

Resilience of Rural Households in Africa: An Introduction

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Introduction

The term *resilience* originates from the Latin word *resilire* which means “to leap back”. Resilience is defined as “the ability of a system to absorb shocks, to avoid crossing a threshold into an alternate and possibly irreversible new state, and to regenerate after disturbance” (Resilience Alliance, 2007). Resilience, in other word, means the amount of disturbance that the system can endure without changing the original steady-state and without moving into an alternate regime. Social-Ecological systems have certain thresholds that are important for considering the system resilience. Social-Ecological systems also show reversible and sometimes irreversible regime shifts in time scale with societal implications. More resilient systems are considered to have an ability to absorb larger disturbance without moving into an alternate regime (Gunderson 2003; Walker 2004).

The concept of ecological resilience has been a focus of ecological research since defined in the seminal paper “Resilience and Stability of Ecological Systems” by C. S. Holling (1973). The earlier concept of resilience is called *engineering resilience* where resilience is defined as the recovery time for an ecological system to return to the initial equilibrium condition present before disturbance. Systems that return to initial equilibrium conditions more quickly are considered to be more resilient that systems that take a long period to recover after disturbances. The equilibrium concept was expanded to the concept of *ecological resilience*, which emphasizes capacity to endure disturbance, incorporating non-linearity, multiple equilibria and regime shifts. After the 1990s, the resilience concept focuses more on the properties of self-organization after disturbance. Recently researchers applied these resilience concepts used in ecology and engineering to complex social-ecological systems (Levin et al., 1998; Levin, 1999; Berkes, Fikret & Folke eds., 1998; Berkes, Colding & Folke eds., 2003). Resilience is a particularly relevant concept for considering the recovery of communities affected by disasters and the development of rural societies whose livelihoods are highly dependent on natural resource base.

The development of ecological resilience theory occurred in parallel with the emergence of the field of ecological economics, which was established in the late 1980s. Ecological economics arose mainly in the developed world and accordingly had less focus on critical development issues such as poverty and environmental degradation in developing world. Furthermore, conventional development economics tend to ignore ecosystem services that are the basis of human economic activity. There was

thus a need to link socio-economic research with ecological research, and to apply the resilience concept in social-ecological systems in order to address development issues such as resource degradation and to enhance human security. Important concepts for considering resilience involve threshold, regime shift and redundancy.

Various methods for quantifying resilience have been developed. Briguglio (2005) defined economic resilience as follows: a) to recover quickly from a shock; b) to withstand the effect of a shock; c) to avoid the shock altogether. Briguglio (2005) first tried to quantify economic resilience using indicators of macroeconomic stability, microeconomic market efficiency, and good governance. Adger (2000) defined social resilience as “the ability of groups or communities to cope with external stresses and disturbances as a result of social, political, and environmental change”. Washington-Allen et al. (2008) attempted to quantify ecological resilience by using remote sensing analysis to estimate vegetation productivity in dryland ecosystems. Although resilience is defined and analyzed in both economic and ecological terms, their integration is still under development. The recent resilience literature has begun to apply this concept directly to development issues (Mäler 2008). The recent report *World Resources 2008: Roots of Resilience—Growing the Wealth of the Poor* published by the UNDP/UNEP/WB/WRI clearly indicates that resilience is one of the goals that communities need to achieve through economic activities and in the course of development. Despite selected recent efforts (Resilience Alliance 2007), the method of evaluating resilience is still not well defined in the current literature compared to vulnerability (Gallopín 2006). The purpose of this introduction is to address approaches to study resilience we employ in our Resilience Project.

Operationalizing Resilience

In the Semi-arid Tropics (SAT) (Thorntwaite 1948; Megis 1953; Troll 1965; Ryan and Spencer 2001), people’s livelihoods are vulnerable to environmental variability. The SAT includes Sub-Saharan Africa and South Asia, where the absolute number and proportion of people who are extremely impoverished will remain large for some time to come. People in these regions depend largely on vulnerable rain-fed agriculture. Food security and poverty reduction are critical issues. As an ex-ante and ex-post risk coping strategies, the capacity of diversified access to resources is one important condition for resilience (Shimada, 2009; Thamana 2007). Access to resources is facilitated through a transfer and/or substitution of livelihood from agriculture to livestock, agriculture to non-agriculture, market, social organization and institution, as well as social network. Rural household and communities in Africa are facing not only risks from natural disasters but also risks from social and economic changes, such as international price hike of cash crops, political transition, changes in land tenure systems and agricultural policies.

In order to operationalize resilience, it is important for us to consider *resilience* in the context of the human security of rural households in SAT region. In the Resilience Project, we consider resilience *to* environmental variability, such as drought, flooding and social changes. We consider resilience *of* food supply and consumption, health status, agricultural production and livelihoods. Lastly we consider resilience *for* protecting human security, i.e., survival, livelihoods and dignity (Commission on Human Security, 2003).

Resilience and Human Security

Resilience in the context of protecting survival, livelihood and dignity of households and communities is considered as follows (Figure 1):

Survival

-The ability of the household (subsistence farmers) to recover from a shock (e.g. drought) to sustain their survival.

Livelihoods

-The ability of household and community to recover from a shock and maintain their agricultural production and livelihoods. This involves the recovery of agricultural production and household income by shifting to other source of income.

Dignity

-The ability of household and communities to recover from a shock to maintain their living environment that does not endanger their dignity.

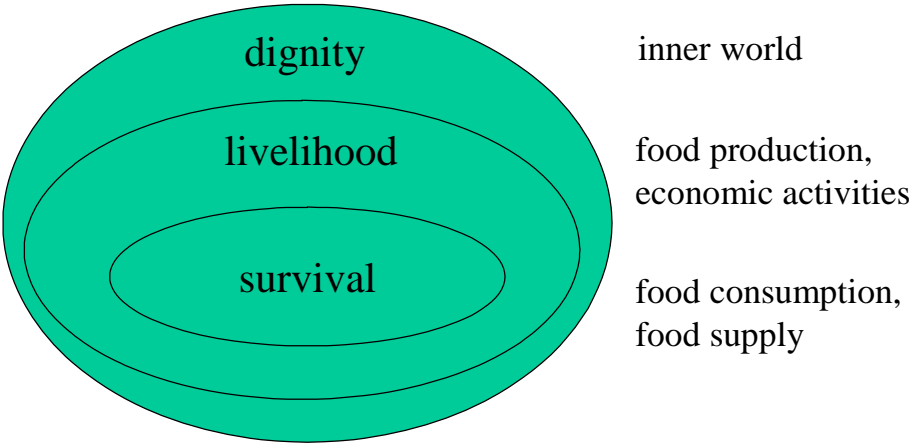


Figure 1. Human security for survival, livelihood and dignity

Approaches to Resilience

In Resilience Project, four themes employ different approaches to resilience. For an empirical approach to resilience, we focus on the mechanism and the speed of recovery in food consumption and livelihoods of agricultural households after shocks such as drought and flooding (Figure 2). Theme 1 measures the level of decline of agricultural production through maize yields (Shinjo et al.; Kuramitsu et al.; Sokotela et al.; Miyazaki et al. in this issue). Theme 2 observes the speed of recovery

in food consumption, body weight and skinfold thickness (Sakurai et al.; Yamauch and Kon; Kanno et al.; Shimono et al. in this issue). Theme 3 considers qualitatively under what conditions livelihoods do or do not decline, how they recover and the differential coping strategies utilized by households (Shimada 2009; Ito 2009; Nakamura 2009; Kajoba 2009; Mulenga 2010; Ishimoto in this issue). Theme 4 visualizes the spatial pattern of resource use by agricultural households (Yamashita et al.; Miyashita et al.; Matsumura in this issue). This theme also includes spatial resilience (Evans and Caylor in this issue) and historical investigation (Thamana et al. in this issue). For a major disaster, the social-ecological system has possibly shifted to alternative state in case of 2004 Indian Ocean tsunami (Kume 2009; Palanisami et al. in this issue).

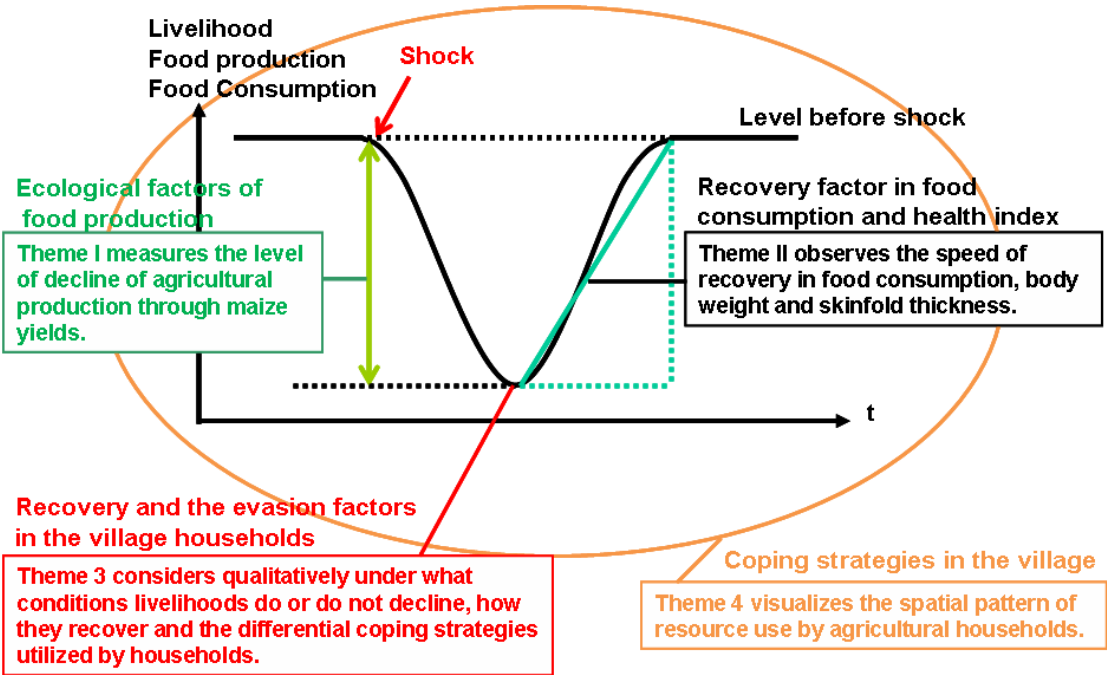
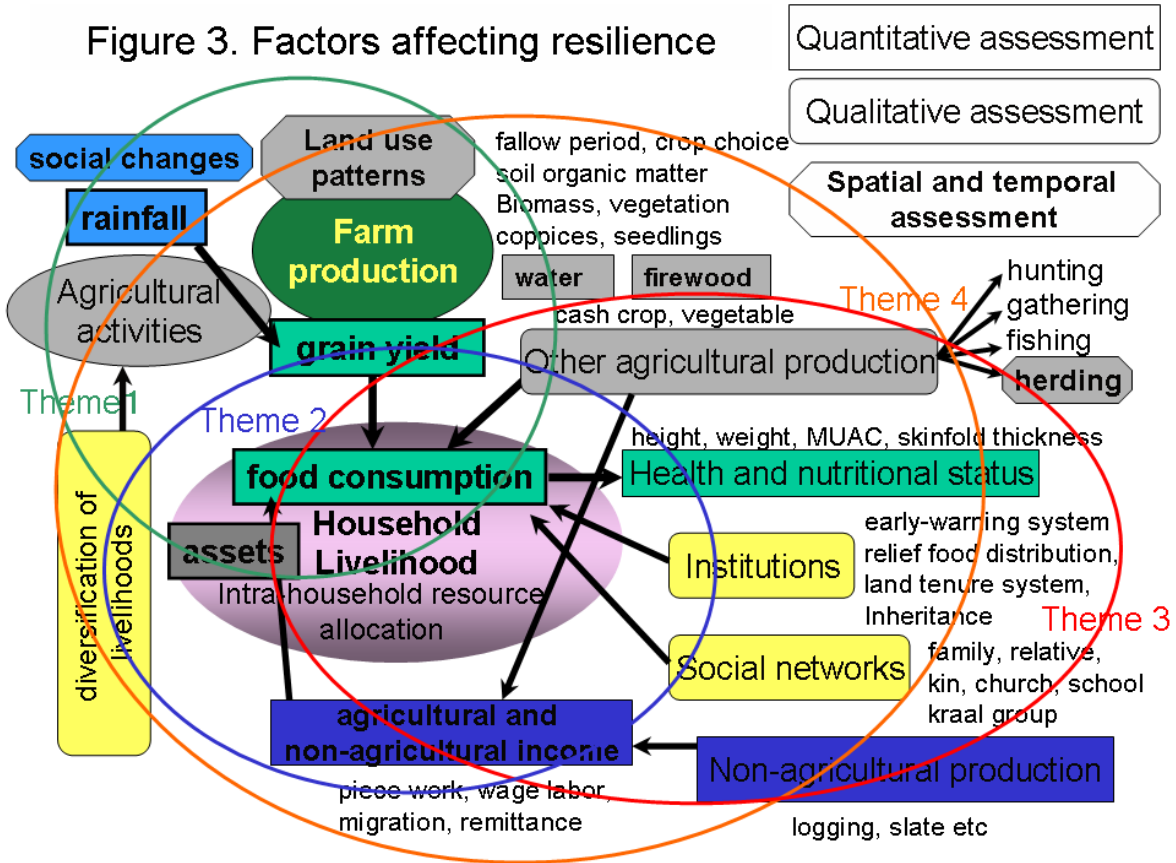


Figure 2. Approaches to Resilience

Indicators and Factors Affecting Resilience

In case of emergency such as drought, the most important mission is to secure food supply for survival. The resilience of social-ecological system for subsistence agricultural households in SAT is resilience *to* environmental variability, *of* food supply and consumption, health status, agricultural production and livelihoods, and *for* protecting human security, i.e., survival, livelihoods and dignity. Figure 3 indicates our research components and indicators of resilience. This figure illustrates the relationship between food supply, food consumption, health, and ecosystem services in drought prone area. Environmental variability such as rainfall and social changes (resilience *to* what) is shown in blue. Indicators are food supply, food consumption, food production and health status (resilience *of* what) shown in green. The connecting arrows show the working hypothesis of the project. Our

purpose is to find out the strength and weakness of the connection between these components, test indicators of resilience, and verify factors and conditions for resilience. Environmental variability (e.g. rainfall variability) affects crop yield from farmer's field, thus directly affecting food availability and consumption i.e., survival of household. The decline of food consumption will affect the health and nutritional status of household members. The decline of food consumption especially affects children under 5 years old and causes a decline in health condition as estimated from their body weight and skinfold thickness. When food supply from their own fields declines, household heads try all measures to secure food supply for the household from other means. Options include the sales of cash crops such as vegetables, or switching to alternative agricultural activities such as hunting, collecting wild food, fisheries, and livestock production. If agricultural production is not enough to support food supply, then household members pursue non-agricultural activities such as piecework to supply food to the household and maintain livelihoods. For household survival and maintenance of livelihoods, food distribution system of aid agencies and local institutions and organizations that secure access to resources are important, but social networks such as relatives and friends also play an important role. Even though food production declines in drought years, households employ various coping strategies and alternative economic activities to try to recover from these shocks. In addition, regional scale dynamics are source of resilience to maintain survival and livelihood. Ecosystem services provide a variety of resources to rural communities in the region. For example, agro-ecological systems provide food supply, lake ecosystems provide fish, forest ecosystems provide emergency food, firewood as energy, water for cooking, and material for construction.



Conclusion

This paper tries to provide an overview of our empirical approaches to resilience. We consider resilience in the context of agricultural livelihood of SAT region. Our target is agricultural households in drought-prone Southern Zambia and their survival and livelihood. We especially consider the recovery of food consumption and food supply as well as livelihood after environmental shock such as drought and flood. Resilience is a concept that has a potential for opening doors to a different approach to natural resource management (Resilience Alliance 2007). The sustainability of rural societies requires an appreciation of the resilience of households and communities. Resilience is the basic capacity of a society to build sustainability at all levels.

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