

MYANMAR COUNTRY REPORT: FLOOD FORECASTING AND WARNING IN MYANMAR

1. INTRODUCTION

Myanmar known as golden land lies between latitude about 10° N to 28.5° N and longitude 92.5° E to 101.5° E, the country occupies the total area of 678,528 square km in which the north – south is stretching for about 2,200 km and east – west stretching about 800 km including the long part of Southern Myanmar Peninsula strip that of (50-150) km extends from east to west.

The neighbouring countries around the union of Myanmar, namely Bangladesh lies in the southwest, India is in the west and on the eastern and south-eastern side lie the People's Republic of China, Laos and Thailand. The total length of Myanmar border is 4000 km. The vast plan area of land called central valley lies in the central part of the country simply because it is bordered by the Shan Plateau at the eastern side and by the Assan mountain range and Rakhine Yoma at the western side.

2. WATER RESOURCES AVAILABILITY

The largest and most important rivers in our country are the Ayeyarwady, which may be seen as Myanmar's main artery. It runs for some 2,150 km from its sources in the far north, draining an area of 410,000 sq km, which is about 60 percent of the whole country. The most important tributaries of the Ayeyarwady are the Chindwin and the Mu, of which the former drains 17,000 sq km to the west of the Ayeyarwady, running 800 km from the north-west of Myanmar.

East of the Ayeyarwady delta, two other large rivers reach the sea; the Sittoung and the Thanlwin. The former, although being only half the length of the Chindwin, drains an area twice as large and is of great economic importance. The Thanlwin rises in China and flows for 1,100 km through Myanmar territory, draining about 125,000 sq km. A long series of rapids 150 km from its mouth prevents the Thanlwin from having the economic significance of Myanmar's other main rivers.

Mekong River

The Mekong River rises in the Plateau of Tibet at elevation of over 5,000 m. It flows generally in a southerly direction in China, Myanmar, the Lao People's Democratic Republic, Cambodia, Vietnam and Thailand. The total length of the river is 4,200 km but only about 265 km is located on Myanmar border with China and the Lao People's Democratic Republic.

3. FLOODS IN MYANMAR

Floods in Myanmar generally occur during the Southwest Monsoon season of June to October when the monsoon troughs or low pressure waves superimposed on the general monsoon pattern resulting in intense rainfall over strategic areas of the river catchments. The flood had caused much damage to crops and livestock.

3.1 Widespread Flood

Mostly occur in the large and medium rivers, caused by the heavy rainfall striking at head water region for considerable period (1-3) days, the flood wave forming at the head water started to move downward and causing flood along the river up to the delta area.

3.2 Flash flood

Usually occur in the small rivers and streams, caused by heavy rainfall on the source and the flood wave move downward and swiftly.

4. RIVER FORECASTING TECHNIQUES

Among the empirical models, multiple regression technique is chosen for forecasting flood peak levels at all the down stream stations along the Chindwin and the Ayeyarwady rivers. The sophisticated mathematical river forecasting models, such as Sacramento model, Tank model, COSSARR model, HBV model, APIC hydrologic model, and Discrete Linear Cascades model had been installed and tested in the mini-computer system. Apart from these conceptual models, the channel routing models as well as a back-up model are tested for operation use.

4.1 Multiple Regression Technique

To extend the forecast lead for the lower Ayeyarwady at Prome and Henzada, multiple regression technique is applied by using flood peaks at Bhamo (Ayeyarwady river) and Mawlaik (Chindwin river), together with the initial water level at Prome, Henzada and Shwesayan (Myitnge river) at the time of preparation of forecasts. The forecast lead time is 7 to 9 days for Prome and 9 to 12 days for Henzada accordingly. The formulae used are as follow: -

$$H_p = 0.287H_B + 0.585H_M + 0.113H_{PI} + 0.19H_S + 1353$$

$$H_H = 0.670H_B + 0.495H_M + 0.270H_{PI} + 0.190H_S + 412$$

Where H_p = Forecasting Water Level at Prome

H_B = Existing water level at Bhamo

H_M = Existing water level at Mawlaik

H_{PI} = Initial water level at Prome

H_S = Existing water level at Shwesayan

H_H = Forecasting water level at Henzada

4.2 The Conceptual Models

The continuous soil moisture accounting models are generally used in forecasting flow from rainfall over the upstream catchments of the Chindwin and the Ayeyarwady. The conceptual models used in the river forecasting sub-system are the Sacramento model, the Tank model, the COSSARR model, HBV model and APIC-hydrologic model.

4.3 Channel Routing Technique

The SSARR and Muskingum routing models are installed and tested in the flood warning and river forecasting sub-system using the data of the Chindwin river.

5. PREPARATION OF FORECASTS AND WARNINGS

Under the guidance of the Director General of Department of Meteorology and Hydrology, a committee headed by the Deputy Director of Hydrology had been formed to take responsibilities

for issuing flood warnings. The prime duty of the committee is to decide whether or not the flood warning should be disseminated to the people, who dwell in the flood prone areas.

The preparation of flood forecasts and warnings is normally done by the main river forecasting centre. During monsoon season as soon as heavy rainfall warning issued, careful watch on the possibility of flooding have been made. The flood forecasts are then prepared when the conditions are favourable using the technique mentioned earlier. If the water level of any station along these rivers is going to reach or exceed its town danger levels, it is necessary to inform the flood committee immediately.

On receiving the flood information together with the computed flood forecasts, the flood committee discuss the possibility of the flood inundation. There are two types of floods, namely; the normal and the severe one. The former is the rise in water level just to the town danger level to a considerable extent. The severe flood will inundate the flood prone areas. Then the flood committee has to decide whether to issue the flood warnings.

6. DISSEMINATION OF FORECASTS AND WARNINGS

Once the Flood Committee has decided to issue the flood forecasts and warnings for major and destructive floods, the forecasts and warnings are disseminated through different channels of communication, such as radio, television, newspaper, telegraph, telephone and single band transceivers to the administrative authorities of the flood prone areas. If the expected flood is a severe one, the warnings are broadcast very frequently (every 3 hours) through the Myanmar Broadcasting Services.

7. PUBLIC EDUCATION ON FLOOD PREVENTION AND COMMUNITY PREPAREDNESS

Varieties of programmes related to flood prevention and community preparedness to educate the public were arranged through different kinds of information media such as Radio talks, Radio plays and Newspaper articles. The public responses to these programmes are quite satisfactory.

Specifically, in the area threatened by floods the hydrological staff of the department collaborate with local administrative personals in the flood prevention and community preparedness measures.

8. FLOOD PREPAREDNESS PLAN

Directorate of Water Resources and Improvement of River Systems (DWIR) cooperates with the concerned agencies especially with Department of Meteorology and Hydrology (DMH) in demarcation of danger water level.

Most of the revetments undertaken by the DWIR are situated at the toe portion of dikes along the major rivers of Myanmar. These dikes are constructed by local or Irrigation Department (ID) for flood prevention purpose. Different activities of river training conducted by the DWIR are wooden pile groynes, steel cable groynes, rock groynes, protective mattresses with vegetation and dredging. Not only for the navigation, river training works are essential to divert the high flow of the rivers and reduce the flood by means of the proper River Channel Improvement.

9. CONCLUSION

Measures employed in flood control, flood fighting and flood disaster prevention being numerous, Department of Meteorology and Hydrology (DMH) on its part is contributing its services by issuing warnings and forecasts, as accurate as possible well in advance.