivate sustainable. Large parts of this land also have very shallow soils and excessive drainage conditions. This land constraint is by and large crop and management independent. It is generally not rectifiable unless at great cost, by means of physical structures (e.g. terraces) and even then only in places where the conditions allow the construction of the structures required. It can thus generally be considered a permanent limitation.

The physical potential for small-scale rain fed crop production is seriously constrained in the larger part of the Zone. Approximately 31% of the Zone is classified as suitable for small-scale rain fed crop production. Out of this 31%, 7% is considered moderately suitable and the remainder (24%) is classified as marginal. Highly suitable land does not occur in the Zone. Major limitations include lack of adequate moisture and the steepness of the terrain.

Approximately 70% of the Zone is sub-moist with a dependable LGP of less than 120 days. With increasing altitude, this LGP becomes more limiting to most of the crops because of the increase in length of the growth cycles of these crops due to the lower temperatures. Moisture limitations can, of course, to a certain extent be counter-acted by an appropriate management practices, such as the selection of proper crop types and cultivars and the implementation of water conservation techniques.

Moderately suitable land is confined to altitudes below 2400 m.a.s.l. This land is largely found in the eastern part of the Zone. Limited areas of moderately suitable land also occur in the lower parts of the Tekeze drainage basin, particularly along the Tekeze River.

At altitudes between 2400 and 3100 m.a.s.l. the occurrence of land units with good soils is largely restricted to the plateaus. These plateaus have a sub-moist moisture regime and are marginally suitable for small-scale rain fed crop production due to the short dependable LGP and relatively long crop cycle of most of the crops. These land units are thus classified as marginally suitable despite the occurrence of

good agricultural soils. For crops with a short growth cycle these units classify as moderately suitable. These crops include oats, field pea and lentil.

The moist land units at this altitude located on the eastern escarpment zone comprise steep land and are classified marginally suitable due to adverse terrain conditions.

At altitudes above 3100 m.a.s.l., thermal conditions become prohibitive to most of the crops considered. The exceptions are barley and to some extent wheat. Land with good soils at these altitudes is classified as marginally suitable for these two crops because of moisture limitations due to the very long growth cycles these crops have due to the low temperatures.

The area of suitable land per household provides an indication of the crop production potential available to households. Under the current rural population distribution approximately 1.1 ha of land suitable for crop production is potentially available in the Zone. This land may not be used for crop production only, as it is also suitable for a range of other uses, including settlements, roads, etc. Out of 1.1 ha only 0.3 ha is moderately suitable, i.e. land where significant yield improvements can be expected by improving agricultural inputs.

4.1 Holding size

Farmers will only take the risks needed for agricultural improvement if they are food-secure. The limited area of potential cropland per household (see above) shows that a significant enlargement of the holdings for cropping purposes is physically not feasible in major parts of the Zone. An increase in holding size would thus require a reduction in the number of farming households.

4.2 Declining soil productivity (fertility and water holding capacity)

The reduced availability of cropland on a per household basis is likely to result in declining soil productivity. Fertility levels and water holding capacities of the soil are diminishing for reasons related to the high and increasing pressure on land. The main reason is because fields are now largely used for cereal production in order to satisfy the growing demand for food. Practices of fallowing and crop rotations (particularly with legumes) have decreased. Mechanisms for the natural replenishment of soil nutrients have thus diminished.

Marginal land, including steep lands and very shallow soils are becoming increasingly intensively cultivated. On steep land, the loss of topsoil due to erosion results in reduced fertility levels of the soil. Erosion also adversely affects the soil water balance.

4.3 Reforestation

Tree planting has been undertaken for several decades in the Zone and is a well-established and common activity. The zonal department as well as several NGOs that are active in the area supports it. It may be assumed that those farmers who are interested and able to plant trees either for self consumption or for the market have the opportunity to do so. However, there seems to be an enormous gap between fuel wood supply and demand, as evidenced by the disappearance of most of the natural vegetation and the continuous onslaught on the remaining vegetation.

4.4 Soil conservation

Soil conservation is envisaged as an integral part of agricultural production systems. It is, however, addressed separately, because it has not previously been approached in this way. This has resulted in a number of general problems, which are not production system-specific.

4.5 Ecosystem protection

Parts of Zone are ecologically valuable. The afro-alpine vegetation that is the habitat of the Ethiopian wolf is a rare and diminishing ecosystem that merits protection. The highland cliffs are habitat

for the endemic gelada baboon. Most of these habitats are being encroached upon by agriculture and road construction that are hard to resist given the high population density and unpopularity of wild animals generally.

5 Conclusion

- To protect environmentally sensitive areas, i.e. areas with high bio-diversity, or endangered species, which are under threat from the surrounding land use systems.
- To secure, intensify and where possible expand crop production in order to improve production levels sufficiently to meet the requirements of the increasing population growth, with the emphasis on food production.
- To secure and intensify livestock production, on particular for draught and transport and secondly for meat, hides, skins and wool production, dairy production and poultry, It was found vital to map out Appropriate strategies.

Accordingly, the following strategies were formulated: -

Promotion of appropriate soil and water conservation This strategy aims to improve the sustainability of soil and water conservation measures. For soil and water conservation measures to be effective and lasting they should form an integrated part of the agricultural production systems.

Promotions of reforestation Two reforestation strategies are considered. First, the development of woodlots and boundary plantations of Eucalyptus on holdings and, second, the allocation of land to individuals or groups of farmers for reforestation of indigenous and exotic species on degraded slopes.

Promotion of agro-forestry The aim of this strategy is to intensify crop production by combining the production of trees and shrubs with annual and perennial crops and possibly livestock on the same field. Agro-forestry is a particularly relevant option in areas where farmers have very limited access to suitable cropland and on steeper slopes, because of the increased ground cover

Protection of ecologically sensitive areas This strategy aims to protect the ecological resources of the zone that are under threat from present land uses. This could be realized through a complete change of land use, or a more controlled continuation of the existing use of the land.

Promotion of high input rain fed crop production The strategy aims at increasing rain fed crop production through the increased use of external inputs such as improved seed material, fertilizer and chemicals.

Promotion of improved, low input, rain fed crop production Such type of strategy is necessary to improve yield levels of rain fed crop production systems by means of improved practices that require low external inputs. Such systems are subsistence-oriented and produce annual food crops, largely cereals and pulses. Fertilizers, improved seeds and chemicals are not used, or applied in limited amounts. Improvements are expected to result in modest average yield improvements, but particularly to reduce the risk of crop failure.

Improvement and development of small-scale irrigation systems This strategy aims to intensify crop production systems by the improvement, and where possible, expansion of existing irrigation schemes, as well as by developing new irrigation schemes.

Promotion of improved livestock production systems The aim of this strategy is to improve and commercialize the production of small ruminants i.e. sheep and goats, and cattle.

Promotion of intensive livestock production This strategy aims at the commercialization of the livestock sector through the development of small-scale dairy and fattening farms.

Promotion of apiculture This strategy aims at improving cash income of rural households. Bee keeping is an important activity for many people and one of the opportunities in the Zone to generate cash income. Honey is sold unprocessed and almost all is used to brew *tej* (honey beer). Some wax is used to make church candles.

Enabling voluntary resettlement This strategy aims to reduce the pressure on highly populated and unsustainably used land, where the expected impacts of above strategies will be insufficient to lead to significant improvements in land management. Voluntary resettlement refers to the permanent out migration of people from densely populated rural areas.

The formulation of these strategies is based on the information available, on the generated new data and discussion made with experts and officials working in the zone. The strategies are considered realistically feasible under the specific sets of physical, socio-economic and institutional conditions that occur and are expected to occur in the foreseeable future in the various parts of North Wollo.

There is a strong believe that the implementation of these strategies will help to Institutionalize Sustainable land use in the study area.

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