



Tropentag 2015, Berlin, Germany
September 16-18, 2015

Conference on International Research on Food Security, Natural Resource
Management and Rural Development
organised by the Humboldt-Universität zu Berlin and the Leibniz Centre for
Agricultural Landscape Research (ZALF)

Impact of Climate Change on Agricultural Production in North-West Cambodia

Socheat Keo^a

^a Czech University of Life Sciences Prague, Tropical AgriSciences , Czech Republic.

Abstract:

In Cambodia, agriculture plays a main role to ensure food security and contribute to economic growth. Currently, this sector is strongly impacted by natural disasters (drought, flood and increasing insect pests and diseases) caused by climate change influencing farmer livelihoods. Therefore, this research was conducted to investigate farmer's agricultural practices, determine the impact of climate change on these practices, and to know how farmers adapt to climate change. 180 farmer households were selected to do individual interviews. Of 180 households, 90 households were defined as poor (ID poor) by Ministry of Planning and 90 households were common farmers. Semi-structured interviews were conducted with key main informants such as district governor, chief of commune, commune council and chief of village. The results demonstrated that both types of farmers mainly depend on rice cultivation in wet season. Most of the farmers use conventional practices and some farmers still use traditional agriculture equipments and animals (cow) in their rice production. Almost all the farmers use direct-seeding technique in growing rice. Because of the natural disasters, farmers don't want to invest money in agriculture production. The natural disasters (drought and flood) and insect pests destroyed rice production every year since 2010. To adapt to current climate change situation, half of the interviewed farmers have changed their rice varieties. Some farmers dig small ditches to mitigate the drought and flood and nearly half of interviewed farmers allow their family members to migrate to find a job in order to earn money for supporting daily livelihood and for starting up agriculture production again next year.

Keywords: Adaptation, agriculture production, climate change, poor farmer

I. Introduction

Cambodia is still depends mainly on agriculture sector. In 2013, agriculture sector in Cambodia contribute 33.8 percent to gross domestic product (GDP) (ADB, 2014). Beside contribution to GDP, agriculture play main role to ensure food security in the region and improve farmer livelihood in rural area. More than 70 percent of total population of 13.5 million people is engaged in agriculture (largely rice cultivation) for their livelihood (NIS, 2008). After civil war, Cambodia has remarkable success in extending cultivation field and more intensive in agriculture production. According to Ministry of Agriculture Forestry and Fisheries (MAFF), amounts of agricultural equipment and input are increasing leading to increasing yield and total agriculture product. For example, average rice yield had increased by 38.89% from 2004 to 2008 (from

1.977 to 2.746 tons per hectare) and 15.18% from 2008 to 2013 (MAFF, 2014). However, agriculture in Cambodia is facing many challenges, and natural hazard caused by climate change is the one of the obstacles to development of Cambodian social economic and poverty reduction in rural area of Cambodia (Nyda Chhinh & Bunnak Poch, 2012).

II. Material and Methods

This research was conducted in August 2013. Six villages (Rork, Korkchak, Ponror, Smach, Rondas and Rolum) from three communes (Spean Sraen, Tram Sorsor and Srekhvav) in three districts (Phnom Srok, Srey Snom and Angkor Chum) from two provinces (Bantey Meanchey and Siem Reap) at North-west of Cambodia were selected for this research. According to district governor, two districts which are selected are poorer than others district and most of farmer depend on agriculture sector. 90 farmers holding ID poor¹ and 90 common farmers from six villages were selected for individual interview with structured questionnaire to find out farmer's agriculture production which is practicing, how natural hazard effect on their production and how they react, and how much money people lose per year caused by natural hazard. Village transection tool was applied in targeted area to illustrate farming system in the region. Group discussion was conducted with key informants (experienced farmer, chief of village, chief of commune and district governor) in the region to understand overview of situation of agriculture practices history and natural hazard happening in the region.

III. Results and Discussion

According to research result, natural disasters have strongly impact on farmer's agriculture production and farmers are more vulnerable, because they are using conventional practices. Agriculture is the main sector in the area which 93.89% of total farmers are engaged in this sector. Most of the farmers are cultivating rice. Beside rice, there are some farmers have grown others cash crop such as cassava and vegetable, raised animals such as (chicken, cattle and pig), fishing, non-timber forest product collection, business, worker, government staff, migration, and handicraft.

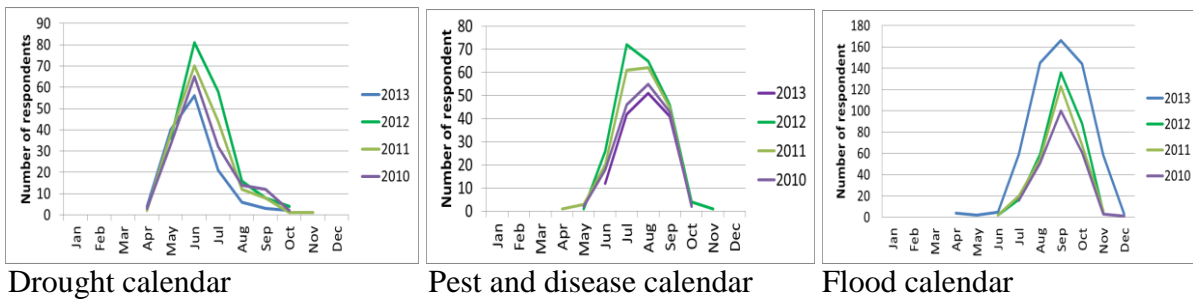
3.1 Agricultural system

According to village transection, landscape of agricultural system is divided into three different types: low-land, semi-up-land and up-land. In low-land, farmers are growing rice only one time per year depending on rain fall and river wet season, and fishing in both seasons. It is grassing field for cattle in dry season. Rice production low-land is facing many problems (worm, brown plant-hopper, crap, red snail, flood and drought) reducing rice yield. In semi-up-land, farmer are living, growing fruit tree around their house and vegetable, and raising animal. Semi-up-land level is higher than low-land that can escape from flood, but farmers are depending on the rain. Recently, semi-up-land is also affected by flood and drought. Diseases (foot and mouth disease, chicken pox, salmonellosis and newcastle of chicken) are increasing in animal production because of increasing level of flood and drought. In up-land, farmers are collecting non-timer forest product, and cultivating up-land rice. Up-land is the place where is rich source of cattle feed when the low-land is flooded. Up-land rice yield is always decreased by insects, animal (monkey), and drought. Generally, farmers start to prepare land for rice cultivation from mid of April to mid of July, plantation from May to August, and harvest from November to December. Rice field size of non-poor farmer is bigger than poor farmer. The average rice yield in the study area is around 1,000kg per hectare is significantly lower than average of national rice yield.

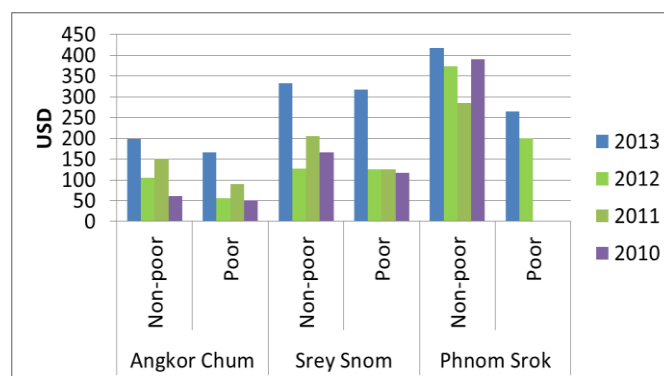
¹ ID poor was identified by Ministry of Planning and Development Partner

3.2 Impact of climate change on agriculture practices

According to rice cropping, drought, pest and disease, and flood calendar, drought happened when farmers was planting rice. During increasing of number of famer affected by drought, the number of farmers affected by pest and disease was also increasing and then later on flood was coming. Consequently, agriculture production is damaged by those natural hazards. Especially, rice crop production (both low-land and up-land rice production). The up-land rice field is affected when the drought is not extremely, because there is no water in the rice field, but the situation of water in low-land is better. The situation of water in up-land rice field is better when the low-land rice field is flooded. Fruit tree around the village does not get serious impact from the natural disasters, because they were grown in village next to the farmer's house far from flooded area. In addition, those natural disasters influence on pig, cow, and buffalo production as well but it is not seriously. For those animals just get ill and famers difficult to find feed, but for chicken and duck are different many of them were died especially in Phnom Srok district. In those districts, the water source of agriculture practices is mainly depending on rain fall.



Among of common and poor farmer, we found that the average loss of agriculture production caused by natural disasters calculated in cash of common famer is more than poor farmer. Non-poor farmers have bigger agriculture production than poor farmer. In the period of 4 years from 2010 until 2013, the loss of agriculture production calculated in cash in 2013 is more than others year. Among of three districts, Phnom Srok get more seriously impact from natural disasters especially flood because reservoirs were built during Khmer Rouge regime degraded by flood and there is no maintaining.

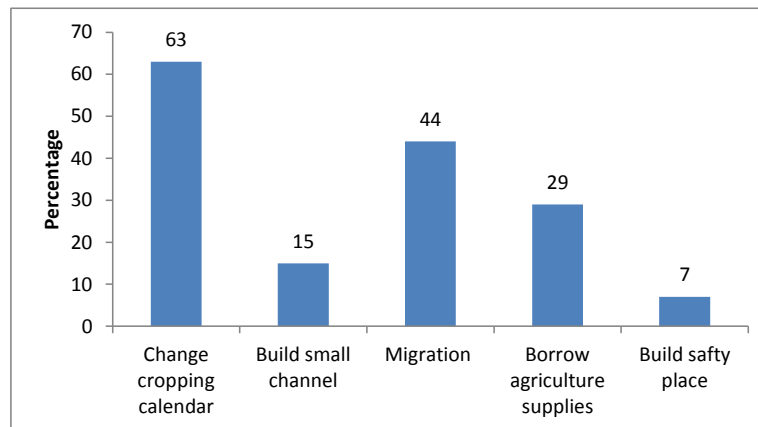


Size of natural impact of agriculture product calculated in cash

3.3 Farmer's adaption to climate change

For adapting to disaster, a half of respondents have changed varieties of rice based on landscape and level of flood (changing from low-land rice to floating rice), some farmers dig small ditch to mitigate the drought and flood and nearly a half of interviewed farmers allow their family member migrate to find the job to earn the money to support daily livelihood and for starting up agriculture production again next year. Most of famer family's members migrate to Thailand to

find permanent or seasonal job. These practices are not so effective to adapt to climate change, but they are what farmer can do in the region.



Farmer's adaptation to climate change

IV. Conclusions and Outlook

In study area, agriculture plays crucial role to ensure food security and potentially improve household income of both types of farmer. Rice is the main crop and provides employment to people in rural area, but from 2010 to 2013 natural disaster always damage rice production. Farmers are practicing subsistence farming system depend mainly on nature and both poor and non-poor famer are facing extremely flood. Increasing natural disasters from year to year in the study area is main obstacle of development in agriculture leading to food insecurity and increasing migration. The number of migration at the Thailand border will increase if the natural hazard become more extremely. To solve these problems, we proposes three recommendations to the Royal Government of Cambodia and development partner: (1) enhance providing accurate information of natural disaster prediction in the area which helps farmer to prepare their agriculture production before natural disaster happen and providing support during and after natural disasters happened. (2) Agriculture production should be recovered after natural disaster happen and farmer should be encouraged to invest more on agriculture production through establishing agriculture insurance services. (3) Agriculture techniques should be developed from conventional practices to more intensive technique to improve land and labor productivities and water resources management should be improved as well. Actually, this research just focuses mainly on the farmer's perception. For future research, it should be focused more on natural disaster mapping, geo-database design, and studying on climatic components when they are changed what will happen on agriculture production.

References:

1. ADB (Asian Development Bank). 2014. Key indicators for Asia and the Pacific (45th edition). Manila: ADB. 312p.
2. Chhinh N and Poch B. (2012). Climate change impacts on agriculture and vulnerability as expected poverty of Kampong Speu Province, Cambodia. *IJERD – International Journal of Environmental and Rural Development*, 28-37.
3. MAFF. 2015. Annual Report 2015. Phnom Penh: MAFF. 51p
4. MAFF. 2014. Rice production for 10 years 2004-2013. Phnom Penh: MAFF. 23p
5. NIS. 2008. Statistical Year Book of Cambodia. Phnom Penh : Ministry of Planing.