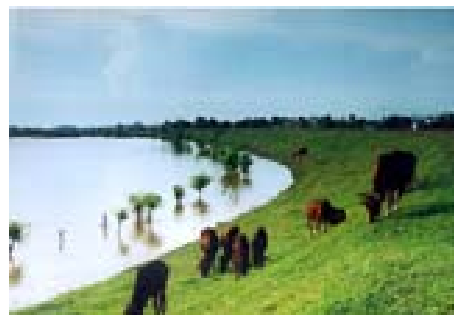


Vietnam

Flood Control for the Red River

The Red River, the Delta and Floods

The history of the development of Vietnamese civilizations is closely linked to the Red River (Hong River) Delta. As the second largest granary of Vietnam, the Delta holds a significant meaning in the life of the Vietnamese people. This is where approximately 15–20 % of Vietnam's rice is produced. A population of 17 million now inhabits the 16,500-km² area of the Red River Delta.



The catchment area of the Red River is estimated at 169,000 km², half of which lies in China. The Red River at Hanoi comprises three major tributary systems, the Da, Thao and Lo Rivers. The river is the source of various positive aspects for human life, such as water resources and rich alluvium (it is called the Red River as the large amount of alluvium it carries colors it red all year round). However, these go hand in hand with a much less expected occurrence: floods. Increased flash floods as a result of deforestation in the upstream parts of the Red River basin, and raised bed levels of the rivers due to the deposition of sediment, are causing higher flood levels, endangering the ever increasing socio-economic value of the capital.

The land in low-lying areas of the river delta is protected against flooding by river dyke systems. According to official historical records, in 1108, King Ly Nhan Tong ordered the construction of the first dyke with solid foundations on a large scale aimed at protecting the capital of Thang Long (now Hanoi). For years, the dyke has been upgraded and considered a symbol of the Vietnamese people's strong will and vitality.

Solutions implemented

Comprising 500 tributary rivers and springs, the distribution of the Red River is very complicated. With a length of 3,000 km, the dyke system is considered the most important measure for protecting human lives and property. The flood season in the Red River lasts from June to October, with particularly serious flooding in August when the water level is generally up to 4–8 m higher than the natural ground level. During the flood season, a large number of disaster experts and volunteers are mobilized to ensure the protection capacity of the dyke system. They play a very important role in keeping human lives and property safe and sound.



The so-called multi-purpose reservoirs in the upstream area of the river are the second most significant measure to protect the region against severe damage from floods. Normally, these reservoirs act as water reservation bodies for hydroelectric plant, but in the flood season their flood-control function takes priority. The two big reservoirs, Hoa Binh by Da River and Thac Ba by Lo River, with a total flood-retention capacity of 5.4 billion cubic meters, are used to reduce floods in downstream areas. In addition, several new reservoirs, such as Son La and Tuyen Quang, are now under construction in the upstream Red River. These structural works will be become operational in 2006 and 2012 respectively, strongly enhancing the flood prevention capacity of the Red River Delta.

Furthermore, when neither the dyke system nor the upstream reservoirs can reduce flooding, another protection measure will be implemented: flood diversion into the Day River. This river can take over part of the flood water from the Red River with an average discharge of 5,000 m³/s. In addition to the Day River, other flood-retention works that can be utilized when the Day River works are overwhelmed are Tam Thanh, Lap Thach, Luong Phu and another in the middle-stream area of the Red River. However,

these will only be mobilized in the case of extreme floods.

In order to improve the capacity of the Red River flood plain, it is very important to clear obstacles such as irrelevant construction works and sediment in the river bed. River bed dredging is one method. However, owing to economic limitations, this cannot be implemented as frequently as needed.

In the present economic conditions of Vietnam, it is impossible to build dykes with a wide cross section to protect against extreme flooding as the land occupied is large and costly. For this reason, the idea is to build emergency spillway works allowing the flood water to come over and flood particular regions, avoiding damage to significant points in the dyke system. The principle underlying this method is to accept partial damages to avoid broken dykes.

Widening the covering of upstream forests is a fundamental method of reducing the severity of floods. However, this requires a long period of time for its implementation. The forest system in upstream areas not only functions as a flood harmonizer but also has a beneficial effect on the environment and the ecological system. At present, forest cover is increasing thanks to forest planting and protection campaigns steered by the Vietnamese Government.

In addition to structural methods, the following non-structural ones also play an important role, being used for early preventive purposes.

- Land use management: Plan safety zones for human and production activities, reducing damages caused by floods.
- Apply special treatment policies to regions subject to flooding and their local populations. In such regions, solid construction works are built to ensure survival in floods.
- Enhance timely flood forecasting and warning abilities through improved investment in meteoric and hydraulic equipment.
- Be prepared for flood events by readying rescue devices, equipment and necessities.
- Conduct information dissemination campaigns to improve people's awareness of flood prevention by all available means, including television, radio, the Internet, books and training courses. These are implemented at the same time to ensure that the information reaches the maximum number of people.



In conclusion

The inhabitants of the area adjoining the Red River have a long history of struggling against floods. Various methods have been implemented in the struggle to protect human lives and property. Actions nowadays focus on flood control measures covering severely flood-prone areas, especially priority regions like Hanoi, the development of a legal framework for disaster mitigation and prevention, and a combination of structural and non-structural methods to achieve maximum efficiency.

In the process of struggling against floods, co-operation with international partners has a special meaning. A large number of project have been implemented, mainly focused on upgrading the river dyke and sea dyke systems, improving people's awareness of and preparedness for disaster mitigation and developing a legal framework for disaster prevention. Through such projects, we have learned many valuable lessons on disaster (especially flood) reduction that are applicable in the case of Vietnam.

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