

Ecosophy Program

KUBOTA Jumpei | Program Director

Climate warming is one of the truly global environmental problems. It affects almost all systems of the world, including sea-level, hydrological regime, vegetation, agricultural production, marine life, and so on. On the other hand, most environmental problems are described as specific phenomena—as declining water quality or loss of forest or biodiversity in a particular place—yet these can also be viewed in global perspective. In arid regions, for example, the construction of large reservoirs and irrigation systems has greatly enhanced agricultural productivity. Such transformations of hydrology and landscape have clear local effects, yet as humankind comes to view the biophysical phenomena found in a place as iterations of larger processes, we recognize that the world is characterized by linkage and connection. Water shortage or soil degradation in one area may lead to food shortage or air pollution in another.

Humans have created new global cycles and scales of interaction with nature. The exchange of people, ideas and materials can stimulate human creativity, yet at present there is little agreement of how to establish patterns of exchange that will simultaneously enhance human wellbeing and ecological integrity. This is the fundamental problem of our time.

Projects in this domain examine the manner in which contemporary environmental problems both contribute to and result from global phenomena and processes. These research projects focus on specific social and environmental contexts in which environmental problems are found, the linkages of these problems to social and material phenomena in other places, and on the conceptual models used to describe such interconnection.



Completed Research Leader

Title

E-04

UMETSU Chieko

Vulnerability and Resilience of Social-Ecological Systems

Vulnerability and Resilience of Social-Ecological Systems

Project Leader **UMETSU Chieko** RIHN

A cycle of poverty and environmental degradation is a principal cause of severe global environmental problems. Forest degradation and desertification are prevalent throughout the semi-arid tropics, including in Sub-Saharan Africa and South Asia, where the majority of the world's impoverished people live. People in the semi-arid tropics depend on rain-fed agricultural production systems that are vulnerable to climate variability. Environmental resources such as vegetation and soil are also vulnerable to human activities. A key factor in preventing environmental problems lies in social-ecological resilience, or the ability of human societies and ecosystems to recover from social or environmental shocks.

This project examined the factors affecting social-ecological resilience in rural Zambia and the ways in which it can be enhanced. Project research focused on heavy rain in 2007 as an environmental shock. Crop damage differed by geographical location and condition, and we observed that farmers diversify field locations as an ex-ante coping mechanism. Weekly household surveys revealed that declines in food consumption levels depended not only on crop damage but also on associated increases in food prices. Heavy rain caused a decline of calorie intake as well as body weight, thus affecting not only agricultural production but also health and labor supply.

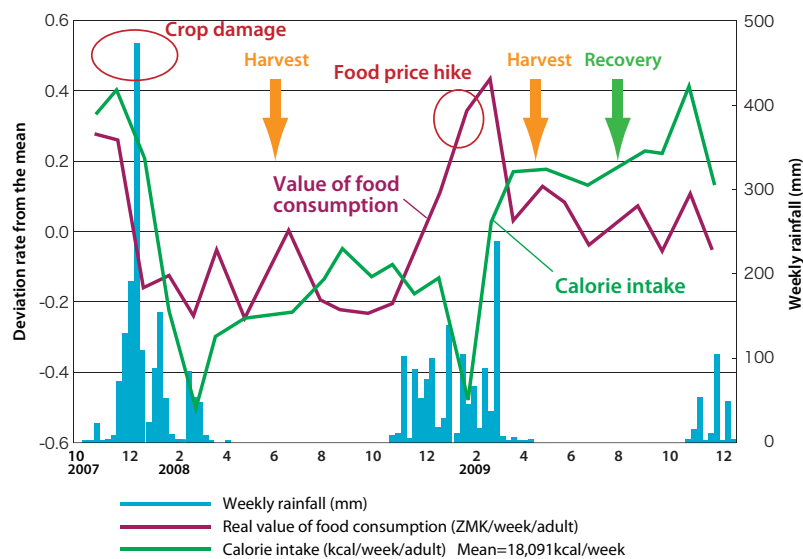
Farm households employ various coping activities, including replanting maize and cotton, changing crops, and earning cash income from non-agricultural activities by utilizing available natural resources, economic

opportunities and social networks. Most households did not recover food consumption after extreme rainfall for more than one year, and poor households suffered the most severe and long lasting impacts.

In the short run, household resilience in the rural communities can be considered as livelihood recovery through food consumption and production. Our results indicated long term strategies, such as improvements in basic services such as education, health care and market access, are necessary to improve adaptive capacity, as is resource management suited to local ecological conditions. Long-term observation also shows that change in rural institutions, social organization and development forces complicate changes in household resource use and affects their vulnerability and resilience.

Dissemination of research outcomes

In 2011, we organized two international symposia and discussed our research outcomes with various researchers and stakeholders. In Lusaka, Zambia, we organized Lusaka Workshop in 2007, 2009 and 2011 and discussed applicability of resilience concept to development projects. In August 2011, we held a village workshop for disseminating research outcomes to villagers in the study site and discussed together strategies to enhance resilience of the community. Additionally, we plan to publish research outcomes as three books in 2012.



Change of food consumption after 2007 heavy rain

Impact of heavy rain in Dec. 2007 appeared as food price hike in Feb. 2009 just before the next harvest season and affected poor households. It took more than one year for most households to recover from the rainfall shock and they fully recovered only after the next harvest in 2009.

TOWARDS ENVIRONMENTAL HUMANICS OF THE EARTH SYSTEM



The triple catastrophe Japan experienced in March 2011 underscored the complete dependence of all societies, no matter how technologically advanced, on the Earth's elemental forces and properties. It also exposed how this dependence is managed and mediated by both formal and informal social institutions, which are often embedded and expressed in the practices of everyday life. In this sense, we see that science, governance, institutions and social practices comprise a single field of activity, yet one which cannot be identified as such in conventional forms of study. In order to open our research at RIHN to such dimensions, we now focus our efforts on conjoining the existing Domain Programs through a set of cross-cutting Initiatives intended to enhance design-oriented, problem-solving approaches for the contemporary human-environmental condition.

A plant sprouts fresh leaves in a mudflat created by the 2011 tsunami