

IMPLICATION OF LOCAL PEOPLE'S PERCEPTION OF CLIMATE CHANGE AND ITS IMPACTS FOR THE WATER RELATED DISASTER MANAGEMENT: A CASE STUDY FROM NORTHERN THAILAND

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1. INTRODUCTION

Climate change is a reality and it is happening at an unprecedented rate (Kiehl, 2011). A study by Suntasirisomboon and Kruasuwan (2011) predicts an increase in the annual cumulative precipitation throughout most of Thailand in coming days. These changes are likely to increase the frequency and magnitude of some extreme weather events and disasters as flood all over the world including Thailand (Bhaktikul, 2012). Without knowing the local situation, management decisions will remain uncertain and will lead to ineffective results from implementation. This paper aims to investigate the local people's perceptions of climate change and flood impacts considering Yang Luang village in the mountainous Mae Chaem River Basin (MRB) of northern Thailand as a case study. This study not just contributes to the extension of the large body of work on people's perception of climate change but also provides preliminary information that will be helpful in managing water related disasters in the area.

2. STUDY AREA

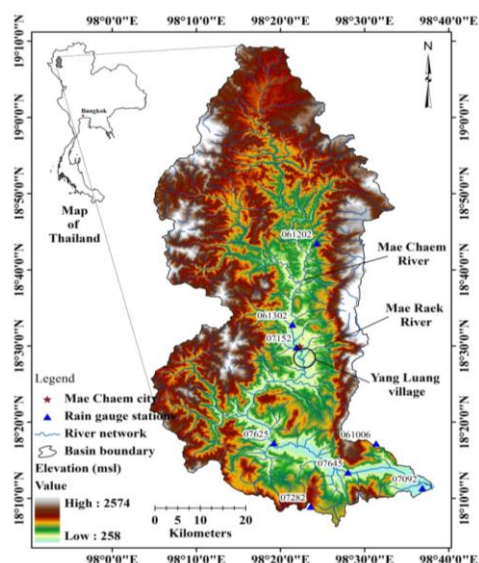


Fig. 1 Location of study village in Mae Chaem River Basin, Northern Thailand

Yang Luang village lying 5km west of Mae Chaem city in the mountainous MRB (Fig. 1) is selected as a study area. This village is selected because it has suffered from various extreme events such as drought, flood and landslide in the past years. It receives around 881mm annual rainfall (as per 30 year average of 1982 to 2011). It has 227 households with about 900 people. Agriculture is their main source of livelihood. Most of the farming is rain-fed and only limited area has irrigation facilities. Irrigation water is managed from Mae Raek a sub-tributary of Mae Chaem River flowing through the village, a small (Hui Ta) reservoir under king Bhumibol's project, and one community managed irrigation

system. Pipe water, groundwater, rainwater and bottled water purchased from the market are the major sources of domestic and drinking water.

3. METHODOLOGY

This study is based on social (household/individual perception & socio-economic) as well as observed hydro-meteorological data, which is used to validate the climate change perception. Detail explanation of data collection and analysis methods used in this study is explained below.

3.1 Data collection: Data were collected from primary as well as secondary sources in August 2013. Qualitative and quantitative participatory approaches were used in primary data collection. Altogether 87 households were randomly sampled and surveyed. The questionnaire included both open- and close-ended questions. Secondary data (observed daily rainfall and relevant literatures) were collected from various sources. Rainfall data recorded from 1982 to 2011 at the gauging station (id-07152) close to the study village was collected from Royal Thai Irrigation Department, Thailand.

3.2 Data analysis

Household data analysis: In addition to simple descriptive statistics (summation and frequency), fisher's exact test and multinomial logistic regression were applied in the data analyses. The choice of the explanatory independent variables is based on data availability and literature. A range of household and climate attributes variations is hypothesized to influence people's perception of climate change.

Rainfall data analysis: Descriptive statistics such as sum and frequency were used in analyzing the rainfall data. Trends of long-term annual rainfall, accumulated monthly rainfall, total rainfall of peak rainy months (August, September, and October) and number of rainy days were plotted to establish the changes in climate pattern and to analyze the match between farmers' perceptions and climatic facts.

4. RESULTS

Local people's perception of climate change: About 45% of surveyed households have personally experienced and 47% others have comprehended climate change from mass media or communication with neighbors, and development officers. Significant difference in climate change perception is not observed between different gender, age, education and income source categories. This could be possibly because all respondents are directly or indirectly involved in climate-dependent agriculture, either as a farmer or farm-labor, and experiencing changes in rainfall. A greater proportion of respondents have experienced significant changes in climate in last fifteen to twenty years. The fisher's exact test also do not show significant difference in climate change perception between respondents with ≤ 30 years and > 30 years farming

Key words: Climate change, People's perceptions, Flood, Northern Thailand

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experience. The analysis of 30 years of annual rainfall data from the nearest station confirms a radical change happened in 1993, which then onwards shows an increasing trend in last 18 years (Fig. 2). More than 85 and 70% of households have perceived changes in amount of rainfall. Their perception of increasing rainfall amount over the past two decades has been strongly supported by rainfall data, which shows higher accumulated monthly rainfall than 30 years mean value for years 2000, and 2002 to 2011 respectively (refer Fig. 3).

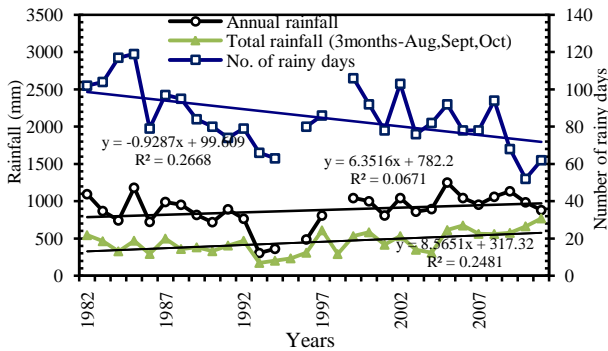


Fig. 2 Trends of annual rainfall, number of rainy days and total rainfall in peak rainy months (August, September and October) for 30 years at the rainfall station-07152 (Note: 1995 and 1998- missing data years)

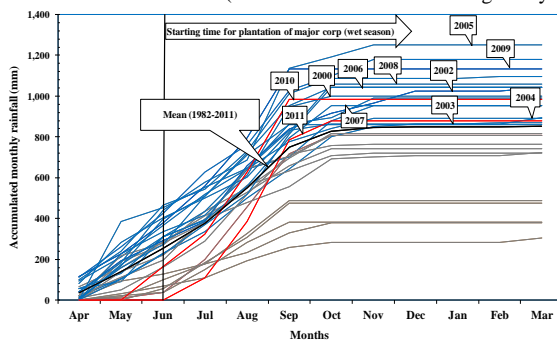


Fig. 3 Accumulated monthly rainfall for 30 years at the rainfall station-07152

Local people's perception of flood: Yang Luang villagers have simply understood flood as a presence of too much water in their surrounding area. 84% of respondents have flood experience and reported of major flood experiences in 2002, 2003, 2004, 2005, and 2011, respectively. Majority of households interprets heavy rainfall in the headwaters of the Mae Chaem and Mae Raek Rivers raise water level in the downstream of Mae Chaem River and its backflow causes flooding in their village (refer Fig. 4). Understanding of floods due to heavy rain is much better developed than those due to landslide and unintentional damming of rivers and streams. This may be because the key physical processes for the earlier type of flood are easier for the general public to recognize and understand than later one related to landslide events. However from the field observation, it is clear that the flooding in the village is not just due to a backflow of water from Mae Chaem River but also a combined effect of stream channel blockage due to landslide and flash flood in the River Mae Raek (Fig. 4).

About 30% of households have perceived increasing trend and risk of flood in last decade while remaining 70% have not perceived any trends and simply apprehend flood as a natural phenomena. The smaller p value (0.023) for the fisher's exact test performed between respondents perceiving heavy rainfall and increasing trend in flood events rejects the

null hypothesis and confirms that respondents perceiving heavy rainfall have perceived increasing trend in flood. Since hourly rainfall data were not available, it was difficult to directly verify the local people's perception of heavy (long duration) rainfall in the area. However, Figure 3 demonstrates the increasing trend in annual rainfall and total rainfall in peak rainy months (August to October) generated from 30 years data, which supports local people's perception of increasing amount of rainfall and flooding experiences over many years between 2002 and 2011. Studied households have experienced various impacts (partial crop loss, irrigation canal collapse, soil erosion, difficulties in ground water collection, assets loss, and reduction in household income) from past flood events. However, till date no any water-related health problems and conflicts are reported in the village.

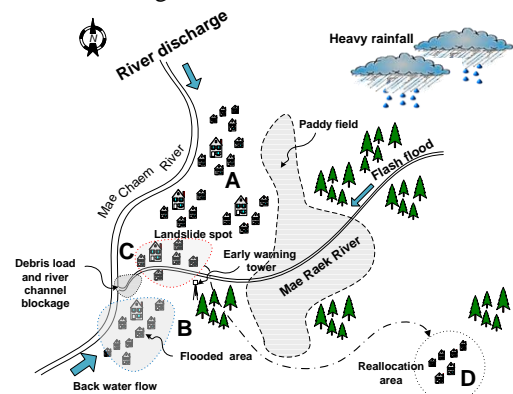


Fig. 4 schematic view of study village in Mae Chaem River Basin, Northern Thailand

5. IMPLICATION OF STUDY RESULTS: Majority of respondents in Yang Luang village have perceived climate change mainly through personal experience but the influence of media and local communication is also noteworthy. Local people have experienced heavy rainfall and increasing flood events in the last decade. Understanding of floods due to heavy rainfall is much better developed than those due to landslide and unintentional damming of rivers and streams. However, flood in the area is also an effect of stream channel blockage due to landslide and flash flood. The implication of this result is that local people's effort for adapting to flood alone cannot lead to effective results from implementation without considering landslide mitigation measures. The awareness and management focus should therefore, be towards both landslide and flood mitigation. Ensuring access to information on climate change through mass media and extension agents is strongly recommended to create awareness on climate change impacts such as flood and its mitigation.

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