Dynamics of Social-ecological Systems: The Case of Farmers' Food Security in Semi-Arid Tropics

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Abstract

Resilience is defined as "the capacity of a system to experience shocks while retaining essentially the same function, structure, feedbacks, and therefore identity (Walker et al. 2004)". Although resilience has been defined and analyzed as ecological as well as social-ecological terms, their method of analysis is still under development. Recently, the concept of resilience has been directly applied to regional development and food security issues where people heavily rely their livelihoods on natural resource base. Resilience of social-ecological system (SES) is considered an important component for achieving sustainability.

Within the Semi-Arid Tropical Sub-Saharan Africa, communities' livelihoods depend critically on fragile and poorly endowed natural resources, and poverty and environmental degradation are widespread. People in these regions depend largely on rain-fed agriculture, and their livelihoods are vulnerable to environmental variability. Environmental resources such as vegetation and soil are also vulnerable to human activities. To surmount these environmental challenges, human society and ecosystems must recover quickly from environmental shocks.

We argued that in order to operationalize resilience, it is important for us to consider resilience in the context of human security of rural households in SAT region. 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. Purpose of the paper is to show our empirical evidence in Zambia and dynamics of farmers' livelihoods in response to various shocks. Whether threshold can be defined in the context of food security in social-ecological system. And lastly, role of institutions to build adaptive capacity of the communities is discussed.

Keywords: food security, livelihood, environmental shock, agricultural system, adaptive capacity