2. Resilience of Rural Farmers and Approaches for Clarifying Capacity:
The Level of Household Livelihood

Yudai Ishimoto
Research Institute for Humanity and Nature, Kyoto, Japan

Abstract

Resilience, in the context of this study, refers to insusceptibility to damage and the ability to recover after damage. Insusceptibility has two aspects, comprising robustness and flexibility in response to shock. This study sought to clarify the relationships between resilience and several other important concepts. Here, I describe an approach for clarifying the capacity for resilience. In addition, I examine the sequence of adaptation and coping behavior in the time period following a specific shock, with a particular focus on the resilience of rural farmers at the level of household livelihood.

2.1. Introduction

Resilience, in the context of this study, refers to insusceptibility to damage (Holling et al., 1995) and the capacity to recover after damage (Ellis, 2000). Insusceptibility is comprised of two aspects; robustness, and flexibility in response to shock.

Section 2.2 clarifies the relationships between resilience and several other important concepts which are discussed in resilience and vulnerability studies (Adger, 2000; Resilience Alliance, 2007; Terner et al., 2003; Watts and Bohle, 1993); capacity, external factors, exposure, assets, vulnerability, shock, disturbance and risk. Section 2.3 describes an approach for clarifying the capacity for resilience. Finally, section 2.4 discusses the sequence of adaptation before and coping behavior following a specific shock. This study has a particular focus on the resilience of rural farmers at the level of household livelihood.

2.2. Relationships between resilience and other concepts

Figure 2-1 and 2-2 illustrate the relations between resilience and several other important concepts at the level of household livelihood. This section describes the relationships between resilience and other concepts, providing examples to illustrate each concept.

In this study, resilience consists of three components; capacity, external factors and assets. The term exposure is used as a substitute for external factors in vulnerability studies (Bohle, 2001; Chambers, 2006). Household risk is composed of potential risk and manifested risk. Emergent risk may lead to a change in the properties of potential risk. Potential risk can be thought of as vulnerability, emergent risk can be restated as disturbance.

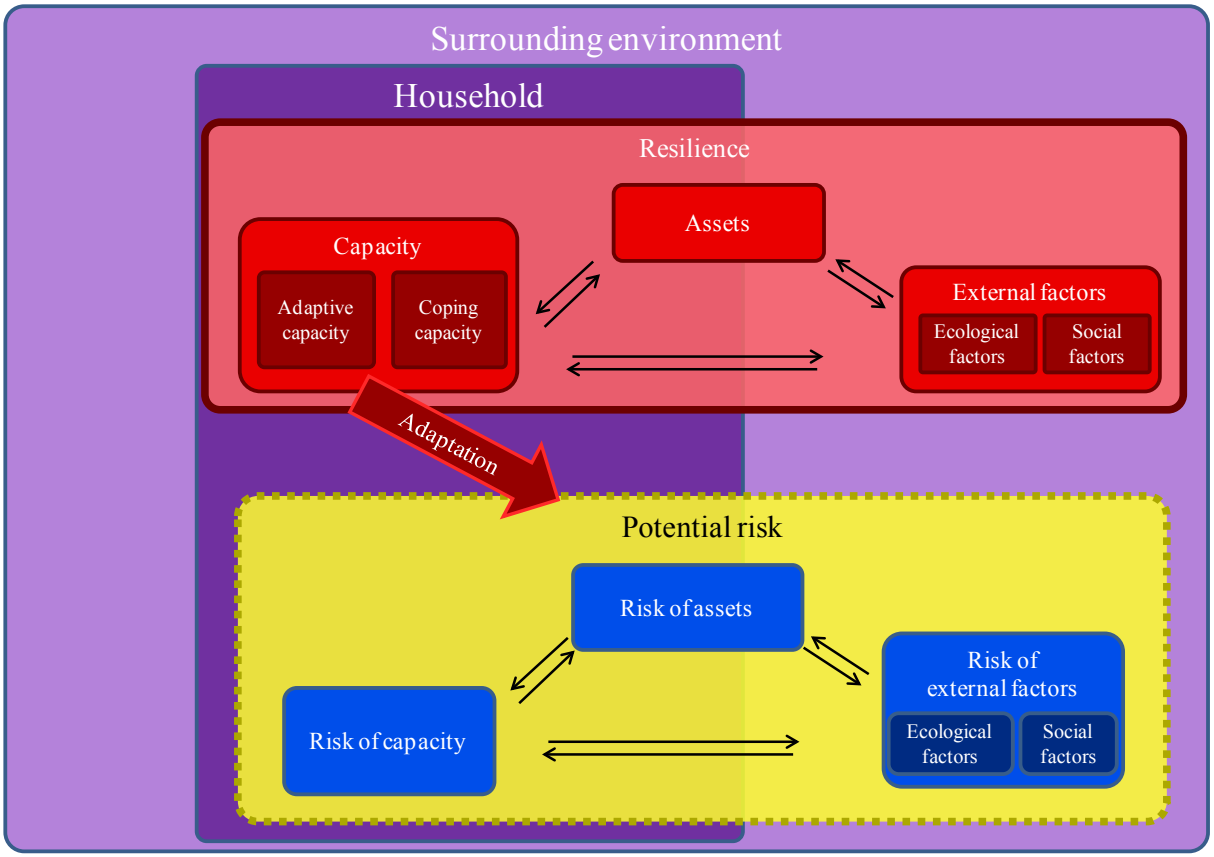

Figure 2-1. Relationship between resilience and other concepts

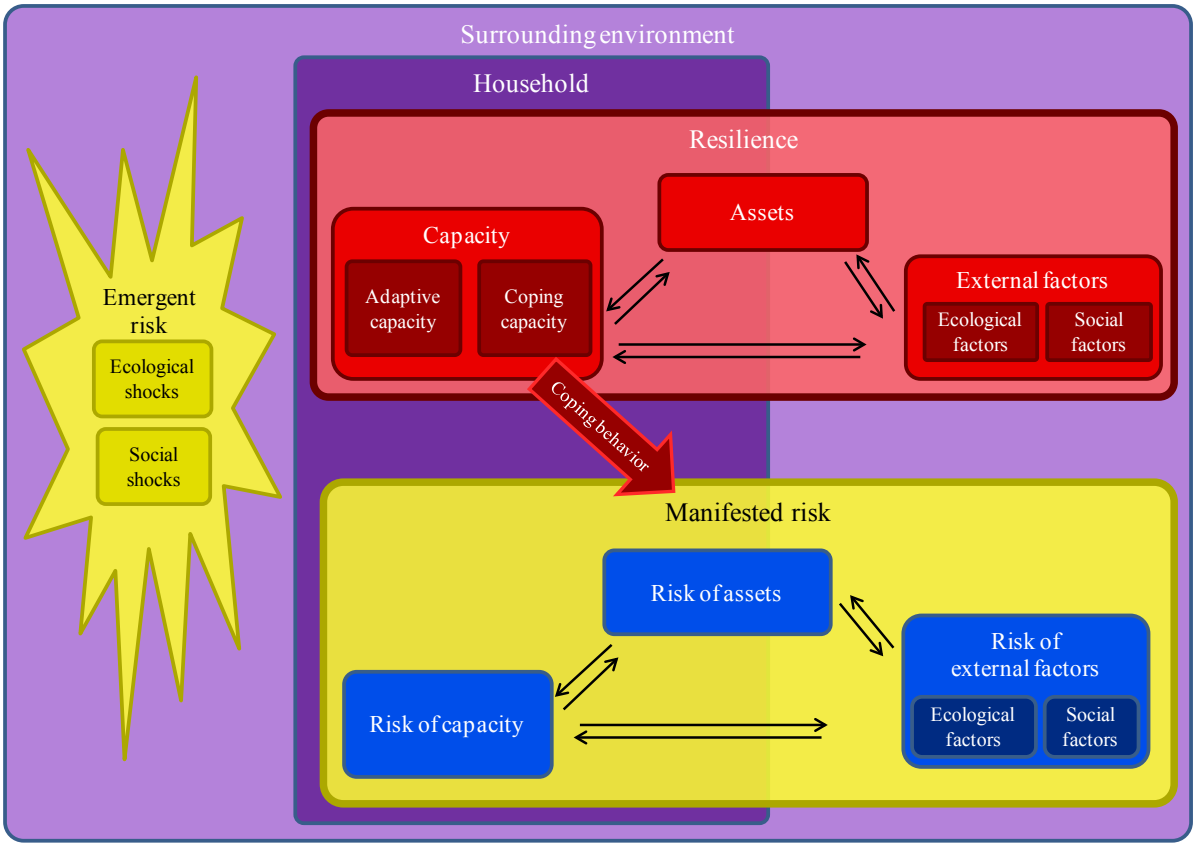

Figure 2-2. Relationship between resilience and other concepts: changed properties of potential risk by emergent risk

Various potential risks are related to each component of resilience; low capacity, negative external factors and insufficient assets. When emergent risk is more extensive than expected, potential risk is manifested; that is, Figure 2-1 shifts to Figure 2-2. Emergent risks can be divided into ecological shocks and social shocks. Ecological shocks include light rain, heavy rain, disease epidemic, insect damage, bird damage, other animal damage, and so on. Social shocks include political, economic, cultural and legal changes etc.

External factors can be divided into ecological factors and social factors. Ecological factors include geographic and climatic factors, etc. Social factors include political, economic, legal, historic and cultural changes etc.

Capacity is divided into adaptive capacity to potential risk before shock and coping capacity with manifested risk after shock.

Three components determine whether resilience is in a high or low state at the level of household livelihood: capacity, external factors and assets. In cases where capacity is high, external factors are positive and assets are sufficient, the state of resilience is high.

Figure 2-3 shows a conceptual diagram representing resilience of rural farmers at the level of household livelihood. In the figure, the X-axis represents assets, the Y-axis represents external factors, the Z-axis represents assets, and the volume of the cube on sides X, Y and Z-axes represents resilience. As each component improves, each axis lengthens, and as volume increases, resilience also increases.

For example, if rainfall (an external factor) is extremely bad (i.e. drought or flooding), agricultural production may fall to a low level. However, if people with a high capacity for resilience can practice suitable farming technology to offset the rainfall conditions, the reduction in agricultural production may be absorbed or cancelled out.

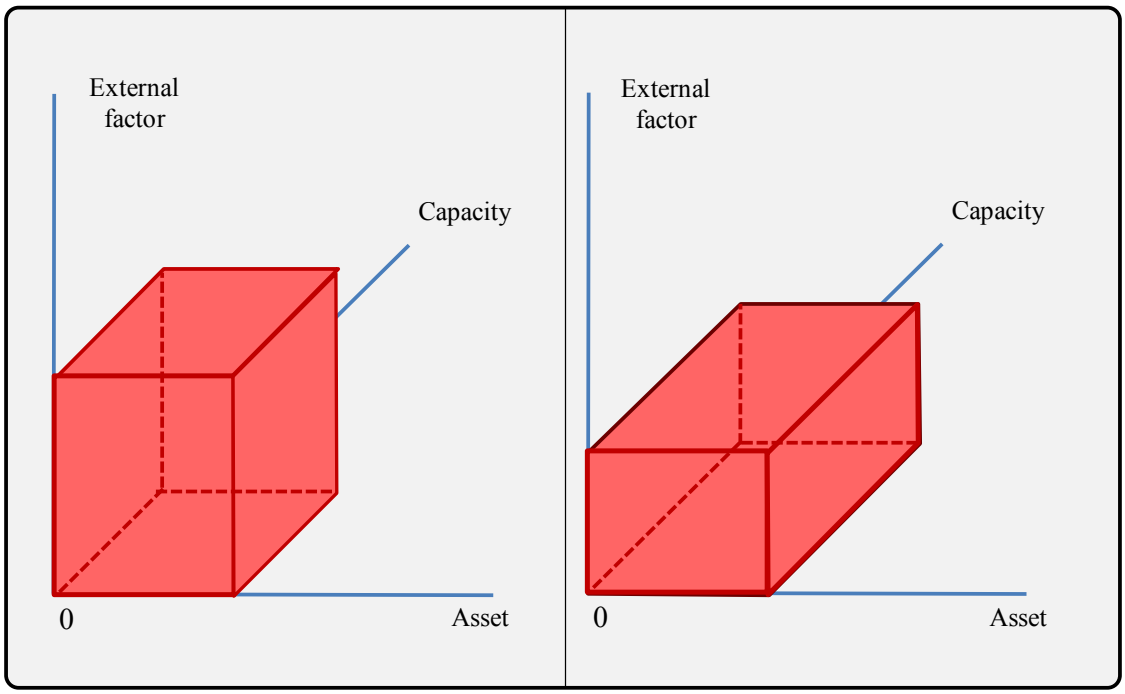

Figure 2-3. Three components determining whether resilience is in high or low state.

2.3. Approach to clarify capacity

The quality of prediction and analysis of external factors has been significantly increased in recent years with improvements in meteorological data, satellite image data and socioeconomic data. Meanwhile, a standardized method of analysis for determining capacity as an internal factor has not yet been established (Shimada, 2008). As such, this study focuses on capacity as one component of resilience.

Capacity itself is difficult to measure and observe. However, when capacity is considered in terms of the behavioral adaptation of farmers to potential risks before a shock occurs, and the ability to cope with the manifested risk after shock, it can be measured and observed. The current report empirically analyzes evidence of adaptation and coping behavior by farmers in the Southern Province of Zambia, located in a semi-arid tropical region with fluctuating rainfall, as a case study for clarifying the mechanisms underlying capacity.

2.4. Adaptation and coping behavior in time series

Adaptation and coping behavior varies according to the nature of a shock. The current report focuses on extremely heavy rain as an ecological shock, and analyzes farmers' behavior across time, in terms of how they adapt and cope at the level of household livelihood.

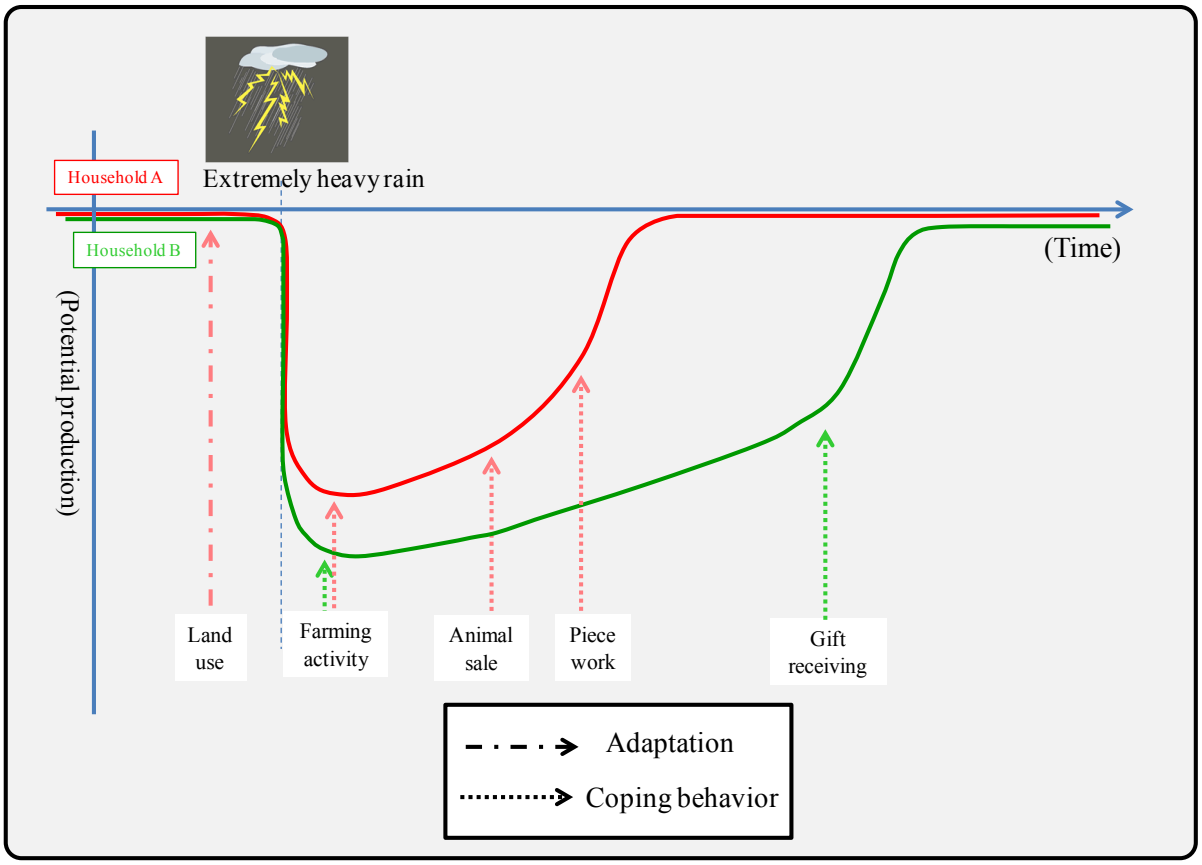

Figure 2-4. Conceptual diagram of transition in potential production and behaviors to extremely havy rain

Figure 2-4 shows a conceptual diagram of the transition in potential production and behaviors in response to extremely heavy rain. In this figure, the adaptation and coping behavior of Household A and B are compared. Household A has a relatively large amount of assets and labor, both of which are lacking for Household B. The horizontal axis represents the time, and the vertical axis represents the potential production of all livelihood activities Figure 2-4.

As shown in Figure 2-4, Household A adapts to the potential risk of geographical factors with land use, in contrast with Household B, which does not. Following the extreme rain event, Household A suffers less of a decline in potential production relative to Household B. Household A copes with the post-shock decline by undertaking additional farming activity, animal sale and piecework, so that potential production reaches pre-shock level. Meanwhile, Household B copes by undertaking additional farming activity, but cannot sell any animals or practice piecework. Eventually Household B is compensated by gifts through a social network.

References

Adger, W. N. 2000. Social and ecological resilience: are they related?. Progress in Human Geography. 24. 347-364.

Bohle, H. G. 2001. Vulnerability and Criticality: Perspectives form Social Geography. IHDP Update 2/2001. Newsletter of the International Human Dimensions Programme on Global Environmental Change. 1-7.

Chambers, R. 2006. Vulnerability. Coping and Policy (Editorial Introduction). IDS Bulletin. 37-4. 33-40.

Ellis, F. 2000. Rural Livelihoods and Diversity in Developing Countries. Oxford. Oxford University Press.

Holling C. S., D. W. Schindler, B. W. Walker, and J. Roughgarden 1995. Biodiversity in the functioning of ecosystems : an ecological primer and synthesis. Perrings C. A. , K.- G. Mdler, C. Folke, C. S. Holling, and B.- 0. Jansson (eds.). Biodiversity Loss: Ecological and Economic Issues. Cambridge University Press. Cambridge. 44-83.

Resiliencce Alliance. 2007. Assessing and managing resilience in social-ecological systems: A practitioners workbook.
available at http://www.resalliance.org/index.php/resilience_assessment

Shimada, S. 2008. Introductory analysis of social vulnerability in rural Africa. E-journal GEO. 3-2. 1-16. (in Japanese)

Turner, B. L., R. E. Kasperson, P. A. Matson, J. J. McCarthy, R. W. Corell, L. Christensen, N. Eckley, J. X. Kasperson, A. Luers, M. L. Martello, C. Polsky, A. Pulsipher and A. Schiller. 2003. A Framework for Vulnerability Analysis in Sustainability Science. Proceedings of the National Academy of Sciences of the United States of America (PNAS) 100(14): 8074-8079.

Watts, M. J. and H. G. Bohle. 1993. The space of vulnerability: the causal structure of hunger and famine. Progress in Human Geography. 17(1). 43-67.