

Roadmap toward Effective Flood Hazard Mapping in China

Wang Jinxing

Organization: Bureau of Hydrology, Ministry of Water Resources, China

Address: No.2 Lane 2 Baiguang Road, Xuanwu District, Beijing 100053

Email address: wjxmwr@mwr.gov.cn

1. The role of flood hazard maps to mitigate flood damages in China

1.1 The flood status in China

China has a large territory with great difference in climate, landform and geology, and with the natural conditions and socioeconomic historical conditions to create various kinds of floods and the concerned disasters. China is characteristic of the uneven distribution of annual rainfall due to its unique location in the Asia monsoon area. Nearly 60 to 80 percents of annual precipitation is concentrated in summer flood season, and China is hit frequently by rainstorm and typhoon. In China, there are about 40% of the population, 35% of the agricultural lands and 70% of the gross product in the alluvial plains 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 to 166 thousand dollars per km² in the 1990s, about 6 times than in the 1950s. Therefore, the flood damage relief is an important and urgent task in China.

In 2005, China has experienced severe floods in the flood season. Devastating deluges plagued on whole Pearl River Basin in the last ten days of June, one of 7 main basins in China. The special great flood had occurred in the midstream & downstream of Xijiang River, the maximal peak levels of some main stream and sub-stream had exceeded the highest in history. In the first ten days of July, the fujiang river and qujiang river of Yangtze River had occurred over warning level or big floods. In the middle ten days of July, the upstream of Huai River Basin and Minjiang River of Fujian province had occurred big flood. In the middle ten days of August, the sub-river of Liao River Basin, Qing River, Cai River, Hun River and Taizi River had occurred big floods.

1.2 The outline of the present countermeasures for mitigating flood damages

In order to prevent potential great flood disasters, Chinese Government has taken many measures to construct the structure measures and non-structure measures flood preventing systems over the main rivers. 246,000 km long embankments were constructed, more than 860,000 reservoirs had been built with a total storage capacity more than 475 billion cubic meters, 98 national flood detention areas were opened up along the main rivers, with total capacity near 100-billion cubic meters. All these have initially controlled the normal flood disasters. However, these are not economic and impossible to raise the standard without limit. When the over standard flood can not be controlled with the structure measures, the non-structure measures will be taken as the most important tool for flood disaster preventing. Our country has developed some no-structure measures, such as legal and institutional system, hydrological telemetering system, flood forecasting and warning system and telecommunication system etc. All these will be taken as the most important tool for flood disaster preventing. As one of the non-structure measures, I think flood hazard mapping also will play an effective mitigation role in China in the future. Because the flood hazard map shows some inundation and evacuation information in an easy-to-understand format, the local residents can easy know the route to a safe place. Compare with the Japan, I think Chinese flood hazard map has some different with Japanese flood hazard map, because our basin and city are also very large. And China is a developing country, we still need time and fund to build and perfect our structure measures.

2. The allocation of roles in making flood hazard maps in china

The work of flood defense belongs to the issues of flood control and water management in China. The Organizations have been separately set up at state, province, region and county levels. They are responsible for water management and construction management of engineering works. The water administrative organization at the state level is the Ministry of Water Resources (MWR). Under the Ministry of Water Resources, seven water resources commissions were separately established in the Seven Large River basins. Each of them is in charge of one river basin's water planning and water management. The

provincial, regional and county level water management organizations perform their respective responsibilities under the leadership of their one-step-high water management organization as well as the government at the same administrative level. Management organizations are also responsible for every day management of the engineering projects (See figure 1). The state, provinces, municipalities, and related regions and counties have also established flood control organizations respectively, so as to perform centralized arrangement of food fighting activities.

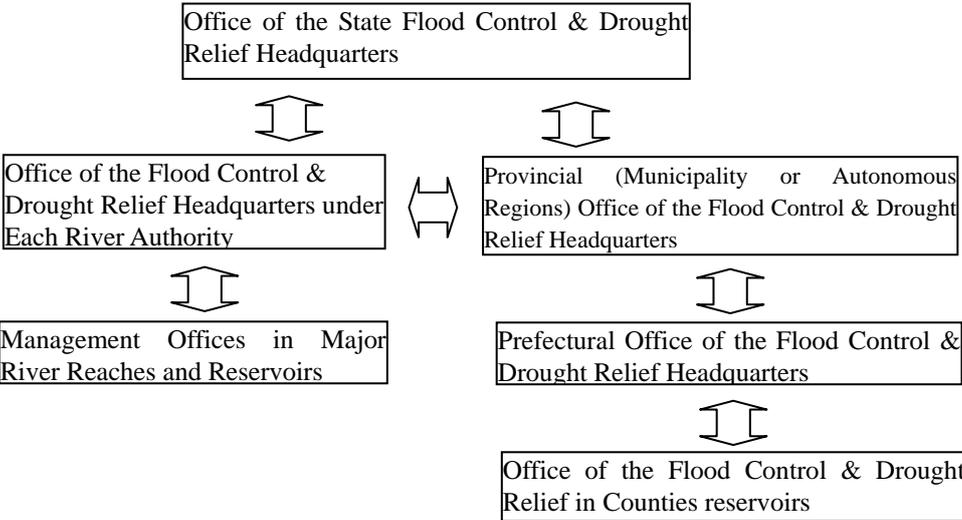


Fig 1. The organization structure of flood defense

The State Flood Control and Drought Relief Headquarters (SFCDRH) is the highest flood control organization in China. The routine job office of the SFCDRH is called the Office of State Flood Control and Drought Relief Headquarters (OSFCDRH), which is put inside the Ministry of Water Resources. Those administrative regions above the county level also established flood control organizations at their respective levels, if they have flood control problems. And the composition of any level flood control organizations is just like the SFCDRH. Each member of the river flood control organization is either a governor of the related provinces or a general director from the water resources commission of the river. The commander of the river flood control organization is the chief governor of one province designated by the central

government. And the deputy commander is the highest executive of the water resources management organization in the river. The routine job office of a river flood control organization is inside the water resources management organization in the same river.

Because the flood defense in China is undertaken in both central and local levels, so I think that the central flood defense organization (OSFCDRH and other correlative organizations which sustain the technology of draw flood hazard map) should take the responsibility for make anticipated inundation area maps of seven major rivers. In the other hand, the local government should take the Responsibility for making and disseminating flood hazard maps, the Bureau of water resources and Office of Flood Control Headquarters of the local government should bear the concrete works.

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. By use of color, the risk map shows that as the scale of probability grows, the inundation areas expand. In 2005, the guideline for draw Flood risk mapping was issued by the OSFCH. I think we should spend a long time and fund in basal work of flood risk map. After this, we may draw the flood hazard map in some detention areas, major cities, dike protected areas. And I think in the flood hazard map, we should consider the dam failure events.

All the arrangements and all the concrete actions for flood defense must take ensuring the people's life into consideration. It is one important principle that we have to stick to in flood fighting activities in China.

3. Acquirement of the training course

All parts of the curriculum are very interesting and impressive to me and I have acquired much from this training course. It includes:

- 1) Meaning, significance, effectiveness, contents and development of flood hazard map.
- 2) Procedure of producing flood hazard and fundamental analyzing method

necessary such as hydrologic and hydraulic analysis, runoff simulation and inundation simulation.

3) Preliminary production, dissemination and utilization of flood hazard map.

4) Great enhancement of my awareness about the above by field study and trip on flood hazard map and river management.

4. My actions about flood hazard mapping

In view of the significance of flood hazard Mapping, I think it is very necessary to impel the relevant works in China. According to the practical situation, it seems that two steps should be taken. First, flood hazard maps of flood retardation areas should be produced to meet the need of the changing idea about flood fighting in China. Then we can do the same work for the alluvial plains that are possible to be flooded.

After i return to China, i plan to make a report about this training and flood hazard mapping for my organization first. Secondly, I want to apply for the applied research on How to lengthen the effective flood forecast period. Finally, i will suggest my organization cooperating with the Office of Flood Control and Drought Relief Headquarter to produce the flood hazard map of a typical retardation area.

5. Thoughts for more effective flood management in Japan

The flood management in Japan is very effective and efficient because of its perfect organization, proper river law amended continuously to reflect changing socio-economic conditions, high-standard flood control facilities, comprehensive mitigation measures, etc. So i can not put forth any valuable suggestions and only some private immature thoughts regarding flood management for reference are listed below.

1) More effective anti-disaster education for understanding is expected so that it will facilitate the evacuation of residents.

2) The capacity of some shelters should be enhanced.

3) The land planning of the areas vulnerable to water inundation should be made more precise or the plan should be implemented more completely.

6. Suggestions for a more meaningful training course

As mentioned above, the training course is very successful and I appreciate the chance provided by JICA and the up-most efforts made by the staff of JICA and PWRI. Some suggestions are put forth only to meet the will of the organizers for better training effect.

- 1) Longer training period is expected, such as three months or half a year.
- 2) A whole exercise of produce flood hazard map is also expected.
- 3) More detailed contents such as inundation simulation may be more useful to produce flood hazard map.
- 4) More field studies and visits may be more effective.