

# Impact of Climate Change and Community Awareness Case Study in Battambang Province, Cambodia

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## Abstract:

*In contributing to explore the level of impacts, the research entitled —Rural Livelihood Adaptive Capacity to Flood and Drought in Battambang Province, Cambodia” have carried out. The objectives of the research are 1) to assess the impact of flood and drought on community livelihood; 2) to find out the existing coping mechanism to adapt to flood and drought; and 3) to explore the potentials and opportunities to build community capacity. Both quantitative and qualitative approaches are adopted with 113 sample sizes. Flood and drought was seen to have serious impact to agricultural productions, particularly rice crop, at perceived high level, and the better-off households have higher destructions of main crop due to flood and drought compared to the poor. . Even though coping strategies for floods were reportedly adopted by most of the households but levels of success were still very limited that need to be improved. Poor access inputs and infrastructures and poor knowledge as well as lack of supportive actions from development agencies were the main constraints.*

## Keywords

*Rural Livelihood, Adaptive Capacity*

## 1. Introduction

Cambodia has been categorized as one of the nine most vulnerable countries in the world as well as Southeast Asia in regards to climate change ( Yusuf & Francisco,

2009).According to UNFCC, the main problem is its low capacity to adapt to climate change hazards (e.g. extreme events such as floods and droughts) and its high percentage of rural population, depending on agricultural production which is highly exposed to those hazards (UNFCC, 2008). Thus, damaging of crops and livestock endanger directly the families’ livelihoods.

Based on MOE’s report, out of all Cambodian provinces, Battambang is the one most vulnerable to Climate Change (MOE, 2005). It was noted that the socio-economic activities have been negatively affected by the climate change and natural disasters through destruction of crop yield and other social infrastructure. Obviously, Battambang frequently faced several types of disasters including droughts and floods, leading to many problems such as chronic dimensions of food security and malnutrition, people poorer, damage farm and social infrastructures, since this province is dependent primary on the level of water from Mekong River and rainfall (UNDP, 2012). On the other hand, the degree of vulnerability of people depend basically on the level of poverty and their resilience capacities that will combine to determine the severity of impacts of system changes due to increased climate variability in conjunction with other social, cultural, economic or environment change agents (PPCR, 2013).

Therefore, studying on “Rural Livelihood and Climate Change Resiliency: Case Study in Battambang Province” is very interesting research topic to see more specifically for

the impact of climate change on rural livelihood and as well as to discover the adaptive capacity in the target area for consideration as the experience or lesson learned to share among other provinces in Cambodia.

## 2. Methodology

A mixed method was adopted in this research. In this case, multi-stage sampling technique was used to select 113 farmers for face-to-face interviews (with household heads) by using structural questionnaires. Additionally, focus group discussions (with community elders) and observation were integrated to harness diverse ideas about the same issue and assist in ‘cross-checking’ the results and consequently help to increase the validity and reliability of the findings. The target household samples will be randomly selected based on the household list that stays with the village chief. Moreover, the number of target household samples will be divided in to 2 groups such as a group for better-off households and another group for poor households (ID Poor were provided by the government based on some criteria such as house type, household poverties, and land size) in order to conduct the interview with.

## 3. Result and Discussion

### 3.1 Household Demographic

The household demographic information provides a familiarity with the living standard of the population within the project targeted area. It also helps in giving an idea about the level and intensity of the vulnerability of the population targeted by the research. This is presented with the help of information on general household information, household’s economic status, educational standard of household head, and household loan status.

There were 113 valid households had been interviewed in the survey with similar proportions between poverty groups (ID-Poor). Within these interviewed households, about one fourth (24%) of households are headed by female. The average family members in total are five members per household. The findings show that average family size and proportions of female-headed households in studied site were significantly higher than national figures (4.7 for household size in Cambodia (NIS, 2009) and 13% for female headed households (NIS, 2010)). The proportions of the poors with vulnerability indications in term of membership and household responsibility were significantly higher than the better-off households (38% vs 10% and Sig. = 0.001 for female- head households, and 6 vs 4.5 and Sig. = 0.04 for household size). It is indicated that the households in target areas, particularly the poors, were likely to be in hardship socio-economic conditions.

*Table 1: Household Head Sex*

HH Sex	Number		Percentage (%)	
	Poor	Better-off	Poor	Better-off
Male	34	52	61.82	89.66
Female	21	6	38.18	10.34
Sig.			0.001	
Total	55	58	100	100

The findings presented in the table 2 below are calculated among the populations of the surveyed households who are over five-years old.

Over 95% the populations interviewed have below high school education level, of which nearly one third (31%) were illiterate. Majority of the household members were found to have their standard education level in primary school while almost one out of ten members achieved

secondary school and very few (2%) obtained high school or over.

Statistically significant differences on standard education level were observed between the poors and the better-off households (Sig. = 0.000). The numbers of population in the poor households who never attended school were almost triple compared to those of better-off people. Moreover, the adult literacy rate of studied community is significantly and highly lower than those of Cambodian national reported in 2009 (78.3% for the respondents compared to 73.9% (National adult literacy rate 2009 in Cambodia) for the whole population, male: 82.8% vs 82.4%, female: 73.8% vs 65.9%). The findings are significantly associated with high level of drop-out rate by the children in target regions (at primary and secondary school). This is mainly attributed to poor living conditions, drawing them to have high risk of labor abuse. It is indicated that the education level of the households in studied site were relatively poorer than those in national ones, and the poors have highly lower level of education than the better-off households. The issues post out the constraints to build the capacity in dealing and improving with livelihood of the households, particularly the poors, in studied site.

*Table 2: Household Education*

Education	Percentage (%)	
	Poor	Better-off
Never go school	45.45	17.24
Primary School	49.09	62.07
Secondary School	3.64	10.34
High School	0.00	1.72
University	0.00	1.72
Other	1.82	6.90
Sig	0.020	
Total	100	100

### 3.2 The Impacts of Flood and Drought

**Flood Impact:** Flood was seen to have serious impact to agricultural productions, particularly rice crop, at perceived high level (score 2.9) while other sectors have reportedly low level of destructions due to flood impacts. The levels of impact on rice crop production were statistically significantly higher for the better-off households (Sig. = 0.003) compared to the poors. It is the facts that severity of rice destructions was significantly associated with level of rice growing by the households, meaning that the household cultivated rice with bigger land size have higher destructions than those with smaller ones.

Problems on the children education (poor access and quality) during flooding and human health occurrences were moderately and negatively affected by flood while the relatively lowest and moderate impacts were observed on lack of household water uses, loss of animals, loss of properties, and poor job opportunity in the studied sites. Severities of flood impacts on these sectors were not significantly differed regarding of poverty groups (Sig. > 0.05).

*Table 3: Perceived Level of Flood Impact*

Impact	Poor	Better-off	Total	Sig.
Loss crop yield	2.5	3.3	2.9	0.003
Loss animal	0.5	0.4	0.4	0.814
Human disease	0.7	0.5	0.6	0.174
Lack water sources	0.5	0.4	0.4	0.799
Loss properties	0.4	0.1	0.3	0.081
Not access to school	0.7	0.6	0.6	0.704
Impact on business	0.1	0.4	0.3	0.048
Other	0.0	0.1	0.1	0.215

(Scale: 0-4, where 0 = No impact, 1 = Low impact, 2 = Moderate, 3 = High, 4 = Very high)

**Drought Impact:** Similar to flood impacts, drought moderately and seriously impacted to lack of household water uses (Score 1.3) and destructions of main crop productions (Score 2.5) respectively. Disease infections on human and animal were reported moderate levels while almost no impacts were observed on loss of property, children educations and job opportunities. With exception to crop destructions, the poor and better-off households encountered similar level of drought impacts for household socio-economic infrastructures.

Table 4: Perceived level of drought impacts

Impact	Poor	Better-off	Total	Sig.
Loss yield	2.0	3.1	2.5	0.000
Loss animal	0.4	0.3	0.4	0.737
Human diseases	0.5	0.4	0.4	0.756
Lack water source	1.1	1.4	1.3	0.344
Loss properties	0.1	0.1	0.1	0.954
Access School	0.0	0.1	0.0	0.191
Impact business	0.0	0.1	0.1	0.089
Other	0.0	0.1	0.0	0.102

(Scale: 0-4, where 0 = No impact, 1 = Low impact, 2 = Moderate, 3 = High, 4 = Very high)

In general, both flood and drought have significant impact on destructions of livelihood outcome of the households, and became frequently occurred and more serious to community in studied sites.

**Impact on rice growing land:** Regarding of land size, over 80% of growing land of the surveyed households reflected in table 5 were affected by flood in first rice growing period whereas about two third of land size (68%) were impacted by drought occurrence in second growing period. The levels of affected lands were significantly

associated with land size, poverty groups, and growing periods (Sig. = 0.000), indicating that the higher land size, the higher affected by the disasters. Due to lower land size, the poors were seen to have significantly lower level of impacts on growing land than the better-off households, but regarding of percentage of flood affected land, the poors were heavily affected by flood (83% vs 75%).

**Impact on rice productivity:** Consistently with affected land, the disasters significantly impacts in destructing the rice productivities (reducing rice yield) in studied site for any poverty groups and disaster types, revealed in table 6. It is found that rice yields obtained by the households were calculated on average 2 tones and 3.5 tones per hectare in first growing season and second growing respectively in normal years. Due to disaster impacts, the rice yields have statistically significantly declined by 70% and by 60% as the results of flood and drought effects respectively in first wet season (Sig. < 0.01); and by 58% due to drought in second growing period (Sig. < 0.01). Taking account of poverty groups, the poors encountered significantly higher serious destructions on their rice productivities that better-off households due to both flood and drought. In fist growing period, the rice yield of the poors have significantly declined by 85% and 65% compared to 60% (Sig. = 0.007) and 55% (Sig. = 0.460) for better-off households due to flood and drought impacts respectively. In second growing period, the levels of destructions were calculated to be approximately 75% for the poors and 48% for the better-off households due to drought impacts (Sig. = 0.029).

*Table 5: Impact of climate change on growing land*

Season	Land Type	HH Type		Total	Sig	Std	
		Poor	Better-off			Poor	Better-off
	Land size(H)	1.00	2.46	1.84	0.000	0.82	1.76
Rainy	Land effect by flood	0.83	1.84	1.41	0.000	0.66	1.36
	Land effect by drought	0.85	1.53	1.24	0.008	0.84	1.62
Dry	Land size(H)	0.75	1.56	1.28	0.000	0.35	1.15
	Land effect by drought	0.48	1.09	0.88	0.018	0.50	1.45

*Table 6: Impact of climate change on rice yield*

Season	Land Type	HH Type		Total	Sig	Std	
		Poor	Better-off			Poor	Better-off
	Normal year	2.0	2.0	2.0	0.900	1.2	1.1
Rainy	Flood year	0.3	0.8	0.6	0.007	0.5	1.2
	Drought year	0.7	0.9	0.8	0.460	1.1	1.2
Dry	Normal year	2.8	3.5	3.3	0.228	1.4	2.2
	Drought year	0.7	1.8	1.4	0.029	1.0	2.8

### 3.3 Community Awareness on Climate Change

Understanding the surveyed households current capacity for disaster adaptation will assist in providing necessary inputs for future strategies and activities. This section depicts the general issues, knowledge and activities in respect to the existing capacity of the community members on community awareness of disasters. The adaptive capacity of the community is gauged by the existence of early warning systems, community awareness on institutional functioning of disaster related committees, resilient agricultural knowledge and practices.

#### 3.3.1 Disaster Information Accessibility

Views on disaster early warning sign and information were queried during the survey. Flooding and drought were the main disasters to be technically predicted, with alerts issued. The main sources of information for predictions are water level measurements and rainfall level measurements that are collected and managed by the Department of Hydrology and Water. This information is then further disseminated through various channels.

**Local Mass Media:** Local TV and radio channels were widely accessible to the community in target areas as most of the households (60%) claimed to receive disaster information from local TV or Radio channels. Information on disaster predictions (mostly flood and drought) were disseminated on a daily basis through radio and TV. However, there were inconsistent perceptions by the participants among FGDs regarding the level of accessibility and actuary of the information.

Most participants held the view that not many community members were interested in the information on weather forecasts through TV or radio, even if they had the ability to access it. They considered that disasters rarely occurred in their

communities. In addition, participants claimed that some of the community members in their locations were concentrating on Movie (or stories) rather than information or news.

**Messages by local authorities:** About 15% of the household reported that local authorities including village chiefs and commune council members were found to engage in sharing information on development activities and disasters in target community. The process of information sharing involves the commune leader receiving the information from their respective authority (e.g. district governors), conveying the messages to village chiefs and other key village authorities through commune meetings, and the village chiefs in turn disseminating the information to their villages through occasional village meetings or direct communication. However, there were no established mechanisms to disseminate the information to communities as these activities were usually integrated into village meetings which normally focus on general development activities, events or emergencies such as floods.

#### **Other sources**

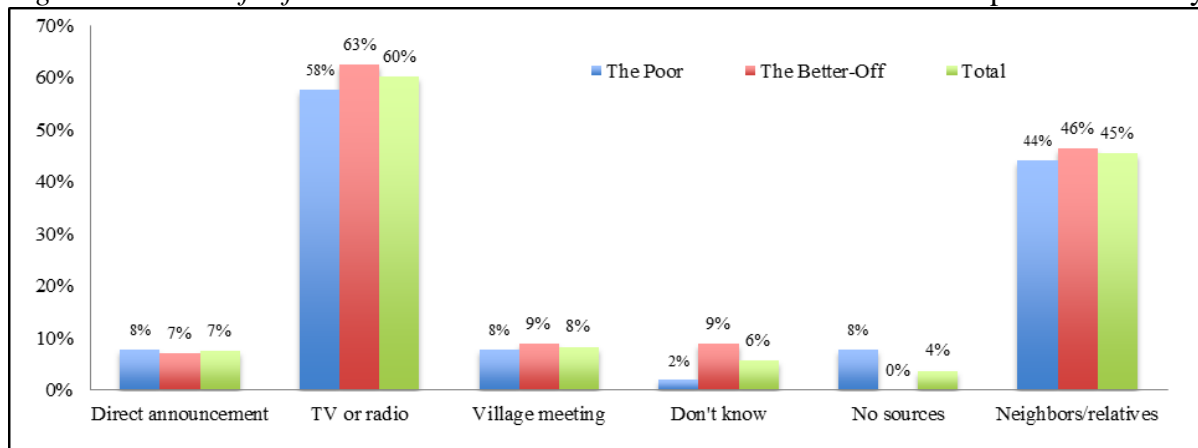
About 45% experienced obtaining this information from their neighbor or relatives. In contrast, about 10% complained that they have no information source about disaster. According to FGD and field observation, there were no unified or concrete community systems to mitigate or respond to disasters in any target districts. No one in the community was reported to be responsible for the early warning systems. Management, data compilation, and dissemination mechanism were considerable hurdles for technical early warning system.

Generally speaking, even though facilities to access to disaster information become widely available the access to disaster

information were still very limited regarding of the limited or absence of mechanism in-place as well as community awareness and knowledge on disaster.

Varieties of topics were raised among the trained households including related livelihood techniques, disaster preparedness and response, hazard identifications, and disaster information receiving. About one fifth of the households reported that they

Figure 1: Source of Information

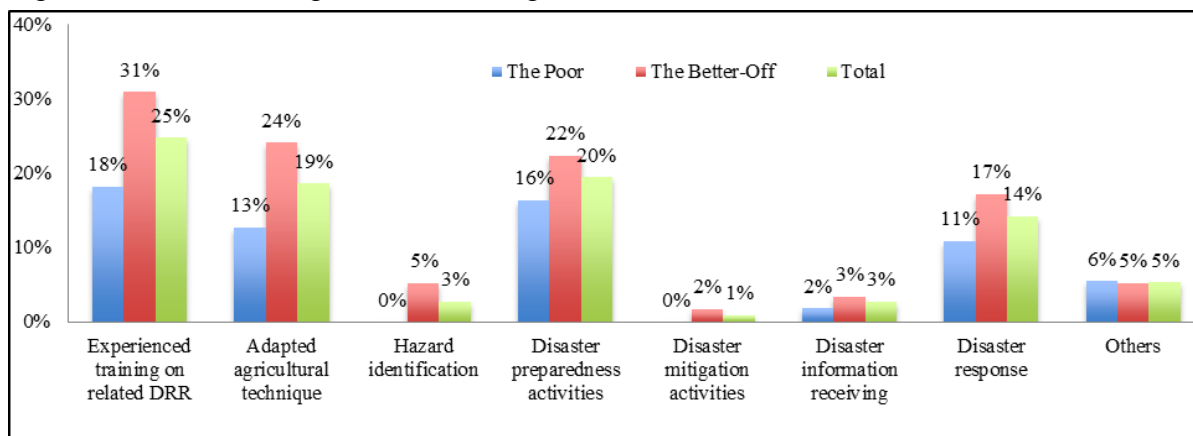


### 3.3.2 Participation in Climate Change Training

As part of understanding on household capacities related to disaster adaptations, the households were asked to report their experiences of receiving any relevant training and types of skills received. Based on the household interviews, about one fourth of the surveyed households (25%) reported that they experienced receiving the training related to DRR and CCA while other remainders never did.

experienced receiving agricultural training that could be related to disaster adaptation, and similar figures were on disaster preparedness and respondents. Very few mentioned about hazard identification and disaster mitigations (less than 5%). It is also found that the better-off households were equipped with knowledge slightly better than the poors. The finding indicates that knowledge of the households related to disaster adaptation, particularly the poors, were still very limited that need to be strengthened.

Figure 2: Climate Change related trainings



#### 4. Conclusion and Recommendation

Flood and drought are the most serious disasters in the community affected not only livelihood, but also physical and social assets (education, WASH, ...) of the households in research areas. As of high dependency on rice crop productions, the households in studied sites are highly vulnerable to these disasters since their main staple food are frequently and seriously affected by flood and drought; they were equipped with poor capacity to adapt to these disasters in term of poor inputs, lack of alternative livelihood, poor agricultural techniques, poor access to infrastructure and information. It is clear evident that both the poors and better-off households are significantly impacted by disasters while the better-offs were seen encountered high level of destructions on their livelihood activities, but they are relatively less vulnerable (less food shortage, less human diseases,...). It is the facts that the better-off households are found to be equipped with better adaptive capacity in term of better access to higher inputs, better knowledge and practices, more subsistence farming. The limited technical assistant, poor physical and social infrastructure (lack of irrigation facilities, access to information, poor market) are also the main factors contributing to limited financial capital/inputs, poor agricultural techniques, and limited livelihood options. Related to institutional capacity, the local authorities seem to concentrate more on emergency response rather than long-term strategy development. There were no developed disaster preparedness plans in target communes and the specific DRR/CCA activities were not integrated into the commune development plan.

Technical assistant are critical to improve main crop production (rice). This could be done through providing the training and technical supports on agricultural techniques from NGOs, related government

and others. Agricultural adaptive techniques on rice crop should be promoted. As the poors have relatively lower capacity to cope with flood and drought in terms of poorer knowledge and lack of inputs, thus target groups for interventions should be targeted on the poors rather than the better-off. As of limited information and knowledge on disaster and climate changes, facilitating to develop early warning systems for flood (flood measurement, rain gauge) and drought should be done. The capacity of local authorities (CCDM, VCDM) on should be strengthened to help the community more access to disaster information, and disaster management. Facilitating to disseminating the disaster information regularly and frequently should be held. Mechanism for social issues and mutual support should be in places to build systemic solidarity in the community to respond and mitigate the impact of the disasters. For example, in case of emergency, community infrastructures, information sharing, and knowledge sharing, and problem-solving in community.

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