

**ENVIRONMENT STRESS AND INCREASED VULNERABILITY TO IMPOVERISHMENT AND SURVIVAL IN RURAL
ETHIOPIA: A SYNTHESIS FROM EXISTING EMPIRICAL EVIDENCE¹**

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ABSTRACT

Households living in ecologically fragile and marginal areas are vulnerable to climate-based production and income shocks, and high transitory poverty and food insecurity consequently as evident from large downward variability in food consumption and periodic famines. There are recurrent processes underlying the persistence of famine conditions: (i) degradation of natural resources in its different manifestations (i.e., increased aridity and frequent droughts, soil erosion and fertility decline, moisture stress); (ii) deterioration in crop income marked by declining productivity, increased production variability and thinning in crop diversity; (iii) weakness in livestock to buffer income in time of crop failure (coincides with decline in livestock production, increased disease and heightened death); (iv) insufficiency of other sources of income and assets to compensate for loss in crop and livestock incomes (other income sources are often positively covariate with agricultural income and covariate to common shock); (v) non-resilience of rural markets under distress (often tend to cause large deterioration in terms of exchange); and (vi) thinning of options for smoothing consumption including publicly provided safety nets. The case of Gurageland is illustrative that conditions of environmental stress, population pressure and impoverishment do not necessarily translate into famine where rural infrastructure and markets are better developed, income sources are diversified into non-local and non-covariate income sources, and support networks are resilient. However, the fundamental development challenge of overcoming structural poverty still remains in rural Ethiopia at large.

1. INTRODUCTION

Ethiopia has a diverse biophysical environment. The highlands, which account for 43 percent of the total highland areas in Sub-Saharan Africa, cover about 40 percent of the total land area in Ethiopia, more than 93% of the cultivated land, and the home for nearly 90 % of its human and 75 percent of its livestock populations³. The highlands exhibit varied topography and climate, high population and livestock density, and integrated crop-livestock farming systems. On the other hand, the lowlands account for more than 60 percent of the total area, about 12 percent of the human population and close to 30 percent of the livestock population. The lowlands exhibit low and highly variable rainfall distribution, sparse vegetative cover, extensive pastoral-based livestock farming, and low population and livestock density.

According to the latest agro-ecological mapping (NMSA, 1996), there are at least 18 major agro-ecological zones in the country. About 55 percent of the total land area constitutes moisture-stressed arid and semi-arid areas with less than a four-month of period of crop growing. The land is not suitable or marginally usable for rain-fed cultivation because of severe moisture stress. No crops are grown in most of these areas or are grown with a high-risk of crop failure. Areas with a longer and dependable period with at least 120 days of crop growing are found in the remaining 45 percent of the total land area, particularly in the moist and humid highlands. Arable land suitable for crop farming is even less in the climatically favored zones because of topographic and soil constraints (i.e., slope, soil acidity, waterlogging, etc).

Population is growing rapidly because of slow demographic transition and strong population momentum that is already in motion. The majority of the rural population is in the highlands distributed in an inverted U shape with respect to elevation (Muluneh, 2003; Mesfin, 1991; Aynalem, 1987). And with population growing rapidly in the face of inelastic supply of arable land, population density is increasing beyond sustainable capacity in some of the highland areas—exceeding more than 500 persons per square kilometer. There is high concentration of population confined in areas with moderate to severe land degradation, particularly in the long settled highlands (for example, the maps in Sonneveld, 2002).

¹ The term environmental stress refers to increased aridity, desertification, depletion of natural vegetation (natural forests and rangelands), and degradation of properties of arable soils critical for agricultural production inclusive of nutrient depletion and moisture stress. Vulnerability is defined here in terms of the effect of environmental-induced shock on incidence of poverty (P_p), i.e., percentage of people falling below poverty threshold. High poverty incidence does not necessarily imply large absolute size of population in poverty.

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³ Figures obtained from Kidane Georgis. This author is unable to trace the sources of these estimates. Nevertheless, the fact remains that the Ethiopian highlands, like the other African highlands, account for a small share of the landmass but home and source of livelihoods for the majority of the human and livestock populations.

Pushed by environmental degradation and scarcity, farmers in the long-settled and densely populated highland areas in particular are gradually abandoning the mid-elevation zones and move upwards where the temperature is cold or descent onto the lowlands where the climate is less favorable for settlement and cultivation (for example, the cases of South Wello and Northern Shewa as reported in Mesfin, 1991). The transition zone in the highland and lowland continuum is increasingly encroached by highlanders descending into lower elevation and pastoral herders moving upwards in search of scarce arable and grazing lands, and water. But these marginal areas have not only very low carrying capacity with little resilience to withstand major ecological disturbances but are flashpoints for armed conflicts (Tesfaye, Belay and Dessalegn, 2003).

Although income sources are diversified, agriculture is the mainstay of the rural population. Farming is particularly concentrated in the mid-to-high elevation zones, especially where topography is suitable for human settlement and cultivation. Agricultural productivity is generally low and variable, and it is constrained by quantity and quality of natural resources (climate, soil, water, vegetation), shortage of assets such as oxen, absence of working adults with good health, low technological change, access to agricultural markets because of weak road infrastructure and service providing institutions.

Rural poverty is sizable contributing nearly 90 percent of the total incidence of national poverty (MEDAC, 1999). The high-order poverty estimates show rural poverty is deep as well as unequal among the poor. And since the majority of the rural poor are primarily dependent on agriculture for their livelihoods, they exhibit agriculture specific poverty characteristics such as land scarcity, poor quality of land resources, shortage of assets and working labor, low educational attainment, low technological change, and living in marginal areas with poor agricultural potential, and constrained (Bigsten, Bereket, Abebe and Mekonnen, 2003; Deracon and Krishnan, 1998; Getaneh, 1999).

The studies in rural poverty confirm the relation between poverty and environment (e.g., poverty is largely rural, incidence is high in marginal areas). Natural resources are the basic and limiting inputs into agricultural production (climate, soil and water resources) and hence influence agricultural production and related income sources. Second, environmental goods and services are the direct sources of income such as cash income from collected forest and grass products. Third, the environmental goods and services are also sources of human diets and health inputs (i.e., medicine plants). Whilst the empirical evidence is not yet established, the share of these goods is likely to be high in income and consumption of the poor, particularly in periods of droughts.

The African case studies on famine establish that environmental stress such as recurrent droughts has strong consequence on agricultural income particularly in ecologically marginal or degraded areas since the relation between rainfall and production is strong due to low soil fertility and moisture, and poor soil structure. Conditions of strong link between agriculture and income, thin and fragmented output and input markets, weak household and community support mechanisms, and insufficient institutional capacity to respond both in timing and scale of required intervention often turn into widespread starvation and population displacements (von Braun, Teklu, and Webb, 1998).

The intent of the paper is not to ask why famine occurs, but to ask why it persists. The thrust is particularly to relate environmental stress to persistence of famine and increased vulnerability to poverty in African case of Ethiopia. First, the geography of vulnerability to poverty (as well to food insecurity) is described as related to transitory poverty and frequency of famine. Second, the literature on coping strategies and mechanisms specific to Ethiopia is reiterated as benchmark to trace change overtime. Third, three cases of famine persistence are presented representing different nexus of agroecological zones, population concentration and livelihood systems. Fourth, the empirical regularities in the case studies are deciphered to identify the processes underlying famine persistence. An additional case is introduced to demonstrate that famine is not eminent always where environment degradation and scarcity occurs. Finally, the main concerns of increased vulnerability to poverty and consumption risk are highlighted especially for the poor with eroded capacity to mitigate and cope under stress.

2. GEOGRAPHY OF VULNERABILITY

The geography of poverty shows poverty is largely rural and accounts as much as 90 percent of total poverty. Although the poor live in heterogeneous agro-ecological and production environments, poverty incidence appears to be high in marginal production environments. The mapping of incidence of poverty by geographical area in Elizabeth (1997), for example, shows poverty tends to be lower in villages with adequate and stable rainfall, moderate population density, and high market access. The worst villages are characterized by poor topography and soils, low and variable rainfall, high population density and poor market access. The econometric evidence on poverty determinants (Bigsten, Bereket, Abebe and Mekonnen, 2003; Deracon and Krishnan, 1999; and Getaneh, 1999) statistically establishes that place of

residence matters (i.e., likelihood of being poor is high for those living in remote poorly endowed agricultural areas with little access to economic and social services)⁴.

The most serious environmental stress is observed in the drought-prone areas of Ethiopia. These areas are mainly located in the north and central highlands (Tigray, Gondar, Wello and northern Shewa) and their associated lowlands, the pastoral lowlands in northeast, southeast, and south, and the Great Rift Valley Lakes region that runs from northeast to south and divides the Ethiopian highlands into west and east. Most of these areas share common biophysical characteristics: short rains that are low and highly variable, light textured soils with inherent low organic matter and essential nutrients, moisture stress, and sparse vegetation.

As the evidence compiled in Baulch and Hoddinot (1999) shows, geographic areas with environmental stress and frequent occurrences of droughts (or, other natural calamities) are often subject to large downside transition as more people move below poverty line and become poor. As evident in the case of Ethiopia, the percentages of the always poor, sometimes poor (transitory poverty) and never poor account for 24.8, 30.1, and 45.1 percent, respectively. That is, nearly one-thirds of the surveyed households move in and out of poverty (or, cross the poverty line up and down). The regression results in Deracon and Krishnan, (1998) also show years of decline in rainfall (measured over a period of last five years) significantly increase incidence of poverty, holding other factors constant. And the persistence of rural poverty or rising trends in poverty indicates that more people slide and stay longer than those who move out of poverty.

Historical and contemporary records of famines in Ethiopia also show these areas are prone to natural calamities, particularly to droughts and crop failures, and consequently to famine and outbreaks of diseases (for example, Mesfin 1984; Dessalegn, 1991; Webb et al 1992; Dagnew, 1995; Markos, 1997). As the evidence from the major famines of the last three decades shows, the extent and severity of food shortage, and excess of livestock and human mortality were high in these famine-prone areas.

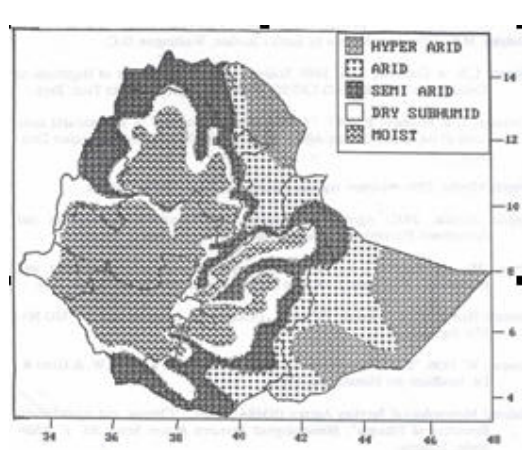


Plate 1: Moisture zones of Ethiopia.

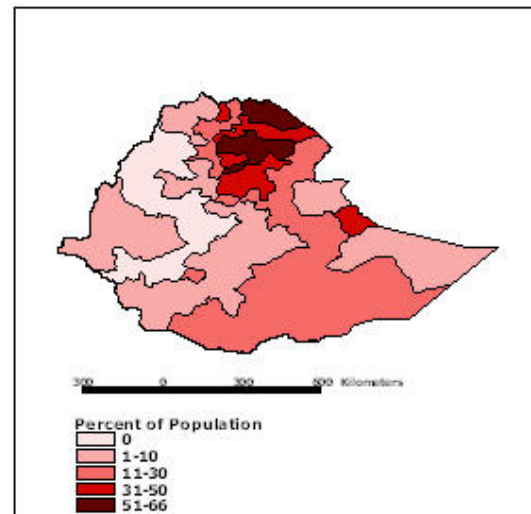


Plate 2: Percent of population in need of food assistance, 1978-88.

3. MANAGING ENVIRONMENTAL INDUCED INCOME AND CONSUMPTION RISKS

⁴ The African evidence shows that the geographical locus of poverty is globally shifting to Sub-Saharan Africa as evident from the rising share of Sub-Saharan Africa in total poverty of the developing regions. And poverty is largely rural because both population share and poverty incidence are higher in rural than in urban areas. Within Africa, country-specific studies show there is considerable statistical relationship between measures of poverty (i.e., incidence, depth and intensity) and place of residence, which represents mixed effects of biophysical environment, density of infrastructure, and market development. However, the links between biophysical environment and poverty is still tenuous except that semi-arid and arid areas are more likely to exhibit higher incidence of poverty and malnutrition with a possibly of larger transitory component because of frequent climatic-based shocks.

Rural households in developing regions face multiple sources of idiosyncratic and covariate risks that cause income and consumption fluctuations. In response, they follow a variety of ex-ante and ex-post strategies to manage risks to minimize downside variability (see WDR, 2001 for a recent literature). The types of strategies include diversification of agriculture production and income (income smoothing), and various insurance strategies that include self-insurance (e.g., asset diversification, precautionary savings, food in stocks), group-based support networks, market-based private insurance and publicly provided safety nets.

Farmers in Ethiopia commonly diversify their income sources to maximize income and pool risk. Seasonal migration is a way of pooling risks across space and increasing income by seeking employment off-season when availability of farm work is scarce in place of residence. They build diversified assets particularly varied species of livestock partly as self-insuring mechanism. Livestock-based livelihood is particularly basic in pastoral areas. Rural households network through community-based support institutions, which often greatly activated in times of need. In addition, rural households call on remittance from migrant relative and relief food assistance

When they experience repeated crop failures, they engage typically in coping strategies that involve: (1) lowering food consumption and quality (change in diet variety to basic food items, reduction in meal frequency and serving, and dependency on wild foods); (2) shifting to non-farm income sources; (3) disposing and dispersing assets; (4) greater dependency on kin and relations as sources of gift or food exchange, or place of residence for migrant relatives; and (6) abandoning communities and migrating collectively (Dessalegn, 1991; Webb et al 1992; Dagneu, 1995; Markos, 1997).

And, during periods of distress, rural communities in Ethiopia markedly increase their dependency on markets to employ most of these strategies as self-provisioning of food through subsistence production and on-farm stock is exhausted. In the case of valued assets, particularly livestock, farmers abandon their common practice of selective and gradual disposal of assets as the need for greater cash to finance high-priced food grains becomes imminent and the risk of livestock mortality increases. The numbers of those who seek employment increases appreciably albeit weak demand. Greater dependency also increases on “freely” available forest productions as source of cash income. There are some variations in coping strategies between different socio-economic groups (e.g., occupation and income groups), but the goals are similar: protecting survival whilst conserving future livelihood.

Coping with risk is not cost-free (Tesfaye, 1992). Households that are risk averse are willing to pay a premium to reduce risk. How much they are willing to pay depends on their risk aversion and variability of income. But there is a limit as to the level of such a premium. Households paying a high premium may reduce income variability, but this may be attained at the cost of risking their future food production, especially if these households live at a subsistence margin. Such a limit may be surpassed at a time of food distress due to involuntarily high costs of adjustment to prevent loss of productive assets and human lives. The costs of foregone income or consumption are high in particular for the poor.

Often these costly coping strategies fail in Ethiopia to contain large-scale distress migration, widespread starvation, and excess morbidity and mortality. This is evident from the major famines of the last three decades, the extent and severity of food shortage, and excess of livestock and human mortality in areas prone to natural calamities, particularly to drought (Mesfin, 1984; Dessalegn, 1991; Webb et al 1992; Markos, 1997).

4. PERSISTENCE OF FAMINE CONDITIONS

The country has a long history of famines. Contemporary records show famines still persist with considerable losses of lives and impoverishment. Three cases are presented below to relate environment stress to poverty and famine. South Wello is often the epicenter of famines as evident in 1973/74 and 1984/85. Famine conditions continue to occur in southern highlands known in the literature as the “Green famine” zone. Rural people in the case of Wolaita, for example, are increasingly at risk of famine. The pastoral people in the arid and semi-arid lowlands face shrinkage of their pastoral territory and economy, and experience recurrent famine conditions.

4.1. The Case of South Wello: the Epicenter of Famine

South Wello zone in northeast Ethiopia represents areas of long-settled northern highlands with variable topography, severe environmental stress, high incidence of poverty, frequent droughts and famines, history of major rural out migration, and potential “resource-based” conflicts. The zone is more than 90 percent mountainous and plateaus with rugged tops, and severely broken and long steep slopes. The soils are variable and commonly low in soil organic matter and macronutrients, particularly in the degraded landscapes. The rainfall regime is mainly

bimodal with the level of rainfall declining and its variability increasing towards the east. The eastern parts of South Wello, the lowlands in particular, experience low rainfall, high variability and frequent droughts. The historical records of rainfall in South Wello show that these areas are prone to periodic droughts (Workineh, 1987).

South Wello is a long settled with the majority living in rural areas. Rural population averages between 150 and 350 persons per square kilometer of land with largest concentration in the mid-elevations with better rainfall and soil. The numbers are growing rapidly mainly due to high rate of natural growth and settling in very fragile and marginally areas such as the drier 'Qolla' and the colder 'Wurch' zones within the highlands. In spite of problems of low and erratic rainfall, the highland farmers are also increasingly encroaching the lowlands and compete for scarce land and water with agro-pastoral and pastoral population particularly in the transition zone of the highland and lowland continuum.

Land resource degradation is extensive and severe. Very little natural forests exists in the mid to high elevation except in remote steep lands with gradients of more than 60 percent (see in particular the studies in Mesfin, 1993; Kebrom and Hedlund, 2000; Belay, 2002). The process of deforestation has progressed to the lower elevations with significant contraction of woody biomass (Belay, 2002). Loss of topsoil and associated organic matter and essential nutrients is extensive and deep (e.g., Belay, 2000) with evidence of high erosion risk without conservation treatments (Belay, 2003).

Nearly all the arable land is already converted into farmland, especially in the most populated highland plateaus. Farm holdings are small and they are declining. Land is also continuously cultivated. Farmers are pushing land expansion onto topographically marginal areas marked with steep slopes and shallow soils within the 'Woina Dega' (1800 –2400 m) and 'Dega' (2400 – 3000 m) zones (Belay, 2002, 2003) where they take out land traditionally reserved for pasture and forest, and put under intensive annual cropping. The indigenous soil fertility practices are on decline (i.e., land under fallow, legume crops in crop rotation cycle, and application of crop residues and manure) without adequate use of chemical fertilizers to compensate for loss of nutrients. Both crop and forage productivity is on long-term decline caused by falling soil fertility (e.g., Markos, 1997; Yared et al, 2002).

With increasing land scarcity, and declining soil fertility and farm productivity, farmers are under subsistence pressure particularly in moisture stressed areas where there is a strong link between rainfall and agricultural productivity. This is evident from magnified downside variability in production in time of droughts. Secular decline in rainfall translates into large decline into agricultural production as evidenced in South Wello in 1973/74 (Mesfin, 1984), in 1984/85 (Dessalegn, 1991) and in 1999/2000 (Yared et al, 2002). Frequent occurrences of droughts, as evident in the second half of the last century, means that the variability in production is increasing as the mean level of production trends downward. That is, farmers in South Wello are faced with both declining production and increased exposure to downside production risk.

Whilst typically income sources are diversified (e.g., crop and livestock production, farm and non-farm wage income, petty trade, collected products, etc), the non-agricultural income sources are not sufficient to compensate loss in agricultural income to stabilize fluctuation in total income. Whilst some households move to income sources with better returns, there are more households moving into lower-return occupations such as sale of collected environmental goods such as firewood and charcoal; casual wage labor in rural towns and petty trading. Even when agriculture produces low income, it is still the dominant income source. Opportunity for employment outside the local economy is scarce. Hence, farmers' ability to stabilize income and escape poverty is limited.

There are signs today the population is exposed to increased vulnerability to downward consumption risk (or, survival risk). Recurrent droughts are occurring, agricultural productivity is declining, physical assets are depleting, "freely" available forest resources are thinning, long-distant employment is scarce, social support networks are falling part, and surviving on lowered food intake is constrained by low body adaptability. There are fewer instruments for households to mitigate and cope with frequent drought induced crop failures. The general trend is towards progressive impoverishment and increased survival risk.

4.2. The "Green Famine" in Southern Highlands: The Case of Wollaita Administrative Zone

The Wollaita zone represents the southern highlands that are commonly characterized by diverse agroecology, high population density, scarce arable and grazing lands, intensive agriculture, chronic food deficit, and increasing vulnerability to drought and famine. It has variable topography. Rainfall is bimodal with annual precipitation averaging 1290 mm for the recent decade of the 1990s. The climate is sub-humid in the highlands and semi-arid in the lowlands with relatively high temperatures, and low and irregular rainfall.

Population is long settled. It is distributed vertically with the largest concentration in mid-elevation (Weyna Dega belt) where agricultural land is scarce and intensively cultivated. According to the 1994 Population census, the population density of the zone is 292 persons per km. However, there are densities exceeding 500 persons per km in some districts. The pressure on arable land is intense in these high-density areas where population continues to grow rapidly.

Although the soils are inherently fertile, large areas have been depleted due to erosion, leaching and continuous cultivation. The results of measurements of nutrient flows on selected fields in Eyasu (2002) show both nitrogen and phosphorous balances are mostly positive on homestead fields, particularly on fields treated with intensive organic manuring, but the outfields under cereals are mostly in negative, which are indicative of large outflow of nutrients lost to plant growth, removal of crop residues and soil erosion. Consequently, soil fertility and consequently yields are declining. Farmers practice indigenous land use and management innovations, but limited in scope and effectiveness to reverse degradation processes.

Outside agriculture, the rural households generate income from non-farm wage, trading, and remittance from migrants. Distant migration as a way to maximize income across seasons and cope with food shortage has a long history. However, the majority of the population lives on subsistence margin with little or no land and livestock and dependent on marginal non-farm income sources (i.e., casual labor, petty trade). The very poor are often without working labor, with no assets (i.e., land, livestock) and dependent on income transfers (Bush, 2002).

The rural population is increasingly vulnerable to droughts and famine, especially in the drier lowlands. The recent record shows increased frequency of droughts as in 1984, 1987, 1994, 1999 and 2000. The resilience of onset as 'famine crop' has diminished since the major droughts of the mid-1980s (Bush, 2002). Livestock holdings are on decline because of shortage of grazing areas and feed availability, drought and animal disease, and forced liquidation in time of crop failure and slow recovery. With farm size and productivity declining, scarce non-farm income and depleting assets, the capacity of the rural population has thus diminished to cope with droughts and production failures, particularly the poor.

4.3. The Arid and Semi-arid pastoral areas

The arid and hot semi-arid zones cover a large mass of land area with distinct biophysical characteristics: low and variable rainfall, low inherent soil fertility, severe moisture stress, and sparse vegetative cover. The majority of the pastoral population, who accounts 12-13% of the Ethiopian population, inhabits these agroclimatic zones (e.g., the Afar in northeast, the Somalis in east and southeast lowlands, and the Borans in the south).

The pastoral territory is shrinking. The best lands such as areas of flood-fed prime grazing lands and wet-season pastures are converted into irrigated farming. Farmers from neighboring highlands are also descending into pastoral areas, particularly into the upper limit for rangeland for cultivation. Armed conflict over scarce rangeland and water restricts availability of land for grazing. In addition to the contraction of the physical space, the rangelands are degrading. The arid lowlands are experiencing increased aridity, which are marked by declining rainfall levels and increased year-to-year rainfall fluctuations. Woody bush species are encroaching the natural grasslands and thereby reducing the grass cover (e.g., Coppock 1994 for the Borana plateau). Increased aridity, extensive loss of vegetation, and overgrazing contribute to a continuous desertification (loss of productive) of rangelands. For example, the arid regions of Afar and Somalia are under continuous threat of desertification.

Herders are responding to scarcity of grazing land by readjusting the size and the specie composition of livestock. The cattle population has been in particularly the most affected because of increased aridity and encroachment of woody bush species (e.g. Desta and Coppock, 2002 for Borana cattle population). The herd composition is shifting from cattle (i.e., grazers) towards goats and camels (browsers) to increase drought resistance, flexibility in grazing requirements, and ease of converting into cash. The pressure on rangeland is also pushing the pastoral population to ascend the neighboring highlands in search of pasture in dry season or drought year (particularly if the drought is localized).

The pastoral economy is continuously diversifying. As the recent evidence shows, agropastoralism involving livestock and crop production is rapidly growing. The numbers of pastorals shifting towards trading in livestock (i.e., business of selling milk, live animals and butchery), trading in beverages and crafts, wage employment, gathering and selling collected firewood and charcoal, renting property, and retail shops (von Braun, Teklu, and Webb, 1998; Little et al 2001). There are more people diversifying into low-return income sources with increased risk

exposure such as wage employment (men), collecting and selling forest products, trading beverages and crafts (female). Increasing diversification towards these income sources is associated with a growing impoverishment of the pastoral population.

Despite continuous diversification, however, the pastoral population now faces elevated famine risk as evident from frequent occurrences of widespread starvation and population displacements in recent years (e.g., 1999/2000, 2002/2003). Several factors work in tandem for persistence of famine conditions. First, environmental stress has increased due to aridity and frequent droughts. Second, shrinkage of pastoral territory amidst increased aridity limits pooling climatic risks over a large geographic space and thereby increases likelihood of decline in range production and livestock. Third, the traditional drought management mechanisms (e.g., diversification of herds, mobility, livestock sharing, reciprocal grazing) are not as effective to mitigate drought-induced excess depletion of livestock. Fourth, frequent occurrences of droughts in a context of ineffective drought management cause substantial decline in livestock population due to excess deaths and distress sales. Fifth, the shift to other income sources is mean-income reducing while simultaneously increasing income risk. Sixth, indigenous institutions that effectively managed common property resources, support networks, and conflicts are falling apart without a viable replacement. Finally, livestock markets, particularly in local/primary markets where the participation of pastoralists is high, are poorly developed (von Braun, Teklu and Webb, 1998; Tegene and Alemayehu, 2001). The relative prices of livestock to grain often decline in dry-season (or, drought years) as more pastoral population enters with large supply of poor quality livestock to fetch high-priced grains and thereby causing deterioration in purchasing power and effective demand for food.

The pastoral population thus remains vulnerable to increased impoverishment because of shrinkage of pastoral area and range productivity, increased risk of livestock loss, shift to low-return income sources, and degeneration of indigenous support institutions. The poor are deriving their livings from crop cultivation in a risky environment or selling firewood, charcoal and water, wage labor (e.g., herder in rural areas or casual worker in urban areas). The exceptions are the few better-off pastoral households with accumulated wealth and business skills.

5. KEY PROCESS UNDERLYING FAMINE PERSISTENCE

In all the above cases of persistence of famine conditions, the natural resources (climate, soils, vegetation and water) are the basic sources of livelihood (production, income, wealth and food). But these resources are degrading as evident in declining vegetative cover, soil fertility, agricultural productivity and crop diversity, and increased moisture stress and production variability. Consequently, the rural population is experiencing erosion of its livelihood and living conditions are deteriorating with increased risk of widespread starvation. There are important regularity patterns that emerge and can be traced along environment-poverty-famine continuum:

Increased frequency of droughts: Drought probability mapping based on assessment of rainfall deficit from long-term averages (Tesfaye, 1988; Workineh, 1987; NMSA, 1996) and availability of moisture for crops growth (i.e., drought frequency or drought proneness) show the arid and semi-arid areas are the most at drought risk. Frequency of droughts is high in these areas with drought index of more than 40%. Critical even to agriculture is the low predictability of the distribution of rainfall during crop growing period. The history of drought, particularly the recorded data as of 1500 shows an increase in frequency of droughts over time (NMSA, 1996; EPA, 1998). On average, one drought occurred every seven years from the 16th century to the first half of the 20th century. The frequency increased to an average of one drought every two years since 1950s.

Workineh (1987) identifies notable drought periods during 1953 and 1984: 1953, 1957-58, 1964-65, 1965-66, 1971-75, 1978-79, 1982, and 1983-85. The author concludes the frequency and intensity of drought has increased over the 1953-84 period. The data obtained from monitoring of drought or disaster affected population also identifies large numbers of drought-affected population in 1985 (6.99 million), 1986 (6.14 million), 1991 (7.22 million), 1992 (7.85 million), and 1994 (6.70 million).

Location-specific studies also confirm the pattern of increased frequency in drought episodes. According to the 1999 study in South Wello, for example, 38% and 62% of the communities experienced 2 to 3 and 4 to 7 years of crop failures and severe threat of hunger respectively in the preceding 10 years (Yared et al 2000). Based on reports of oral historians in Wolaita district in southern Ethiopia, Dagneu (1995) identifies seven major food shortage and famine years over the period between 1963 and 1991: 1963/64, 1965/66, 1970/71, 1980/81, 1983/85, 1987/88, and 1990/91. The frequency of droughts in both studies markedly increased in the 1980s. Secular decline in rainfall translates into large decline into agricultural production as evidenced in South Wello in 1973/74 (Mesfin, 1984), in 1984/85 (Dessalegn, 1991) and in 1999/2000 (Yared et al, 2002).

Declining soil fertility and crop productivity: The major arable soils exhibit inherent deficiency albeit variably in some soil properties: low organic matter, principal soil nutrients such as nitrogen and phosphorous, acidity and salinity, and waterlogging. Soil degradation occurs extensively in arable land in its different manifestations, particularly in long settled intensively cultivated highlands: soil erosion, biological degradation (i.e., loss of organic matter), chemical degradation (i.e., loss of nutrients) and physical degradation (i.e., poor water infiltration, poor drainage in soil, restricted aeration in rooting system). Negative nutrient balances are the norm than exception in most of the cultivated soils. And the rate of depletion of nutrient loss is the highest in Sub-Saharan Africa (Stoorvogel and Smaling, 1999). Farmers recognize soil erosion and declining fertility are the major factors contributing to lowering productivity and increasing risk of crop failure.

The empirical evidence corroborates the perceived decline in soil fertility and crop productivity. Crop yields are generally low because of low factor accumulation, technical inefficiency and slow technological change. Declining productivity related to at least four factors: extensive soil erosion, leaching, continuous cultivation without adequate soil fertility management (i.e., abandoning gradually the practices of fallowing land, growing leguminous crops in crop rotation, and application of organic fertilizers such as crop residues and manure), and expansion of cultivation into marginal areas (i.e., steep slopes, low rainfall zone, shallow area) that are inherently deficient in essential soil properties. Use of productivity enhancing technology such as improved seeds and fertilizers is still low because of high cost, low return, high production risk in moisture-stressed drought-prone environment, and low effective demand for new technology. With both farm size and yield declining, labor productivity is bound to decline from already low initial level, which are the characteristics of the African smallholder agriculture.

Crop production is not only low but it is also highly variable in moisture stressed areas where there is a strong link between rainfall and crop yield. Coefficient of variability in rainfall often exceeds 30 percent, as compared with less than 10 percent in the more rainfall abundant and stable humid zones (Workneh, 1987). Frequent occurrences of droughts, as evident in the second half of the last century, mean that farmers are faced with both declining production and increased exposure to downside production risk.

Income from livestock is weak to buffer consumption: Income from livestock is an important source of income among the sedentary farmers, but more prominently among the pastoral population in the lowlands. However, conditions of increased aridity and scarcity of rangelands, restricted livestock mobility, and poorly functioning pastoral markets are weakening the livestock economy. Ability of livestock to buffer income is much reduced in time of crop failure because periods of droughts are often marked by poor pasture and water conditions, decline in livestock production (low birth, delay in maturity, decreased milk production), worsened disease environment, and increased livestock loss through death and distress sales. And reconstituting lost livestock is slow and costly under prevailing conditions of increased periodicity of droughts and poorly functioning markets where prices tend to rise rapidly in post-famine period.

Other income sources are thinning and risky: As the importance of income from crop and livestock declines, rural households are moving towards other income sources: petty trading in food and beverages; sale of collected environmental goods such as firewood and charcoal; casual wage labor; and land rental. Among the pastoral population, increasing numbers are shifting towards crop cultivation, trading in livestock (i.e., business of selling milk, live animals and butchery), trading in beverages and crafts, wage employment, gathering and selling collected firewood and charcoal, renting property, and retail shops.

However, the possibilities for income expansion through these income sources are demand constrained mainly because of the poor performance in farm economy. And exposure to covariate risks loom large particularly in the incomes of the poor. First, income sources such as trading beverages and food are linked to crop production, and hence positively co-vary with crop income. Second, agricultural wage employment is marginally available in rural areas. More people are moving to rural towns and market centers to settle and work in low-skilled casual wage employment. However, wage employment is generally scarce because of strong link to agriculture dominated local urban economy.

Distant migration as an alternative source of wage income has diminished in recent years because of three important factors that constrain mobility of labor. First, for most farmers, the cost of migration is high relative to expected employment opportunity and return. Secondly, the permanent residency requirement of the existing land policy closes the option of migrating for work away from place of origin. Thirdly, the current aggregation of people by ethnicity and drawing administrative boundaries further restrict mobility of labor because of territorial claim and restriction of access to land. As labor mobility is restricted, using migration as a way to pool climatic risk through spatial diversification of livelihood diminishes. This is particularly an important income smoothing strategy for people in drought-prone areas, who, without long-migration, are confined to local income sources that often co-vary positively.

Environmental goods and services (e.g. forest products as source of firewood, charcoal, medicine and grass products such as straw, basket, etc) are important sources of income for most of the rural households. Because they are “freely” available, they represent a large share of the income of the poor. However, continuous dependency on natural forests is unsustainable since most of these forests are almost depleted in the northern highlands (Belay, 2002; Kebrom and Hedlund, 2000; Mesfin, 1991). Further depletion occurs at considerable high economic and environmental costs.

Local markets are under continuous stress: In many respects, the risky attribute of the aforementioned income sources is due to the behavior of local markets under distress. For rural households with no or little land to cultivate, labor is the primary source of livelihood. Both the level of employment and wage rate determine wage income earned. The evidence points to a general abundance of labor in ecologically fragile northern highlands, as indicated by existence of involuntary unemployment or under employment (Markos, 1997).

Local urban labor markets are under continuous stress because of their strong links to local farm economy. In time of severe crop failure, for example, economic activity in rural towns is depressed because of decline in local purchasing power due to increase food price and slow down in activities such as grain trading and transportation. Such period often coincides with increase in labor force participation amidst depressed demand for labor, which translates into lowered real wages both in agriculture and in urban labor markets. Such positive co-variation of wages with agricultural production reduces effectiveness of rural labor market in buffering income in persistent drought conditions.

The existing evidence also indicates that prices of forest products such as fire wood and charcoal fall in local markets in time of prolonged droughts because of increasing supply in markets experiencing weakening demand (Yared et al, 2002; von Braun, Teklu and Webb, 1998; Dessalegn, 1991). Income from “freely” available natural resources, which is an important source of income for food-deficit households, thus fails in time when it is critical to supplement agricultural income.

In most of the cases, the commodity terms of exchange in these markets move in ways that erode the real purchasing power of sellers of assets (livestock in particular), labor and forest products, and buyers of food. Commonly, prices for food crops increase markedly while the prices of livestock, wages, and prices of collected or gathered products drop appreciably. The disposal of assets and sell of labor and forest products occur often in markets with excess supply and depressed prices. Hence, the returns from these sources are positively correlated with crop income and thus risky because of poor functioning of the markets under distress.

Some of the markets disappear in some cases for lack of effective demand (von Braun, Teklu, Webb, 1998). As Dessalegn (1991) illustrates for South Wello, there were famine-free areas in the drought years of 1984-85 that were in a position to export food grains but there was not sufficient flow of trade to avert famine in areas with severe crop failures because of lack of effective demand.

Options for smoothing consumption are getting fewer: With income sources getting thinner and most of them co-varying positively with crop production, farmers are increasingly left with fewer options to smooth consumption in times of crop failures. Yared et al (2000) conclude from their community assessments in South Wello that the general trend is towards decline in availability and effectiveness of coping options as a result of repeated production failures, progressive impoverishment, and declines in possibilities for income-earning in other regions.

The moral economy that is characterized by networks of social support and reciprocity is weakening because of years of recurrent droughts and production failures, and associated impoverishment. The evidence from South Wello even points some of the support institutions fall apart under prolonged food stress and increased impoverishment (Dessalegn, 199; Yared et al, 2002). As noted in Yared et al (2002), traditional exchange and support mechanism were almost non-existence in the drought year of 1999. And the level of assistance channeled through these institutions has declined overtime as a result of impoverishment of the rural population.

Typically, farmers start rationing food consumption early on to protect disposal of valuable productive assets and dispersal of families under stress. Consumption adjustments frequently involve adjusting diets to basic (or, cheap) food items, supplementing with edible wild plants, and reducing frequency of meals and serving. But there are limits to adapt to lowered consumption level. First, food consumption level is already low. Second, there is no evidence to suggest the nutritional status of the rural population is improving, especially those at high risk of vulnerability despite deliberate effort to favor allocation of food to vulnerable members within households as demonstrated in coping the famine of 1984-85 in Wello (Dessalegn, 1991). Third, the spread of HIV/AIDS pandemic degenerates the ability of body to adapt to lowered food intake. The critical food security challenge in such environment is not to attain food consumption at all times for healthy and productive life (a universal threshold), but to survive (meet a minimum threshold).

6. INCREASED VULNERABILITY TO POVERTY AND SURVIVAL

Persistence of famine conditions has poverty enhancing effect directly on population affected by famine. Some of the non-poor cross the poverty threshold and swell the ranks of the poor. For example, Dessalegn (1991) concludes from his case study of Wello region that the losers of the prolonged and intense food shortage of the 1982-85 period in South Wello included not only the poor but also the relatively more prosperous in the pre-crisis period but unable to successfully defend their asset (physical and social) and food consumption⁵. Dagnev (1995) also finds that in the aftermath of three periods of mainly drought-triggered severe food crises in Wolaita district, the income rankings of some of the households were lowered: 6.1 percent of the rich households dropped to middle class and 9 percent to poor income status. 18.4 percent of the middle-income households became poor and complete destitute.

The poor (the old as well as the new) are particularly vulnerable to elevated consumption risk and survival, and greater burden of coping. First, their income and asset level is low. They are heavily dependent on farming, particularly on producing food crops, but often unable to produce enough to meet food consumption need year round. Second, their income sources are diversified but these income sources are often mean-income reducing and risky. That is, the poor are diversifying more into low-return income sources with increased risk exposure because of the close interdependency of these incomes with risky crop and livestock incomes. The poor are often constrained to diversify effectively to reduce risk and preserve mean income level because of constraints on choices due to limited access to credit or inadequate capital. Distress migration is high among the poor who often opt to move to towns where they face a new set of survival constraints. Third, access to the thinning indigenous support system is constrained more to the poor. As Yared et al (2002) noted from the survey of communities in South Wello, provision of assistance has become discriminatory against those with weak social capital and links in support networks. Giving becomes less generous and more focused on one's immediate social network. Finally, the ability of the poor to adapt to lowered food intake is limited because of their poor nutritional and health conditions. The poor thus continue to face elevated food consumption and survival risk as environmental stress sustains.

The most at risk are the always poor. These are mainly households who are unable to generate income and assets on account of lack of labor due to aging, poor health, and physical incapacitation. Although the empirical evidence is still scarce, a new category of the very poor is emerging due to the spread of HIV/AIDS that comprises child-headed households and households headed by the old or disabled. These categories of the always the poor have little or no assets of their own, and hence heavily dependent on community support networks and/or relief food aid.

Reversing the processes of impoverishment are slow as evident from more people moving in than moving out of poverty and persistence of non-declining poverty incidence and depth. Recovery in post-famine period such as reconstituting lost assets (for example, livestock) and stabilizing food consumption is costly and slow. It is costly because prices of assets such as livestock tend to rise rapidly from their lowest points at which farmers disposed them in famine period. And, because of increased impoverishment, farmers lack the financial capacity to buy these assets. In addition to increased cost and reduced ability to purchase, recovery is interrupted by recurrent droughts and associated distress sale of assets.

The effects of rural famines are not limited to famine-affected areas. They are passed on indirectly to non-famine affected population including urban through food market effect (shortage of food and increase in food prices) and labor market effect (a large influx of rural population, increased labor supply and depressed wages). The living conditions of the urban poor are particularly aggravated as these low-skilled migrants compete for scarce social services and meager non-skilled wage employment

7. FAMINE IS NOT IMMINENT WHERE NATURAL RESOURCES ARE SCARCE AND POPULATION CONCENTRATION IS HIGH: THE CASE OF WEST GURAGELAND⁶

Gurageland is found in south of the central highlands. The landscape is diverse with elevation ranging from 980 masl to 3400 masl. More than 70 percent of the total land is in the highlands above 1700 masl. The land is the home of the predominantly Gurage ethnic group. As of the

⁵ However, all were not losers. There were emerged better-off groups that included farmers who lived in communities that were not hit by drought, particularly those engaged in trading in high price products or buying livestock at low prices. These new well-to-do farmers were in a better position in the post-famine period as they were able to rent out their livestock or exchange livestock for labor, rent land for cultivation or engage in crop sharing arrangements.

⁶ This section is drawn from Mulunch (2003).

1960s, significant progress has been made in development of road infrastructure. There are all-weather roads connecting the region to major urban centers, particularly to the nation's capital city and rural towns, which is between 100 to 150 kilometers.

The Gurageland is one of the densely populated highlands in the country. The population density in West Gurageland averaged 173 persons per km² in 1984. It has since increased to 250 persons per km² in 2000. The concentration is high particularly in the highlands above 1700 mm where about 94% of the population lives. The concentration of population measured in persons per square kilometer increases with elevation; 67 in elevation below 1700 masl, 285 in 1700-2400masl, 319 in 2400-3200masl, and 495 in above 2300 masl. Population pressure is thus high in highland zones.

Nearly all the rural households are smallholder farmers practicing mixed farming systems with enset plantation at the core. Currently, the major land uses comprise cropped land (perennial crops including enset and annual crops), grazing land, and woody vegetation (natural forests, eucalyptus woodlots and shrub lands). Enset, a perennial crop, is the most preferred staple crop for its high calorific value per unit of land and drought resistance. Farmers also grow annual crops (barley, tef) as well as other perennial crops (coffee, chat, and fruit trees) for cash. Whilst land under natural forests has shrunk, areas under eucalyptus woodlots are expanding fast.

The trends over the last three to four decades indicate expansion of both perennial and annual crops, particularly perennial crops, and fast growth of eucalyptus woodlots in 1700-2300 masl. Farmers are expanding Enset in the traditional cereal producing high elevation belt where there is little land for grazing. Cash cereal and perennial crops are expanding in the middle elevation at the expense of shrinking grazing land. Because Gurageland is rapidly integrated into monetized urban economy, the rural households are expanding plantation of cash tree crops mainly for cash whilst depending on enset for subsistence. Despite expansion of cropland and increased land intensification, however, per capital food production continues downward trending. About 70 percent of the respondents reported either no change or decrease in crop production over time.

Whilst agriculture is still the principal source of income, the rural households also diversified. For example, the survey in Mulneh (2003) shows that 73 percent respondents reported taking part in rural non-farm activities in year 2000. On average, income from local non-farm, remittances and the money migrants bring to their home averaged 27 percent. According to the respondents, non-farm income supplements agricultural income, stabilizes household income, and reduces uncertainty and ensure food security. Although in minority, non-farm income is also used to invest in agriculture.

Migration especially to urban areas is an important component of the income diversification strategy. As of recent years, there is a significant shift of the population towards urban areas accounting about 40 percent of the population in 1994. There are both push and pull factors that work in tandem for occurrence of high mobility of the Gurage people. Nearly all the respondents in the Gurageland survey attributes the growth of rural non-farm including migration to growing population pressure, scarcity of farmland, production shortfall and food insecurity. In addition, improvement in road infrastructure and transportation, availability of better wages and varied employment in urban areas, and strong kinship, friendship and neighborhood ties have reinforced the environmental push factors to migrate to urban areas.

West Gurageland in many respects has similar biophysical environment, population concentration and farming systems to Wollaita zone. But occurrence of famine is rare in Gurageland. Among the key processes identified in section 5, there are some exceptions in the case of West Gurageland that presumably explain why poor biophysical environment and high population density are not sufficient for occurrence of famine. First, there are developed rural market networks that are connected to major urban markets including the Addis Ababa market. Second, farmers are increasingly shifting towards high-value crops such as chat and Eucalyptus crops especially in the cool highland elevation. Three, there is significant flow of migrant income (either as remittance or savings) to rural areas to buttress household consumption. Finally, the support networks that have the origin in rural areas remain strong among the migrants in their places of destination, which expand in time of need.

8. CONCLUDING REMARKS

Environmental scarcity associated with degradation of productive capacity of natural resources affects rural livelihoods and welfare in major ways. With scarcity of natural resources and associated declines in crop and forage productivity, incomes from agriculture that are the basic sources of livelihoods are falling from low level and subject to high variability. Declines in agricultural productivity and income also cause incomes that positively co-vary to fall such as crop-dependent beverages, agricultural wage, and trading in grain.

Households living in environment stressed areas are facing increased risks of impoverishment and survival due to persistence of famine conditions. The evidence on persistence of famine conditions suggests that the rural household and community based coping strategies are not effective to contain downside variability in income and food consumption. The trend is towards declining effectiveness of coping options. First, environmental stress has increased due to aridity and frequent droughts. Second, crop income remains low and is subject to large variability due to its strong link to rainfall. Third, income from livestock is weak to buffer consumption in period of drought. Fourth, incomes from other sources are not sufficient to compensate losses in crop and livestock, and are also exposed to high rainfall-linked covariate risk. Fifth, farmers continue to diversify their income sources but unable to reduce their exposure to covariate risk by lowering their links to rainfall dependent incomes. Sixth, since rural markets are poorly developed as evident from their thinness and associated large seasonal price fluctuation, they cause large deterioration in terms of exchange in time of distress. Seventh, most households move towards mean-income reducing income sources and hence remain impoverished. Eighth, household and community based consumption devices are thinning and getting fewer. Finally, conditions of poor nutrition and health amidst rapidly spreading HIV/AIDS pandemic mean that households' ability to survive on reduced food consumption is diminished. Poverty, famine and HIV/AIDS interact in ways that risk the lives of millions of people.

The long-term strategy for reversing the environment, poverty and famine downward spiral is addressing the long-term development challenges that enhance household capability to diversify income sources while reducing exposure to common income shock; improve market infrastructure and institutions; minimize restrictions on labor mobility; strengthen indigenous support network, and enhance public response capability to monitor and intervene timely without crowding out private effort. At the core of such strategy is promoting sustained pro-poor growth. However, the debate on development strategy and priorities for Ethiopia at large and environmental stressed areas needs to be carefully thought through to save lives and enhance living conditions at affordable low economic and environmental costs to the society. Addressing poverty and famine in environmental stressed areas calls for a careful deliberation on development strategy that gives priority to saving lives whilst dealing with long-term structural problems of the country as one entity (not as fragmented regions).

Whilst agriculture is not the only growth vehicle for poverty reduction, it is the primary way. Getting agriculture on sustainable pro-poor growth path requires focusing on conditions required for broad-based pro-poor growth and setting tight standards to reduce cost and risk to enhance profitability and competitiveness of agriculture while reducing poverty (Tesfaye, 2003). The first order of priority is halting the declining trends in key growth "movers". Second, greater capitalization of agriculture is necessary to have the basic conditions of growth in place. While the types of investments are bound to vary between different areas of agricultural growth potential, emphasis should be in areas where return to investment in agriculture is high and stable. The effort of capitalization needs to be supported by pro-poor policies and institutional changes to ensure the growth process captures and benefits the poor. The argument that poverty is high in environment stressed areas is persuasive. However, such statement is not equivalent to saying most of the impoverished people are in these areas and agricultural growth should be pursued at high social cost and risk.

The evidence that the rural population is subject to large transitory poverty suggest that public policy has also important role in putting in place safety nets mechanisms to contain downside variability in income and consumption. But, given the high priority to invest in growth, public income transfer programs should be designed to reduce leakage to non-target population, redistribute benefits to target population, and save budgetary outlays. In general, the design of public transfer policy has to be guided by a set of principles. First, it has to recognize the existence and structure of private risk coping mechanisms. To the extent that these private mechanisms are a viable option, public programs should not crowd them out. Second, it is necessary to understand the time path and dynamics of these private coping mechanisms. The type and timeliness of public interventions are critical to prevent costly private options. Finally, public transfers need to recognize that households are unequal in their private coping mechanisms. The overarching goal of public policy is to develop targeted, instead of generalized, public income transfers with a minimum disincentive effect on the functioning of private risk coping mechanisms.

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