

# ANALYSIS OF CLIMATE AND LANDUSE CHANGE EFFECTS ON FLOOD

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## 1. INTRODUCTION

Flooding is the most common disastrous acts of nature among all catastrophes leading to economic losses and death. A flood can be defined as a mass of water, which produces runoff on land that is not normally covered by water or alternatively a flood is a fairly high flow, which overburdens the natural channel, provided for the runoff. Ayeyarwaddy delta in Myanmar, Chao phraya in Thailand and Mekong delta in Vietnam are identified to study. The World Meteorological Organization estimates that about 90% of all natural disasters are caused by weather, climate and water. People living in coastal lowland area used land for commercial activities and household activities. This is one of the effects to become flood hazard. Natural hazards can be caused by deforestation, precipitation and land use changes. The impacts of natural disaster are more and more severe on coastal lowland areas. Thus we will analyze the variation between these causes of natural disaster and comparative study on the three study areas.

Flood is an overflow of water, an expanse of water submerging land, a deluge. It is influenced by a combination of natural factors such as high rainfall, snowmelt, relief and coastal flooding and human causes such as deforestation, poor farming, over cultivation and population pressure. Severe flood occurred in these three delta regions, which caused severe damages and loss of lives. The fact that such severe floods occurred in recent years caused considerable public interest and the political environment. Two delicate statements were repeated again and again in the press and in many TV and radio discussions:

- (a) During recent times we observe an increasing frequency of severe floods
- (b) The increasing frequency and intensity of flood is man made, e.g. by land use change, a climate change, etc.

In recent years, heavy rainfall, flash flood, landslide have occurred more and more frequently. In some areas, they have occurred in many years continuously and many times in one year. Flooding in each basin usually occurs in monsoon season. Along with the social-economic development in the country, the serious damages caused by natural disasters, especially by heavy rainfall, flash flood and landslide have increased more and more. Inhabitants of this river basin earn their living from

Agricultural production of rice, vegetables and other major economic crops. Inhabitants of these river basins are peace loving and very proud of their inherited cultures. Flood is analyzed by accounting the combined effects of and land use change.

And then we will study on three different areas. So, we can find the similarities and differences events in these areas and can guide management of flood risk under the factors of and land-use change.

## 2. STUDY AREA

Myanmar (Ayeyarwaddy delta) is situated between Lat 15° 40' and 18° 30' approximately and between long 94° 15' and 96° 15'. It is an area of 13,566 sq-miles. The annual precipitation in this study area varies widely from 1500-2500 mm. Thailand (chaophraya) is situated between Lat 14° 27' 07" 78"N and between Long 100° 46' 05" E. The annual amount of rainfall in chao phraya is 1200-2000mm. Vietnam (Mekong) is situated between lat 9° 42' 43.92" N and 10° 19' 27.87" nN and long 106° 10' 12.35 E and 106° 51' 12.71" E. The annual precipitation in this in Mekong delta region also varies from 1300-2300 mm. All these three regions are delta regions and the annual rainfall in each area is not quite different. Most of the land in each area is arable and the biggest rice growing area of each country. All these three study areas face with flood hazard in monsoon season during May – September. Mostly occur in the large and medium rivers, caused by the heavy rainfall striking at head water region, the flood wave forming at the head water started to move downward and causing flood along the river up to the delta area.

## 3. METHODOLOGY

Two remotely sensed images were selected for this study. One is a Land sat Enhanced Thematic Mapped data dated November 2, 2000 and another is a Land sat Enhanced Thematic Mapped plus data (ETM+) dated December 30, 2005.

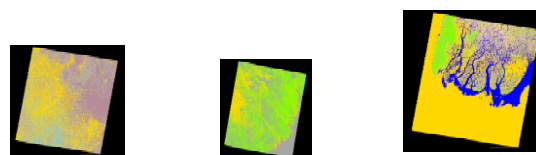


Fig 1. Land use of Thai, Vietnam and Myanmar

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This global land sat data is classified by supervised classification method by using ERDAS software. Imagery from AVHRR satellite acquired between 1981 and 1994. (1 km pixel resolution) This global land cover is classified into 14 groups by Maryland department of Geography in 1998. Classify the land use type in the map downloaded from land sat. Analyzing and comparing the land use change of each study areas.

#### 4. RESULTS AND DISCUSSIONS

The effect of land use changes on river flow in river basin were determined using historical land use data. Land use data at 1km resolution is used. Expanding cities due to economic growth, population growth or both often comes at the expense of increased flood risk.

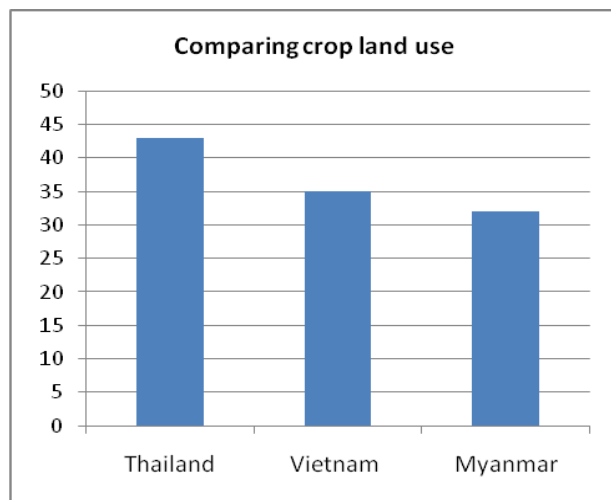


Figure 2. Crop land use in different regions.

In asian countries land cover change exhibited a typical vegetation transformation. The figures show the variable of crop land use type in each region. As these three regions are delta regions and a large rice growing area, the percentage of crop land is high in all regions. As shifting cultivation continue to play a major role in land degradation. Moreover, in highly populated areas, repeated cuttings for domestic uses have transformed many of these magnificent stands into scrub forest. Most of the areas of my study areas in each country are low land area. So, by comparing the elevation and land use change we can analyze which land use type are in which elevation of each area. The projected future sea-level rise could inundate low lying areas down coastal and wetlands exacerbate flooding. The impact of contaminants in flooding water is related on vegetation type as well as on agricultural crops.

#### 5. CONCLUSIONS

Remotely sensed imagery and historical hydrological data were employed to examine the linkage between land use change and flood risk in these study areas. It has been shown that it is possible to study the effects of land use and climate changes on flood flows by using data taken at different time interval. The variability of the relationship between flood frequency, flood discharge, inundation period with the different land-use, topography and climatic conditions. It is expected to provide rationale suggestions for management of flood risk. Stormsurge, flood forecast due to climate change and urbanization for land-use planning and development in flood hazard areas. And then we have to learn lessons from this case that how human activities driven by socio-economic factors may be responsible for the recently increasing level of flood risks.

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