Proposal Report
on
Flood Hazard Mapping Project
in
Taihu Basin

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China

Flood Hazard Mapping Training Course
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1. Background of the proposal

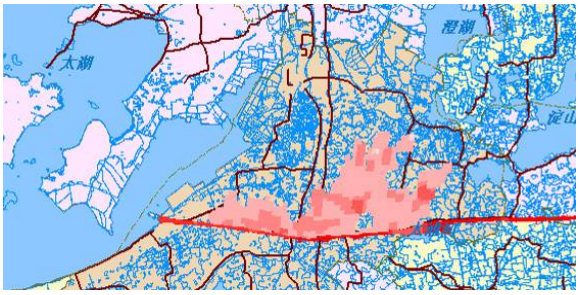
1.1 Training situation

In the Asia areas, especially East and Southeast Asia, there are many floods every year, and much human life and property are lost by flood, and it is predicted that population in urban area will rapidly increase in the near future. In order to reduce the damage caused by flood, in addition to the structural countermeasures, non-structural countermeasures have also been more and more paid attention. Flood hazard map as an important non- structural measures was already very mature in Japan and was widely applied in the nationwide.

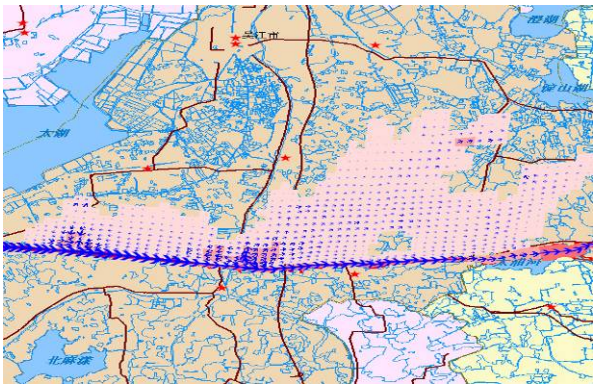
In order to provide professional knowledge and techniques of Japan to the developing countries, JICA have been implementing the training course “Flood Hazard Mapping” since 2004. I participated in this year's training course fortunately. Through this training, I understood the present situation of flood hazard mapping in Japan and learned how to make flood hazard map. This will be helpful to my work. I think Japan's flood management idea is very advanced. It is worth while to learn the disaster prevention activities by our country.

1.2 Present situation of flood hazard mapping in China

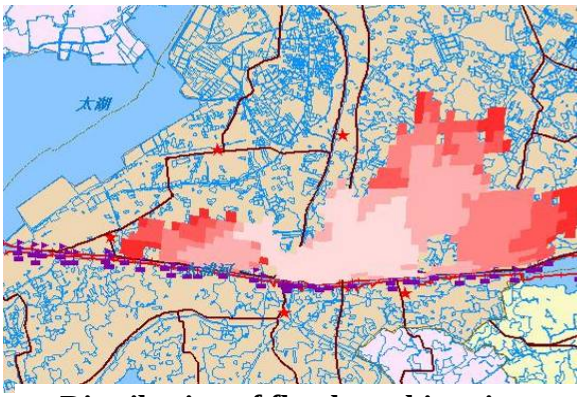
In China, the first flood risk map had drawn in 1976, it is very simple. From 1997, China was practices of drawing flood risk mapping. Such as zhejiang province, the risk map is concerned the probability in 5, 10, 20, 50 and 100 years. In2004，Chinese government chose some area in the prefecture of seven river basin agencies respectively to make experiments of flood risk mapping. Taipu River was chose to make experiments of flood risk mapping in Taihu Basin. This task was finished in 2007. Because of lacking of some basic data, such as detail DEM, distribution of property and so on, flood risk map is not yet in use.



Distribution of inundation depth of Taipu River(flood of once in50 years)



Distribution of flooding velocity of Taipu River(flood of once in50 years)



Distribution of flood reaching time of Taipu River(flood of once in50 years)

1.3 Significance of flood hazard mapping in China

China typically suffers from the flood damage. Affected by the climate and topography,torrential rains and floods occur frequently in China and about 40% of the population, 35% of the agricultural lands and 70% of the gross product of the industry and agriculture exist on the alluvial plains that are vulnerable to water inundation. With economic growth, urbanization and the subsequent concentration of population and property, the direct economic loss per unit area has increased rapidly. Therefore, the flood damage relief is an important and urgent task in China.

China has taken many structural and non-structural mitigation measures. Structural measures have so far had a remarkable effect. But no matter how high engineering standards, it is not realistic to rely on the flood projects completely to reduce flood damage. As an important non-structural measures, flood hazard mapping will play an effective mitigation role in China. First, flood hazard map can serve for the flood control and flood fighting decision-making. Secondly, flood hazard map can direct the land use plan and construction of safety facilities in the target area. Thirdly, flood hazard map can help the residents evacuating in emergency.

1.4 Problems of flood hazard mapping in China

The most important things in flood hazard mapping are whether we can collect detailed datum and develop advanced hydrological and hydraulic numerical models, and also the experience is indispensable. The main problems we may probably encounter in the process of producing flood hazard maps as below:

(1) Lack of laws support. Flood Control Law of People’s Republic of China came into force as of January, 1998, but no such provision about flood risk and hazard maps. So it’s not an obligation for local governments to produce flood hazard maps, if local governments are lack of enthusiasm or fund, they may not impel this work.

(2) The evacuations are difficult to be established. Some important embankments of lower major rivers protect wide lands and many residents, and the flood level is several meters higher than the inland ground level. Residents live sporadically in this area and the transportation is not convenient, the farthest evacuation routine may exceed 10 km, so the evacuation time will be very long. If the levees are broken in these protective areas,, large areas and thousands of residents will be inundated, how to estimate the inundation area and establish the evacuation plan is a difficult problem.

(3) Low flood control standard. Because flood control standard of many levees can only prevent the flood which occurs once in 10 years. So 10-year, 20-year, 50-year, 100-year flood, and maximum flood inundation areas should be drawn out in the maps with different colors so that the risk of different flood magnitude can be displayed. The work load is very heavy.

(4) Lack of detail information and experience. Although China Institute of Hydraulic and Hydropower Research is pursuing in the flood risk study, they have taking several pilot study about flood risk, yet this study has not been demonstrated by actual floods. And production of flood hazard maps just starts, now there is no flood hazard map is perfect. In addition, the information possessed by different departments

are not sharing. So collecting data is often difficult.

(5) The technology is very difficult. China has a vast territory with large differences in the natural climate, and flood characteristics and socio-economic are also very different. The flood hazard mapping involves the aspects of nature, economy, society and so on, the technology difficulty is very big. Especially in the plain river networks of Taihu Basin, the flooding and waterlogging are often concurrent.

1.5 Plan of flood hazard mapping in China

In 2005, the guideline for draw flood risk mapping was issued by the Office of State Flood Control and Drought Relief Headquarters of China. Based on the experiments of flood risk mapping, the guideline is being revised at present and intend to place the flood hazard mapping on the national construction plan. Because China is too big and restricted by fund, Chinese government will plan to make flood risk maps in batches by stages in whole country.

2. Outline of the Taihu Basin

2.1 Natural condition and socio-economic situation

Taihu Basin is selected as target area to apply a flood hazard map. It situated in the Yangtze Delta and across Jiangsu and Zhejiang provinces and Shanghai Municipality. In the basin, land is flat and rivers are densely distributed. The water surface of basin accounts for 15% of the total area. The climate there belongs to subtropics monsoon climate and is mild, with distinctive seasons and plentiful rainfall. The mean annual rainfall is about 1177mm. The rainfall from June to August accounts for 40% of annual rainfall. The flood season is concentrated in June to July.

Taihu Basin is one of the most active economic areas in China. Numerous large, middle and small-sized cities are scattered like stars in this densely populated basin, such as Shanghai, Suzhou, Wuxi, Changzhou, Zhenjiang, Hangzhou, Jiaxing and Huzhou, with an urbanization rate of 74.3%. By the end of 2006, the area of Taihu Basin is about 36,900 km^2, with a population of 44.66 million, and gross domestic product (GDP) of 2106 billion RMB, accounts for 0.4%, 2.9% and 10.7% of the national total.

Taihu Basin Map

2.2 Disaster characteristics

The flood in Taihu Basin caused mainly by “plum rains” and typhoon. The former has a long duration, is widely distributed and easy to cause basin-wide flood and water logging disaster, such as 1954, 1991 and 1999 flood. The latter has a short duration but higher intensity and is easy to cause serious regional flood and water

logging disaster, such as Rananim typhoon in 2004, Matsa typhoon in 2005, Saomai typhoon in 2006.

Due to Taihu Basin is an alluvial plain and above 80% of total basin area is plain and water surface, once Taihu encounters continuous monsoon rain or sudden storm, water levels in Rivers and Lakes will rise rapidly. Under the simultaneous attack of flood and waterlogging, a prosperious and rich land, will become a flooded area, causing a severe damage.

1991 flood

1999 flood

2.3 Structural countermeasures to mitigate flood

Taihu flood control project including eleven key components has been completely implemented after 1991 catastrophic flood. A flood control components system has been substantially formed, with functions such as regulating storage of Taihu Lake, flood discharged northward to Yangtze River, eastward to Huangpu River and southward to Hangzhou Bay. At present, we are positively implementing the Opinions on the Recent Flood Control Construction in Taihu Basin for further perfecting layout of flood control components and water resources dispatch capability.

3. Schedule of implementation

In view of the significance of flood hazard mapping, I think it is very necessary to impel the relevant works in Taihu Basin. According to the practical situation, it can be implemented step by step.

Afetr I go back to China, I plan to make a lecture about flood hazard mapping for my colleagues and report to my Bureau Director what I learned in Japan and suggest that we should do the work of flood hazard mapping as soon as possible, of course, also depends on fund. At the same time, I will put the funding application for the flood hazard mapping into the annual contingency fund application plan for flood prevention so as to strives for financial support by the central government.

Concrete implementation items of the schedule as below:

3.1 Collecting data

Collecting past floods information and flood control projects information of the district of Jiaxing, Huzhou and so on within Taihu Basin.(have funds);

Collecting base map with 1:10000(depend on funds);

Collecting social and economic data of basin, including population, GDP,

property and their distribution(depend on funds);

Collecting historical hydrological data in Taihu Basin(have funds);

Update land use information(depend on funds);

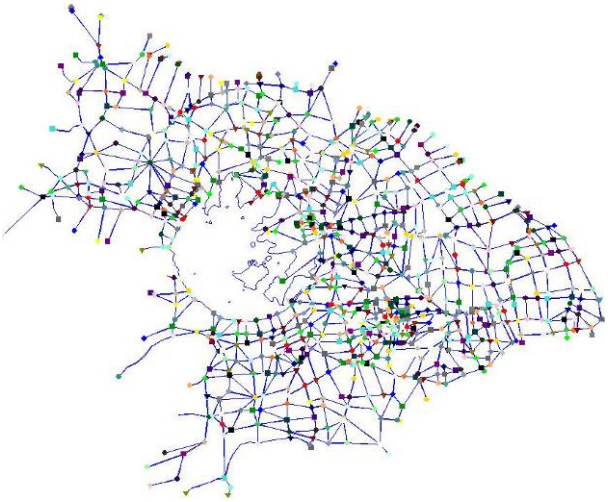
Collecting flood dispatching plan of key flood control components within basin (have funds).

Above tasks will be finished at the end of 2009 year based on the supporting by funds.

3.2 Flood risk analysis

The hydrological model and one dimension hydraulic model of river network have been developed in Taihu Basin. In order to calculate and simulate the flood evolution after levees break or overflowing, we will commission Hohai University to develop 2D hydraulic model of Taihu Basin when I return to Shanghai and plan to finish in June of 2009.

Through hydrological and hydraulic model, anticipated inundation areas of different magnitude floods can be calculated, including extent of inundation, water depth, flow velocity, arrival timing etc. This tasks will be finished by Mr. JinKe after he come back to China.



Generalization chart of river network for modelling

3.3 Mapping

This task is depend on the situation of data collecting and funding. If the conditions are ripe, it should be able to be completed before the end of 2010 year.

4. Estimated budget

No.	item	cost(thousand Yuan)
1	data collecting	3000
2	model developing	1100
3	flood risk analysis	1300
4	mapping	1600
5	dissemination	500
	sum	7500

5. Expected effectiveness

5.1 Expected benefit and progress for residents

Residents easily know how to get flood information and where, when, how to

evacuate, evacuation time will be shorten effectively.

Residents' self-help and mutual-support ability will be improved.

Residents' awareness of flood disaster prevention will be greatly increased.

5.2 Expected benefit and progress for administrators

Government's public assistant ability will be improved.

Flood hazard map can serve administrators for the flood control and flood fighting decision-making and the managing level of disaster will be improved.

Flood hazard map can direct land use plan and construction of safety facilities.

Flood prevention lord of river basin agency and local governments will be reduced greatly.