

Concluding Report

“Roadmap toward effective Flood Hazard Mapping in Vietnam”

1. Name : Nguyen Thanh Phuong
2. Country: Vietnam
3. Organization: Department of Dike Management and Flood Control, Ministry of Agriculture and Rural Development, Viet Nam.
4. The course: Flood Hazard Mapping, 2005.

Contents

A) The role of flood hazard maps to mitigate flood damages in Vietnam

- *The flood status in Viet Nam*

Vietnam is located in the Southeast Asia area with its population of 82 million inhabitants (2003). The weather is influenced by the tropical monsoon climate. The result is very high rainfall; the mean annual precipitation approximately 2,000 mm. The availability of water is also very abundant, the total annual runoff generated over the country is 928 billion m³, of which the surface water resources are 880 billion m³, and the ground water resources are 48 billion m³. There are 14 major river basins in Vietnam; the biggest rivers are Red River (North of Vietnam) and Mekong River (South of Vietnam).

River and streams often have high slopes leading to fast flood. Rainy season coincides with stormy ones so we always confront natural disasters of flood and storms. Runoff at high-flow season accounts for about 60-85% of the total annual runoff. Total runoff in high-flow season in the central and southern littoral areas may be 60-70% of total annual runoff despite its short 3-4 months period. Highest flow levels occur in July and August in the north and north-central area; September and October in the south-central and central highlands; and October in November in the southern area. The flow in those months is about 20-30% of the total annual flow. The big flood usually occurs in those months.

Flooding in small rivers rises and falls quickly, from 1-5 m³/s/km² to over 20 m³/s/km². Flashfloods in mid-size and small rivers often occurs in some mountainous provinces in the central region. High and extreme floods resulted in a high loss of life and extensive property damage by inundation in downstream lowlands in the Red River in 1945 and 1971, in the central littorals in 1964 and 1999, and in the Cuu Long River delta in 1996, 2000.

Floods happen at different times every year in different rivers, but tend to be later towards the south, and the interval between areas is about 1 month. Flood season in the north are usually occur from June to October, in the Central Region from September to November, and in the south from July to December.

Northern Lowlands and Mid-Lands: In spite of a large system of dykes and flood control structures such as Hoa Binh and Thac Ba reservoirs, Day dam for flood diversion, and flood retarding zones, the flood control infrastructure is not capable of eliminating the danger of flood destruction in the north. The northern river dyke system has been in existence for hundreds of years. Dyke consolidation and strengthening are carried out annually, including the treatment of potentially risky phenomena like leakage, boilers, enlarging of dyke cross

sections, and revetment of upstream side slopes. Preparing human resources and materials for warnings and emergency actions, coordinating between rescue forces of various sectors for a rapid response in case of emergency or disaster are also undertaken annually.

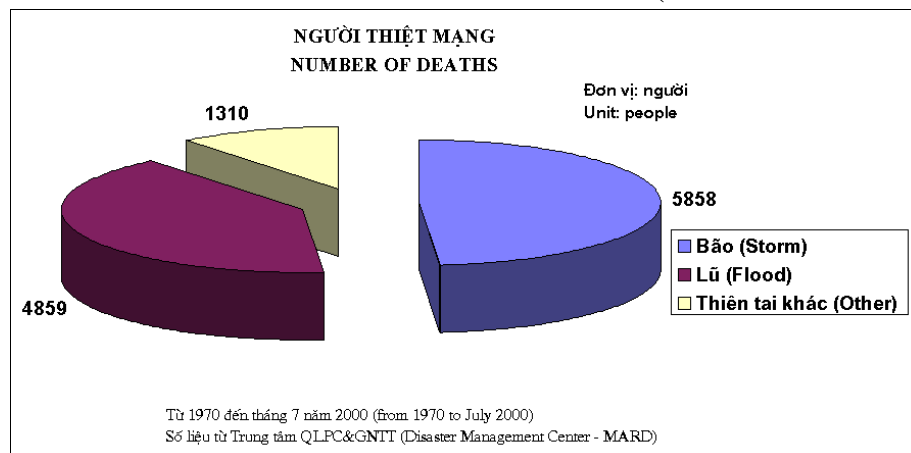
Although the dyke level in Hanoi and corresponding locations downstream has been heightened to cope with design water levels of 13.30 m at Hanoi for the Red River, and 7.21 m Pha Lai for Thai Binh River. If high flood occur at the same time as a flood tide combine with typhoon, dyke may be broken and devastating damage. The flood in 1945 inundated of 312,000 ha of rice production area. During the severe flood in 1971, dyke failure caused serious inundation of 250,000 ha of land in Northern provinces, 2.7 million people affected.

Cuu Long Delta: Flood occurs over a three to five months period and often inundates over two-thirds of the delta area. Severe floods happened in 1961, 1966, 1978, 2000, 2001, and 2002. The “Co-existence with Flood” solution is applied in addition to structural and non-structural measures to minimize the damages from floods and maximize its advantages. To mitigate and eliminate the negative impacts from floods, sea dyke system in the Cuu Long River delta needs to be upgraded to prevent salt intrusion for the region. The embankment system should be capable of withstanding early floods to protect summer and autumn crops.

Central Region is constantly faced with natural disasters, the most frequent of which is floods. Floods occur after heavy rains, typhoons, and tropical depressions. They are often extensive and repeatedly inundate vast areas, even the whole region. Floods in central rivers are mainly flash floods and extreme floods that occur rapidly, rising and falling quickly. They are largely due to short rivers with steep gradients, and deforestation of watershed forests which deteriorates the ability of flow regulating as of heavy rains. In this region, the frequency of high floods and flash floods is higher than in other locations. Severe floods occurred in 1964, 1978, 1999. In addition, construct reservoirs in upstream, and build sea dyke in the north-central region must be upgraded to withstand strong winds combined with high tides.

Severe floods in major rivers of these areas often caused inundation in river lowlands which last for several days. Flood prevention and water-related disaster mitigation should be comprehensive and include forestation, forest protection, and prevention against water concentration downstream. Reservoirs should be built upstream for flood control. A number of national programs have been implemented such as 5 million ha reforestation and a bare hills forestation. Flood diversion projects should be developed, along with an improvement of dyke. They have caused bad effects to the socio- economic development and environment in particular and the sustainable development of the Viet Nam. The flood can occur in any place, at any time in the catchments of rivers and springs.

Number of deaths because of natural disaster (from 1970 to 2000)



The outline of the present countermeasures for mitigating flood damages in Viet Nam

Water-related mitigation measures for the Red River Delta:

- Forestation and protection of watershed forests.
- Strengthening of dyke systems
- Dredging of rivers and channels
- Using reservoirs for flood control in upstream of big rivers.
- Diversion and slowing down of flood speed.
- Improvement of dyke management and rescue.

Strengthening of dyke systems:

Dredging of river channels for quick flood water drainage:

Solution of reservoir construction in upstream areas:

Flood diversion solution:

Forestation and forest protection:

Organization of effective management and exploration activities of flood preventing solutions for the Red River Delta and Midland areas:

2. *Water-related mitigation measures for Central Region of Vietnam*

- Reinforce the river dyke systems and the salt water resistant embankment systems to protect agricultural production and prevent early floods and flood tide,
- Train river banks and sea borders; prevent erosion, protect densely populated areas and important manufacture zones; gradually stabilize big river mouths; facilitate flood discharge, etc.
- Build and improve the canal systems and upstream reservoirs,
- Authorities at all levels and local people in disaster-prone areas in Central Vietnam consider flood and storm control as annual focal tasks. Training and education to improve community awareness is being carried out. Basic knowledge about floods and storms and their effective mitigation measures propagated broadly to villages, families, and individuals.
- Provide equipment and training to improve technical expertise and the effectiveness and quality of disaster forecast and warning activities. Local agencies are being skilled with the capacity to make forecasts and to issue warnings for small and medium size river basins from general weather forecasts. Communication systems and warning transmission systems have been improved to allow every individual of the community could be assess to the disaster information.
- Search and rescue works have been implemented efficiently when an affected area is in a severe disaster. The supply of search and rescue means, contingency food, contingency medicine, and other necessary goods are being implemented.
- Rearrange crop patterns and animal-breeding patterns to suit topographical and production conditions in disaster-prone areas in order to avoid floods in the main cropping season,

- Forest plantation in upstream watersheds and along coastal areas,
- Incentive policies are developed to assist with the mitigation of floods and storms for specific industries in flood-prone areas, and to stabilize living and livelihood production conditions,
- Construction of industry and housing infrastructure that are suitable for disaster-prone areas is being undertaken,
- New residential areas are being planned and built away from flashflood-prone, inundation-prone, storm surge-prone and erosion-prone areas.
- Shelters for fishing ships and local fishermen are built along the coastline of Central.
- Planning for construction of flood control works.

3. Water-related mitigation measures for the Mekong River Delta of Vietnam

The objectives for flood-control and flood-mitigation measures in the Mekong Delta of Vietnam are the following:

- To protect human life and property, to maintain safe and sustainable housing for local people, to maintain social security.
- To protect the stability of agricultural production and to increase the land-use coefficient.
- To protect infrastructure works.
- To protect and sustain the ecological environment in the Delta.

To achieve these objectives, both structural and non-structural measures are being used. These measures are suitably planned for all sectors of the economy; use the most suitable technologies, which easily managed, and compatible with Mekong River Exploitation Agreements with upstream Mekong River Basin countries.

Guidelines, solutions, and plans for flood control and disaster mitigation in the Mekong Delta of Vietnam are the following:

- Sustainable development in this flood-prone environment, and coexistence and accommodation to flooding,
- Programs that prevent salt water intrusion resulting from tides and storm surges are given priority, to better consolidate conditions for sustainable development in the Mekong River Delta.
- Flooding is an important issue in general, and flood control in the Mekong River Delta is even a more difficult and complicated task,
- Similarly cooperation with the upstream riparian countries in the Mekong River Basin must be followed to be able to mitigate and to manage floods in the Mekong Delta region of Vietnam.

• Flood hazard maps will be useful in Vietnam

Flood is one of the main disasters in Vietnam from long time ago. We had a long history against with flood, and until now it seem to be a big problem of the country. Flood have caused bad effects to the socio-economic development and environment in particular and sustainable development of the country in general, and occur in any place, at any time in the catchments of our rivers and springs. Together with the global climate changing, the situation of natural disasters, heavy rain consequence caused is heavier not only in our country but also in many countries in all over the world.

In order to effective flood control, the role of flood hazard maps will be very important in Vietnam, and will be one of the tools for us to mitigate the loss of life and properties. People by themselves will protect their life base on the information of FHM.

The Central Region with special characteristic of topography, flood and inundation occur frequently. The reason that FHM is really important for the region in the short term period:

- Because of lacking flood control construction.
- Local government could not handle every activity during flood time,
- Rising the resident's awareness on Community based on disaster risk management

If people in the region have FHM and have experience of using it, the number of dead tolls will be reduce.

In the long term, if the economy condition is high enough every region of the country should issue the FHM., as well as another disaster maps.

B) The allocation of roles in making flood hazard maps

- *Organization should hold the main responsibility for making a fundamental map such as an anticipated inundation area map*

Department for Dike Management and Flood Control

- *Organization should hold the main responsibility for flood hazard maps:*

Department for Dike Management and Flood Control

C) The "Action Plan "of making flood hazard maps

- *Which area do you choose for target river basin area? Why?*

Priority region:

Thua Thien Hue province, Central Region

Reason of the selection:

- Flood occur every year,
- Flood Hazard Map available (without evacuation routes and shelters) and did not disseminate to the community
- The attitude of the local residents in disaster reduction is rather high (compare with other regions)

- *What do you think is necessary to make flood hazard maps in the chose area?*

Establishing the Hazard flood mapping in the areas where influenced by the severe flood in 1999 and the flooding maps corresponding with the flooding alarm-marks in order to warn inundation possibilities including inundator area and depth to help planning socio-economic activities in future, as well as constructing works in the areas risked by flooding of Thua Thien Hue province, Central Region.

The inundation map is a visual tool that permits of mastering inundation possibility when it is able to forecast any water level change in a representative location in the inundation zone. This is very necessary not only for the leader when they decide treating an urgent situation, but also for the local residents can safe their life by themselves by information. The map establishment purpose aims:

- Informing previously inundation area and level in any point of inundation zone once knowing flood water level in a key point.
- Creating a base for the selection and coordination of measures to prevent floods and inundation. As known, the urban inundation prevention scheme includes many measures such as enclosing dyke, stone embankment, retention lake or shelter, drainage line... as well

as non-construction measures such as inundation zoning, land use management plan and construction regulations for zones risked by inundation.

- Assisting land-use management in inundation permanent zones. The inundation prevention works can not ensure completely the inundation risk elimination, because of the protection scope and level of those works has always a certain limit. In addition, construction consequence is many natural plots such as rice fields, lakes that were formerly water permeable and retention sites up to now became and become impermeable sites, thus, the inundation risks increase. Therefore, it is required to study and calculate the scope of inundation control works corresponding to the rational leveling elevation.






- Creating a base for the study on the inundation prevention measures in the basic construction. Once it is inevitable to accept the construction in a zone risked by inundation, apart from the construction measures, it is required to have different technical solutions to reinforce the sustainability of works against the inundation and flood. In this case, the hydrologic parameters such as inundator height and time (duration), flow velocity and mud sand quantity is very necessary information to determine the technical reinforcement solutions as mentioned above.

- Designing the inundation control works. The design of these works such as retention lakes, pumping stations should rely on many documents on hydrologic, hydraulic study and calculation, among the inundation map is a very important document. It helps to assess annual average lost risk and to analyze cost-benefit of the projects on inundation prevention works.

- We have some basis data in order to establish flood hazard maps.***

- + Inundated water level,
- + Flood area
- + Topographic maps.
- + Land use maps.
- + Infrastructures
- + Hydrometeorology data
- + Rainfall data

Action plan on Making and Disseminating FHM

	Year 1	Year 2	Year 3	Year 4	Year 5
Review the flood hazard map that developed before					
Re-check the accuracy of the map combine with up-to-date data and contribution of the local residents					
Complete the FHM of the region (include: evacuation routes, shelters)					
Evaluate the effectiveness of the FHM, and disseminate for community					
From the success model of FHM apply for other regions					

- What seems a problem in making flood hazard maps in Viet Nam***

- + Many people are seemed not familiar with FHM.
- + In the point of view of many people, FHM is made for scientific propose so that the map had not contribution of the residents.
- + Lacking of finance resources,
- + Data insufficient,
- + The procedures on implement and approved should take long time,
- + Attitude of responsibility organization
- + Limited awareness of local residents

To clear the challenges

- + Chose the priority region that usually effect by flood,
- + Centralization of work for appropriate levels,
- + The achievement of the priority project will be the good experience for other regions,

D) My advice/ suggestion for making this training course more meaningful

- If the participants have more chance to visit the flood control construction in Japan, it will be useful and they also can apply to their countries.
- The more exercise lecture, the better for participant practice.