Ecosophy Program

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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** Nagasaki University

What we found after the project

In Zambia, we focused on 2007 heavy rain as environmental shock and compared with other years. Crop damage by heavy rain differs by geographical condition of farm fields and farmers diversify field locations in various places as ex-ante coping mechanism. Weekly household survey revealed that the change of food consumption levels depends not only on crop damage but also succeeding food price hikes. Heavy rain caused a decline of calorie intake level as well as body weight thus affecting not only agricultural production but also health and labor supply.

In face of crop damage, farm households tried various coping activities including replanting maize and cotton, changing crops, earning cash income from non-agricultural activities by fully utilizing available resources such as natural resources, economic opportunities and social networks. Most households did not recover food consumption after extreme rainfall for one year, with poor households receiving the most severe and long lasting impacts due to price hikes and poor access to markets.

From the long-term observation of rural livelihoods, various factors such as changes of rural institution, social organization and development forces complicate and co-evolve the change of resource use by households and affecting vulnerability and resilience of rural society.

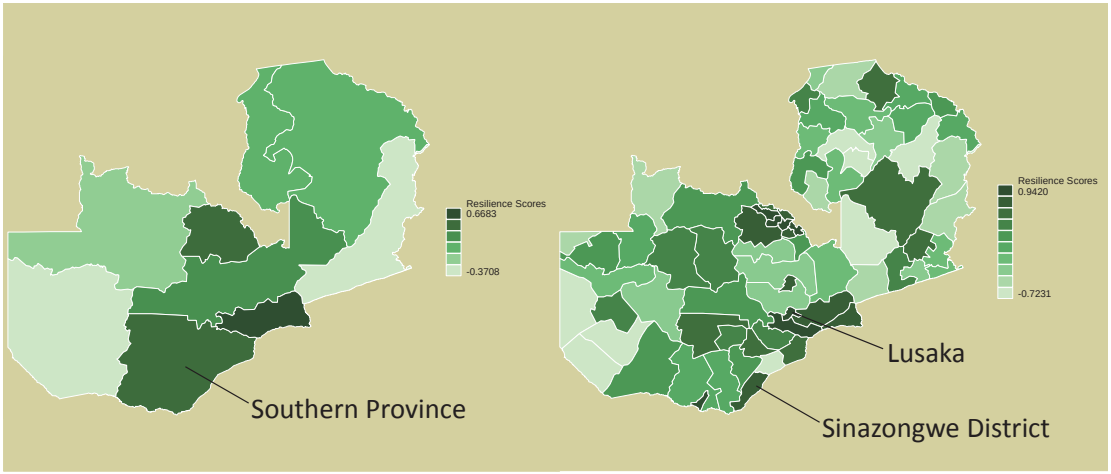
Resilience in the context of food security in Semi-Arid Tropics can be considered as livelihood recovery through food consumption and production in the short run. In the long run, resilience for food security is the bundle of various adaptive capacities of households and community. To improve adaptive capacity, long term strategies are required for improving basic services including education and health care. Furthermore, not only enhancing specific resilience to a certain risk, but building general resilience of the society to respond to all types of risks is necessary. Thus more comprehensive approach to food security is required.

Contribution to Global Environmental Research

Vulnerability of social-ecological system is the main cause of global environmental problem. In our project, we identify what causes vulnerability of households and communities and the factors affecting resilience. Our results indicated long term strategies for improving adaptive capacity such as education and market access are necessary as well as resource use that match with local ecological conditions. This strategy that suit to local condition while increasing overall adaptive capacity is the key for enhancing households and community resilience.

Dissemination of research outcomes

In 2012, we presented our research in many international conferences to share final project outcomes with various stakeholders. Those included Planet Under Pressure 2012 Meeting, Japan Geoscience Union IHDP session, and JIRCAS International Symposium. At the World Water Week 2012, we received Best Poster Award. Our research results received recognition from the international community for advancing interdisciplinary research on resilience. The Resilience Project has been contacted by many researchers and policy makers for information and collaboration. Additionally, we plan to publish research outcomes as three books in 2013.



Data: Zambia Living Condition Monitoring Survey 2004, N=19,340 HH

Resilience Mapping
Resilience scores to food insecurity were estimated and mapped in Provinces (left) and Districts (right). These maps allow policy makers to identify where are the hot spots that need policy focus in the region in terms of building resilience to food insecurity.