
13 The Dynamics of Vulnerability and Adaptive Capacity in Southern Ethiopia

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Abstract

Agriculture accounts for more than 40% of the Ethiopian economy, 85% of all employment, and is driven primarily by rural smallholders. Those living in rural areas face a range of short-term, seasonal, annual, and long-term vulnerabilities. This chapter analyzes the range of dynamic, and sometimes unpredictable, challenges in Wolaita Zone, southern Ethiopia. We explore how individuals proactively manage vulnerabilities and seek means to enhance their adaptive capacity. These findings demonstrate that smallholders are engaging in change, highlighting the important role of their agency in understanding vulnerability and resilience.

INTRODUCTION

The largest contributor to the Ethiopian economy is agriculture, accounting for almost half of the gross domestic product. It is also the primary livelihood activity for more than 80% of the population (Loening, Durecall, and Birru 2009). The vast majority of national agricultural activity is conducted in rural areas: smallholders farm more than 90% of the cultivated land in the country, with 60% doing so on less than a hectare of land (Taffesse, Dorosh, and Gemessa 2012). Although smallholder livelihoods and yields are crucial for national food security and the Ethiopian economy, those living in rural areas face a range of seasonal, annual, and long-term vulnerabilities.

This chapter explores smallholder vulnerabilities using a case study from Wolaita Zone, located within the Southern Nations, Nationalities and Peoples' region in southern Ethiopia. We use broad and inclusive measures of adaptive capacity and vulnerability that encompass livelihood choices and

coping mechanisms to contextualize resilience. These are outlined in the first section. An examination of local vulnerabilities and an analysis of how individuals are engaging with change follows. The concluding discussion reflects upon the role of agency within the context of vulnerability and adaptive capacity and explores how academics and professionals can enhance their understanding of resilience by better incorporating agency into analyses.

CONTEXTUALIZING RESILIENCE

Smallholder farmers have long practiced approaches to manage their vulnerabilities and enhance their capacity to adapt to change. Resilience-based perspectives in the academic literature are a recent phenomenon, much of which stems from systems research in ecology (Holling 1973). Walker and Salt (2006, p. 1) define resilience as “the ability of a system to absorb disturbance and still retain its basic function and structure.” Viewing change from this foundational paradigm enables new phenomena, technology, and processes to be assessed in terms of direct impact, as well as how the community and/or individual is able to respond so as to maintain the function of the system processes and structure.

One of the ways in which community and individual resilience is evaluated is through adaptive capacity, which Ludi, Tesfaye, and Levine (2011, p. 7) define as the “potential of individuals and societies to respond to change.” In order to understand the capacity of individuals and communities to adapt, assessments must take into account system-wide impacts and identify change that is manageable and absorbable or disruptive. To do this, an investigation into uncertain and/or unknown potential must be conducted to identify the ways in which individuals and communities will respond to new phenomena, technologies, and processes. Therefore, aspects of adaptation may not be “possible to directly measure” (Ludi, Tesfaye, and Levine 2011, p. 7). Consequently, rather than a specific methodology or set of measurements, we use resilience-based perspectives, which provide a lens through which the changes can be understood.

New phenomena, technologies, or processes that occur within the functionality of a system are considered managed and manageable by existing adaptive capacity; those beyond that threshold can result in an “irreversible new state” (Resilience Alliance 2007, p. 1; see also Walker and Salt 2006). Applying these concepts to smallholder contexts suggests that individuals and communities have thresholds within which they can adapt to change and a point beyond which entire livelihood(s) will be disrupted. This does not necessarily relate to size or scale; minor changes can be disruptive and major changes can be managed.

Resilience-based perspectives include an evaluation of the likelihood that any change might disrupt the functionality of the entire system, such as when new crop species or seed types are introduced or when large-scale infrastructure projects are proposed. One of the unique contributions of this framework is the system-wide, long-term evaluation of potential impacts, in addition to yield, cost, suitability, and other factors common to economic models.

New phenomena, technologies, or processes that cannot be absorbed and disrupt system functionality can be causes or manifestations of vulnerability. An insufficient capacity to adapt, for example, may be a result of poverty and the agro-ecological setting and negatively affect the resilience of an individual and/or community. Assessments of resilience can use vulnerability as a proxy measure of adaptive capacity, while recognizing limitations and avoiding equating resilience with the absence of vulnerability. Evaluations of this nature provide a means to assess the limits of individuals and communities as well as their strengths (Department for International Development 2003; Sen 1988; World Bank 2005). The substantial literature describing vulnerability provides insight into how these assessments can be applied in practice (e.g., Moser 1998; Scaramozzino 2006).

Resilience-based perspectives can also include components of renewal and reorganization (Folke 2006). One example from ecology research is ecosystem restoration, which “aims to enhance the resilience and sustainability” (Allen et al. 2002, p. 1421) of an ecosystem to a state where it is within its “natural range” of variability (Landres, Morgan, and Swanson 1999, p. 1181). In this context, resilience-based perspectives seek to strengthen the stability of a renewing or reorganizing

system so that it is better able to absorb change, such as by enhancing the genetic diversity among and within species (Harris, Rhodes, and Martin 2013). For individuals and communities, this also includes fostering a diversity of knowledge and skills. Turner, Davidson-Hunt, and O'Flaherty (2003) describe this as "cultural capital"; a collective asset that enhances resilience by enabling the utilization of a larger range of options during times of change.

METHODOLOGY

The case study from Wolaita Zone draws upon qualitative and quantitative research conducted by the authors from 2013 to the present. Gecho (2014) completed a survey of 300 households in four districts, purposefully selected to represent different agro-ecological zones. Households were randomly sampled following a community-wide wealth ranking exercise. In 2015, the authors completed a second household survey, covering 450 households, purposefully selected from three districts to compare the influence of access to services, infrastructure, and irrigation. Following the second survey, Cochrane conducted focus group discussions, which act as a feedback and triangulation mechanism for the survey findings, as well as 31 interviews within smallholder households in Wolaita Zone.

CASE STUDY OF WOLAITA ZONE

Residents of Wolaita Zone confront a range of dynamic and unpredictable challenges. These include high population density, variable rainfall, limited land availability, shrinking land size holdings, land degradation, crop diseases and pests, volatile commodity prices, chronic food insecurity, limited access to services, and high levels of poverty (Rahmato 2007). Household surveys conducted by the authors in 2015 indicate that, on average, households are food insecure for two to five months per year, depending upon rainfall and yields. Within the focus group discussions, participants explained that lack of yield due to poor, inconsistent, or too heavy rainfall, which reduces income, pushes families into debt, and results in an inability to feed everyone in the household. This, residents state, is a primary reason why youth drop out of school and leave the household for labor work in towns. Although numerous challenges continue to confront the residents of Wolaita, this research demonstrates that individuals have been proactively managing vulnerabilities and have been engaging in means to enhance their adaptive capacity.

Ethiopia is home to four main agricultural systems: pastoralism, root crop-based, cereal crop-based, and shifting agriculture. Within Wolaita, root crops are of primary importance, particularly as a means to overcome seasonal food insecurity. These crops include enset* (*Ensete ventricosum*, native to Ethiopia), sweet potato, Irish potato, and taro. Cereals are also grown in the region, with maize as the most common. Locally grown fruits include bananas, mangos, and avocados. Small-scale production of coffee, an important cash crop, is common in certain parts of the region.

Livestock holdings are a vital part of livelihoods: cattle for plowing fields, donkeys for transporting goods and people, and sheep and goats for household and market purposes. Two breeds of poultry are also raised. Animal byproducts are used as fertilizers to replenish essential nutrients in the soil. Due to the limited amount of protein in many root crops, animal products are an important component of local diets.

LONG-TERM

The greatest long-term challenge faced by smallholders in Wolaita is the lack of irrigation infrastructure, combined with a vulnerability to climate change (Center for Global Development 2012; Central Statistical Agency of Ethiopia [CSAE] 2009). The residents of Wolaita also experience declining landholding sizes. As Rahmato's study notes (2007, p. 10), the land "holdings [in Wolaita]

* Enset is a crucial contributor to the root crop-based agricultural system. It is considered one of the most sustainable crops in Africa, particularly for densely populated areas (Brandt et al. 1997).

have always been small relative to other parts of the country.” Rahmato found that, in 1976, the average landholding size was 0.7 hectares. This dropped to 0.5 for most smallholders by 1989. In some areas within Wolaita, average landholding size has since fallen below 0.25 hectares (data provided by the Damot Gale District Agricultural Office, Wolaita Zone, Ethiopia on May 14, 2015). Smallholders note that land size is not sufficient; many face chronic food insecurity.

The government has set aside communal grazing land, protected forest areas, and developed a “land bank” system for unused land to be redistricted. In Wolaita, 57% of the land is used for crops, 19% is forest and bush area, and 11% is for grazing. The remaining 13% is classified as “other”; it is uncultivable or cultivated but not distributed (Gecho 2014). The majority of cultivated land is owned and inherited. The division of land is largely a product of inheritance, whereby a number of children share the land of their household.* This results in smaller plots with each generation. Within Wolaita, the size of landholdings is compounded by population density, which is one of the highest in Ethiopia (CSAE 2007). Therefore, there is practically no unused cultivatable land for new generations. The land shortage has compelled the government to create resettlement programs multiple times over the last 50 years, moving residents to different parts of the region and throughout country.

ANNUAL

According to the 2015 surveys, the most common input used in Wolaita is fertilizer (91%). Farmers also utilize improved seed varieties (72%). Both resources are acquired annually through government channels. There are two key access barriers: poverty and irregular supply. Although the government subsidizes inputs and facilitates access through the provision of credit (with a percentage of the initial cost paid at the outset), many of the poorest households still cannot afford it. This is the product of entrenched poverty and is experienced by households on an annual basis. The majority (50%) rely on formal loans and credit. Gecho (2014) finds that 68% of surveyed households said that the cost barrier was too high for fertilizer and 41% said that it was too high for improved seeds.

The irregular supply of inputs deters farmers from relying upon them. For example, rapid fluctuations in fertilizer distribution have continued from at least the 1970s (Rahmato 2007) until the present (data provided by the Damot Gale District Agricultural Office, Wolaita Zone, Ethiopia on May 14, 2015), with doubling and halving of distributions occurring on a year-to-year basis. Not knowing if inputs will be available and in what quantities influences decisions about adopting and relying upon them. In focus group discussions, farmers expressed appreciation for the new drought tolerant varieties developed at regional agricultural research centers. However, they explained that availability, cost, and accessibility prevent adoption.

SEASONAL

Rainfall data are typically presented in an annual and averaged format. This gives the impression that rainfall is seasonally consistent (see Figure 13.1). Contrary to these data, farmers cite variable rainfall as being a major seasonal challenge. Gecho (2014) finds that 79% of smallholder farmers mentioned rainfall as their greatest problem.

The challenge of rainfall volatility is clear in Figure 13.2, which shows a range of minimum–maximum rainfall from 2003 to 2013, highlighting significant fluctuations. The difference of rainfall peaks and troughs, as well as irregular and out of season rainfall, confirm farmers’ experiences and challenge the conventional narrative about seasonal rainfall. For farmers who are entirely dependent upon rainfall for their agricultural livelihoods, the determination of when to prepare fields and plant seed is much more difficult as a result; incorrect timing can have negative, multiyear impacts.

* Land tenure has shifted significantly in the last century. The introduction of land certification is the most recent attempt to enhance tenure security (Deininger, Ali, Holden, and Zevenbergen 2008). The traditional patrilineal system of inheritance has been legally altered, giving equal rights to sons and daughters. However, much more progress is needed to align legal rights with lived realities (Holden 2008).

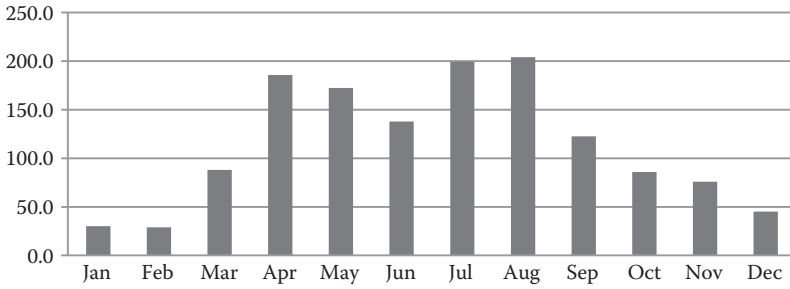


FIGURE 13.1 Average rainfall in Wolaita Sodo (2003–2013).

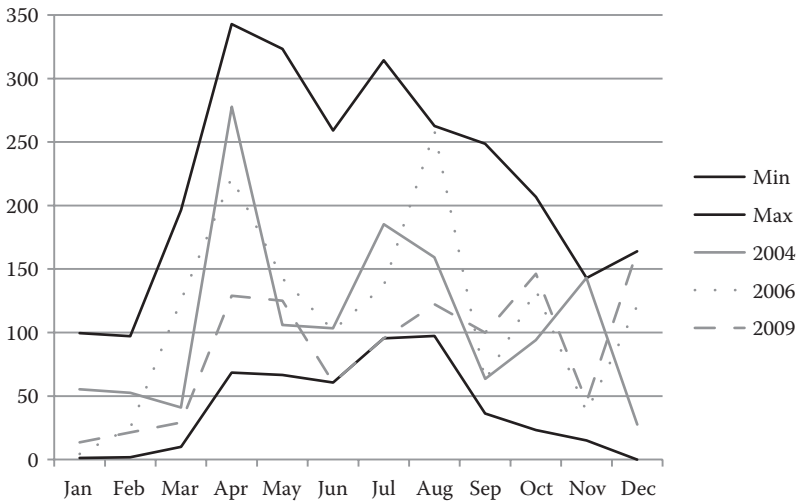


FIGURE 13.2 Rainfall variability in Wolaita Sodo (2003–2013), selected years shown.

Throughout much of Ethiopia, the “hunger season” ranges from one to four months, depending upon the rainfall of the previous year. In Wolaita, this averages two to five months, creating seasonal food insecurity and malnutrition. Each year, there is a rise in diagnosed malnutrition cases toward the end of the “hunger season,” which slightly overlaps with the planting of the first seasonal rains (see Figure 13.3). The rise in malnutrition indicates the severity and annual nature of these seasonal

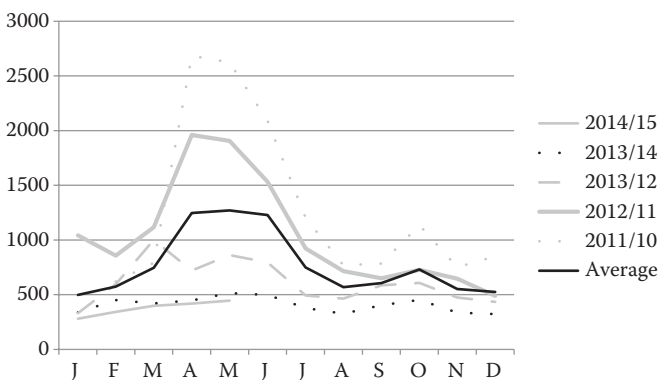


FIGURE 13.3 Seasonal child malnutrition in Wolaita Zone (new intake of outpatient malnutrition cases).

challenges. It should be noted that the cases shown in Figure 13.3 are only children diagnosed at a health extension post and do not capture undiagnosed cases or convey the impact of reduced and less diverse food intake during these months.

ENGAGING CHANGE

Residents of Wolaita engage with their long-term, annual, and seasonal vulnerabilities in proactive and informed ways. This agency demonstrates the ways in which individuals, households, and communities understand their vulnerabilities, seek to enhance their capacity to adapt to change, and become more resilient. Some of the responses to change explored below are unconventional. Indeed, some are chosen as the best option amongst an array of limited and relatively unfavorable choices.

LONG-TERM

Long-term responses to declining land size include family investment in child education. If unable to send all children to school due to the cost, families strategize to ensure at least one child completes tertiary education. In Wolaita Zone, almost 90% of children begin primary school, but less than 16% continue into grades 11 and 12 (see Table 13.1). The dropout rates in primary and secondary school are due to high costs of education and the indirect costs of lost household labor and pressures faced from the inability to provide basic needs for all members of the household.

In the 2015 household surveys, we found that households facing fewer risks, such as those with access to irrigation, felt they had sufficient income to send all their children to school (61%) when compared to those without such access (41%). Individual interviews and focus group discussions within all communities consistently highlighted the idea that supporting as many children as possible through secondary school raises the potential future household income. In most cases, however, graduates relocate to nearby towns or cities for employment. This negatively impacts households, as they lose agricultural labor. With aging parents and school-aged children remaining, this strategy also creates short-term challenges.

A second response to long-term vulnerabilities in the household is the domestic migration of youth for unskilled work opportunities in towns and cities (e.g., domestic work and labor at construction sites). Insufficient resources within the household often drive this choice; in interviews and focus group discussions held throughout Wolaita, households consistently cited insufficient food as a primary reason pushing youth to make this decision. Even though such work is low paid and

TABLE 13.1
Educational Enrollment Rates in Wolaita^a

Grades ^b	School-Aged Population ^c	Enrolled ^d	Percentage Enrolled
1–4	301,687	270,726	89.7
5–8	187,505	143,590	76.6
9–10	102,961	43,387	42.1
11–12	79,470	12,580	15.8

^a These figures are approximated. Community members explained that dropout rates are primarily understood as a product of limited resources, but that is not the only cause.

^b The grouping of grades follows the cycles of education in the Ethiopian education system.

^c Data obtained from the Wolaita Zone Administration Office for 2012.

^d Data obtained from the Wolaita Zone Administration Office for 2013. We recognize that the different comparison years do not allow for exact percentages. Due to data availability limitations, we present approximate figures to demonstrate the extent of dropout rates.

irregular, for many, these jobs are the best available option. Dropout rates reflect the high levels of youth leaving education (see Table 13.1). In one district where food insecurity was higher (average 4.3 months food insecure) than the surrounding ones (average 3.7 months), community members estimated that 70% of the youth had left for work.

Those who leave for skilled or unskilled work feel an obligation to support their families; however, most are unable to do so due to the low salaries they receive. In the 2015 household surveys, 29% of families in one district received financial support from family living elsewhere in the country; domestic remittance in a neighboring district was much lower (8%). In focus group discussions, community members explained that this was due to the types of work commonly undertaken by people from different locations: some migrate for long-term work in more distant parts of the country, others remain nearby.

Obtaining education and employment are long-term responses. Employment results in members of the household semipermanently or permanently leaving their communities; it requires investment over time to acquire education. A significant percentage of households engage in these off-farm work options. In Wolaita, 20% of surveyed households had at least one member engaging in off-farm employment. Sixteen percent of households had at least one member who migrated domestically (Gecho 2014). Work migration is a direct response to the long-term challenges of high population density, declining land size, and chronic food insecurity.

ANNUAL

Farmers in Wolaita typically planted a limited number of primary crops in the two planting seasons. In the shorter of the two rainy seasons (*belg*), maize and beans were grown. In the second rainy season (*meher*), sweet potatoes and taro were commonly planted. Most households planted enset, referred to as “the enemy of hunger,” an important perennial crop that is relied upon during times of food insecurity (Tsegaye and Struik 2002, p. 292). Farmers recognize that relying upon fewer crops enhances vulnerabilities. Having a wide variety strengthens their ability to adapt to changing rainfall, as well as reducing the risk of pests and diseases devastating an entire crop. Thus, many farmers have purposely diversified the types of crops they grow. New root and cereal crop varieties, as well as fauna, have been introduced. Most of these have been made available through agricultural extension workers, with some hybrids being the result of work done by government-run regional agricultural research centers. Recent diversification is not a result of a newfound appreciation of vulnerabilities; rather, it is related to improved access to new seeds, seedlings, and livestock.

It is traditional practice in Wolaita for households to partition their land into six small areas, within which different crops are grown. These may also be intercropped (Rahmato 2007). Diversification within these plots has been supported through agricultural extension workers, regional agricultural research centers, and government-supported nurseries. As part of this process, farmers maintain important perennial crops, such as enset but have introduced new types of crops, including fruit trees, vegetables, and improved varieties of root crops and cereals. These meet household needs first. In the case of surplus, they are sold in local markets. They have also introduced new animals, such as hybrid chickens for improved egg production.

The types of diversification vary, influenced by location, land size, and household income. Household surveys conducted by the authors in 2015 found that those with irrigation, who experience less risk due to regular water access, had less crop diversity (averaging 5.8 crops) than those without it (averaging 6.7 crops). The greater diversification reflects the level of risk and efforts to mitigate potential negative outcomes, even if some choices result in lower yields. However, higher-cost diversifications were more common in the community with irrigation than those without. These include planting avocado trees (average 2.3 trees versus 1.5 per household) and purchasing egg-producing poultry (average 0.5 versus 0.1 per household).

When exploring these differences in focus group discussions, the more remote communities reported that they knew about other means to diversify but were unable to access them. For

example, tree seedling nurseries were located too far away or vaccinations for hybrid chickens were not available in their communities, resulting in poultry loss and a discouragement of this form of diversification. As a result, the ability to enhance adaptive capacity is affected by access to irrigation and transportation infrastructure, nearness to livestock health facilities and towns, as well as household capacity to invest in diversifications.

SEASONAL

The challenge of variable seasonal rainfall makes its impact on malnutrition inconsistent and unpredictable. There can be too much rain, too little, or it may come at the wrong time in the planting cycle. Therefore, it is difficult for households to engage in proactive ways. In theory, the establishment of irrigation infrastructure would enable households to manage these risks. The few communities in Wolaita that have irrigation infrastructure do not experience these challenges in any significant way. In one such community, household members explained that, instead of one or two yields per year, they now have three or four. As a result of increased and consistent yields, seasonal food insecurity had largely been overcome. Households experienced an increase in their income from improved yield and from the ability to plant new crops, particularly vegetables.

In interviews and focus group discussions, smallholders stated that surplus yields and selling to the markets was not a common practice in the past. In our 2015 household surveys, however, the majority of all households sold at least some of their yield (65%). Those with access to irrigation infrastructure engage in this practice much more (91%) than did those without it (56%). Transportation infrastructure enables those crops to reach the market. Although the community with irrigation infrastructure was far from the nearest town market (approximately 20 km), it had access to an asphalt road. Thus, the vast majority (91%) sold crops at the market. Households in a community equally far from the market town but without transportation infrastructure sold significantly less (46%).

The introduction of improved seeds, the diversification of crops and livestock, as well as the development of irrigation and transportation infrastructure have strengthened the importance of weekly markets within towns and expanded their scale. The high cost of infrastructure, however, is beyond the capacity of individual communities. Therefore, households focus upon new crops and diversification in response to seasonal vulnerabilities.

For those without irrigation, the responses to variable rainfall are more localized and focus on diversifying livelihood options. When harvests are poor, household members may overcome seasonal food insecurity by engaging in nonfarm and off-farm options, such as selling milk or butter, collecting firewood or grass, or engaging in petty trade. The collection of firewood and grass is practiced by those without livestock or the financial capacity to buy and sell goods, which are sold in nearby towns. This activity, however, does not fully provide for the needs of the households and is a last resort option.

Choices such as these are ones of necessity rather than proactive engagement. Households that were relatively poor relied upon these nonfarm income sources to a much greater extent. Fifty-two percent of the poorest households engaged in nonfarm activities, while only 16% of relatively better-off households did (Gecho 2014).

LESSONS LEARNED

This chapter explored vulnerabilities that exist in Wolaita and the ways in which community members engage with new phenomena, technology, and processes. The experiences demonstrate that change is dynamic and multidirectional. The findings outline the immediate and long-term challenges posed by declining land holdings, irregular supply of inputs, malnutrition, and volatile rainfall. In order to address challenges, policies and programs can enhance the adaptive capacity of

individuals and communities. For example, this research highlights the positive impact of irrigation and transportation infrastructure, as well as market access.

This research also demonstrates that individuals and households engage with change, proactively enhancing their own adaptive capacity and taking advantage of opportunities available to them. The exercise of agency is a key finding here, and one that is often under emphasized. The importance that households place upon education, employment, and diversification demonstrates that they are not averse to change. Rather, they make calculated choices, sometimes between limited and relatively unfavorable options.

Many households continue to struggle with chronic poverty and seasonal food insecurity. While external changes, such as rainfall and irrigation, are important, this research highlights the role of individuals and households as agentic change makers. Programs and policies can be strengthened if the vulnerabilities are addressed in tandem with strengthening opportunities. This is particularly critical for those opportunities that community members themselves have prioritized.

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