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Rural Poverty, Food Insecurity and Environmental Degradation in Ethiopia:
A Case Study from South Central Ethiopia*

(Revised April, 2003)

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***Rural Poverty, Food Insecurity, and Environmental Degradation in Ethiopia:
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Summary

This paper addresses the challenge of reducing poverty, food insecurity, and natural resource degradation, and abolishing recurrent famines in Ethiopia. With a population of about 65 million, Ethiopia is one of the largest and most populated countries in Africa. Ethiopia can be regarded as a microcosm of Africa due to its vast and diverse agro-ecology and population. Physically, it ranges from 200 meters to over 4000 meters above sea level. It has about 18 agro-ecological zones and diverse population of some 85 ethnic or linguistic groups. The paper begins by addressing the conceptual relationship among food insecurity, poverty and natural resource degradation based on an extensive review of pertinent literature. The basic challenges of food insecurity-poverty- natural resource degradation discussed include: The challenge of developing and managing human resource and population growth, the challenge of developing and reforming institutions of governance, and the challenge of adopting poverty-focused economic growth policies. The relevance of agricultural and employment based development strategy is emphasized, given the fact that 85 percent of the population is currently engaged in agriculture and related activities. But, for such a strategy to succeed there is a need to adopt productive and sustainable technologies and institutions. One of the key points made is that farmers must find technologies to be profitable in order to adopt them successfully, and that such technologies can also improve sustainability. The paper further emphasizes the need to develop institutions that are incentive compatible, such as land tenure, agricultural research, and credit markets to enable and to complement the successful adoption of appropriate technologies by farmers.

The paper finally draws some broad policy implications by pointing out the critical need to adopt institutions and policies that have a positive-sum or win-win outcome. These policies include investment in agricultural research and technology; the development of institutions that provide access to modern inputs and extension services; the removal of marketing and related policy distortions; and the promotion of policies that counter externalities or spillover effects of production or those that minimize environmental costs by reducing natural resource degradation. The need to adopt a land tenure system that provides security by vesting property or legal ownership rights to farmers aimed agricultural development is one of the key policy implications of the study.

*Rural Poverty, Food Insecurity and Natural Resource Degradation in Ethiopia:
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Introduction

With a population of about 65 million and a physical size of 1.115 million hectares, Ethiopia is one of the largest and most populated countries in Africa. It is estimated that one in ten African is from Ethiopia. The country can also be regarded as a microcosm of Africa due to its vast diversity, with a physical diversity ranges from about 200 meters below sea level to over 4000 meters above sea level. It has about 18 major agro-ecological zones. Ethiopia's physical and agro-ecological diversity also extends to its population, which comprises of some 85 ethnic or linguistic groups. In socio-economic and political terms, Ethiopia has experienced, over the last 30 years, many of the problems such as civil and cross-border wars, political experimentation, economic mismanagement and decline found in the rest of Africa. Thus, there are few socio-economic, political, and agro-ecological conditions in Africa that do not have some manifestation in Ethiopia

Ethiopia's economy is primarily based on agriculture, which accounts for 50 percent of the gross domestic product (GDP) and employs about 85% of the labor force. Agriculture accounts for 90 percent of total foreign exchange earnings with coffee contributing about 60% of the total value of exports. Ethiopia's coffee exports, however, is only about 2 percent of the world coffee market. Agriculture provides about 70% of the raw material for food processing, beverages and textile industries. Hides and skins account for 20 percent of the total value agricultural exports followed by pulses, chat and animal products in that order of significance (MEDAC, 1999)

Crop and livestock production is primarily based on smallholder farming, which comprises of some 7 million farmers who produce more than 90% of agricultural products, including 98% of coffee. About 95 percent of the cultivated land is under smallholder agriculture, and the rest under state or commercial farms. About 60% of the total land area is estimated to be potentially suitable for agricultural production, although only 10 percent is currently under cultivation. Ethiopia also has a livestock population of about 31 million heads of cattle, 21.7 sheep, 16.7 goats, 7.02 million equines's, 1 million camels, and 56 million poultry. This makes the country rank first in Africa in livestock population. Much of the country's food crop production including 75% of the livestock production currently takes place in the highlands and 25 percent in the lowlands.

In spite of its vast agricultural potential, Ethiopia has been trapped in the state of food insecurity and poverty. The country has been chronically dependent on food aid, and it is currently one of the largest recipient of food aid in Africa. The average yield for food crops has been about 11 quintals per hectare, and has been growing only about 0.6 percent and lags behind the population growth of about 3 percent, resulting in an annual per capital decline of 2.4% in domestic food production. Ethiopia's population grew from 23 million in 1960 to 65 million in 2001, and it is expected to double in the next 25 years (CSA, 2001). Population growth is more severe especially in the highlands (above 1500 meters above sea level), which are home to 85-90% of farm households.

The Food Insecurity-Poverty, Low Agricultural Productivity, and Natural Resource Degradation Cycle in Ethiopia

The over-arching development problem of Africa in general and Ethiopia in particular, is the problem of poverty and food insecurity. Although the developing world has made some progress in this area over the last three years, food security in Africa has stagnated or declined. For example during 1970-90 period, the number of food insecure people in developing countries fell from 940 to 786 million, or from 36 % to 20% of the total population. However, the food insecure population in Africa rose from 130 to 170 million (ACC/SCN 1992).

Food insecurity is directly related to poverty at the global, regional, national, and local levels. Globally, about 840 million people are food insecure and/or are chronically undernourished (FAO, 1996a). Food insecurity is a result of lack of income and access to food, which is driven by poverty. Global food insecurity can be addressed through a more equitable distribution and access to food. For example, if available food is evenly distributed, it is estimated that each person in the world can be assured of 2700 calories per day, which is more than 220 minimum calorie requirements for an average person. The reality, however, is that food insecurity is major problem in all regions of the developing world as shown in table 1.

There is a strong link between lack of economic growth, poverty, and food insecurity. This is revealed by the fact the most significant reduction in food insecurity has occurred in East Asia, where the number of food insecure fell from 52% to 32% of the total population or from 475 to 268 million over a period of about 20 years. East Asia is also the region where the fastest economic growth and poverty reduction has taken place. On the other hand, the proportion of food insecure population more than doubled or rose from 11% to 26% in Africa, during the same period as shown in table 1. The projected share of food insecure population in the Region is estimated to be 39 %, which will make Africa the only region in the developing world where food insecurity is expected to increase by the year 2010 as shown in table 1.

Table 1.- Food Insecurity in the Developing World, 1969-71, 1990-92, and 2001

Region	No. of Food Insecure People* (millions)			Share of Total Food Insecure Population (%)		
	1969-71	1990-92	2010	1969-71	1990-92	2010
East Asia	475	268	123	52	32	18
South Asia	238	255	200	26	30	29
Sub-Saharan Africa	103	215	264	11	26	39
Latin America & the Caribbean	53	64	40	6	8	6
Middle East & North Africa	48	37	53	5	4	8
Total	917	839	680	100	100	100

Note:- * Refers to the number of chronically undernourished people or those whose estimated annual food energy intake is below that required to maintain body weight and support light activity. **Source:** FAO (1996a).

Many factors are contributing to trap Ethiopia, in the current state of food insecurity and poverty. These include production fluctuations, non-farm employment, low income, regional fragmentation of markets, high rate of natural degradation, low

level of farm technology, high level of illiteracy and inadequate quality of basic education, poor health and sanitation, high population growth, large indeptness, poor governance, and interstate and intra-state military conflicts and wars. These factors impede the achievement of food security and sustainable economic development. Ethiopia, along many African states, is caught up in vicious cycle of food insecurity-poverty-low agricultural productivity- land degradation cycle. This phenomenon is especially severe in the densely populated East African highlands which comprises some 90 million people, the majority of which is defined by the highlands of Ethiopia.

The food insecurity-poverty-natural resource degradation can be overcome by focusing on three basic and related development policy challenges: 1. The Challenge of Developing and Managing Human Resources and Population Growth, 2. The Challenge of Developing and Reforming Institutions of Governance, 3. The Challenge of Adopting Poverty-focused and/or Enabling Economic Growth Policies that Reduce the Costs and Risks of Private Investment on key sectors such as agriculture.

The Challenge of Developing and Managing Human Resources and Population Growth:

The most significant element in the process of economic development of any country involves appropriate investment in its population, since people are both the means and beneficiaries of economic growth and development. The quality of population is the single most important factor that distinguishes economically successful nations from failed or poor states. Improving population quality requires massive investment in education, health care including adequate nutrition, shelter, and clean water guided by an *effective* and *capable* system of governance. Moreover, there is a need for managing population growth in the developing world where the bulk of the increase in population is projected. The share of developing countries population growth is expected be 84% of the total global population growth by the year 2020. Over this period, the relative increase in population growth will be the greatest in Africa, where it is expected to double from the current 0.6 billion to 1.12 billion. Ethiopia's current population of 65 million is expected double by 2020. Poor education, health, and adverse demographics are, in part, the outcome of ineffective policies and long economic decline. With rapidly growing population, Africa must reverse the marginalization of its people, especially its female population, and strengthen their capabilities and capacity. Africa loses twice as much labor through illness as any other region. This disparity will increase as HIV/AIDS incapacitates 2 to 4 % of its active labor force and depletes skilled population of the Region(World Bank 2000). Ethiopia is among the top three countries affected by the AIDS pandemic, with drastic consequences for the current and future generations. The various regimes of Ethiopia and most African states have made inadequate appropriate investment in their peoples. They have neglected the critical human capital development of their societies by failing to invest in quality education, health, and nutrition.

The Challenge of Developing and Reforming Democratic Institutions of Governance

The second challenge for reducing food insecurity and poverty in Africa in general and Ethiopia in particular is that of improving institutions of governance aimed at developing *capable* and *effective* system of government at national, regional, and local levels. This challenge depends on the development of leadership that is accountable and transparent at all levels. This implies a system of governance that allocates scarce resources both efficiently and fairly across all the current regional states.

A *capable* and *effective* system of governance and leadership is possible only under a democratic system that is subject and guided by the rule of law, independent judiciary, peaceful and open political competition, and an independent press. These pillars of democracy must be built into the national constitution, with proper checks and balances that include term limits for significant political offices. Decisions should be decentralized on a non-ethnic basis by taking into consideration the cultural and economic settlement patterns of the population. The national constitution must be reformed following a peaceful, open, and a politically inclusive dialogue of all stake holders. A system of governance that is imposed from the top as it has been the case under various regimes in Ethiopia cannot be sustained in the long run.

The Challenge of Adopting Poverty-focused growth policies

The challenging of adopting enabling policies that lead to rapid economic growth is related the two challenges mentioned earlier. For Africa in general, where 70% of the population is in agriculture, an agricultural focused- strategy is the best way of reducing food insecurity and generating greater employment both in farm and non-farm sectors. Investment on agriculture focused economic growth is especially crucial for Ethiopia, where 85% of the population currently makes its livelihood in rural and agricultural related activities. Moreover, investment in agriculture must be pursued not only to reduce food insecurity, but also to alleviate poverty through employment creation and income generation in farm and non-farm sectors. It is also the best strategy for conserving natural resources or reversing land degradation and deforestation, since poverty forces poor people to overuse natural resources and forests in order to meet their basic survival needs.

Food Insecurity Security and Natural Resource Degradation in Ethiopia: The Quest for Productive and Sustainable Technologies and Institutions

As indicated earlier, Ethiopia is a large country with about 65 million people of which about 85 percent are engaged in rural and agricultural based economic activities. It has one of the lowest per capita income in the world and high incidence of absolute poverty- with 50 percent of the population below the poverty line. For example, Ethiopia's per capita income was about \$110 in 1997, and its Human Development Index (HDI), a composite index of income, life expectancy, and education ranks 171 out of 174 countries listed in the *Human Development Report 2000*, published by the UNDP. Ethiopia also faces a related problem of severe *food insecurity* that manifests itself in the lowest calorie intake in Africa at about 1845 calories per person per day.

Food insecurity, which is the opposite of food security, is defined as the lack of food access by all peoples to enough food for active and healthy life. It is a result of lack of income to acquire food from domestic production and/or food imports. It is estimated that more than half of the population is food insecure of which the largest group are located in rural areas, with insufficient land to produce and purchase food (Tesfaye & Debebe, 1995).

A major development challenge for Ethiopia is to reduce absolute poverty and food insecurity at acceptable environmental and economic costs. In order to tackle this problem and devise appropriate policies and institutions to meet the challenge, it is necessary to understand the relationships among natural resource management, technology, agricultural productivity and food insecurity. Ethiopia faces a rapid population growth that contributes to the environmental problem, which manifests itself in land and water degradation and loss of biodiversity caused by low agricultural productivity and high dependence on fuel wood (Demel 2001). Soil degradation is the severest environmental problem (Paulos, 2001). Ethiopia loses about 400 tons/ha of topsoil every year (Shibru & Kifle, 1998). It is estimated that the amount of grain lost to land degradation alone can feed more than 4 million people (Demel 2001).

Although some aspects of the environmental problems are caused by natural factors such as draught and desertification, most of it is poverty driven by human activity. Conditions of high absolute poverty induce the poor to become both agents and victims of environmental degradation. People in absolute poverty and food insecurity have the incentive for high fertility to increase the number of potential income earners in the household and to provide for old age security (Smith, 1997). Moreover, in order to survive in a subsistence economy, farmers are forced to mine soils and to cut down trees leading to land degradation and deforestation. Thus, environmental degradation becomes a result and a cause of economic stagnation and decline, which is aggravated by absolute poverty and food insecurity. To address this problem, it is necessary to identify and generate appropriate technologies and institutions that significantly reduce food insecurity and absolute poverty in a sustainable manner. In other words, the general policy research problem is to study the institutions that impact on agro-ecologically specific *productive* and *sustainable* technologies, aimed at reducing food insecurity and absolute poverty in Ethiopia.

The Environment- Food Insecurity and Poverty Problem in Ethiopia

There is a vicious cycle of natural resource degradation and food insecurity driven by absolute poverty and population growth in Ethiopia. The country is caught up in a 'poverty –environmental degradation and food insecurity circle (Shibru and Kifle, 998). This is a complex and multi-dimensional problem with no single cause. For example, population growth is only one factor, which can be regarded as both the cause and the result of the problem. On the other hand, the problem is quite surmountable since it has been overcome by many societies in the developing world under appropriate policies.

The comparative and historical experiences of societies that have succeeded in this regard demonstrate that the solutions must involve long term and sustained *investment in people*, specifically in those areas that enhance the *capability* and *knowledge* of individuals and communities to combat poverty and manage natural resources in efficient and sustainable manner. Such capability and knowledge enhancing factors (also called ‘human capital investments’) involve public and private investments in quality education, training, as well as technologies and institutions that enhance economic welfare and progress. The specific problem of food insecurity, which is closely linked to absolute poverty, can also be best addressed within this framework of possible solutions.

Food insecurity can be defined as the lack of capability to produce food and to provide access to all people at all times to enough food for an active and healthy life (World Bank, 1986). It is directly linked to *absolute poverty* and lack of purchasing power (Sen, 1983). Poverty has both *relative* and *absolute* dimensions. Relative poverty is a function of income inequality and cannot be abolished unless there is a perfect equality of income, which is not possible. *Absolute Poverty*, however, which is based on a minimum standard of basic consumption and calculated by minimum caloric intake and other necessities, can be eradicated. Food insecurity is directly related to absolute poverty, which can be analyzed at the household, community, regional or national levels (Eicher, 1998). But, mere focus on food production cannot solve the food security problem, since food security has both supply (production) and demand (income) dimensions. A successful food policy for Ethiopia needs to address both sides of the *food insecurity equation*. In this regard, a key policy research issue is to identify the combination of technologies and institutions aimed at providing both availability and access to food by local communities and regions in Ethiopia. Insuring food availability involves increasing agricultural production or supply, which can be addressed by public and private investments on what has been called the *prime movers* of agricultural development (Eicher, 1988,1995). These include public and private investments in:

1. new technology and agricultural research,
2. human capital and managerial skills produced by investments in schools, training, and on-the-job experience,
3. physical capital investments in rural infrastructure such as irrigation, dams and roads,
4. farmer support institutions such as marketing, credit, and extension services.

But, a crucial pre-condition to implement the above prime movers is a favorable public policy and institutional environment guided by a political leadership committed to agriculture.

In this regard, the adoption of an agriculture and rural-centered development strategy known as Agricultural Development-Led Industrialization (ADLI) is crucial. But, the successful implementation of the strategy still remains to be seen, since it faces major institutional impediments such as land policy. ADLI is focused on the development of smallholder farm productivity and the expansion of commercial farms. Such a strategy, if and when successfully implemented, has the potential to reduce food insecurity, absolute poverty and environmental degradation.

The Relevance of Agricultural and Employment Based Economic Growth Strategy for Ethiopia

An agricultural and employment based economic growth strategy as articulated by Mellor (1986) is the most appropriate strategy for the development of the Ethiopian economy, where 85 percent of the population is rural and agricultural based. Most of the agricultural potential is located in the Ethiopian highlands, which constitute 35-40 % of the landmass. The highlands are home to 88 percent of the population, comprising 90 percent of cultivated land, and 70% of the country's livestock population. Thus, the battle to eradicate or to significantly reduce absolute poverty and food insecurity in Ethiopia will be won or lost on the highland ecosystems. This is not to suggest that the lowlands are to be ignored by public policy. But, in fact the success in reducing poverty in the lowland or marginal lands is achieved better and faster by investing on high potential agricultural areas, due to the dynamic relationships between highland and lowland ecosystems as long as there is free inter-regional trade and mobility of labor and capital. Moreover, lowland and marginal areas can specialize in economic activities that are suited to their regional comparative advantage and benefit from interregional trade.

An agricultural and employment based strategy based on the generation and dissemination of technological and institutional changes and investments required to improve agricultural productivity and to increase farm and non-farm employment and incomes will be the primary source of growth for Ethiopia. The strategy also has the potential to lead to a poverty-focused economic growth necessary to reduce food insecurity and environmental degradation. A poverty- focused growth involves two complementary elements according to Adelman (1986). First, it must promote the productive use of the poor peoples' abundant assets such as labor by policies that harness market incentives, along with the institutions, infrastructure, and technology to that end. Second, it must provide basic social services to the poor in the form of health care, family planning, disease prevention, basic education, and nutrition services.

Conceptually, the role of agriculture the development process has three dimensions (Mellor, 1986): 1. Agricultural growth under a fixed and shrinking farmland. This requires an appropriate technology that involves land saving in the form of biological and chemical technologies. 2. Growth in domestic demand for food and farm output despite inelastic demand. The growth in food demand occurs through accelerated growth in rural employment (or increased demand for labor), made possible by indirect effects of agricultural growth itself, 3. increased demand for goods and services produced by the non-farm sector and facilitated by technology-based increase in agricultural income. These basic elements of the strategy are interactive, which require an open trading regime favorable to farm goods at the regional and international level.

For example in 2001, farmers some parts of Ethiopia were producing bumper crops due to good weather. But, they are also faced a problem low prices for their products due to weak demand and an inadequate system of marketing and transportation.

The problem of localized food insecurity can, in the long run, be addressed by developing export markets for farm commodities, by increasing rural incomes from farm and non-farm employment, and by promoting greater inter-regional trade that allows movement of food from surplus regions to food deficit regions of the country.

The critical need for moving agriculture forward is underlined by the need to increase food supply to feed a rapidly growing population, and to provide employment and income growth needed to reduce absolute poverty and food insecurity for a predominantly rural-based population. Since Ethiopia has a large pool of unskilled labor, agricultural development can relieve the growing unemployment problem. The supply of labor is a function of the labor market and the food market. Increasing employment provides the working poor with added income of which 60 to 80 percent is spent on food due to high-income elasticity of demand. If food supply does not increase, a rise in population will cause food prices to increase, reducing real income of workers, raising wages and reducing employment in other sectors of the economy (Mellor, 1986). Agricultural production also stimulates non-farm employment since increased farm incomes provide effective demand for non-farm rural enterprises.

Moreover, agricultural development makes well known general contribution to the overall national economic development and poverty reduction by increasing the supply of food for domestic consumption, by releasing labor for industrial development and non-farm sectors, by enlarging the market for industrial (non-farm) output, by increasing the supply of savings, and by providing foreign exchange earnings (Johnston and Mellor 1961). For both microeconomic and macroeconomic reasons, no country has ever sustained rapid economic growth without first solving the food insecurity problem (Timmer, 1998). At the microeconomic level, inadequate or lack of access to food limits labor productivity and reduces investment in human capital (Fogel, 1994, Strauss, 1986). At the macroeconomic level, periodic food crises undermine political and economic stability, reducing the level and efficiency of investment required for economic growth and poverty alleviation (Timmer 1998). There is also an important link between agricultural productivity and nutritional status of workers. Fogel (1991) provides a strong evidence for the importance of increasing calorie intake to reduce mortality and to increase productivity of the working poor. Using a robust biomedical relationship that links height, body mass, and mortality rates, he found increases in food intake among the British population in the late 18th century have substantially increased productivity and per capital income. So, the “Fogel linkages” which enhance the food security of the poor, can also contribute to long-run economic growth and poverty reduction.

A ‘poverty focused’ economic development policy has best chance of success if it is based on increasing agricultural productivity that result in food security and the reduction in absolute poverty. Adelman (1986) has identified two strategies to attack the problem of absolute poverty: 1. An export-oriented growth in labor-intensive manufacturing, and reliance on agricultural-led industrialization, which she believes is likely to result in equitable economic growth and poverty reduction. But, most African economies have failed to implement this strategy in the past for at least two reasons: First, there is insufficient or lack of investment in improved technologies in Africa,

unlike Asia, which has invested in green revolution technologies. Technologies that are appropriate for some agro-ecologies and crops for Africa are still not on the shelf. For example, although crops such as maize and wheat have benefited from green revolution technologies, technologies for food crops such as sorghum, teff and barley are either not on the shelf or have not been adopted. Thus, there is a need for successful generation and adoption of appropriate technologies for specific agro-ecological areas of Ethiopia. The second reason is the lack of an appropriate public policies and institutions. The problem here is that policies and institutions are short term, discontinuous, misguided and focused on transfers and consumption activities. There is critical need to face up to the long-term challenges of human capital investment and productive efficiency in agriculture. Given the current national commitment to agriculture and poverty reduction in Ethiopia at least on paper, one would expect and hope that appropriate policies would be developed and implemented in the near future.

The Quest for Productive and Sustainable Agricultural Technologies

The challenges of meeting food security based on appropriate technology and that of slowing or reversing natural resource degradation can be and should be pursued together in Ethiopia. An appropriate technology is one based on *induced technical change* as articulated by Ruttan (1998). It involves the adoption of labor-intensive biological and chemical technologies that increase yield increasing and land saving.

But, there may be lack of locally and environmentally specific technologies in Ethiopia. Indeed, successful agricultural development and sound natural resource management are complementary (World Development Report, 1994). Productivity and sustainability problems are two sides of the same agenda, which are also linked to the absolute poverty and food insecurity problem. Currently about half of the Ethiopian population is below the poverty line and food insecure. The goal of cutting poverty level by half or to about 25% below the global poverty line is achievable within the next decade if proper combination of *productive* and *sustainable* technologies and institutions are adopted. Indeed this is a realistic goal that should be pursued in Ethiopia during the next decade with proper policy and institutional environment. For example, Malaysia reduced the population below poverty from 50 percent in 1970 (which was about the same as the current level in Ethiopia) to about 10 % in 1990 (World Development Report, 1990).

Agricultural productivity, measured in terms of average (or marginal) factor productivity (land, labor, and capital), depends on technology, quantity, and quality of the factors used. A key technological issue is the type of technology farmers can use under a growing population, diminishing farmland, and land or soil degradation. Is the technology profitable or sufficiently productive to meet food security needs, and can it be sustained with the resource base of the various agro-climatic zones of the Country?

In this regard, two broad technological options of agricultural intensification have been identified in the literature (Reardon, 1998). First, a traditional or a low-input sustainable agriculture (LISA) technology based on meeting soil fertility needs through application of organic matter and indigenous soil conservation techniques, and second, a combined use of LISA with farm intensification based improved technologies aimed at meeting the goals of productivity and sustainability in agriculture. A number of recent papers under the theme of "Sustainable Intensification of Agriculture in Ethiopia" discuss the issue of

farm intensification including some of institutional and technological requirements (Solomon et al., 1996).

Some environmentalists and agricultural scientists have been pushing LISA strategy, which alone cannot meet the goals of productivity or food security and resource sustainability goals in Africa (Low 1986). LISA has the potential to increase food production by only 1% a year, which falls short of meeting the annual increase in food demand of at least 3% or more for Ethiopia to keep up with population growth. If food security cannot be met with such a strategy, farmers are likely to engage in activities such as soil mining and clearing forests on fragile lands. Thus, rising absolute poverty and food insecurity drives natural resource degradation. Poverty or food insecurity drives farmers to adopt farm extensification practices that is environmentally damaging (Reardon, 1998). Indeed, studies have shown that if LISA food production strategy instead of Green Revolution technologies had been pursued in South Asia since 1960s, 44 million acres of land, which are now under forest, would have been under cultivation (Tribe 1994). This evidence suggests that biodiversity, which is one of the goals of sustainable natural resource management, has been enhanced in Asia by the land-saving productive green revolution technologies. In Ethiopia, there is evidence that farmers can adopt improved agroforestry and soil conservation practices only under more secure land tenure system (Berhanu 1998, Beyene, 1996)

Thus, the challenge is to adopt agro-ecologically focused and locally specific technological options in Ethiopia aimed at slowing or reversing resource degradation. Moreover, according to Bekele and Holden (1998), “the challenge of breaking the poverty-environment trap and initiating sustainable intensification requires policy incentives and technologies that provide short-term benefits to the poor while conserving the natural resource base”. It is important to transform subsistence agriculture to science-based intensive agriculture by adopting promising indigenous practices combined with selective use of improved technologies such as inorganic fertilizer, better equipment, improved seeds, and improved soil conservation and agroforestry practices. Improved technologies and use of farm capital is the most promising path to achieve the goals of greater productivity, food security, and sustainability in most agro-climate zones (Reardon, 1998)

Institutions for productive and sustainable technologies in agriculture

Institutions in general are *rules of the game* that shape human interaction including economic interaction (North 1990). Economic problems such as hunger, poverty, war, and unemployment are result of institutions that provide rationale people with *incentives* to behave in a destructive rather than constructive manner (Van Den Berg, 2001). Institutions and organizations are not always the same, although they are sometimes used as such. Institutions are *rules* of the game while organizations and individuals are the *players* (Kasper, 1998).

Markets are institutions that evolve and develop overtime as a form of ‘institutional capital’ of a country, and must be allowed to evolve with proper public policies. In agriculture, institutions must be developed that provide farmers the *incentives* to save and invest in farms and to adopt productive and sustainable technologies.

Johnston (1998) notes that in addition to farm level technologies changes that improve land and crop varieties, institutional or “socially determined factors” in the form of public investments in areas such as agricultural research, extension, infrastructure, and enabling macroeconomic policy environment are essential. For example, a clearly defined and secured land tenure system is a key institution that promotes incentives for farmers to adopt improved technologies and to protect natural resources.

A sustainable technology involves *farm-capital* intensification that takes place in two stages. First, it involves labor-intensive application of manure and construction of traditional land improvements (planting grass strips, anti-erosion ditches, earthen bunds). Second, it requires increased use of improved soil conservation practices based on modified animal traction equipment, land saving chemical and biological technologies such as fertilizer and improved seeds. *Sustainability* here means successful management of resources for agriculture aimed at satisfying the changing needs of communities, while enhancing the quality of the environment and conserving natural resources (CGIAR, 1988). But, whether farmers can move to the second stage in the long-run will depend on institutions and policies that promote agricultural profitability, and provide access to cash or credit to farmers to purchase or produce farm capital (Reardon, 1998).

In general, a successful intensification practices compatible with goals of productivity or food security and sustainability requires the following conditions (Reardon, 1998): 1. public investment in the development of rural infrastructure such as feeder roads, small-scale irrigation infrastructure, and dams. 2. The development of input (labor, capital and land) markets. Improvement of input markets is necessary to reduce transaction costs and to improve the efficiency. 3. Appropriate macroeconomic policies that get “prices right” are important. Policies must make both factor and product prices favorable to farmers. The liberalization of markets for farm products since 1991 in Ethiopia has been the right policy in the long run, but the development of institutions that govern the development of *factor markets* (labor, capital, and land) is crucial for Ethiopia. For example, labor market policies should facilitate the free movement of labor and capital across agro-ecological regions.

Flexible, pragmatic, and informed public dialogue on land policy aimed at eradicating rural poverty and food insecurity is crucial. For example, since farmland is an increasingly scarce input, land markets should be allowed to emerge in order to allow for sustainable, equitable and efficient use of land (Teklu, 2001). There is a critical need to develop supporting institutions such as effective extension systems, and improved physical infrastructure such as roads and irrigation systems that complement market institutions.. 4. Farmers’ capacity to save and to invest in farm intensification can be enhanced by providing access to credit and to non-farm income from non-farm employment opportunities. In most agro-ecologies of Ethiopia, institutions that combine promising indigenous practices with improved technology and farm intensification approaches are required to meet the goals of productivity, food security and environmental sustainability. This will also require the availability of capital that allows farmers to use fertilizer, organic matter, and improved seed, in combination with increasing investments in soil conservation and small-scale irrigation technologies. The capacity of farmers to choose alternative technologies is critically conditioned by public

and private investments in rural infrastructure, input and output market improvements, land markets, credit policy and promotion of non-farm enterprises such as agro-industry. The challenge is to develop innovative, cost-effective private and public institutions that support agriculture under a favorable and macroeconomic and institutional environment (Reardon,1998). Indeed, in absence of appropriate rural institutions, rural poverty alleviation will be just a dream, since technological packages and credit cannot reach the small farmer (Itana, 1995).

Summary, Conclusion and Policy Implications

Over the period of nearly three decades, Ethiopia has gone through two major revolutions and several experiments with rural development policies. Both the 1974 and 1991 revolutions resulted from the inability and unwillingness by the governments of the time to undertake the necessary institutional reforms to transform the rural economy where the majority of the people make their livelihood. Moreover, what has remained constant during nearly three decade of institutional experimentation and turmoil are the top-down or the elite-driven nature of development policy making process, and the high level of poverty incidence and recurring famines in the Country. The per-capita income of Ethiopia during the period since the revolution of 1974 has not changed. It has fluctuated between \$100 and \$120 per year, and the proportion of the population in absolute poverty has remained the same or slightly increased. For example, the per capita income in 1976 was \$100, and it was exactly the same in 1999 (World Development Report, 1978, 2000).

Ethiopia now faces the challenge of facing up to the unfinished revolution of transforming the rural economy with the aim of reducing absolute poverty, food insecurity, and natural resource degradation. This paper is aimed at studying this problem by reviewing the available literature on development policy, and by conducting a study of farmers to learn about their views on various dimensions of rural and agricultural development problems and issues that affect their lives. The study does not claim to be a comprehensive study of rural economy of Ethiopia. Rather, it should be regarded as a case study that attempts to bring “the missing element” in most studies of the rural development process in Ethiopia. This missing element is the voices or views of farmers, which are the primary beneficiaries of rural development. The views of farmers, is complemented by a survey of professionals engaged in various dimensions of rural and agricultural development activities in various parts of Ethiopia.

During the time when Ethiopia experienced first revolution in 1974, some 53 percent of East Asians and 58 percent of the population in all developing countries lived in absolute poverty. Over the last 25 years, the population in absolute poverty in East Asia declined to 12 percent, and that of developing countries fell by nearly half or 30 percent (Resegrant and Hazell,). On the other hand, the level of poverty in Ethiopia has not changed over this period.

The key development policy question is whether there are lessons that Africa in general, and Ethiopia in particular can learn from East Asia to reduce absolute poverty rate by at least half, and abolish the recurring famines over the next 20 to 25 years.

The experience of East Asia suggests poverty reduction has primarily been driven by rapid agricultural based economic growth, combined with direct social spending. But, for agricultural development to reduce poverty the following conditions must be met:

- 1 Improved technology package must be available and adopted profitably by farmers,
2. There must be a relatively equitable distribution of land with secure tenure rights,
3. There should be efficient input, credit, and product markets to allow farmers to access farm inputs and receive profitable prices for their products,
4. The labor force must be able to migrate and diversify into the rural non-farm economy, and
5. Policies must be in place that do not discriminate against agriculture in general, and small farmers in particular (ibid).

Although agricultural based economic growth was a necessary condition to reduce poverty in East Asia, it was not a sufficient condition, since it only explains half of the decline in poverty. Beyond such growth promoting factors and policies, East Asia made massive investments education, health and infrastructure. The investment in education had both direct and indirect effects on the poor. The direct effect includes the enhanced ability of farmers and rural people to adopt technology and modern farm management techniques. The indirect effects include raising the educational level of parents who, in turn, ensure that their children receive education and healthier lives. Advances in female education was especially important, since it affects many other dimensions of development such as lowering fertility rates, raising productivity, and improved management of natural resources. Several empirical studies suggest strong education-growth-poverty reduction linkages.

Advances in health and education require private and public partnerships. The private sector plays an important role in health service delivery, but there is critical need for public intervention in order to improve health outcomes for the poor. Many important public health services such as immunization programs, provisions of vitamins and micronutrient supplementation to school-age children, prevention programs for HIV/AIDS and other sexually transmitted diseases, malaria; and community-based family planning services, can be provided to the poor in a cost effective manner at the local level.

Rural infrastructure plays a critical role in poverty reduction. Poor roads limit the access of farmers to markets and the ability of traders to travel to remote farm areas. Better roads also enhance competition, and promote economic diversification by linking farm and non-farm economic activities, or the rural and urban sectors of the economy. For example, a study based on 13 states in India, found that investments in rural infrastructure lowered transportation costs, increased farmers' access to markets and led to agricultural expansion. It did so by lowering transaction costs, creating higher demand for farm inputs, and leading to significant reduction to rural poverty and increased total productivity growth (TFP). For example, increased public investment on roads by 100 billion rupees in India, reduced the poverty incidence by 0.87%, and increased TFP by over 3 percent. Moreover, agricultural research and extension (R&E) increased TFP by 6.98% and reduced the incidence of rural poverty by 0.48% (Fan, Hazell, Haque, 1998)

Land reform is the other unfinished critical element of transforming the rural economy in Ethiopia. But, land reform can only lead to increased agricultural productivity and poverty reduction if complementary institutions such as research, extension, and transport services are available to farmers and rural people.

Successful land reform must include the development of legal framework for property rights and the establishment of private farms that follows a genuine privatization of state and collective farms. For example, the Indian experience with land policy reforms aimed at increasing land access to the rural poor has some implications for Ethiopia. It involved a selective deregulation of land-lease (rental) markets, a reduction of land transaction costs by improving land registration, promoting independent farmers land rights and associations at the local level, and strengthening civil society institutions to provide checks and balances to implement successful reform. An intensive recent study on the economics of sustainable management of land resources in the highlands of Ethiopia concludes as follows. *“A change in the land tenure system to ensure security of land ownership is indispensable. This serves as a guarantee for farmers’ confidence to reap the benefits of long-term investments on land such as construction of soil conservation structures, manure use, and implementation of water harvesting techniques. It is also imperative to come up with and implement a policy that ensures legal land transaction, as against the current de facto land market, for proper (and sustainable) utilization of land resources”* (Regassa, 2003, p.13).

Since the results of such policies may take time to lead to successful poverty reduction, it is important to have short-term safety-net programs that directly transfer income and social services to the poor in the short-run. These include food subsidies, public works programs, and credit programs focused on the poor. The approach must be demand driven by local communities, and target women and children. Other means of safety-net programs include public works programs that offer temporary employment during off-season period when agricultural work is limited or unavailable. Long-term benefits can be generated if such programs can be used to build rural assets such as schools, primary health services, and physical infrastructure such as roads. But, for such programs to be useful they must be accompanied by short term on the job training linked to long-term employment and development.

In general, policies that can bring about a win-win outcome of developing agriculture, alleviating poverty, and protecting the environment in Ethiopia should include: *1. Investment in agricultural research and technology*: Such investment serves the dual purpose of increasing agricultural production and protecting the environment.

It would not require trade-offs between meeting food security needs and maintaining the natural resource base. This has been the central message of the literature reviewed earlier in this paper. Ethiopia has a long experience in agricultural research that goes back to 1966, when the first national agricultural research institute was established. This institution of agricultural research must be strengthened and kept out of politics. Researchers must be supported and given appropriate incentives to conduct their research, and they must have easy access to research tools and information such as the Internet for example.

2. Access to Modern Inputs and Technology: Although research may be a necessary for agricultural development, it is not sufficient. Farmers must have access to technologies and knowledge that result from research. For example, farmers degrade soils and forests because of lack of income, but also due to lack of knowledge about appropriate methods of natural resource management.

For example in this survey, when farmers were asked as to why they may not plant trees or build soil erosion practices, a significant number reported that they lack the necessary

knowledge to do so. Indigenous practices of natural resource management can also be informed by research.

3. Removal of Market and Policy Distortions: Institutional and market distortions must be minimized or eliminated. Access to off-farm sources of employment is crucial to increase the incomes of rural communities as well as generate incomes to be re-invested back on farm and non-farm enterprises. Here, the critical issue for rural development and poverty reduction is that of appropriate land policy that allows for a more secure form of land tenure. The farmers surveyed in the two districts express fear of losing farmland through sale or redistribution. Farmers express strong desire to have land ownership title as reported by the majority (73 percent) of farmers in the two districts surveyed. One of the best ways to provide farmers the incentives to increase productivity and to protect natural resources is, to give them security of land through ownership, and to regulate possible further land concentration by legal means. Moreover, responses from a survey of rural development professionals in various parts of the country also speak with a clear voice about the effect of privatizing land. The majority of the respondents surveyed report that privatization of land is the appropriate form of land tenure to achieve long-term food security, as well as to reduce the rate of deforestation and soil erosion in Ethiopia.

4. Incentives and regulatory policies to compensate for externalities that may adversely affect natural resources: Here, the use of price based incentives such as subsidies, taxes, and other incentives are preferable to direct regulation. But, such policies must be selectively and carefully designed and used to avoid unintended resource misallocation, market distortions and control the potential for rent seeking and corruption. For example, it is better to raise taxes on additional land than to simply deny enterprising farmers to increase farm size.

In conclusion, Ethiopia can face up to the challenge of reducing absolute poverty, food insecurity, natural resource degradation and abolishing recurring famines by pursuing a poverty-focused economic growth strategy that transforms the currently low productivity agricultural sector where 85 percent of the population currently makes it's livelihood. Agriculture has served as an engine for economic development and poverty reduction in Asia over the past two decades. There is no reason why this challenge cannot be met in Ethiopia within the next two decades under a favorable institutional and policy environment. It can be met by developing private and public institutions that promote the basic *prime movers* of agricultural development which include: 1.appropriate technology generation and adoption provided by public investment on agricultural research, 2, human capital investment in people through public and private investments on education, health, and training programs, 3.investments in infrastructure such as roads, dams, and irrigation facilities, and 4.investments in agricultural support institutions such as credit, marketing, fertilizer and seed distribution systems. Massive effort aimed at transforming agriculture along these lines will enable Ethiopia to break out of the current vicious cycle of poverty-food insecurity- natural resource degradation.

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