

# RIVER OF RICHES-STUDY OF GREAT FLOOD PLAIN RIVER : GANGES

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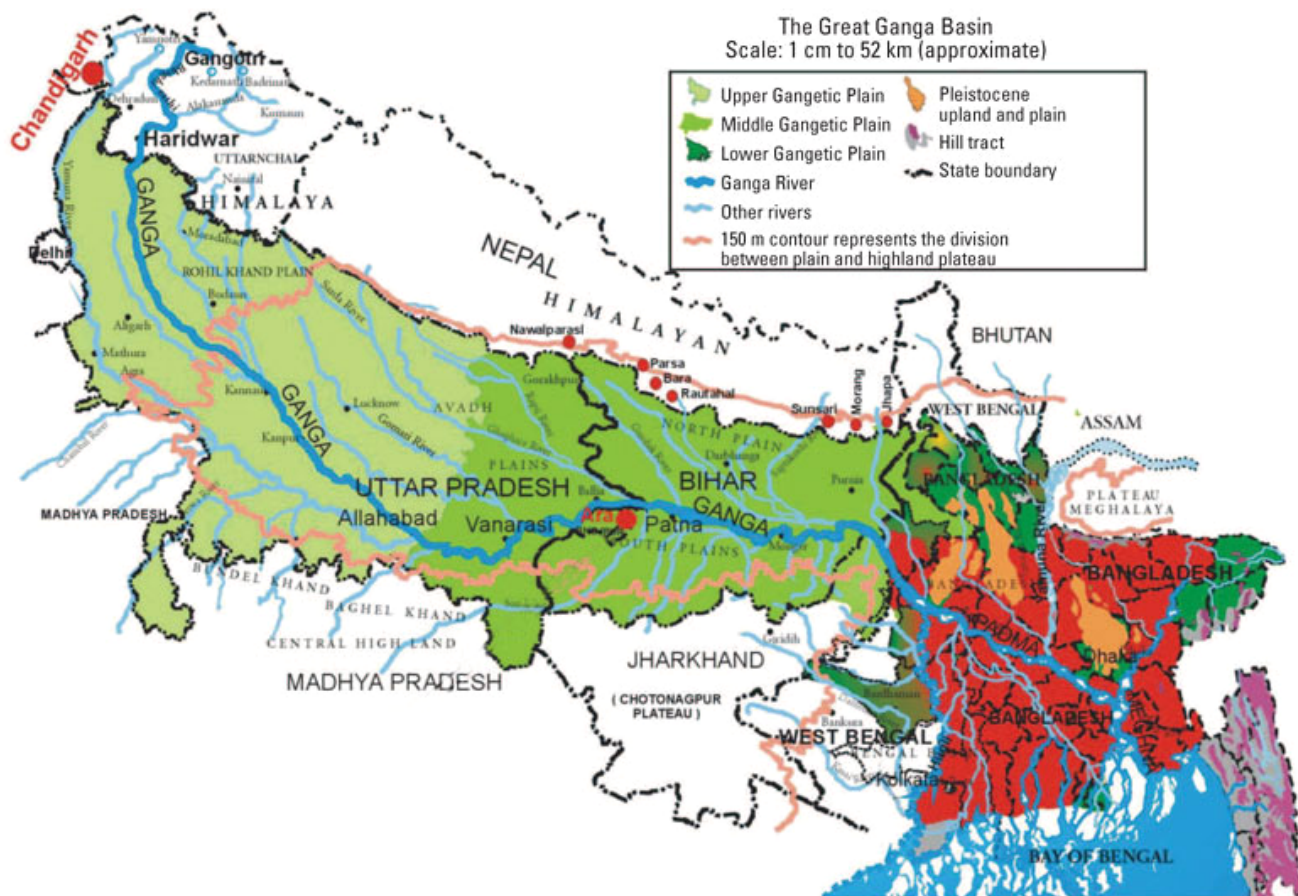


## Introduction

The response around the world to such catastrophes was predictable, more dams, higher levees and sturdier embankments to contain rising waters. These days, however water – management experts are increasingly questioning whether traditional remedies make sense; in fact some contend that dams and other barriers do more harm than good. But are human activities making India more flood-prone? Building cities on the world's worst flood-prone area – the Indo-Gangetic plains – is not new. Over the past 40 years billions of dollars have been spent on river containment in India. Critics insist the impact has been limited and in some cases has had the perverse effect of aggravating damage caused by rain swollen rivers. Flood is the penalty human beings have to pay when they interfere with the rivers' right of way. The paper tries to evaluate how India's biggest challenge in sustainable development will lie in the ways it learn to use the Indo-Gangetic flood plains, which have the potential to feed not just India but large parts of Asia. The ecologically appropriate water utilization model is yet to be developed, but the region's rich traditions should provide some useful pointers. However, to use this rich annual Tift appropriately,

what is also needed is political will and discipline. Dams and embankments have now become important causes of flood. With the meltdown of the Himalayan glaciers, embankments tend to break when river rises suddenly. According to Sir William Willcock's account of 1920 the silt laden Himalayan flood waters not only enriched the soil and provided bumper crops but the fish brought down by it kept malaria down. The Government steadily destroyed the system by making permanent embankments. Traditional irrigators, regularly breached embankments to draw flood waters down canals to every field and pond. But the British made breaching illegal and reduced productivity in most districts of Bengal resulting the infamous famine. Will cocks' analysis certainly needs to be sharply debated in these days of 'sustainable development', of this great flood plain river.

India's first Prime Minister Jawaharlal Nehru, believed that dams will produce power, irrigation and control flooding and become the "temples" of a modern, secular state. Since then 400 large dams have been built in India, along with thousands smaller levees as well as 16,000 km of river embankments, but the area affected by floods has expanded from 2 million hectares to 9 million due to deforestation, poor urban drainage and other factors.





### **The River of Riches :**

Each year these rivers were flooded leaving behind a fresh layer of sediments. The Indo-Gangetic plains are a product of such floods. A recent study carried out by Rajiv Sinha, of Geosciences group, IIT Kanpur has brought to light amazing quantity of sediment load carried by the Ganga River in its present hydrodynamic regime. Gangetic Rivers erode bulk of the sediments from upstream areas in the Himalayas and deposit part of it in the alluvial plains and a significant part in the Bay of Bengal, says Sinha. His study reveals that the Ganga river annually erodes around 749 million tonnes of sediments, mostly from the Himalayas, brings about 729 million tonnes at Farrakka and finally dumps 95 million tonnes in the Bay of Bengal. Thus the floodplain of the Ganga gets an annual increment of about 65 million tonnes of sediments.

Year after year these rivers painstakingly deposit their load on the plains and have resulted in the green belt of the country, one of the most populated areas since times immemorial.

The river Ganga starts its 2427 km long journey from Gangotri glacier. Ganga basin has an area of about 1,093,400 sq km says Himanshu Thakur of South Asia Network on Dams, Rivers & People, New Delhi. Incidentally Ganga River basin which is normally ravaged by floods from June to September each year is one of the most densely populated poorest areas in South Asia with largest collection of disaster affected people.

Changing courses by Ganga and its tributaries has been going on since times immemorial. In the recent years since 1925 Ganga has shifted from 4-9 km and the shifting channel is quite a problem for large tracts of land between West Bengal and Jharkhand.

The behavior of Ganges is well known, yet the problem occurs every year. This is because the spurt of population has driven people to occupy the flood pathways of the river. As long as the river is within its channel no one feels the pinch. The moment it tries to occupy the flood pathway, over which the river has all the right, people feel the pinch. It is for the government to check people from settling down in such areas.



## Flood Control vs. Flood Management

In the middle of the 20<sup>th</sup> century, flood problems drew attention in South Asia. In India, the earlier approach had been to control flooding by structural measures, specifically by the construction of flood embankments and anti-erosion structures for the protection of riverbanks. Flood cushions were also provided in some reservoirs. However, it was soon realized that even though flooding could be reduced using these measures, it would never be possible to totally control floods. It was also recognized that it would not be possible to provide permanent protection to all flood prone areas for all magnitudes of floods. Providing protection would involve factors as diverse as the topographic limitations of the region as well as financial investment – and would entail prohibitively high cost of construction and maintenance.

Experience also showed that the loss of life and property could be reduced considerably by using non-structural measures such as reliable advance warning about incoming floods, flood proofing, and flood plain zoning. People can move to safer places in an organized manner as soon as advance flood warnings are received, and moving them to safer place can save valuable property and cattle. Hence, the practical approach that is now widely adopted in flood management, and which can provide a reasonable degree of protection against flooding at a reasonable economic cost is a combination of both structural and non-structural measures.

## Flood Management Strategy

Flood Management activities can be broadly classified in four major categories.

- Modifying the floods in order to keep the flood waters away from developed and populated areas by decreasing runoff, increasing channel capacity, or containing, diverting, or storing flood waters.
- Modifying susceptibility to flood damage by keeping people and developed areas out of flood hazard areas or by insuring that such developed areas are flood-proof
- Modifying the loss burden by reducing the financial and social impact of flooding by providing post flood assistance and insurance
- Bearing the losses

All these measures for flood management can be classified as either structural or non-structural measures. Measures taken up under 'modifying the flood' are mostly physical measures and are termed 'structural measures', while those under the other three headings are mainly 'non-structural measures'.

## **Structural Measures**

Flood management in the form of physical measures to prevent the floodwaters from inflicting damage usually involves one of the following.

- Dams and reservoirs
- Embankment and flood walls
- River bank protection and anti-erosion structures.
- Natural detention basins
- Channel improvement
- Drainage improvement
- Diversion of flood waters
- Catchment area treatment/afforestation

## **Non-Structural Measures**

Non-structural measures strive to keep people away from floodwaters. One must always bear in mind; however, the stark reality that flood plains belong to the river and that floods, commonly perceived only as a curse, can be turned into a blessing in disguise if properly prepared for. Flood plains can be used judiciously and shared with developed areas by vacating and permitting use of the land by the river where never the situation calls for it. This approach allows the flood plains to be utilized and reduces the disaster dimension, while retaining its beneficial effects.

Non-structural measures are very cost effective and can be readily implemented. In recognition of the fact that it may not be possible to halt human encroachment in flood plains areas, the main thrust is now on non-structural flood management measures. Non-structural measures can be grouped broadly as follows.

- Flood forecasting and advance warning.
- Flood plain zoning
- Flood proofing
- Disaster preparedness and response planning
- Disaster relief
- Flood fighting
- Flood insurance.

## **Flood Forecasting and Advance Warning**

Flood forecasting and advance warning is gaining the greatest attention of planners as the approach of choice when considering non-structural measures to modify the susceptibility to flood damage, and is gaining acceptance with the public as well. Flood forecasting forewarns the resident population when the river is going to use its flood plain, to what extent, and for how long. In 1959, the Government of India laid the foundation for a strategy of laying more emphasis on non-structural measures by establishing a nationwide flood forecasting and warning system under the Central Water Commission (CWC). The state governments of the individual states often supplement these with their own efforts by providing reliable advance information/warning about impending floods. Advance warning helps in preventing the loss of human lives and moveable property and in reducing human misery to a considerable extent. With advance warning, people, cattle, and valuable moveable property can be removed to safe places upland of the areas that will be inundated.

## Dissemination of Flood Warnings

Advance flood warning, by disseminating flood-forecast information, is the most common non-structural measure of flood management. The important considerations for advance flood warning include.

- accuracy of the flood forecast;
- timeliness of the advance warning; and
- Proper dissemination of the advance flood warning.

The importance of the first two is well known and is undertaken during the formulation of the flood forecast. Equally important, however, is dissemination to the right user since it is the public that is the end user of these warnings. Flood warnings are disseminated by telephone, wireless network, police wireless, flood telegrams, fax, and special messenger. Advance flood warnings are generally disseminated to the following.

**Flood control rooms** - State governments usually have control rooms in the capital as well as the administrative headquarters. Advance flood warnings are passed on to these control rooms and it is their responsibility to inform all concerned to take necessary action.

**Civil Authorities** – These authorities are generally in charge of announcing warnings through loudspeakers in the areas that are likely to be affected. They are also generally in charge of disaster preparedness for the area and for transporting people to safer places. In the event of flooding, these authorities are also responsible for providing relief measures such as boats, drinking water, food packets, fodder for cattle, and medicines.

**Engineering Authorities** – Advance flood warnings are provided to engineers in charge of structure such as dams, reservoirs, flood embankments, anti-erosion works, railways, roads, and bridges in areas likely to be affected in order to enable them to take precautionary measures for the safety of the structures.

**Strategic Establishment** – Oil refineries, power stations, coalmines, factories, and other industrial units located in the areas likely to be affected are also issued flood warnings.

**Mass Communication** – Flood warnings are also sent to the press, and to radio and television stations, so that they can publish/announce appropriate warnings to the public. In India, during the flood season, the station of All India Radio and local television channels reserve a particular time slot every evening and/or morning for flood news including advance flood warnings. The general public is aware of this and they know that they can get reliable information in time.

**Flood Signals** – In areas prone to frequent flooding, a system of light signals can be used to indicate impending danger. For example, a yellow signal can indicate a minor warning such as may be needed when a flood occurs within the river, whereas a red signal can indicate a more serious threat such as when a large area is likely to be inundated. Such a system is in practice in the Damodar basin in India.

**Village Administration** – In the case of particular villages, advance flood warnings are sent not only to the central flood control rooms and civil authorities, but also directly to the gram panchayat (village administration), schools, hospitals, and dispensaries among others.

In 1991, the Central Water Commission evaluated the performance of the flood protection work. The study showed that the anti-erosion work had helped to divert the main current towards the north, thereby reducing erosion in the town and downstream areas. Similarly, the system of dykes was functioning well and was adequately checking the spillage of flood water into Dibrugarh and its suburbs providing a sense of security to the local population. However the floods of 1988 alerted the population to the necessity of regular monitoring and further raising and strengthening of these embankments. There is an urgent need to carry out flood plain zoning in the protected areas and to regulate development activities in the town and its adjoining areas. The gradual shifting of development activities from the present vulnerable areas of the town to comparatively safer higher areas will also help to reduce flood damage potential.

### Performance of Flood Forecasting in India

Year	No of forecasts issued	Accuracy of forecast	
		No. of forecasts within $\pm 15$ cm or $\pm 20\%$	% of accurate forecasts
1991	6603	6225	94.3
1992	4764	4567	95.9
1993	6643	6438	96.9
1994	7476	7087	94.8
1995	6417	6189	96.4
1996	6467	6266	96.9
1997	5465	5263	96.3
1998	7943	7775	97.9
1999	7055	6826	96.8
2000	6510	6315	97.1
2001	5463	5342	97.8
2002	4241	4151	97.9

Accuracy of Flood Forecasts in India



## Conclusion

The basic problem seems to be the mind set of decision-makers who believe that floods are a nuisance and must be controlled. Little has been done to live with floods or use the water advantageously. The Gangetic flood plains are getting increasingly waterlogged because of indiscipline in land use systems. The embankments can protect people from floods permanently has been proved false.

A river basin is the most appropriate hydrological unit for the planning and management of water resources. Integrated river basin development aims at the optimum use of basin water resources to best meet all of the water needs of a basin. It is a tool that can be used to address issues related to both the positive and the negative aspects of floods and droughts in a basin. Effective flood management needs to consider the whole basin and requires that methods that can reduce flood losses should be considered and used where appropriate. There should be a master plan for flood management for the basin. Sound watershed management through extensive soil conservation, catchments area treatment, and construction of check dams should be promoted to reduce the intensity of flood. Adequate flood cushions should be provided in water storage projects wherever feasible to facilitate better flood management.

A judicious mix of structural and non-structural measures would optimize the benefits that accrue from structural measures alone. An extensive network of flood forecasting stations should be established to issue timely warnings to settlements in flood plains. Flood plain zoning and strict regulations on the location of settlement and economic activities in flood zones will help minimise loss of life and property. While physical flood protection work like embankments and dykes will continue to be necessary, the emphasis should be on non-structural measures such as flood plain zoning, to minimise losses and reduce the recurring expenditure on flood relief.



## **Bibliography**

UNDP (1991) : Manual and Guidelines for Comprehensive Flood loss Prevention and Management, Bangkok, United Nations Development Programme, Economic and Social Commission for Asia, and the Pacific.

INCID (1993) : Non-structural aspects of Flood Management in India : Indian National Committee on Irrigation and Drainage.

IRS (1997) : Theme paper in River Basin Management, Indian Water Resource Society.

Times of India Bureau reports on Floods in India.

Green Politics – Down to Earth.

Ananda Bazar Patrika Bureau reports on Flood.

World's Greatest Flood Plain : Mr.V.K.Joshi

WWF-India

Photographs : Arjun Manna-WWF, Sundarban Project.

Map : Abhijit Choudhury.