

Integrated natural resources management to enhance food security

The case for community-based approaches in Ethiopia



Environment and Natural Resources Service
Sustainable Development Department



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ABSTRACT

Securing food and a livelihood is inextricably linked to the exploitation of the natural resources base (land, water and forest) in Ethiopia, where over 85 percent of the population lives in rural areas and depend on smallholder agriculture. The pressure of intense human activity and improper farming and management practices pose serious threats to the sustainability of the natural resources and maintaining ecological balance. There is a widespread problem related to intensive cultivation, overgrazing and deforestation and soil erosion and soil fertility decline, water scarcity, livestock feed and fuelwood crisis. These factors often interact with one another resulting in a reinforcing cycle of the “poverty, food insecurity and natural resources degradation trap”. This problem manifests itself in recurrent drought and famine affecting millions of people, particularly in the Ethiopian highlands. In order to address this problem, the paper puts forward a community-based integrated natural resources management, which makes a systematic effort to improve soil and land productivity; agroforestry development and other rural energy sources; low-cost rainwater harvesting; livestock improvement, and expanding the livelihood base in the non-farm sector under the existing National Extension Programme. The current agricultural extension approach is focused on what is known as the “intensified package approach”, which puts heavy emphasis on accelerating production, using fertilizer and improved seed (mainly hybrid maize), without careful analysis of agro-ecological zones, markets, infrastructure, farmers choice and other sustainable development options.

Major concern was raised regarding the current resettlement policy that is aimed to arrest environmental degradation and attain food self-sufficiency in the densely populated and drought-prone areas. This policy is narrowly focused on moving around subsistence farmers (who are often dependent on food aid) to continue the same production in virgin lands, without considering other profitable and sustainable land use options. Resettlement, as a Government-led programme, presents an ominous danger of recreating the catastrophic environmental conditions in new areas that have necessitated such measures in the first place.

The community-based integrated natural resources management approach puts equal emphasis on stabilizing yields and reducing vulnerability (by broadening the livelihood base) among the large number of small-scale farmers who live in marginal, degraded and fragile ecosystems. It also provides a more flexible approach and a broad umbrella (not packages) under which extension-research-farmers and community organizations would develop activities/programmes to respond to various agro-ecological zones and local resource endowment and local resource endowment and farmers' capacity to invest in low-cost and environmentally sound soil, water and forest management techniques and livestock improvement in an integrated manner. A key component to this approach is the presence of community-based organizations, which would play a central role in the empowerment of local people and provide greater incentives to manage and utilize their natural resources in a sustainable way.

Key Words: integrated natural resources management, community-based organizations, soil and water conservation, agroforestry, rainwater harvesting, livestock feed, population pressure, resettlement, agro-ecological zones, smallholders, intensified package approach, hybrid maize, alternative livelihood, rural energy, vulnerability, poverty, food insecurity and natural resources degradation

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The views expressed in the paper are my own.



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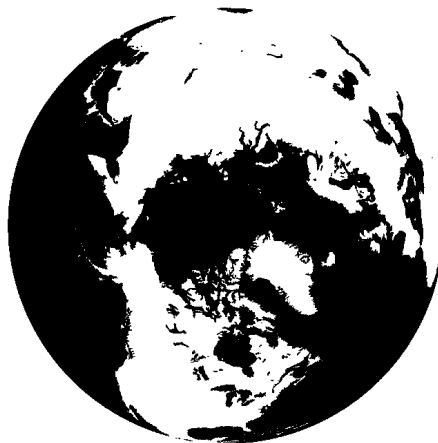
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ABBREVIATIONS

AEZs	Agro-ecological Zones	NLDP	National Livestock Development Programme
CSA	Central Statistical Authority	NRM	Natural Resources Management
CSE	Conservation Strategies of Ethiopia	NRM&RD	Natural Resources Management and Regulatory Department
EFAP	Ethiopian Forestry Action Plan	PA	Peasant Association
EHRS	Ethiopian Highland Reclamation Study	RWH	Rainwater Harvesting
EPA	Environmental Protection Authority (Ethiopia)	SC	Agricultural Service Cooperatives
FAO	Food and Agriculture Organization of the United Nations	SCRP	Soil Conservation Research Project
FLDP	Fourth Livestock Development Project	SDPRP	Sustainable Development and Poverty Reduction Programme
FTC	Farmer Training Centres	SFI	Soil Fertility Initiative
GoE	Federal Democratic Government of Ethiopia	SG-2000	Sasakawa Global-2000
IFPRI	International Food Policy Research Institute	SPNN	Southern Nations, Nationalities, and Peoples Regional State
ILRI	International Livestock Research Centre	SSA	Sub-Saharan Africa
MoA	Ministry of Agriculture	SWC	Soil and Water Conservation
MoNRDEP	Ministry of Natural Resource Development and Environmental Protection	TLU	Tropical Livestock Units
MRD	Ministry of Rural Development	UNDP	United Nations Development Programme
MWR	Ministry of Water Resources	UNEP	United Nations Environment Programme
NFIA	National Fertilizer Industry Agency	WB	World Bank
NGO	Non-governmental Organization	WFP	World Food Programme
		WFS	World Food Summit



OVER 85 PERCENT OF ETHIOPIA'S POPULATION, ESTIMATED AT 64 MILLION PEOPLE, LIVE IN RURAL AREAS AND DEPEND ON NATURAL RESOURCES (LAND, WATER, FORESTS AND TREES) FOR ECONOMIC DEVELOPMENT, FOOD SECURITY AND OTHER BASIC NECESSITIES. The country's



population is estimated to reach 130 million by 2030. This has a serious implication on the sustainability of the natural resources base and the efforts to attain national food security given that nearly half of the current population is classified as undernourished.

The natural resources base is coming under increasing population pressure and inappropriate farming and management practices. Small-scale farmers, who depend on these resources, face serious threats from intensive cultivation, overgrazing and deforestation. There is a widespread problem of soil erosion and soil fertility decline, fuelwood crisis, water scarcity, shortage of pasture resulting in the “poverty, food insecurity and natural resources degradation trap”. This problem is most acute in the Ethiopian highlands (where over 85 percent of the country's population lives), which is affected by recurrent drought and famine affecting millions of people. In order to address these highly interconnected problems, this paper has put forward the concept of a community-based integrated natural resources management approach to be tested and implemented under the existing National Extension programme.

The community-based integrated natural resources management approach makes a systematic effort to improve soil and land productivity; agroforestry development and other rural energy sources; low-cost rainwater harvesting; livestock improvement (including better crop and livestock integration), and expanding the livelihood base in the non-farm sector using the comparative advantages of local areas. This approach provides a broad umbrella (not packages) under which extension-research-farmers and community organizations would identify and develop the specific components that would be most appropriate and effective to increase crop and livestock productivity, reduce vulnerability, improve natural resources and lower the demand for large families at the community level. It will also integrate environmental sustainability issues, crop and plant diversity and indigenous knowledge and practices in the design of extension programmes. The current supply-driven agricultural extension approach is based on the “intensified package approach”, which puts heavy emphasis on accelerating production, using fertilizer and improved seed (mainly hybrid maize), without adequate consideration of agro-ecological zones, markets, infrastructure, farmers choice, and other comparative advantages in a systematic way. Maize, for example, is not a staple food and not linked to the milling enterprise in small towns and cities like teff and wheat and is very limited in generating livelihoods outside farming and reduces pressure on land.

Community-based organizations would play a central role in the empowerment of local people and in providing greater incentives to manage and utilize their natural resources in a sustainable way. Some of

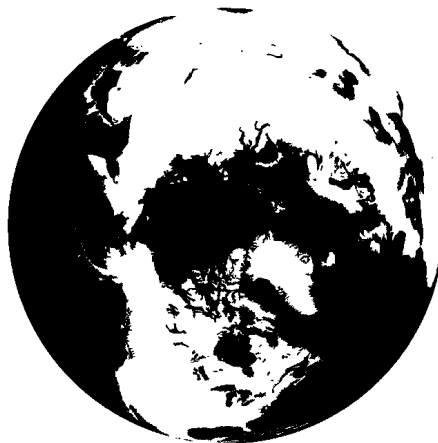
the fundamentals in a community-based approach are bringing groups of men, women and communities into all decision-making processes and upholding the principle of self-reliance and sustainability. Such community and local institutions if strengthened and empowered would be an important means in translating macro-policies into local actions, reducing “risk aversion” behaviour among farmers, facilitating training and human development (including rural women), and generating demand among farmers to adopt innovative practices and bring accountability to extension service and local government officials.

The community-based integrated natural resources management strives to broaden the scope of the current extension programme by putting equal emphasis on stabilizing yields and reducing vulnerability to famine since most of the smallholders live in marginal, degraded and drought-prone areas. It also broadens the traditional concept and practice of the soil and water conservation programme (which has been largely structural) by making an integral part of soil fertility management, good agronomic practices, rainwater harvesting, increasing fodder, vegetative cover and fuelwood products at the village and community level. Thus, the community-based integrated natural resources management provides a more flexible approach to respond to the various agro-ecological zones, local resource endowment and farmers' capacity to invest in affordable soil, water and forest management techniques and livestock improvement in an integrated and sustainable manner while also looking into other alternative livelihood strategies and sustainable development options outside farming.



Background: The Natural Resources Base

ETHIOPIA'S NATURAL RESOURCES BASE, ITS LAND, WATER, FORESTS AND TREES ARE THE FOUNDATION OF ANY ECONOMIC DEVELOPMENT, FOOD SECURITY AND OTHER BASIC NECESSITIES OF ITS PEOPLE. SMALLHOLDER AGRICULTURE IS THE DOMINANT SECTOR THAT PROVIDES OVER



PERCENT OF THE TOTAL EMPLOYMENT AND FOREIGN EXCHANGE EARNINGS AND APPROXIMATELY 55 PERCENT OF THE GDP. THE COUNTRY'S POPULATION IS ESTIMATED AT AROUND 64 MILLION AND WELL OVER 85 PERCENT LIVE IN RURAL AREAS (CSA, 1998). THE AVERAGE

POPULATION GROWTH RATE PEAKED TO SLIGHTLY OVER 3 PERCENT IN THE 1990S AND IS EXPECTED TO REACH 83 MILLION BY 2101. The rate of population growth is expected to decline close to 2 percent by 2030 when the country's population is estimated to reach anywhere between 120 million to 130 million depending on the rate of urbanization (CSA, 1999). This has implication on the sustainability of the natural resources base and the efforts to attain national food security given that nearly half of the current population is classified as undernourished with a daily consumption per head of 1 765 kcal, well below the required energy supply level of 2 600 per day (FAO, 2001).

Ethiopia has diverse agroclimatic zones. The traditional and major agroclimatic zones of Ethiopia are shown in Table 1.

Table 1. Traditional Agroclimatic Zones and their physical characteristics

Zone	Altitude (metres)	Rainfall (mm/year)	Length of Growing Period (days)	Average Annual temperature (°C)
Wurch (cold and moist)	3200 plus	900 – 2200	211 – 365	>11.5
Dega (cool and humid)	2300 – 3200	900 – 1200	121 – 210	17.5/16.0 – 11.5
Weyna Dega (cool sub-humid)	1500 – 2300/2400	800 – 1200	91 – 120	20.0 – 17.5/16.0
Kola (warm semi-arid)	500 – 1500/1800	200 – 800	46 – 90	27.5 – 20
Berha (hot arid)	under 500	under 200	0 – 45	>27.5

Recently, however, 18 major agro-ecological zones (AEZs) and 49 sub-agro-ecological zones have been identified and grouped under six major categories (MoA, 2000 and EPA, 1998). The major categories consist of:

- i. Arid Zone – less productive and pastoral and occupies 53.5 million ha (31.5 percent of the country);
- ii. Semi-arid - less harsh and occupies 4 million ha (3.5 percent of the country);
- iii. Sub-moist – occupies 22.2 million ha (19.7 percent of the country) highly threatened by erosion.
- iv. Moist – covers 28 million ha (25 percent of the country) of the most important agricultural land of the country, and cereals are the dominant crops.
- v. Sub-humid and Humid – cover 17.5 million ha (15.5 percent of the country) and 4.4 million ha (4 percent of the country) respectively; provide the most stable and ideal conditions for annual and perennial crops; home of the remaining forest and wildlife and biological diversity;
- vi. Per-humid – covers about 1 million ha (close to 1 percent of the country) and suited for perennial crops and forests.

These agro-ecological classifications have important implications for strategies in development of

appropriate technologies for agricultural and rural development, natural resources management (NRM) and migration, which will be expounded later.

Approximately 66 percent of the total land area of 112 million hectares is potentially suitable for agriculture. Only 14 percent is currently under cultivation and the largest use of the land (over 50 percent) is for livestock grazing. Securing food and a livelihood is inextricably linked to the exploitation of land and natural resources in rural Ethiopia and soil degradation is a widespread problem. Soil erosion is the most visible form of land degradation affecting nearly half of the agricultural land and resulting in soil loss of 1.5 to 2 billion tonnes annually, equivalent to 35 tonnes per hectares and monetary value of US\$1 to 2 billion per year (Ethiopian Soil Science Society, 1998; Ethiopian Highland Reclamation Study (EHRS) 1985, Hurni, 1992; NFIA, 1998, UNEP/GRID). Similarly, a recent study has highlighted the catastrophic impact of soil erosion, estimated at US\$1 billion per year, on the country's economy, requiring urgent steps to arrest it (Sonneveld, 2002). Many studies attribute water erosion, particularly on cropland, as a major cause for such a high level of soil erosion in Ethiopia (Hurni, 1988;



Shiferaw and Holden, 1999; Sonneveld, 2003) while others have pointed out that the significant role of livestock (overgrazing) in fueling the soil degradation process is a cause, since it is integrated into a smallholder farming system (Dejene, 1990; Stroosnijder, 1996). Soil loss in Ethiopia ranges from very low level in grassland and lowland to a very high level of 100 – 200 tonnes per hectare per year in the highlands (Hurni, 1993, Herwig and Stillhardt, 1999; NFIA 1998).

The Ethiopian highlands are the centre of the economic activity of the country with over 85 percent of the country's population and 75 percent of livestock and they are the source of many of the country's major rivers (including the Blue Nile). These highlands occupy approximately 45 percent of the total land area of which 50 percent is significantly eroded, 25 percent seriously eroded and ca. 5 percent has lost the ability to produce food. Only 20 percent of the highlands are estimated to have a minor problem of erosion (EHRS, 1985). The loss of soil depth is estimated around 4 mm per year, outstripping the rate of soil formation estimated at no more than 0.25 mm per year in Africa. The effective soil depth in Ethiopia is estimated anywhere between 20 to 59 cm (depending on the area), and if such a loss of soil depth continues unabated, Ethiopia could lose nearly all of its top soil in about 100 to 150 years (FAO, 1998 and Sonneveld, 2002). This long-term affect of soil loss (unless effectively controlled) on the ecological balance and survival of a society is often not captured by cost estimates of soil erosion based only on production value for certain years.

Ethiopian soils are fertile, but are undergoing severe mining of nutrients due to intensive pressure on arable land in past decades. A recent study, on the two important plant growth-limiting nutrients - Nitrogen (N) and Phosphorus (P) - shows that acid soils dominate most of the southern and southwestern parts of the country and generally have low P content. Cambisols are more fertile than acid and Vertisols and are fairly distributed in the highlands and used in cereal production. Vertisols are the dark clay soil found

in the highlands and some parts of the lowland, and suffer from water logging and poor drainage and have very low N content (National Soil Survey, 1994). The erosion-prone central and northern highlands of (Shewa, Wollo, Tigraye and Gonder) have low N content and relatively high phosphorus content. Low Nitrogen content in these areas is largely due to low organic content while in the Vertisols area it is mainly due to water logging. Soils in the south and southwestern part (Sidamo, Ilubabor and Keffa) have high N content and low P content (National Soil Survey, 1994; NFIA, 1998). Data on the impact of nutrient on different crops, soils and ecological zones are not developed except in large commercial farms such as Wonje Sugar Estate, and such studies are needed in Ethiopia.

Ethiopia's remaining forest reserves are estimated at fewer than 3 percent (National Conservation Strategy, 1990; Environmental Protection Authority, 1997). Forest land is widely used for cultivation, grazing, fuelwood and construction except those designated by the Government as National Forestry Priority Areas (58 of them). Woodlands estimated at 5 million ha and bushlands totalling 20 million ha are found in the moist western part of Ethiopia and in the pastoral and the agropastoral zones of the lowlands. Large parts of these woodlands are increasingly threatened by shifting cultivation, growth of livestock, expansion of agriculture, and an increasing demand for fuelwood and construction by the urban sector (Ethiopian Forestry Action Plan, 1994). There is an estimated 200 000 ha of plantation of which 135 000 ha of industrial and peri-urban plantation is established and operated by the Government; 20 000 ha of community woodlots and 50 000 ha of catchments and protection plantation. Approximately 150 000 to 200 000 hectares of forest are lost each year mainly for the expansion of rainfed agriculture and also for fuelwood and through overgrazing (Ethiopian Forestry Action Plan, 1994; Environmental Protection Authority, 1997). If these trends continue by 2010 there will be little natural forest left except for minor stands in the remote parts of the country (Ethiopian Forestry Action Plan, 1994).

Biomass fuel provides close to 95 percent of the total energy supply of the country, 77 percent being derived from woody biomass, 9 percent crop residue and 8 percent from dung (MoA, 2000). Only 4 percent of the population is connected to an electric grid mostly concentrated in urban areas. In the year 2000, the demand for fuelwood to meet basic household needs exceeded the projected supply by four times: the estimated demand was at 58 million cubic metres while supply was 11 million cubic metres (MoNRDEP, 1994). As a result, crop residue and dung are increasingly being used to meet rural household energy needs. The diversion of these important traditional forms of replacing nutrients in the soil is estimated to reduce agricultural productivity by 10 percent to 20 percent below its potential (Suthcliffe, 1993; Wood, 1990). Deforestation also increases surface run-off and reduces infiltration and water storage in the soils for human use for a more extended period. It often leads to flooding which is damaging to irrigation schemes. Deforestation is also associated with the loss of flora and fauna and loss of biological diversity. Thus, arresting deforestation and enhancing the source of rural energy (particularly for cooking and lighting) is vital to addressing food security, rural poverty and natural resources management (NRM) and will be explored further later.

Ethiopia has a vast water resource potential and the Ethiopian highlands are the source of many of the international rivers (such as the Blue Nile and Wabe Shebile) draining into the neighbouring countries. Yet only 1 percent of the estimated annual surface water of 110 billion cubic metres is used for irrigation and hydropower. It also has groundwater resources estimated at 2.6 billion cubic metres and many springs and small streams that can be used for water harvesting during the rainy seasons. The country's irrigation potential is estimated at 3-4 million hectares (excluding water harvesting and underground water) but only 160 000 hectares are currently under irrigation (EPA, 1997). Details on opportunities and constraints to irrigation development can be found in the Working Paper on Water Sector and Irrigation. The focus in this paper, however, is on rainwater harvesting by rural households

for domestic, agriculture, livestock, and environmental management reasons (i.e. flooding, water recharge).

The recent rural development strategies of the Government of Ethiopia (GOE) attach importance to the role of rainwater harvesting in attaining food security and broad-based rural development in Ethiopia. In line with the GOE's view, rainwater harvesting in this paper does not include any kind of stream or river diversion schemes or small-scale irrigation. Rainwater harvesting is defined in the same way as by Anderson, which is the control/utilization of rainwater close to the point it reaches the earth for productive purposes (Anderson, 2002). Rainwater harvesting techniques and approaches discussed in this paper are closely linked to improved natural resources management (soil, water, and forest management) at the community level and are aimed at reducing the vulnerability to climatic variability that is so prevalent in smallholder agriculture in Ethiopia. Several NGOs, World Bank, WFP and donors are supporting rainwater-harvesting activities in various regions in Ethiopia and the Ministry of Agriculture (MoA) is now actively trying to promote rainwater harvesting at the national and local level. Some of the experiences that have relevant policy implication in enhancing food security under the broader umbrella of natural resources management are highlighted in this paper.

With 35 million tropical livestock units (TLU) (equivalent of close to 80 million herd), Ethiopia has one of the largest livestock populations in Africa. This consists of ca. 30 million cattle and over 42 million heads of sheep and goats, 7 million equines and over 53 million chickens. Cattle provide traction power for 95 percent of grain production and also provide milk, meat, manure, cash income and serve as a hedge in times of drought and risks. The livestock sub-sector accounts for 15 percent of the total GDP and 33 percent of agricultural output (without including draft power and manure) (MoA, 1997; CSE, 1997). Livestock is also an integral part of the farming system and has major economic and social functions in the rural sector. The livestock sector, however, faces very low



productivity. The major constraints are the serious shortage of feed and widespread diseases (MoA; 1997; Mengistu, 2001).

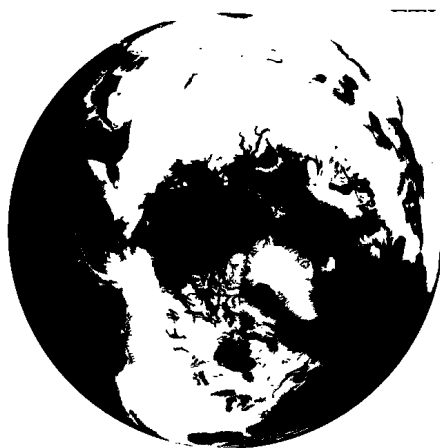
The increasing livestock density and the associated overgrazing on both arable and grazing lands have serious impact on the land and vegetative cover. Over 80 percent of the livestock are in the highly degraded and vulnerable Ethiopian highlands resulting with stocking rate of 160 TLU per square kilometre significantly higher than the recommended TLU level for both humid and semi-arid areas resulting in widespread overgrazing and land degradation (FAO/World Bank, 1996). Policy issues and strategies to reduce livestock impact on natural resources degradation and enhance its role in broadening the livelihood base of the rural people will be investigated further.

Ethiopia has an important place in its richness and diversity of its flora and fauna and endemic plants (Twelde Berhane, 1991). It is an important centre for crop genetic diversity since it is the sole or the most significant source of genetic diversity for some crops such as arabica coffee, teff, ensete, noug, and Ethiopian rape. It is also the main centre for sorghum, finger millet, field pea, chick pea, perennial cotton and sesame (EPA, 1994). The disappearance of a genetic pool and the diversity of known plants and species have been accelerating in the past decades and an effort to protect this erosion diversity at farm and community level is needed (Ejigu, 1999).

Experiences and Lessons Learned in Natural Resources Management to Improve Smallholder Productivity

SOIL CONSERVATION

THERE WAS NO GOVERNMENT POLICY ON SOIL CONSERVATION OR NATURAL RESOURCES MANAGEMENT IN ETHIOPIA PRIOR TO 1974. THE 1974-1975 FAMINE WAS THE TURNING POINT IN



ETHIOPIAN HISTORY IN TERMS OF ESTABLISHING A LINKAGE BETWEEN DEGRADATION OF NATURAL RESOURCES AND FAMINE. THERE WAS A MORE DIRECT LINKAGE IN THE PUBLIC EYE BETWEEN HIGHLY DEGRADED LAND AND THOSE AFFLICTED BY DROUGHT AND Famine in the Ethiopian Highlands.

In 1978, a highly publicized article, which circulated in Addis Ababa, pointed out that about one billion tonnes of top soils were being lost every year in the famine-stricken Ethiopian highlands (Brown & Wolf, 1978). This, and a similar effort by others, raised awareness of the threat of soil erosion to the viability of smallholder agriculture. In 1981, the Ministry of Agriculture and the University of Bern (with the support of the Swiss Government) initiated the Soil Conservation Research Project (SCRP), which generated one of the first systematic data sets on the magnitude and the severity of erosion. In 1983, the Ethiopian Highland Reclamation Study (EHRS) was carried out by national and international experts, which reviewed the main reasons for drought and proposed for Conservation Based Strategy to address it (Constable *et al*, 1985).

Awareness has also led to action and the Government of Ethiopia (supported by various donors, international agencies and NGOs), has made large-scale investment in soil conservation and land rehabilitation measures. The rehabilitation of degraded lands, which started through food-for-work relief assistance following the 1974-1975 famine, has become a major component of the Government's approach to mitigate the impact of soil degradation in many regions of Ethiopia. This approach has focused on a) soil and water conservation; b) construction of terraces, check dams, cut-off drains and micro-basins, and c) afforestation and revegetation of fragile and hillside areas. The focus was on building physical structures to control soil erosion and to rehabilitate degraded lands and massive efforts were undertaken in this regard. This effort has resulted in many ecological benefits such as restoring farmlands, increasing soil depth, water holding capacity and improved woodlot and pastureland (Tato, 1991; and interview with current and previous soil and water conservation experts and officials in MoA).

As important as these ecological benefits were, the large-scale soil conservation efforts of the 1970s and 1980s had some serious shortcomings. First, these structural conservation measures were found to be too costly. After all the investment, not more than 10 percent of the cultivated land has been covered (Hurni, 1990). For example, it was observed that the labour input required for constructing fanaya juu bunds is ten times more than planting grass strips, which are reasonably effective in reducing soil loss and increasing moisture content and water infiltration (Kejela and Fentaw, 1992). Second, farmers were reluctant to adopt such labour-intensive measures (without getting tangible benefits in terms of food or income). Third, there was little systematic effort made to incorporate indigenous soil and water techniques, and not to consider the loss of farmland for conservation (Kruger et al, 1996). Finally, there is no obvious relationship between this large investment in land rehabilitation on one hand and improvement in the food security and income of farmers on the other. This has also been observed by several other studies (edited by Assefa, 1999; Dejene, 1990; Hurni and Tato, 1992).

It is also widely acknowledged that the soil conservation policies and activities of the past decades have not been successful (Debele, 1994; Nedesa, 2002; Pender and Ehui, 2000). It is fair to say that the technologies focused narrowly on arresting soil erosion without fully considering the underlying causes of low soil productivity, socio-economic factors, and the need for tangible benefits to be attractive to poor farmers. Indeed the evaluation of the Swiss-supported SCRP has revealed that the project focused on the technical aspect of soil erosion and paid insufficient attention to other aspects of land management, including the role of livestock (soil compaction), traditional ploughing methods, root system, land-use dynamics and policy and socio-economic issues (Bayers, Dejene, Haile, Jamel, 1998).

Another major weakness of the land conservation and rehabilitation effort over the past twenty years has been its top-down approach and that it has not shown demonstrable change in the day-to-day lives of farmers in terms of improving food security or income. This was also true of the "Conservation Based Development" recommended by the Ethiopian Highland Reclamation Study, which sees conservation measures (that has long-term pay off) as an important step in the attempt to increase agricultural productivity among small-scale farmers. This approach underestimated the short-term cost of some of the conservation measures (labour intensity and giving up of land used for crops or grazing), which were equally unacceptable to many of the poor farmers (Rahmato, 1994; Bayers, Dejene, Haile, Jamel, 1998).

In the late 1980s the weakness of the top-down approach in planning and implementation was recognized by the previous Government (Derge) and initiated the development of the National Conservation Strategy to provide legislative framework for natural resources management. Nevertheless, this did not come into operation, as the Government was fully absorbed in internal civil conflict that led to its collapse in 1991. The Transitional Government of Ethiopia (TGE) that replaced the Derge recognized, in principle, the need

to shift from the top-down approach to soil conservation and include the participation of farmers in the planning and implementation process (Shaxon, 1993). It established the Environmental Protection Authority (EPA) in 1994 as the main policy formation body related to environment and natural resources management. The EPA carried out the task started under the previous Government in the finalization of the Conservation Strategy for Ethiopia, which was approved at the Federal level in 1997 consisting of sectoral and cross-sectoral policy guidelines and strategies in the management of Ethiopia's natural resources (EPA, volume 1, 1997).

In spite of the weakness in strategies and, approaches and implementation used to address land degradation, there is a consensus (among international and local experts and policy-makers) that soil erosion and degradation are major causes for low productivity and vulnerability of smallholders¹. However, against this general consensus a World Bank economist has come up with one of the most astonishing claim, based on a brief visit to Addis Ababa, that soil erosion in Ethiopia has been overly estimated, and the cost of soil erosion is estimated at US\$2 million and another US\$100 million for nutrient loss (Bojo and Cassels, 1995). The authors

compared the financial loss of soil erosion only due to its impact on production. They ignored the nutrient value of soil loss due to erosion from farmer's fields production each year, which is estimated 100 to 1 000 times larger than the estimated production loss² of the US\$2 million. Furthermore, in the drought-prone Ethiopian highlands, where soils are shallow, accelerating erosion (unless effectively checked) will soon result in total economic loss in production, since the productive capacity of the soil will be irreversibly lost once a threshold value of soil depth is reached (anywhere below 20 cm). The study also considered eroded soil from farmers' field and deposited elsewhere as having no negative effect on production. Crop residue, a major source of livestock feed in smallholder agriculture, was considered as nutrient loss. The key issue here is that the authors (unfamiliar with the technical issues and the complex landscape) have rushed to a conclusion that gravely underestimates the threat of soil erosion, which is one of the culprits of the recurrent drought and famine that is ravaging the country. In terms of public policy, such downplaying of the problem of soil degradation could also be counterproductive to the urgent need for increased political commitment by the Government of Ethiopia and international alliance to address this problem

¹ This has been underscored by the vast amount of filed research and literature produced on the subject and numerous international conferences. The World Bank sponsored several of the conferences such as the Soil Fertility Initiative in Ethiopia in 1998 and the Rural Development Workshop in November 2002.

² Discussion and communication with Prof. Hans Hurni, University of Bern, Switzerland and key members of the Soil Conservation Research Project team in Ethiopia in 1998.



Table 2. Summary of the Results of Development Scenarios with and without Soil Conservation Measures

Scenario	Soil Conservation		Net Food production (in billion USD;PPP)		Food per Capita (in Kcal)		Value added per capita: rural population (in USD;PPP)		Value added per capita: total population (in USD; PPP)	
			2010	2030	2010	2030	2010	2030		
1.Stationary	No		12.4	12.0	1083	685	218	162	627	1267
2.Control	Yes		17.8	18.7	1611	1085	324	260	709	1330
3.Migration	Restricted	No	15.9	16.1	1242	786	263	198	662	1290
		Yes	23.2	25.0	1801	1213	383	307	754	1360
	Free	No	16.9	17.1	1317	833	279	210	674	1298
		Yes	24.2	26.0	1878	1264	399	320	767	1368
4. Technology	Stationary	No	43.5	42.9	3978	2681	706	519	1004	1497
		/UN								
	Yes		65.4	42.1	6228	5852	1060	1038	1277	1833
	Stationary	No	43.5	46.4	3968	2605	705	508	1021	1661
/AccUrb										
Yes		65.3	84.4	6212	5682	1058	1021	1366	1992	

Source: Sonneveld 2002 p 192

Stationary: Assumes no soil conservation activities, no improvement in technology and continued population growth

Control: Assumes investment in soil conservation activities and continued population growth

Migration: Restricted - involves movement within ethnic based administrative regions

Free - involves movement across ethnic boundaries

Technology: Assumes improvement in high input agriculture technically

A recent study draws attention to the enormous threat soil erosion poses to the country's effort to attain food security (Sonneveld, 2002). The study examined the impact of soil conservation measures on various development scenarios until 2030 (see Table 2). The findings are based on a complex simulation model and should be taken with some caution. However, it provides further evidence on extent and severity of soil degradation in line with major findings based on field studies. It also provides very valuable insights to sustainable development options to avert the reinforcing cycle of food insecurity, poverty and environmental degradation that will be discussed in Section III. Table 2 highlights that irrespective of the development path taken, soil conservation measures will result in a significantly higher productivity, food per capita and income. For example, under the "Stationary" scenario (no soil conservation and no change in technology and no migration), agricultural production will be reduced to 30 percent by 2030, and per capita per annum will decrease from \$372 in 2000 to \$162 in 2030, while food availability per capita will plunge from 1971 kcal per day to 685 kcal per day in 2030. In the "Control" scenario (soil conservation is practised) productivity will improve by 9 percent in 2030, per capita income will decrease to \$260 in 2030 while food per capita will improve from 685 kcal to 1085 kcal per day. Thus, a development path without soil conservation would be disastrous and clearly not an option.

SOIL FERTILITY

The role of fertilizer in improving the declining nutritional status and productivity of Ethiopia's soils is widely recognized. Fertilizer use has increased from 947 metric tonnes in 1971 (when it was first introduced) to 142 000 metric tonnes in 1992. Fertilizer use has increased from 246 722 metric tonnes in 1995 to almost 300 000 in 2000. This is partly due to the decision of the

TGE allowing farmers to buy fertilizer with 100 percent credit in 1995. The Government's National Extension Package programme that put heavy emphasis on accelerating production using external inputs, often suited to higher potential areas, has also contributed to such a dramatic increase. Production has more than doubled, mainly in maize, due to its responsiveness to fertilizer. But the price for maize plummeted to a record low level (by about 80 percent in surplus areas) and many farmers faced serious difficulty in paying back the credit they took to buy fertilizer (Gabre-Madhin, 2002), which is a major disincentive in using fertilizer and growing maize. For example, the price of Urea fertilizer in one of the surplus areas (Nekempt, Oromia region) by 2002 was six times more than the price of maize while DAP was nine times more, making fertilizer effectively out of the reach of smallholders (Gabre-Madhin, 2002; World Bank, 2002).

In Ethiopia, Phosphorus (P) and Nitrogen (N) were the most crucial limiting factor to plant growth, and not Potassium. As a result, a blanket recommendation of 100 kg DAPS and 50 kg of Urea were formulated for Ethiopia. The Sasakawa Global-2000 (SG-2000) through its demonstration trials have shown that 100 kg of DAP plus 100 kg of Urea are sufficient for most crops except teff and maize which would require 50 kg of DAP and 200 kg of Urea. However, farmers do not often go along with the recommended practices but follow practices they can afford (often half the recommended rate). It is now widely recognized among experts and policy-makers that the increasing application of fertilizer at the current price will not be affordable to many farmers and possibly the Government (that lacks foreign exchange to import fertilizer with out outside support). Thus, extension and research should accord a high priority to find an economically viable option that uses fertilizer in combination with other local available organic sources.



Table 3. Summary of Innovations in Maize Production and Their Impact on Yield

Treatments	Yield (kg ha ⁻¹)
Broadcasting, no fertilizer, late weeding 6 weeks after emergence, flat planting (control)	1309
Row planting, no fertilizer, late weeding 6 weeks after emergence, flat planting	1793 (37)
Row planting, 40 N 46 P ₂ O ₅ , late weeding 6 weeks after emergence, tied ridges	1914 (46)
Row planting, no fertilizer, early weeding 3 weeks after planting, tied ridges	2263 (73)
Row planting, 40 N 46 P ₂ O ₅ , early weeding 3 weeks after planting, tied ridges	2845 (117)

Source: Kidane and Abuhay (1998)

Recognizing that resource-poor farmers do not adopt recommended packages at once, farm trials have been conducted in semi-arid areas to show the relative contribution of agronomic practices and fertilizer on maize yields. The result (shown in Table 3) revealed that row planting alone (no fertilizer, late weeding, and flat planting) resulted in a yield increase of 37 percent from the controlled plot and if early weeding and tied ridges are used yield increased to 73 percent from the control plot. The findings (in Table 3) underline that the most desirable and effective option in increasing yields significantly is the combination of using both fertilizer and agronomic practices. It also underscores the critical role of good agronomic practices since the application of fertilizer alone (without good agronomic practice) has resulted in lower yields than plots using good agronomic practices without fertilizer. Another study has also shown that tied ridges (very efficient in capturing moisture) in dry land areas have increased yields in crops such as sorghum and maize by 50 percent to 100 percent (Georgis, 2002). However, farmers do not like tied ridges because they have to be built by hand which is highly time-consuming. This gives further evidence that the Extension and Research programmes (and SG-2000) needs to show greater flexibility in design-recommended packages to farmers' conditions and resources.

The soil fertility initiative (SFI) for sub-Saharan Africa was initiated in 1996 at the World Food Summit (WFS) under the coordinating role of the World Bank to foster global partnership of donors, African governments, NGOs, development agencies, national and international research centres to restore declining soil fertility in SSA. The SFI could have the potential to enhance soil productivity and promote the intensification of agriculture through a combination of high and low input technologies among small-scale farmers in Ethiopia, if it were implemented through the appropriate Ministry and in a participatory way. The National Fertilizer Industry Agency (NFIA), which was established in 1994 (formerly a unit under the MoA), emerged to take a lead responsibility in introducing the SFI in Ethiopia, with the support of the World Bank. It was not clear why the MoA had not assumed lead responsibility in launching and implementing this initiative when soil fertility goes beyond fertilizer use.

The National Fertilizer Industry Agency has pursued the implementation of SFI in Ethiopia by introducing soil fertility management as one of the components of the National Fertilizer Sector Project, which is financed by the World Bank. The project's dominant component is fertilizer demand, which was allocated 93 percent (US\$214.22 million) of the total

budget (US\$230 million) and the soil fertility management has 3.6 percent of the project budget (World Bank, 1995). The soil fertility sub-components focused on looking at soil nutrient issues where soil testing laboratories and fertilizer trials become the main activity. Under this project, soil fertility management was pursued from a narrowly nutrient point of view in isolation from the broader socio-economic and environmental issues. Fertilizer efficiency when applied to degraded soil (as is common in many parts of the Ethiopian highlands) is typically low with the result that the plant does not utilize the majority of available nutrients. Table 3 above also demonstrates this point. Table 2 also shows that a development path that relies on high input technology (i.e. intensive fertilizer use), but with no soil conservation, is not viable. Food production will increase until 2010 due to intensive use of fertilizer and then will decline by 2030 (due to soil degradation) resulting in significant decline of food per capita and value added per capita (Sonneveld, 2002). Thus, reliance on fertilizer does not lead to a sustainable path in improving food security and income of smallholders.

Soil fertility management requires a broader framework to attain its objectives. Yet, the Government's National Extension Package programme (derived from the SG-2000 intensified package approach) with emphasis on increasing yields, has not been as flexible in responding to the various agro-ecological zones, local resource endowment and farmers' capacity to invest in affordable soil fertility management techniques. The packages are designed by research-extension experts with little or no serious effort made to integrate environmental sustainability issues (crop and plant biodiversity) as well as indigenous knowledge and

practices and crop and plant diversity at community level (Beshah, 1999). The package approach seems to have overplayed the production aspect through making investment on external inputs, which is out of reach of the vast number of resource-poor farmers who have no capacity to invest in this package. This paper will try to address this issue through a community-based integrated natural resources management in Section IV.

FOREST AND TREE MANAGEMENT AND ALTERNATIVE SOURCES OF RURAL ENERGY

As indicated earlier, forest and biomass resources are the most indispensable source used in meeting the energy needs of the rural households in Ethiopia. They are also used for farm implements, construction and as a source of cash income. The use of forest resources by the industrial sector is not significant (EFAP, 1994) and industrial plantation and Government-managed National Forestry Priority areas and other protected areas are not addressed in this paper. The focus is on management of forest, woodlands and tree resources close to the farming, homestead, village and community levels as well as finding alternative biomass energy sources that is simple and affordable to farmers.

In the past Government policy did not encourage on-farm and homestead tree growing and even to this day, there is no clear policy in this regard. In some parts of Ethiopia, for example in the Tigraye Region, tree planting near and on the farm is seen as undesirable and competing with cropland. Forest research as well as agricultural extension has largely ignored on-farm tree growing. Recognizing that forest utilization far exceeds their replenishment in rural communities and that its management is closely linked to land conservation, soil

³ In sub-Saharan Africa, twice as many nutrients are lost compared to other regions; the author suggest that only around 35 percent of N and 15 percent of P are effectively used by the plants. Cited by D. Weight and V. Kelly in *Fertilizer Impact on Soils and Crops of sub-Saharan Africa*, MSU International Development Paper No 21, 1999.



fertility, water recharge, biodiversity, food security and livelihood issues, the 1997 Conservation Strategy of Ethiopia includes some basic tenets that try to address these problems. The CSA guidelines on forest, woodlands and tree management specifically mention that: i) forest development and projects are to be executed primarily by individuals and communities and the Government's role is the provision of technical support (extension and research) and enabling policies (such as pricing policy and increased security of land and tree tenure); ii) forest development strategy should integrate the development, management and conservation of forest resources with those of land and water resources, energy resources, ecosystems and genetic resources as well as crop and livestock production; iii) efforts should be made to achieve the principle of "Sustainable Forest Management" where the volume of wood harvested is about equal to the net growth that forest is capable of generating in a socially acceptable and economically viable way (CSE, 1997, Volume 2).

The most crucial and immediate steps to address the depletion of forest resources that have an impact on other resources and sectors is on the supply side. Here increasing the production of forest products for fuel wood, timber, fodder and construction material is vital. The most promising vehicle to achieve this will be through individual tree planting by smallholders and agroforestry devolvement. This would also bring added benefits to mitigating land degradation (through the increased of vegetative cover) and to reducing the high cost incurred in the loss of crop productivity by the conversion of dung and crop residue for energy needs.

Community forestry, if managed in a participatory manner, has the potential to contribute meaningfully to increase forest products and meet the needs of rural households. In the 1980s the previous military Government introduced community forestry to meet the fuelwood and construction needs of rural

households. Farmers for the most part were ordered to plant in the community forest (by peasant association) with no clear guidelines whether they would benefit from the trees planted and the grass growing from the community forestry. Needless to say, most farmers saw community forestry as an extension of the Government-owned afforestation scheme. In fact, in some places the Government converted community forestry into protected forest areas. The net result was that community forestry was generally poorly managed, with very low survival rate to meet the expected needs (Dejene, 1990, Bendez, 1987). With the fall of the Government in 1991, this approach was abandoned. Recent experience in some regions in Ethiopia has shown that collective action in managing woodlots has worked well if they were managed at the lowest administrative level, involved villagers in decision-making and benefits were shared fairly among participants (Gebremedhin, Pender and Tesfaye, 2000).

Renewable energy sources, particularly in the form of biomass energy, are untapped in Ethiopia. The Conservation Strategy of Ethiopia makes very brief reference to the need for development of alternative energy sources namely, solar, wind, biogas, agricultural biofuel for small towns and villages (CSE, volume 2, 1997). However, little investment has been made in this regard, particularly biomass energy as it is widely available in most rural areas. Urgent attention and priority is required to examine the feasibility of converting agricultural and crop residue, dung and other wastes into an efficient form of energy. In this regard, biogas generation through anaerobic digestion of dung into high-energy form (methane) that could be used for cooking and lighting should be given priority. The by-product from this process (the slurry) would result in a good quality and environmental friendly fertilizer that can be used to enhance soil fertility. This process also contributes to improving sanitation at the village level, as experienced in China.

RAINWATER HARVESTING AT HOUSEHOLD AND VILLAGE LEVEL

Until very recently Government policy had not accorded a significant role to rainwater harvesting (RWH). The recently approved Rural Development Policies recognizes the importance of rainwater control and utilization around the farmers' plot and the work to be done by the farmer himself through labour-intensive technologies (GOE, 2001). This is a positive development although there is still confusion on the definition of rainwater harvesting since small river diversion is also included as part of rainwater harvesting. As stated earlier, this paper uses the definition and classification (Domestic Roof Water Harvesting and Non-Domestic Rainwater Harvesting) used by Anderson for rainwater harvesting (Anderson, 2002). However, in this paper, rainwater harvesting does not include diversion of rivers or stream nor groundwater harvesting.

The purpose of this paper is not to document rainwater harvesting technologies that are being tested or used for domestic and non-domestic purposes. A recent field mission report (commissioned by the GOE) that was prepared with key local water experts and agencies working in the area of rainwater harvesting provides valuable information and expert assessment on the design, cost, benefit, risks, various methods of RWH technologies and practices that are currently being used and tested (Anderson, 2001). The MoA, Extension Department, is also developing technical guidelines in the construction and management of rainwater harvesting (Nega, 2002). The major argument proposed in this paper is that rainwater harvesting for both domestic and non-domestic purposes (agriculture, livestock, etc.) should be seen as an integral part of the natural resources management, which requires collective action for its success and sustainability. Rainwater harvesting, particularly for

agricultural and natural resources management (which is the focus here) is closely linked to agronomic practices, farming system and livelihood activities of the communities. The aim is to make rainwater harvesting a collective group effort for those who live in close proximity to each other in a village or community as is the case in most parts of rural Ethiopia. Groups will also have greater economy of scale to reduce costs incurred in RWH technologies (pooling labour and resources) and reduce health risk through joint monitoring and maintenance of the system (Rahmato,1999).

Many of the experiences gained in RWH (either through WFP, NGOs or MoA) have been at homestead level. During a recent mission to Ethiopia, field visits were organized by MoA to see some of the pilot activities on Homestead Rainwater Harvesting (that involves individual farming families through support from Food-for-Work Programme and MoA) outside the city of Nazareth (about 130 km from Addis Ababa). Most households in this dryland and marginal areas do not have adequate food to last them during the long dry season. The benefits of RWH were quickly noticeable in terms of reduced distance and time on women and children in fetching water, improved nutritional status, ability to expand agricultural, horticultural, livestock, chicken and beekeeping activities particularly during the dry season, improved soil conservation and vegetative cover and environment around the homestead. One farmer interviewed indicated RWH had helped him to grow onions, vegetables and fruits, which he sells in Nazareth and in return buys food items that last him during the dry seasons.

Clearly, as shown above, the RWH system, (using roof and micro-catchments/farmers field) has made a difference in improving the nutritional status and diversifying the livelihood of farmers. Many of the experiences gained in RWH (through WFP, NGOs or MoA) have been at homestead level. Preliminary

⁴ The author participated in field trip to see RWH pilot activities organized by Mr. Betru Nedessa, Food-for-Work Programme, MoA in February 2002 and another in November 2002 by Mr. Huena Nega & Ebrahim Mohamed, Extension Department, MoA.



observation and discussion with farmers and local extension suggest that individually centred RWH for domestic and non-domestic purposes (agriculture, livestock, etc.) faces serious constraints to being a viable option without considerable external financial investment and supervision. Most farmers in this area, for example, do not have a tin roof, seriously limiting the amount of roof water to be harvested and stored. Farmers interviewed use a simple, low-cost hemispherical system (holding 50 to 60 cubic metres of water below the ground with cemented floor and walls and organic matter for roof cover) and indicated that they would not be able to cover the cost of construction material, skilled labour and transportation (amounting close to Eth. Birr 3 000.00) if it had not been for considerable outside assistance.

Extension agents also indicated that maintenance of the system is the same with the simple hemispherical tank (which has the advantage of holding more water at low cost than the other systems such as domed or the Chinese systems) and is much better if it is handled by groups of farmers rather than individual farmers. Sediments can easily enter a hemispherical tank lowering its water holding capacity and life span. It requires proper maintenance, which is difficult for individual farmers to handle and organize. In addition, this particular system occupies a large space in farmers' fields (as it needs grass strips or trees along the water collection channels, which were not seen), taking up more farmland, which is in serious shortage in this area. Thus, this emphasis here is to see RWH as one of the essential elements/components requiring collective action to achieve a community-based natural resources management and development to enhance food security and livelihood of the rural people in a sustainable way.

LIVESTOCK IMPROVEMENT AND GRAZING LAND MANAGEMENT

There was no specific policy regarding livestock density or managing grazing land, until the guidelines that resulted after the Fourth Livestock Development Project in 1993-1994 and the Conservation Strategy of Ethiopia in 1997. Livestock and overgrazing have adverse impact on soil degradation, compaction and reduction on vegetative and biomass cover. It is certain that a policy limiting the number of livestock would not be popular or difficult to implement since they are the most significant means of capital accumulation and quickly disposable assets in time of famine and other emergencies (Rahmato, 1987; McCann, 1987). Even farmers indicating serious land shortage did not like their livestock size to be reduced (Dejene, 1990).

Some of the past as well as the current Conservation Strategies of Ethiopia, such as hillside and area closure, have underestimated the role of livestock and grazing practices in the process of natural resources degradation. Severely degraded areas with no or little vegetation have no human and livestock interference for 3-5 years until 80 percent of the grasses or vegetation are regenerated. Farmers in general are negative towards hillside and area closures (particularly in communities where even cut-carry is not practised) as it has meant taking away the grazing land in their communities forcing them to use their own productive land thereby exposing it to further degradation. The Highland Reclamation Study and its recommendations, which have greatly influenced the Conservation Strategy in Ethiopia, mainly focus on crop land. The severity and incidence of soil erosion (due to absence of vegetative cover) on cropland more than grazing land is not disputed. But the role of livestock cannot be neglected since nearly half of the country's land is used for grazing and during the major rainy season livestock graze on the slope leading to "downstream effect" where water erosion and flooding affects agricultural land. In addition, cropland is left open for grazing during the long dry

season denuding all vegetative cover and causing soil crusting, which exacerbates the incidence of soil erosion and decline in soil fertility.

Past efforts in livestock improvement may have focused on promoting veterinary service, which is important. But the major factors resulting in low productivity of Ethiopian livestock sub-sector is the serious shortage of feed. Livestock depends on natural pastures that are low yielding and grazing areas are shrinking due to expansion of cultivated land. Hence, improved livestock feed and forage production is crucial from both food security and prevention of natural resources degradation. The Fourth Livestock Development Project launched in 1988 by the MoA focused on improved forage development species that are low cost, acceptable to farmers and also contribute to soil and water conservation. These included backyard forage, under sowing forage legumes into cereals, stock exclusion area, forage strip establishment (soil and water conservation), and annual and perennial forage establishment. It has also given emphasis on the need to shift from shifting and uncontrolled and environmentally degraded grazing practices into a more intensive livestock feeding and management system (Mengistu, 2001).

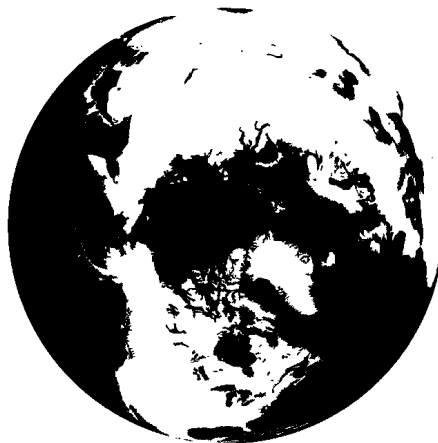
One of the most notable Government strategies regarding livestock improvement is the National Livestock Development Programme (NLDP) which consolidates and expands (with appropriate modification) the results obtained from the Fourth Livestock Development Project, particularly in the area of forage and seed production that are suitable to local conditions (NLDP, 1997). The NLDP has come up with modified forage development strategies for different agro-ecological zones and farming systems that could also be used by other development agencies involved in natural resources management activities (NLDP, 1997). This paper sees livestock feed improvement and grazing land management as an important component of integrated natural resources management. It will examine the integration of crops

and livestock, which can be a main vehicle for intensification and diversification of the production system in smallholder agriculture as well as mitigating the degradation of natural resources.



Policy Options and Strategies in Natural Resources Management to Enhance Food Security and Broaden the Livelihood Base

THE NATURAL RESOURCES BASE (LAND, WATER AND FOREST) IS FUNDAMENTAL TO THE SURVIVAL AND LIVELIHOOD OF THE MAJORITY OF PEOPLE IN RURAL ETHIOPIA. AS INDICATED IN THE PREVIOUS SECTION, THESE RESOURCES ARE UNDER INTENSE PRESSURE FROM POPULATION GROWTH AND



PPROPRIATE FARMING AND MANAGEMENT PRACTICES. SMALL-SCALE FARMERS, WHO DEPEND ON THESE RESOURCES, FACE SEVERE CONSTRAINTS RELATED TO INTENSIVE CULTIVATION, OVERGRAZING AND DEFORESTATION, SOIL EROSION AND SOIL FERTILITY

DECLINE, WATER SCARCITY, LIVESTOCK FEED, AND FUELWOOD CRISIS. These factors often interact with one another and bring a downward spiral of declining crop and livestock productivity, food insecurity, high population growth rate and environmental degradation, (referred to as the nexus problem, Cleaver and Schriber, 1994)⁵. The net result is that a re-enforcing cycle is set trapping more and more of the rural population in poverty, food insecurity and in the degradation of natural resources (see Figure 1).

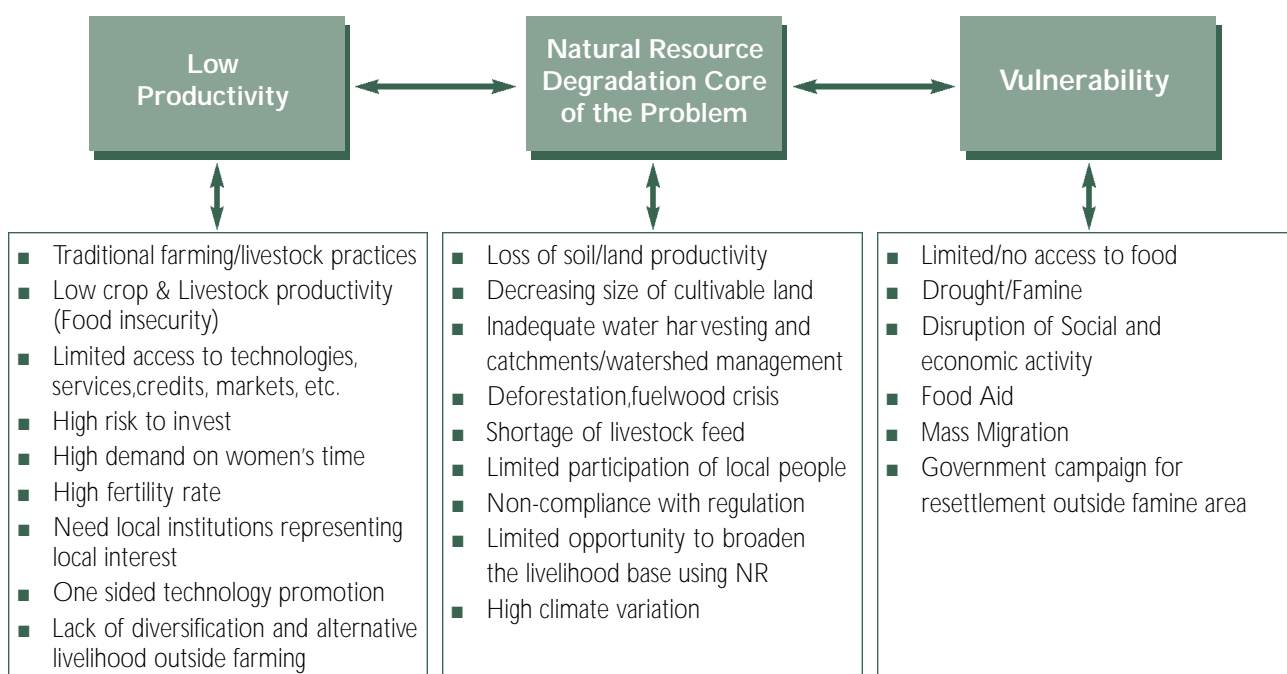
⁵ The nexus problem in sub-Saharan Africa has been a subject of investigation by a World Bank study of Cleaver and Schriber. The study was a conceptual study and focused more on population. It did not go further on how it can be implemented or operationalized at country level and as a result, no field programme/project emerged from the study.

Thus, improving the natural resources base is central to any effort to arrest this “vicious cycle” and improve the productivity of small-scale farmers, who constitute the largest group of people below the poverty line. The current extension programme, however, relies on the “intensified package approach” and is primarily focused on accelerating production, using fertilizer and improved seed (mainly hybrid maize), irrespective of farmers capacity and agro-ecological zones. This has been unprofitable to farmers and inadequate to address the core of the problems faced by most resource-poor farmers as shown in Figure 1. In order to address this, it is vital to go beyond narrow technical treatment of specific sectoral areas and adopt a broader thematic framework (that cuts across various disciplines) that would bring the integration of key sectors to generate a positive synergy to reverse the downward spiral. Some of the key thematic and intersectoral linkage areas that are fundamental in addressing the “poverty, food insecurity and natural resource degradation trap” are highlighted below.

INSTITUTIONAL ISSUES - COMMUNITY AND GRASSROOTS ORGANIZATIONS

The overlapping and at times conflicting responsibility among the various agencies in the areas of agriculture and rural development, food security, and natural resources management has been the cause of serious constraint for effective coordination and implementation of programmes in these areas. As a result, there is a lack of clear direction on policies and priorities of each agency in contributing to this corporate objective. This newly created Ministry of Rural Development, headed by the Deputy Prime Minister, has potential to address this problem. Under the new institutional set up each agency is obliged to report its activities to MRD and this provides a potentially useful institutional safeguard in avoiding duplication and harmonization of policies and actions among these agencies at the Federal level.

Figure 1. Poverty, Food Insecurity and Natural Resources Degradation Trap



A.Dejene, 2003

One important agency that has many overlapping and complementary activities with the MRD (particularly the MoA) is the Ministry of Water Resources (MWR), which has the overall mandate for development of irrigation and water harvesting schemes for domestic and agriculture use. Although the MWR is to focus on medium and large irrigation schemes, it was observed that MWR staff is involved in small-scale irrigation and rainwater harvesting schemes and often collaborate with the MoA staff at the Woreda level. Most of the extension agents in the MoA do not have specific training on water-related interventions and would need collaboration in developing water-related packages for extension. Since small-scale water harvesting is one the pillars of the Government strategy to attain accelerated rural development, it would be most appropriate and effective if the MWR reports under the MRD. After all, a large section of the current MWR used to be under the MoA and was transferred to MWR in 1994. Furthermore, preliminary information obtained from regional level suggests that the agencies reporting under MRD at the Federal level are not necessarily the same at the Regional and Woreda levels. This creates a disconnection between Federal and Regional levels, making it difficult for MRD to coordinate its own efforts, much less the activities of agencies that are not within its mandates. Urgent attention is required to sort out these institutional issues so that there will be some congruence between the structure at the Federal and Regional levels.

One of the major constraints in Ethiopia is operationalizing and translating policies enunciated at the Federal level into action at the local and community levels, particularly in the areas of natural resources management. This is due to the lack of strong grassroots/ community organization that are established by local people and serving their interest. During the previous military Government, the Peasant Association (PA) and agricultural Service Cooperatives (SC) were introduced in a top-down manner and were mostly used by the Government to extract surplus from the peasantry. Yet, the SC provided credit, inputs, basic goods and mobilized resources to develop rural roads, warehouses,

grain mills, and clinics, etc. With the phasing out of all previous organizations (including SC) by the current Government, Government and party-owned agencies dominate the distribution of seeds and fertilizer. They charge an interest rate of 15 percent to 20 percent depending on the region, contributing to the increased price for fertilizer. SC previously provided this service free. If the SC were allowed to develop genuinely by the previous or current Government, they would have been an important vehicle to attain rapid transformation in the rural sector.

Recently, there has been a strong revival of traditional and indigenous institutions to assume a self-help and development role in rural Ethiopia. Ethiopian rural society has many important traditional and indigenous institutions that can be strengthened and transformed to assume various development roles. Realizing the potential of these institutions (such as *idir*, *iquab*, *debo*), several NGOs have used these organizations for various development activities including input supply, water harvesting and land rehabilitation. Thus, the Government should make concerted efforts to support and strengthen these indigenous organizations as they have the potential to be an important vehicle for facilitating community-based approaches in natural resources management and self-help development activities. They could be scaled-up to take the role of cooperatives (which is encouraged by the current Rural Development Strategy) and be a reliable partner in natural resources and rural development.

Community-based organizations would play a central role not only in participation but also most importantly in the empowerment of local people as a stakeholder and in providing greater incentive to manage and utilize their natural resources in a sustainable way. The key principle here is that community-based and grassroots institutions must represent and protect local interest. In the past, the emphasis has been on technical fix and even when local institutions existed, they were used to enforce unpopular Government conservation measures (such as community forestry, hillside closure, and labour

demanding conservation measures). This has resulted in non-compliance and further degradation of the landscape and the downward spiral. Strong local and community organizations can empower local people (particularly women and the poor), mobilize labour for conservation, rehabilitation and development of land, water and forest resources (reducing the burden on rural women), build infrastructure, provide fertilizer and improved seeds, assist extension and research experts in incorporating indigenous knowledge and practice into technical messages, bring accountability to extension, research and local government officials, create awareness about family planning, and generate positive synergy to address the “vicious cycle” noted earlier.

EMPOWERMENT

The Government’s Sustainable Development and Poverty Reduction Programme (SDPRP) calls for empowering local community and demand-driven approach to technology generation and dissemination. The Government seems committed to the devolution of authority from Federal to Regional governments. It has recently made Woreda as the centre of economic development. Two preconditions are essential if true empowerment is to take hold in rural Ethiopia. The first and most crucial is the emergency and establishment of local and community organizations discussed above. The second one is reducing the work burden of women in key tasks and improving their decision-making ability in natural resources management and overall status in rural society.

Women often face social, cultural and at times legal constraints that limit their decision-making capacity in farming and natural resources management. The traditional role of women puts gender specific constraints in fuelwood and water collection, post-harvest activities, livestock management which increases the pressure on their time and increases the

demand for large families reinforcing the nexus problem. Empowering rural women is a multi-faceted task and must include several components such as access land, credit, extension, training in agriculture and natural resources management, low cost technologies and practices that ease their work burden and income generating activities outside agriculture. Reducing the pressure on women in fuelwood and water collection are the two critical components that would contribute to improving the status of women and efficient management of natural resources. Hence, one of the most important policy implications is the substantial development of fuelwood products at farm and homestead areas (through agroforestry) or through the development of environmentally-friendly alternative source of energy (such as biomass) and rainwater harvesting schemes with a specific gender objective to ensure that women are benefiting from these innovations. These efforts could be an important step in reducing women’s time from these demanding tasks that expose them to health hazards, and in reducing the demand for child labour. These efforts would also create opportunities to be involved in other productive or income-earning activities, lower the demand for large families, and assist in averting the poverty, food insecurity and environmental degradation trap.

Empowerment in creating and strengthening community organizations and improving the status of rural women will require institutional reforms that provide incentives and regulatory mechanisms to influence the behaviours of local people and protect their interests. Increasing rural women’s access to agricultural extension and training is one vital area in which the Government should make a concerted effort. Empowerment also requires making substantial investment in human resource development through the training of community leaders, women and local para-professionals, the provision of public and external investment to innovations and development initiatives.



SUSTAINABLE DEVELOPMENT OPTIONS BASED ON AGRO-ECOLOGICAL ZONES/NATURAL RESOURCES ENDOWMENT

Agro-ecological zones have homogeneous climate, precipitation, physiographic, soils, vegetation and animal species. They can be reasonably good indicators of natural resources endowment and agricultural potential and in the formulation of strategies in soil conservation and fertility management, water harvesting, forest management and livestock development (Desta, L., M. Kassie, S. Benin & J. Pender, 2000). Sustainable Development and Poverty Reduction Programme (SDPRP) sees identifying a development path compatible with different agro-ecological zones as one of the basic principles governing agricultural development. One of the major weaknesses of the extension programme and its intensified agricultural package approach is that it has not been flexible to respond to the various AEZs and local resources endowments. In order to attain rapid increase in production, the extension package and the agronomic research programmes have put heavy emphasis on the recommendation of external inputs (fertilizers) that are often suited to high potential areas. However, stabilizing yields (not just increasing) is also a major concern of many farm families who live in AEZs with low agricultural potential and high climatic risks.

As shown earlier, in soil fertility management, resource-poor farmers in marginal areas often rely on other local organic sources and indigenous practices to compensate for increased use of fertilizer, which is expensive. They often do their own assessment of risk and profitability and decide on the right amount of fertilizer for their situation instead adopting the recommended amount by Extension. Thus, in the design of extension packages for soil fertility management, it is vital for extension-research experts to focus on AEZs and sub-AEZs to undertake extensive farmer-field trials as well as to identify local organic sources and practices that can be used in combination with an external input. Thus, the

development of low-input innovations at AEZs and sub-AEZs that incorporate biological fertilizers, indigenous practices and crop and plant diversity is vital if Extension is to be demand-driven.

Many NGOs are currently involved in rainwater harvesting as part of the relief, food security and poverty reduction programme. There are still no coherent guidelines applicable to local conditions. Preliminary observation suggests many of these agencies are designing such schemes through trial and error and the MoA is also limited in its own capacity to assist them. Rainfall data is very useful in designing run-off harvesting and storage tanks and AEZs could be a useful first step in getting some estimates of rainfall data, which is lacking. Information on rainfall data and crop-water requirement at AEZ could assist in the development of an appropriate water harvesting system.

As noted, agroforestry development is potentially the most promising approach to meet the enormous demands for fuelwood, construction and other basic needs of the rural communities as well as the conservation of land resources. In this effort, it is fundamental to select multi-purpose trees that are fast growing, fit into the mixed farming system and bring micro-climatic benefits in stabilizing soils and the environment. Hence, AEZs should be given an important consideration in the testing and selection of multi-purpose trees in agroforestry development. In AEZs, where there are serious moisture and soil constraints for agroforestry and where there is high livestock density and potential for livestock development, an alternative source of energy using manure should be considered. Such alternative sources of energy can also be a source of non-farm income. Similarly, livestock feed, the most important constraint in improving livestock productivity, was addressed by the Fourth Livestock Development Project through forage development strategies based on AEZs. This has proved successful in some areas covered under the project, but still substantial efforts are required to promote forage developments that are well suited to AEZs.

The Government Extension programme has now moved in the development of packages to moisture-stress areas, livestock, post-harvest technologies and agroforestry, which are positive developments. Nevertheless, there is still a long way to go in making AEZ in the centre of extension package development. Greater effort at both the Federal and Regional levels is needed in identifying the constraints, opportunities and comparative advantages in different AEZs in order to design potential development strategies using the natural resources potential as well as the pursuit of alternative livelihood options.

CAPACITY-BUILDING IN NATURAL RESOURCES MANAGEMENT (NRM)

Capacity-building is one of the pillars of the Government's Rural Development Policy and SDPRP, which is applicable at all levels. It is partly related to the institutional issues discussed above. In this section, however, the focus is on issues that arise in translating some of the policies and plans into actions at local and community level and strengthening the local capacity to address the degradation of the natural resources base and low productivity of smallholders.

In a major effort to arrest natural resources degradation, the Government (Natural Resources Management and Regulatory Department, MoA) which has the overall mandate for soil and water conservation, has developed a Five-Year Plan (2000-2004) for various types of on-farm soil and water conservation measures, rainwater harvesting and afforestation activities, for both high rainfall and rain deficit areas⁶. In the high rainfall areas, the target calls for 2.2 million ha of land (on farmers-field) to be brought under various soil and water conservation measures to enhance productivity. The plan acknowledges that there are 643 experts of which 156 are in the Amhara region; 144 in Oromia; and 116 in Tigray and Southern Nations, Nationalities,

and Peoples Regional State (SPNN) (MoA, 2000). Unless there is a dramatic way to increase the number of technical experts in the next few years, the current skilled work force available will be spread too thinly to properly introduce, guide and monitor the activities in close contact with farming communities. Whether they will be able to undertake the training of other para-professionals or farmers to meet this target is not clear.

In the rain deficit areas, the target set for soil and water conservation (SWC) and the estimated cost to the community and the Government are presented in Annex 1. A careful analysis of these targets and the cost involved (Tables 4 to 9) reveal the following issues that have implication for capacity-building and disseminating innovation the farming population. A key issue here is that how the target set at the national level (Table 5) is translated and implemented at the regional and community levels. Identical targets are set for the Tigray, Amhara and Oromia regions for SWC activities (125 000 ha for each region); for ridge and furrow (62 000 ha for each region); for contour ploughing (375 000 ha); for flood diversion (3 000 ha each region); and for micro-basin (3 482 ha for each region) (see Tables 5-7). Given that the three regions have vast differences in population size, land area, landscape and farming system, it is perplexing what criteria could possibly have been used to come up with such identical targets. From the broader Government's objective of attaining rapid agricultural development and rural transformation (not the short-term political consideration), it would seem most appropriate to bring soil and water conservation activities quickly to the vast areas of high agricultural land in Oromia and Southern Nations, Nationalities, and Peoples Regional State (SPNN).

Similarly, the Government's financial contribution to SWC activities as noted in Annex 1, Table 9 is again identical to the Tigray, Amhara and Oromia regions (with 93.75 million Birr for the five-year period) while

⁶ The MoA Five-Year Plan on soil and water conservation measures is presented in Annex 1, Tables 5-10. It is written in Amharic



Southern Nations, Nationalities, and Peoples Regional State (SPNN) were allotted 56.25 million Birr. This translates in per capita basis that allocation for Tigraye is about 4 to 6 times more than the other regions. Again, there was no indication in the document of any justification or criteria used in allocating public resources to the respective regions. However, there is an interface between regional/local and national objectives and public funds should be used to bring the most efficient match between regional and national objectives in order best serve national development and food security objectives.

The Government's contribution would be used for capacity-building and generation and dissemination of appropriate SWC measures (both human and material) at local and community levels. These require collective action where strong community and grassroots organizations are fundamental to mobilizing labour, facilitating training and ensuring that these resources are appropriately used in attaining the community's objectives. As stated earlier, such community organization is lacking at present, perhaps with the exception of Tigraye, where positive development has been reported of community action on soil and water conservation self-help activities. The recently formed Farmer's Training Centres under the Extension Department have the potential to contribute to capacity-building at the community level. The Government's effort to set targets in arresting natural resources degradation is worthwhile, but such targets must come in terms with local and community capacity to implement it, provide objective criteria in the allocation of public (Federal), and ensure that the overarching objective of capacity-building to attain national food security is not sacrificed by regional and local political interest.

The Ministry of Agriculture's Five-Year Plan for soil and water conservation specifically mentions various rainwater harvesting schemes (such as roof water harvesting, flood and run-off diversions, construction of small and medium size ponds) as part of soil and water conservation activities (Tables 4 and 9). It rightly

sees rainwater harvesting as an integral part of agronomic practices and farming systems of the community. However, it does not state this fact. A major constraint to this plan and target is that most of the extension agents have agricultural background and need further training if they are to be effective in disseminating water-related messages and interventions. Even at the Federal level, there are serious shortage of water specialists to assist the increasing number of NGOs, which are requesting MoA technical assistance and advice in the field. There had been no adequate guidelines on the design and management of rainwater harvesting system previously. The MoA is still currently working on such a manual, which is eagerly awaited by the NGO community. Thus, urgent consideration should be given to training new staff in rainwater harvesting for domestic and agricultural use as well as updating (through short-term courses) the capacity of existing extension agents.

The various soil and water conservation activities included under the MoA Five-Year Plan implicitly suggests that soil conservation is seen as complimentary and an integral part of measures to enhance soil fertility, good agronomic practices, and water retention and harvesting. However, previous extension and research programmes have often pursued these activities separately and this should be clearly stated in the extension manual and training. There is growing recognition among experts and policy-makers in finding an economically viable option of using fertilizer in combination with other organic sources. As stated earlier, soil fertility enhancement will require a broader perspective than the increased use of fertilizer. This includes improved and vegetative soil and water conservation measures, use of local organic sources in combination with fertilizer, good agronomic practices and finding alternative sources of rural energy in order to bring manure back to the soil, and site-specific research involving farmers in the development of soil conservation and nutrient enhancement practices suitable to various agro-ecological zones and socio-economic conditions.

INCENTIVES, PROPERTY RIGHTS AND LAND-USE POLICY

Lack of proper incentives and clearly defined property rights to land, forest and trees have often led to inefficient utilization of natural resources and degradation. The current Government is adamant in its belief that all land will remain in the public (Government) hand as in the previous regime. There is intense and ongoing debate on issue of land tenure and whether the public or freehold systems will be the best options to unleash the potential of smallholders and bring rural transformation. The challenge to the Government land policy comes not so much from outside, but within the country (opposition parties, intellectuals, civil society organizations, etc.) and cannot be dismissed for long without finding some acceptable solutions. These issues will not be discussed here, as they are a subject of a detailed examination under a separate working paper on Land Tenure. Nevertheless, the issue of land tenure security is at the core of any discussions on incentive and property rights that are directly or indirectly linked to natural resources management.

In the recent Rural Development Workshop that was jointly sponsored by the MRD and the World Bank and attended by very high Government officials, including the Prime Minister, there was a consensus that land tenure insecurity exists in smallholder agriculture. This is most likely to have an adverse impact on agricultural productivity and investment in land and natural resources management. Furthermore, there was a general recognition by the Government of this problem in various regions. The Prime Minister also acknowledges such insecurity of tenure could exist, but sees no relationship with the current land policy, which in his view is not open for discussion.

Regional administration seems to be actively taking it into their own hands to address the land tenure insecurity issues. The direction and action taken to address this problem differ in each region. However, effort at the Federal level to harmonize this would seem appropriate. In this regard, bringing AEZs could be

helpful in assisting the identification of the type of tenure system that would be suitable to the comparative advantage of areas in terms of its natural resources endowment and development potential. For example, AEZs that are suited for intensification of cereals, high value and cash crops (requiring high inputs) and commercial production of perishable and non-perishable crops could respond better to an incentive structure that has a well-defined property right and tenure system. On the other hand, the current tenure regime may be more appropriate in the sparsely populated lowland and pastoral areas (where there is communal ownership) or some of the mountain and per-humid areas, which are suited for forest, wildlife and perennial products.

Appropriate policies and incentive mechanisms that would dramatically increase wood supply at farm and community level is central to addressing the fuelwood crisis. Agroforestry can help the need for fuelwood while at the same time serve as livestock feed, source of cash, and enhancing soil organic matter. There is now more security in tree ownership around the homestead than in the Derge's time, but the Government still needs to ensure that the utilization of trees and forests is clearly established and respected at regional level. There should also be greater emphasis on on-farm tree planting and targeting rural women to be increasingly involved in tree planting and receiving fair benefits in extension messages. Clear guidelines for tree ownership by individuals and community-based organizations could help in the development of the wasteland and degraded areas in the community. Private sector involvement has been discouraged in forest development and the role of commercial forestry has been insignificant due to state owned monopolies on markets for wood and wood products. Through appropriate incentive mechanism such as the provision of land tenure and tree ownership, private sector could contribute to substantial increase of wood supply in urban and near urban areas.

There are also no clear guidelines and effective enforcing mechanisms in the management of forest and



woodlands. The previous Government relied on the Peasant Association and the MoA Extension agents to strictly implement (at times through coercion) any unauthorized cutting of trees and woodlands. Extension agents no longer interfere in such matters. In the absence of strong community organization and stumpage fee, there has been “free-access” to forest and woodlands in many regions resulting in the depletion of forest resources. This impact is particularly severe in the vast rift valley area of the Southern Oromia and Southern Nationality regions that are rich in biodiversity. Traders, intermediaries and charcoal producers are exploiting the few remaining natural forest resources along the major road and urban centre (extending about 300 km from Awassa to Addis Ababa) beyond its regeneration capacity. Urgent action and coordination of effort between Federal, Regional, and local levels is needed to reverse this trend.

The role food-for-work (grain and edible oils) has played and will continue to play in soil conservation, land rehabilitation and afforestation cannot be underestimated among most vulnerable households who live in highly degraded areas. However, in the past there have been many instances when food aid has been a disincentive in undertaking individual and community action in natural resource management. Caution has to be taken so that food aid will not be a disincentive from taking away other voluntary and self-help activities in the community. Here again the role of local and community organizations will be essential in creating awareness of the targeted role of food-for-work and distributing benefits from such programmes.

The need for a clear national land-use policy in guiding and regulating the country’s agricultural and rural land was underscored at the Rural Development Workshop in November 2002. This has contributed to inefficient utilization of natural resources and degradation. The “open-access” to natural woodlands noted above is partly the result of such an effective policy at the regional level. Thus, formulating a proper land-use policy and establishing its appropriate institutional set-up at the Federal level and

coordinating it closely with regional level administration as recommended at the last November Rural Development Workshop, should be given serious consideration.

POPULATION PRESSURE AND RESETTLEMENT

As noted earlier, Ethiopia’s population is expected to double to 130 million by 2030. The majority of this population will make their livelihood in lands that are currently classified as moderately to severely degraded areas (mainly in the Ethiopian Highlands). By 2030, most of the moderately degraded land could be severely degraded unless there is significant migration to other areas, less dependency on the agriculture sector and massive conservation activities, which so far has not happened. Thus, the Government will continue to confront this colossal task in its effort to achieve food security.

The movements of people (in millions) from the densely populated northern regions to the south and southwestern regions took place quietly under the Imperial Government as major roads and infrastructure were expanded in these well endowed areas (i.e. coffee growing regions) generating opportunities for the private sector. Government-directed resettlement as a policy began after the 1974 famine and then on a much larger scale after the 1984 famine which affected about 8 million people. Referring to the victims as “environmental refugees” the Derge unleashed its resettlement policy of moving over 1.5 million people from the famine-affected areas of the north to the southern and western regions. Objective criteria was also established for resettlement by the MoA (Land-use Policy Department) that was based on environmental consideration, which included: very rugged topography, farm slope exceeding 35 percent, severe deforestation and soil erosion; poor soils, frequency of drought in the community; population and livestock density and land size. Thus, in principle there was legitimate ground for resettlement, but in reality, it was carried out in a coercive manner and the “large-scale” schemes turned



out to be catastrophic to the health of settlers as well as to the new environment where they settled (Dessalegn, 1989; Pankhurst, 1990; Dejene; 1990). Settlers were very dependent on food aid since production was quite low. The few exceptions where resettlement seems to have resulted in relative self-sufficiency is where farmers were given land to cultivate in a peasant association in the highland areas of Keffa and Ilubabor (now the Oromia region), which has relatively similar climatic conditions to area where settlers came from.⁷

As indicated in SDPRP, the current Government also attaches significance to the role of resettlement in reducing the enormous pressure exerted on land in drought-prone areas, which has severely limited its productive capacity. The Government has now officially acknowledged that it has and plans to undertake “intra-regional voluntary settlement schemes” to sparsely populated and under utilized areas as one of the key instrument in attaining food security in a very short period of time (three to five years). The Government’s intention was spelt out in the recent Workshop held on Food Security and Resettlement at the Prime Minister office in Addis Ababa, 13-14 June 2003, which was attended by high-level Government officials and the donor community. A major assumption made by the current Government for resettlement is similar to that of the previous one - allocating land to the surplus rural labour force in the land abundant areas could dramatically increase food production at minimal cost.⁸ The only major departure from the Derge policy is that it will be limited within the existing administrative regions, which is a severe constraint and not an asset as will be examined below. The issue of voluntarism becomes secondary (the Derge directive also professed that its resettlement programme was based on voluntarism)

when the Government intervenes in such a heavy-handed way mobilizing all its resources and bureaucracy to plan and executes a resettlement programme, without presenting other options to the most vulnerable segment of the population.

The Government resettlement programme will involve 440 000 heads of households (totalling 2.2 million people including their families) in four regions (namely, Amhara, Oromiya, Southern Nations, Nationalities, and Peoples Regional State (SPNN), and the Tigray Region) for a three-year period. The Amhara region will have the largest group of settlers with 200,000 households, followed by Oromiya and SPNN with 100 000 households each respectively and Tigray with 40 000 households (MRD, 2003). The total cost of resettling the above population (that includes food ration before next harvest, cost of plough set and hand tools, cost of utensils, cost of improved seed, community infrastructure, transportation, etc.) is estimated at about US\$155 million (MRD, 2003).

The claim by Government officials that cost is the major constraint facing resettlement does not seem to be a convincing one (although the Government faces severe financial constraints to undertake such a scheme on its own). The focus should be, however, whether the assumptions made for resettlement by the Government are valid and whether it is a viable and sustainable option to attain the stated objective, worthy of such a massive involvement by the Government. There is no systematic analysis of land use potential for smallholder farming in the last decade as the Land Use and Planning section (under MoA at Federal level and previously well staffed) is now barely functioning with only a few experienced staff. In the absence of such a

⁷ Author did extensive field research (1987-89) visiting resettlement area in Keffa, Ilubabor, Wellega and Gambella (now under Oromia and Gambella region) and areas in Wollo where many families settled.

⁸ The Prime Minister of Ethiopia called upon to set aside past dogmas against resettlement, which he himself has been responsible and appealed to the international community for support for the voluntary resettlement programme. He stated that resettlement is one of the quickest and the cheapest option to attain agricultural-led growth and make a dent to the worsening food security situation and overcoming the dependency on food aid.



reliable data, there is some question about the validity of the land being abundant in Ethiopia, particularly given the accelerating rural population growth in the past decades⁹. Oromia seems to be one of the few regions that have undertaken some systematic feasibility study on the potential resettlement sites and such a study is urgently needed in other regions.

Preliminary discussions with informed people suggest that the only large tract of barren land in the Amhara and Tigray regions exist close to the Sudan border in lowland areas previously known as Humera, where resettlement is currently being undertaken. The dominant habitat in this area, however, is naturally grown incense and gum tree. There is growing concern among experienced staff in MoA at both Federal and local level if finding pockets of suitable land for subsistence farmers in this frontier area is the best option when the area is suited for large-scale commercial farming. This area is highly infested by malaria and livestock diseases and requires major health and infrastructure investment to make it suitable for settlements. All indication suggests that outside the previous Humera area (now covering areas in both the Tigray and Amhara regions), it is not feasible to allocate land to new settlers within an existing farming community (Kebele) given the diminishing size of the cultivated area in both these regions (often less than half a hectare of land). Even if redistribution of land is allowed (which is against the current land policy), cultivating less than half a hectare, is unlikely to be economical or sustainable, unless it is irrigated.

By far the most comprehensive feasibility study on potential resettlement sites was undertaken in the Oromia region based on extensive fieldwork. Various stakeholders were asked about the availability of space, adequacy of moisture, the productive capacity and constraints, availability of infrastructure and capacity available for handling resettlement (Regional State of

Oromia, 2002). The findings of the study dispel the claim that Oromia has vast unoccupied land in reliable rainfall areas that can accommodate a large influx of settlers. Out of the 31 potential resettlement sites identified suitable for resettlement only five sites were considered as having potential for immediate resettlement under rain-fed conditions. About ten sites were not worthy of consideration since there is limited availability of land and high climatic risks while six sites have potential for possible eventual resettlement if provision is made for wildlife buffer zones, grazing lands, anti-malaria and anti-tsetse measures. All areas in Bale were found to be risky for rain-fed agriculture except five sites with irrigation potential requiring considerable investment. Another five sites were identified for frontier expansion in the valleys of Gibe, Dedessa and Birbir rivers, which has considerable empty land with adequate rainfall. However, these areas in the valleys are home to one of the few remaining forests and wildlife resources and have rich flora and fauna. The study advised against opening this virgin land and instead using land given to former state farm for resettlement purpose. In all, the study identified about 72 100 ha of suitable land for rainfed cultivation, 5 500 for irrigated agriculture in the priority resettlement area, which can support about 26 000 households in Oromia region (Regional State of Oromia, 2002).

Preliminary examination of unoccupied potential arable land in Southern Nations, Nationalities, and Peoples Regional State (SPNN), suggests that the region does not have vast areas of land to accommodate large numbers of settlers as officially proclaimed by the Government. Using the existing database on soil, land use and vegetation map, it is estimated that only 2.6 million ha (about 20 percent) from the total area of 11.6 million ha, may be suitable partly for resettlement and partly for commercial farming. However, as the preliminary study suggested a more systematic field investigation is essential to validate the above indicative

⁹ Discussion with Dessalegn Rahmato, Forum for Social Studies, who has done extensive research on land tenure issues in Ethiopia.

figure.¹⁰ Significant amount of suitable land is located in Bench-Maji and the Debub Omo and Semen Omo zone and Konso, Amoro, and Burgi and especially Wereda that have distinct ethnic and indigenous people and a forest ecosystem rich in biodiversity resources. Thus, opening these areas for resettlement without a more detailed investigation could result in devastating environmental impact that should be avoided.

Perhaps a more pertinent policy issue in resettlement is whether it could significantly contribute to relieving the pressure in the densely populated and famine-prone areas as well as making settlers productive in their new environment. In this respect, the current Government target of moving 200 000 households (47 percent of total households to be resettled) from one part of Amhara region to another part of Amhara region and similarly 40 000 households (9 percent of the total households) will be insignificant to the enormous challenge it faces to avert natural resource degradation in these regions that are affected by successive drought and famine. In this regard the findings presented in Table 2 provide insights that resettlement within regions will not improve food security or rural income considerably in the long run. As indicated in Table 2, the “restricted” migration scenario (within administrative regions and no conservation) have the lowest food per capita and value added per capita for the rural population by 2030.¹¹ Even under “free” migration, with conservation measures and controlling malaria and livestock diseases, there will not be that much of an increase in food per capita or per capita revenue for the rural population by 2030 (Sonneveld, 2002). Thus, it would be more prudent for policy-makers to consider the resettlement impact on a long-term time horizon and examine other options that

could make a significant difference in increasing food production and rural income while reducing the pressure on natural resources in drought-prone areas. One such option could be diversification of farming systems and enhancing alternative livelihood outside the agricultural sector, which is examined below.

BROADENING THE LIVELIHOOD BASE AND DIVERSIFICATION

Absorbing excess labour in the rural sector is a formidable challenge facing Ethiopia. Policies that go beyond food production and consist in the broadening of the livelihood base and expanding opportunities through employment generation and income diversification in the non-farm sector will be crucial. Such policies will increase access to food, reduce the need for resettlement and the ominous threat of the expanding rural population on the natural resources base. Such an approach could stimulate and stabilize the demand for food (without directly increasing food supply) as would production-oriented agricultural intensification policies. It could also be a significant linkage area to reduce the enormous pressure exerted by the impact of the population structure on the rural economy and natural resources (leading to the “vicious cycle”). The population structure consists of over 20 percent of youth (age 15-24) and is estimated to double from 13 million to 26 million by 2030. Similarly, the total number of women of childbearing age is also expected to double to 35 million by 2030, of which 75 percent will be rural women. (CSA, 1999).

Recently, international development agencies (notably the United Kingdom Department for

¹⁰ Discussion with Gizachew Abegaz, Senior Land Use expert in MoA who has done preliminary investigation of land use potential in SNNP. According to Mr. Gizachew more systematic study based on fieldwork is needed to ascertain land potential in this region since there is limitation to this study which is based on arial map and scale that may not adequately capture the variation on land use.

¹¹ Sonneveld study (2002) which assumes no conservation measures under both “restricted” and “free” migration is more likely to be the case in Ethiopia unless the Government makes major investment in conservation and extension activities. Experience shows that farmers moving into a new area are less concerned to maintaining conservation and more preoccupied in securing food and other basic necessities for survival. This often results in very damaging way of clearing land for cultivation and fuelwood.



International Development) and several local NGOs are using the sustainable livelihood approach through various activities at local level. In this context, however, an alternative livelihood system would focus on small-scale and labour intensive enterprises that use local resources and skills; that are equally accessible to women; that reduce the pressure on natural resources; that have forward and backward linkages to the farm and non-farm sector (in both production and consumption); and that are environmentally sustainable.

In pursuing the rural livelihood strategy, the following considerations are noteworthy. The first involves expanding and improving marketing of primary products to small towns and urban areas, for which a particular area has comparative advantage. This includes activities such as beekeeping, poultry raising, fish culture, fruit growing and cattle, sheep and goat fattening. The second entails small-scale processing enterprises (cottage industries) such as grain milling, oilseed pressing, dairy product marketing, leather tanning and pottery that can generate income to rural households. Thirdly, such enterprises and activities have to be suited to the local natural resources endowment and ecological conditions, build on local productive potential, and address social factors (ensuring the participation of women and youth). Fourthly, it would require enabling policies and support to provide access to markets, infrastructure, extension, and credit.

Many of these small-scale ventures are suited for the local private and informal sectors, but their involvement at present is very limited. Private sectors are often reluctant to invest freely in regions to which they do not belong since regional ethnic politics (a prime consideration in the formation of regional boundaries) could make it difficult for them (regional bureaucratic red tape and hostility in some cases as noticed in the Oromia region) to function if they are not native of that region. The “informal” sector is not well understood in rural Ethiopia. However, it has the potential to be a vehicle in promoting rural livelihood, particularly for women who rely on informal activity for some share of their income.

Thus, rural livelihood strategy is another important linkage area that brings a positive synergy to address the poverty and natural resources degradation trap. With appropriate policies and incentives it could be a viable option in generating employment in the non-farm and informal sector, diversifying farming systems (reducing dependency in cereal crops), increasing access to food, improving the conditions of women, youth and the poor, and reducing the pressure on natural resources and demand for large families. These incentives also have great potential in creating small towns and in absorbing the surplus labour force in rural communities thereby reducing the need for resettlement or rural to urban exodus.

Table 4. Matrix Showing Key Policy Issues and Required Actions in Natural Resources Management

Key Intersectoral Linkage Area	Diagnosis of the Problem	Government's Strategy and Actions	Responsible Institutions
1.Community and Grassroots Organization	<ul style="list-style-type: none"> ■ Lack of strong community-based organizations to facilitate NRM and self-help activities ■ Limited involvement of local people and absence of institutions that protect their interest ■ Limited incorporation of indigenous practice in land, water and forest policies 	<ul style="list-style-type: none"> ■ Introduce enabling policies and legislation at the Federal and Regional levels ■ Support,strengthen and up-scale indigenous local organizations to assume cooperative and development roles 	<ul style="list-style-type: none"> ■ Cooperative promotion Bureau under the PM office ■ MRD and MoA ■ Bureau of Agriculture at Regional and Woreda level ■ Traditional and indigenous institutions, Cooperatives,NGOs and CSO
2.Empowerment	<ul style="list-style-type: none"> ■ Lack of active participation in decision- making and technology generation by local people and farming communities ■ Limited access to women to training,extension, credit and gender-specific innovations that reduce time spent on chores 	<ul style="list-style-type: none"> ■ Devolution of authority and empowerment of local and community organizations ■ Focusing on simple and low cost technologies that ease women's work burden (i.e. fuelwood and water collection) 	<ul style="list-style-type: none"> ■ Bureau of Agriculture at Regional and Woreda level ■ MRD and MoA ■ Traditional and indigenous institutions, Cooperatives,NGOs and CSO

Table follows on the next page →



Table 4. Matrix Showing Key Policy Issues and Required Actions in Natural Resources Management

Key Intersectoral Linkage Area	Diagnosis of the Problem	Government's Strategy and Actions	Responsible Institutions
3. Natural Resources Endowment and AEZs	<ul style="list-style-type: none"> ■ Need for objective criteria and indicator to assess comparative advantage of specific areas before formulating development strategies ■ Extension approach narrowly focused on increasing crop yields, with increased application of inputs irrespective of their potential 	<ul style="list-style-type: none"> ■ Introduce and support community-based integrated natural resources management as an extension programme that would broaden the scope of traditional SWC and incorporate technology generation and dissemination in rainwater harvesting, livestock feed improvement, agroforestry development ■ Ensure that Extension-research programmes develop low input technologies that are affordable to farmers, suitable to various AEZs and incorporates indigenous knowledge and practice ■ Include farmer in all trials before formulating and disseminating technical packages 	<ul style="list-style-type: none"> ■ MRD and MoA ■ Bureau of Agriculture at Regional and Woreda level ■ Ethiopian Agricultural Research Organization (EARO); ■ Ministry of Water Resources; ■ Traditional and indigenous institutions, NGOs and CSO

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Table 4. Matrix Showing Key Policy Issues and Required Actions in Natural Resources Management

Key Intersectoral Linkage Area	Diagnosis of the Problem	Government's Strategy and Actions	Responsible Institutions
4.Capacity-building	<ul style="list-style-type: none"> ■ Lack of skilled experts in areas of NRM at all levels ■ Need upgrading extension agents skills in NRM (mainly focused on crops and land) ■ Shortage of trained women extension agents, particularly at Regional and Woreda levels 	<ul style="list-style-type: none"> ■ Set realistic and attainable targets adequately reflecting regional and local capacity ■ Set objective criteria in allocation of Federal funds to Regional and Wereda levels in natural resources conservation and development ■ Update and provide new guidelines to broaden the scope of traditional SWC measures ■ Train community leaders, women and local para-professionals in NRM 	<ul style="list-style-type: none"> ■ MRD and MoA ■ Bureau of Agriculture at Regional and Woreda level ■ Ministry of Water Resources ■ EARO
5.Incentives and Property Rights	<ul style="list-style-type: none"> ■ Land tenure insecurity ■ Lack of clear guidelines and enforcing mechanisms in the management of forest and woodlands ■ Lack of clear and systematic national land-use policy at the Federal and Regional level 	<ul style="list-style-type: none"> ■ Take appropriate measures to ensure tenure security at Federal and Regional levels taking into account regional, socio-economic, cultural and NR endowment of particular area/region ■ Provide clear guidelines and well-defined property rights to tree ownership and forest and woodlands utilization 	<ul style="list-style-type: none"> ■ Prime Minister's Office ■ MRD and MOA ■ Bureau of Agriculture at Regional and Woreda level ■ Land Use and Administration Authority at Regional level

Table follows on the next page →



Table 4. Matrix Showing Key Policy Issues and Required Actions in Natural Resources Management

Key Intersectoral Linkage Area	Diagnosis of the Problem	Government's Strategy and Actions	Responsible Institutions
		<ul style="list-style-type: none"> ■ Dialogue with all stakeholders regarding the current land-use policy and make necessary adjustments that are fully compatible with the poverty reduction ■ Remove any policy or price distortion and strengthen enforcement mechanism for efficient utilization NR ■ Introduce clear national land-use policy governing NR and agricultural land at the Federal levels 	
6. Population Pressure/Resettlement	<ul style="list-style-type: none"> ■ Population Expansion ■ Severe degradation of NR base ■ Improper farming and livestock practices and limited improvement in technology; ■ Limited access by rural women to education, health and agricultural technology; ■ Limited or no opportunity for alternative livelihood outside agriculture 	<ul style="list-style-type: none"> ■ Improving the status of rural women through the provision of education, health and innovation that would reduce their burden in some difficult and time consuming tasks ■ Emphasis in stabilizing yields and-integrated approach in NRM in famine and drought-prone areas ■ Employment generation in non-farm sector ■ Expanding infrastructure in the sparsely populated regions 	<ul style="list-style-type: none"> ■ MRD and MoA ■ Regional Administrative Council ■ Bureau of Agriculture at Regional and Woreda level ■ Land Use and Administration Authority at Regional level

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Table 4. Matrix Showing Key Policy Issues and Required Actions in Natural Resources Management

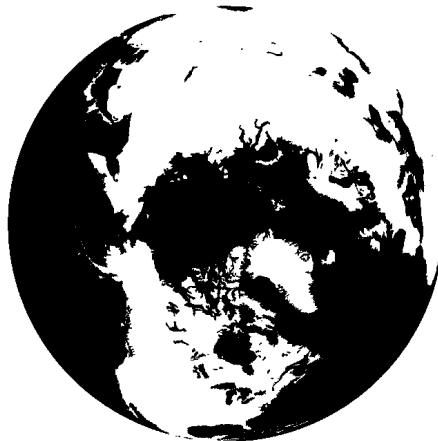
Key Intersectoral Linkage Area	Diagnosis of the Problem	Government's Strategy and Actions	Responsible Institutions
7. Broadening the Livelihood Base and Diversification	<ul style="list-style-type: none"> ■ Excess rural labour force (particularly youth and women) ■ Limited or no opportunity for alternative livelihood system outside agriculture ■ Lack of investment by private and informal sector 	<ul style="list-style-type: none"> ■ Expanding marketing of primary products (based on comparative advantage) to small towns and urban areas (i.e. beekeeping, poultry and fruits) ■ Promote small-scale and labour intensive enterprise (i.e. grain milling, oil seed and fruit pressing; leather tanning and pottery, etc) ■ Encourage and support private and informal sector to invest in small-scale ventures in the non-farm sector, particularly in small towns ■ Provide enabling policies that lead to greater access to markets, all weather roads, and credits. 	<ul style="list-style-type: none"> ■ Small and medium-scale enterprise development ■ MRD and MoA ■ Bureau of Agriculture at Regional and Woreda level ■ Rural Credit and Development Bank ■ Cooperative promotion Bureau under the PM office



Conclusion and Key Policy Issues for Follow-up

THE CASE FOR COMMUNITY-BASED INTEGRATED NATURAL RESOURCES MANAGEMENT APPROACH

ADDRESSING THE ROOT CAUSES OF THE REINFORCING CYCLE OF DECLINING CROP AND LIVESTOCK PRODUCTIVITY, NATURAL



SOURCES DEGRADATION, HIGH POPULATION GROWTH, AND VULNERABILITY AMONG VAST NUMBERS OF RESOURCE-POOR FARMERS IS A CRUCIAL CHALLENGE FACING ETHIOPIA (FIGURE 1). AS DISCUSSED IN THE PREVIOUS ECTIONS, THE CURRENT

“INTENSIFIED PACKAGE APPROACH” HAS OVERPLAYED THE PRODUCTION ASPECT, WITH INADEQUATE ATTENTION TO ECONOMIC, SOCIAL AND ENVIRONMENTAL SUSTAINABILITY ISSUES.

Maize production has increased while prices have plummeted and many of the resource-poor farmers cannot afford to invest in this package. Moreover, maize is not a staple food and not linked to the milling enterprises in small towns or cities like teff and wheat and is highly limited in generating livelihoods outside farming. Realizing the serious limitation of the package approach in addressing the re-enforcing cycle “poverty, food insecurity and natural resource degradation trap” (Figure 1), this paper has put forward the concept of a community-based integrated natural resources management, to be tested and eventually implemented under the existing Extension programme.

The integrated natural resources management approach makes a systematic effort to improve soil and land productivity; agroforestry development and other rural energy sources; low-cost rainwater harvesting; livestock improvement (including better crop and livestock integration); and expand the livelihood base in the non-farm sector using the comparative advantage of local areas. This approach does not have any package but rather a broad umbrella under which extension-research-farmers and community organizations will, in a participatory way, identify and develop the most appropriate components that would effectively contribute to arrest the “poverty, food insecurity and natural resource degradation trap” discussed throughout the paper (Figure 1). Through the interaction and linkages of key sub-sectors and components, this approach strives to bring an upward spiral by increasing crop and livestock productivity, reduce risk aversion, improving natural resources, generating income and alternative livelihood and lowering the demand for large families in rural areas.

In the Ethiopian context, the integrated natural resources management endeavour to bring a more effective sectoral integration in land, water, forestry and livestock at the community level. Past approaches have been piecemeal and top-down in addressing the issue of soil degradation, livestock feed and shortage of pasture land, fuelwood crisis, lack of rainwater harvesting and management, lack of community-based organization and limited opportunity for an alternative livelihood outside agriculture. The integrated natural resources management approach will take into account these factors systematically in a holistic manner at the community level and bring an upward spiral to avert the natural resources degradation and poverty trap indicated in Figure 1.

In the mixed farming system, the integration of crops and livestock is a main vehicle for intensification and diversification of the production system. Similarly, the fuelwood crisis faced by many rural households cannot be separated from the land, water and ecosystem management as well as from the effort to improve crop

and livestock productivity. As noted earlier, rainwater harvesting has contributed to diversification and income generation activities (including women) through vegetable gardening, fruit cultivation and livestock fattening, which has increased access to food during the dry seasons when farmers, women, and children are most vulnerable. Thus, putting these components together in an integrated manner under a new extension system at community level, will be an important step in broadening the scope of the current extension programme.

At the centre of the community-based approach is a self-help group of men and women where the community is the centralized unit that integrates the various sectors and services and promotes development and conservation activities in a decentralized way among farming communities. It aims to empower farmers and communities by putting them at the centre of all decision-making processes and should be guided by the principle self-reliance and sustainability. They can be an important means in mediating macro-policies on local situations, reducing “risk aversion” behaviour among farmers, facilitating training and human development (including rural women), encouraging the incorporation of indigenous knowledge and practices into technical packages and generating demand among farmers to adopt innovative practices and inputs.

As part of its new extension approach the Government plans to establish Farmer Training Centres (FTC) to serve as focal points for extension and training. In each community (kebele) there will be a specialist in crop production, livestock and natural resources development. It is not clear what the natural resources development component will include. It would seem highly appropriate if the community-based integrated natural resources management approach with all or some of the key elements discussed above (depending on local conditions) is pilot tested as part of the FTC natural resources development component. This is also in line with one of the recommendations of the November 2002 Rural Development Workshop



which suggested that the extension programme introduces an integrated natural resources management approach consisting at least of soil management, small-scale water harvesting and forest conservation and development (as integral component) at the farm and community level.

BROADENING AND REFORMING THE INTENSIFIED PACKAGE APPROACH

Stabilizing yields, arresting the degradation of the natural resources base and reducing vulnerability to famine should also be at the centre of the extension effort since most of the smallholders live in marginal and drought-prone areas. Risk aversion is a major constraint in adoption of innovations requiring some investments among many smallholders. In order to overcome this, stability in yields would be as important as increasing yields. Thus, in designing extension messages, the community-based natural resources management approach stresses that research-extension experts should work closely with farmers and local organizations and make a concerted effort to respond to the various agro-ecological zones, local resource endowment and farmers' capacity to invest in affordable soil, water and forest management techniques and livestock improvement. It also provides flexibility to introduce high value crops and cereals (depending on farmers' choice rather than uniformly promoting maize) in suitable agro-ecological zones. It will also integrate environmental sustainability issues as well as indigenous knowledge and practices and crop and plant diversity at community level.

BROADENING SOIL AND WATER CONSERVATION APPROACH

Closely connected to the need for a flexible extension programme is the urgent need to broaden the concept of soil and water conservation. As pointed out earlier, there is an implicit recognition by the MoA to this effect as reflected in its Five-Year Plan. Soil and water conservation should be seen as an integral part of

soil fertility management, good agronomic practices, rainwater harvesting, increasing fodder, vegetative cover and fuelwood products in the village and community level. In this respect, the development of manuals at the Federal level clearly underlying this new approach in natural resources management, particularly in drought-prone areas, is urgently needed. This can be further elaborated and adjusted at Regional level. The 1986 soil and water conservation guidelines (which covered only a few of the major AEZs and focused on traditional approach) need to be updated urgently. It is understood the copy of these guidelines no longer exist in many areas. It would be most timely and appropriate for the MoA at the Federal level to produce new guidelines that would take into account an integrated and community-based approach discussed in the paper and consistent with Regional and local level priorities.

RESETTLEMENT RECONSIDERED

The major reason given for resettlement since the 1970s, irrespective of the change in Government, is the environmental deterioration in the drought-prone areas, which cannot support farming activities. To be sure, there is the eminent threat to natural resources degradation beyond its production capacity in many of the densely populated and famine affected areas, particularly in Amhara and Tigray and in some parts of the SNNP regions. However, all preliminary evidence suggests resettlement within the Amhara and Tigray regions misses the intended objective. There is a justifiable case on the part of the Government to create the necessary conditions such as building infrastructure and eradicating diseases in the high potential areas of Oromia and SNPP to facilitate resettlement across regions, without directly being involved in a bureaucratic and heavy-handed way. However, the current ethnically based administrative regions severely limit resettlement from the drought-prone Amhara and Tigray regions to the southwestern part of the country (in the Oromia region) that are sparsely populated and with high potential agricultural land. Furthermore, preliminary study puts serious doubt about the Government claim on the presence of abundant

unoccupied land suitable for cultivation even in the Oromia and SNNP regions. This further weakens the Government claim that resettlement is the cheapest option in reducing natural resource degradation and attaining food self-sufficiency.

At the core of any resettlement programme is the need to undertake a more rigorous account of environmental, economic and social factors as well as alternative and promising land use potentials. Any resettlement plan should also simultaneously consider other economically profitable and sustainable land-use options. For example, as pointed out earlier, some of the sites identified for resettlement in the Amhara and Tigray regions (Humera area) are well suited for commercial agriculture and incense and gum production while some of the sites identified in the Oromia and SNNP regions are more suited for forest and wood products and biodiversity. Optimizing these alternative land use potential would have been appropriate in terms of broad-based and sustainable development that could effectively contribute food security and poverty reduction objectives. However, the current resettlement policy is narrowly focused in moving around subsistence farmers (who are often dependent on food aid) to continue the same type of production in virgin lands thus presenting an ominous danger of recreating the catastrophic environmental conditions that has necessitated such measures in the first place.

Resettlement has always been driven by political consideration at a time when the country is facing a major drought and famine crisis. However, it is possible that resettlement can be facilitated even in normal years through various alternative livelihood strategies outside smallholder farming, without the label and stigma attached to it as resettlement scheme. This would require a shift in approach in seeing resettlement as an ongoing activity while the governments role will be creating the supportive policy environment to facilitate it rather than as emergency response mechanism directed by the Government. Thus, it would be highly appropriate if the Government encourages open

discussions on this matter and undertakes a systematic study to assess the environmental impact of resettlement as well as other options before fully launching its resettlement programme.

In summary, pursuing food security objectives without protecting the natural resources base will be unattainable among the majority of small-scale farmers in Ethiopia. The community-based integrated natural resources management approach makes a systematic effort to enhance sectoral linkages for improved soil, water, forest, and crop and livestock management at the community level. It aims to bring positive synergy among these components and arrest the “poverty, food insecurity and natural resources degradation trap”, which affects a vast number of resource-poor farmers in Ethiopia. Thus, the current supply-driven extension approach, which is heavily dependent on intensive use of inputs and improved seed should be re-oriented and re-focused to address this challenge. The community-based integrated natural resources management approach (as discussed in this paper) provides a more flexible, viable and sustainable option to increase productivity, to broaden the livelihood base and to reduce the vulnerability of small-scale farmers who operate under high risk conditions.



TABLES 5-10*

Table 5. National Target for Various Soil and Water Conservation (SWC) Measures in Rain Deficit Areas (2000-2004)

No.	Type of SWC Measures at farmer's field	Target
1	SWC (terracing,moisture conservation,etc.)	500,000 ha
2	Ridge and furrow	250,000 ha
3	Contour ploughing	1,500,000 ha
4	Microbasin	13,600 ha
5	Minimum tillage	50,000 ha
6	Mulching	87,000 ha
7	Trash lines	40,000 ha
8	Intercropping	36,900 ha
9	Runoff farming	17,500 ha
10	Flood diversion	12,000 ha
11	Roof water harvesting	1300 (number)
12	Farmer field harvesting	1400 (number)
13	Contribution of medium farms	1200 (number)

* Source: Natural Resources Management and Regulatory Department, MoA 2000. The document is written in Amharic

Table 6. Five-Year Plan for Various SWC Measures in Rain Deficit Areas by Region (2000-2004)

Regions	Total target by Region	Yearly target				
		2000 (1993 Eth.c.)	2001 (1994 Eth.c.)	2002 (1995 Eth.c.)	2003 (1996 Eth.c.)	2004 (1997 Eth.c.)
Tigraye	125,000	18,750	18,750	25,000	31,250	31,250
Amhare	125,000	18,750	18,750	25,000	31,250	31,250
Oromia	125,000	18,750	18,750	25,000	31,250	31,250
Southern Nationalities	75,000	11,250	11,250	15,000	18,750	18,750
Harrari	7,500	1,125	1,125	1,500	1,875	1,875
Dire Dawa	10,000	1,500	1,500	2,000	2,500	2,500
Somali	25,000	3,750	3,750	5,000	6,250	6,250
Affar	7,500	1,125	1,125	1,500	1,875	1,875
Total	500,000	75,000	75,000	100,000	125,000	125,000

Table 7. Five-Year Plan for Ridge and Furrow in Poor Deficit Areas by Region

Regions	Total target by Region	Yearly target				
		2000	2001	2002	2003	2004
Tigraye	62,000	9,375	9,375	12,500	15,625	15,625
Amhare	62,500	9,375	9,375	12,500	15,625	15,625
Oromia	62,500	9,375	9,375	12,500	15,625	15,625
Southern Nationalities	37,500	5,625	5,625	7,500	9,375	9,375
Harrari	2,500	375	375	500	625	625
Dire Dawa	7,500	1,125	1,125	1,500	1,875	1,875
Somali	12,500	1,875	1,875	2,500	3,125	3,125
Affar	2,500	375	375	500	625	625
Total	250,000	37,500	37,500	50,000	62,500	62,500



Table 8. Five-Year Plan for Contour Ploughing Rain Deficit Areas by Region

Regions	Total target by Region	Yearly target				
		1993	1994	1995	1996	1997
Tigraye	375,000	56,250	56,250	75,000	93,750	93,750
Amhare	375,000	56,250	56,250	75,000	93,750	93,750
Oromia	375,000	56,250	56,250	75,000	93,750	93,750
Southern Nationalities	225,000	33,750	33,750	45,000	56,250	56,250
Harrari	15,000	2,250	2,250	3,000	3,750	3,750
Dire Dawa	45,000	6,750	6,750	9,000	11,250	11,250
Somali	75,000	11,250	11,250	15,000	18,750	18,750
Afar	15,000	2,250	2,250	3,000	3,750	3,750
Total	1,500,000	225,000	225,000	300,000	375,000	375,000

Table 9. Cost of Government Financial Contribution for various Soil and Water Conservation (SWC) Measures in Rain Deficit Areas (2000-2004)

No.	Type of Work	Amount needed for the programme (Eth.Birr in millions)	Community contribution (Eth.Birr in millions)	Government contribution (Eth.Birr in millions)
1.	Soil and water conservation (on farm)	500	125	375
2.	Ridge and furrow	12.5	12.5	*
3.	Contour ploughing	75	75	*
4.	Microbasin	85	85	*
5.	Minimum tillage	3	3	*
6.	Mulching	5.232	5.232	*
7.	Trash lines	4	4	*
8.	Intercropping	2.214	2.214	*
9.	Runoff farming	5.46875	1.36875	4.10**
10.	Flood diversion	2.76	0.276	2.484***
	Total	695.17475	313.59075	381.584

* Cost to be covered totally by the Community

** 25 percent of cost to be covered by the community;75 percent by the Government

*** 10 percent of cost to be covered by community;90 percent by the Government



Table 10. Cost of Government Financial Contribution from various SWC Measures in Rain Deficit Areas by Region (2000-2004) - *Ethiopian Birr in millions*

No.	Type of Measures	Tigraye	Amhare	Oromia	S.Nation. -alities	Somali	Affar	Dire Dawa	Harrari	Total
1.	Soil and water conservation (on farm)	93.75	93.75	93.75	56.25	18.75	5.625	7.5	5.625	375
2.	Ridge and furrow	-	-	-	-	-	-	-	-	-
3.	Contour ploughing	-	-	-	-	-	-	-	-	-
4.	Microbasin	-	-	-	-	-	-	-	-	-
5.	Minimum tillage	-	-	-	-	-	-	-	-	-
6.	Mulching	-	-	-	-	-	-	-	-	-
7.	Trash lines	-	-	-	-	-	-	-	-	-
8.	Intercropping	-	-	-	-	-	-	-	-	-
9.	Runoff farming	1.025	1.025	1.025	0.615	0.205	0.0615	0.082	0.0615	4.1
10.	Flood diversion	0.621	0.621	0.621	0.211	0.179	0.020	0.211	-	2.484
	Total	95.396	95.396	95.396	57.076	19.134	5.7065	7.793	5.6865	381.584

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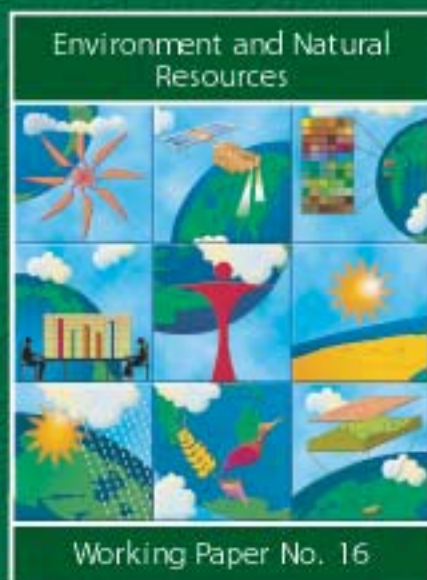
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Integrated natural resources management to enhance food security

The case for community-based approaches in Ethiopia

Securing food and a livelihood is inextricably linked to the exploitation of the natural resources base (land, water and forest) in Ethiopia, where over 85 percent of the population live in rural areas and depend on smallholder agriculture. The pressure of intense human activity and improper farming and management practices pose serious threats to the sustainability of the natural resources and maintaining ecological balance. There is a widespread problem related to intensive cultivation, overgrazing and deforestation, soil erosion and soil fertility decline, water scarcity, livestock feed and the fuelwood crisis. These factors often interact with one another resulting in a re-enforcing cycle of the "poverty, food insecurity and natural resources degradation trap". This problem manifests itself in recurrent drought and famine affecting millions of people, particularly in the Ethiopian highlands. In order to address this problem, the paper puts forward a community-based integrated natural resources management approach, which makes a systematic effort to improve soil and land productivity, agroforestry development and other rural energy sources, low-cost rainwater harvesting, livestock improvement and expanding the livelihood base in the non-farm sector under the existing National Extension Programme.



The community-based integrated natural resources management approach puts equal emphasis on stabilizing yields and reducing vulnerability (by broadening the livelihood base) among the large number of small-scale farmers who live in marginal, degraded and fragile ecosystems. It also provides a more flexible approach and a broad umbrella (not packages) under which extension-research-farmers and community organizations would develop activities/programmes to respond to various agro-ecological zones and local resource endowments and farmers' capacity to invest in low-cost and environmentally sound soil, water and forest management techniques and livestock improvement in an integrated manner. A key component to this approach is the presence of community-based organizations, which would play a central role in the empowerment of local people and provide greater incentives to manage and utilize their natural resources in a sustainable way.