

7. Conclusion of Understanding Agricultural Vulnerability, Human Behavior and Relief

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In this year, we conducted the field investigation data integration focus on thinking the rural farmer's resilience by considering an agricultural vulnerability, human behavior and relief in Southern province. Followings are the results of considerations.

As our discussion result for the concept of resilience in human activities, it consists of three components; capacity, external factor and asset. Exposure is a substitute for external factor in vulnerability studies. Risk of household is composed of potential risk and manifested risk. Emergent risk may lead to change the property of potential risk. Moreover, potential risk may be replaced by vulnerability. There are various potential risks related to each component of resilience; low capacity, bad external factor and deficient asset. When emergent risk occurs, the risk is more extensive than expected, potential risk manifests. Emergent risks are divided into ecological shock and social shock. Ecological shocks include light rain, heavy rain, epidemic, insect damage, bird damage, animal damage and so on. Social shocks include politic, economic, cultural and legal change etc. In this paper's the climate change effect was the extreme heavy rain.

From the rainfall between 2007_08 and 2009_2010 and the daily rainfall and daily accumulation rainfall in Site A and Site C, total amount rainfall at Site A of 2007_08, 2008_09 and 2009_2010 were 1438mm, Site B was 1093mm and Site C was 1262mm respectively. In Site C, those were 1320mm, 1293mm and 1058mm respectively. As is mentioned in previous report, a lot of fields in all sites were damaged from heavy rain in 2007_08. Additionally, in 2009_2010 many fields were also damaged by heavy rainfall. In each sites, total amount of rainfall were highest in 2007_08. But total amount of rainfall in 2008_09 was higher than 2009_2010 in Site C. This means that fields damage by heavy rainfall coursed by not total amount of rainfall but rather rainfall pattern with much rainfall, such as end of December in 2007_08 and end of February in 2009_10.

From the total crop field area in five villages during two rainy seasons of 2007_08 and 2008_2009, it seems that total crop area in rainy 2008_09 decreases comparing with the one in rainy 2007_08. More than 67% of rainy crop fields in 2008/09 are overlapped with the crop fields of rainy 2007_08. From the topographical conditions point of view, the land preparation composed of clearing and burning at rainy crop field is performed from September to the beginning of November. Also, we have many pictures taken in various seasons at three study sites. From comparison with such field data and geo-corrected ALOS/AVNIR-2 images, the characteristics of land use / land cover in the each season might be understandable. In FY2011, firstly, the classification of land cover/use in rainy and dry seasons around three study sites will be carried out using ALOS/AVNIR-2 images, crop calendar and fields' pictures as ground truth data. Secondly,

the spatial analysis for the land cover/use and topographical features will be done. Then we will discuss the potential risks and for the ecological shocks in the villages or sites level.

From the results of on-farm activities investigation in each site from 2007_08 to 2008_09, maize was most dominant crop which is staple food. In Site A, cotton was second in both years. In 2007_08, cotton was second, but in 2008_2009 it's ratio was decreased due to a lot of labor force and selling off in site B. Sweet potato is second dominant crop in site C. In this site, sweet potato is more important cash crop than cotton. These differences of on-farm activities among three sites depend on meteorological condition, soil condition and access to market and main road.

From the results of coping behaviors investigation in on-farm activities during post shock period, about 20% of maize fields were damaged by heavy rainfall in 2007_08. As coping behavior with heavy rain damages through on- farm activities, from 30% to 80% of damaged fields were abandoned. In other fields, many farmers switched or replanted crops. In Site A, they sowed maize seeds again. In site B, they switched to planting ground nuts and maize during the dry season. In site C, they switched to sweet potato. Thus coping behaviors with heavy rain damages were different in each site.

From the coping behaviors investigation in off-farm activities by site-level, the numbers are numbers of households which started new non-agricultural activities because they could not sell maize due to a shortage of maize productions in 2008. 65% of households sold animals as a coping behavior. In Site A, elderly households asked money from relatives. In site B, plank selling households increased.

Key findings on supports and requests for gift through mobile phone by Tonga people are following:

- 1) Person, who has not enough talk fee of mobile phone, can encourage calling by the action "*Paging*".
- 2) In case of household member having no mobile phone, he or she can access mobile phone of other household.
- 3) Cash and food are requested through mobile phone.
- 4) Most of requests are long distant.
- 5) Many cases of requests are between parent and boarding child, villager and urban relative.

The relief program against food shortage risk in Africa has ever been heavily depended on food aid. As I argued above, it takes time for aid organizations to provide an enormous amount of food to local population, and at the same time it is also difficult to procure a needed amount of food at a needed period. As Miyazaki and Ishimoto points out in their chapters, individual farmers adopt a various kinds of coping strategies such as shifting crop varieties, selling livestock, temporal working as a waged labor and utilizing social-networks. Food shortage risk cannot always be avoided by relief food provision as well as agricultural development policies. In terms of resilience of rural farmers, it can be argued that relief activities depended heavily on food aid must be reconsidered. The important thing is to support farmers' voluntary efforts with provision of opportunities they can utilize at a time of food shortage.