

## A STEP TOWARDS SUSTAINABILITY: WATER MANAGEMENT

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### Abstract

India continues to struggle with growing financial crunch to complete its water sector infrastructure and its operation and maintenance cost. On the other hand, inadequate institutional reforms and effective implementation has affected its performance level. In recent years, the Government of India has initiated several steps to improve investment and management of water management sector but considerable efforts needs to be made in this regard.

**Keywords:** Climatic Diversity, Water Management

### Introduction

India being a land of climatic diversities observes floods owing to monsoon rains in Gujarat, Surat, Orissa and Bihar (Champan, Gopalganj, Saharsa, Muzaffarpur and Araria districts), West Bengal, Uttar Pradesh ( low lying areas of Gonda, Balrampur, Faizabad, Barabanki ), Rajasthan, Pinjab and Haryana. India has continued for long to struggle with growing financial crunch to complete its water sector infrastructure, its operation and maintenance cost. The recent floods in Delhi, Mumbai and Kolkata and other metropolises around the country definitely point towards the fact that dams and other barriers do more harm than good.

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

Anil Agarwal, India's leading environmentalist, "the government's anti-flood measures have actually boomeranged. Dams and embankments have now become an important cause of floods. The manmade barriers, he says, prevent drainage of excess water from flood plains into the main channels of rivers and streams. Embankments also tend to break when rivers rise suddenly, sending water gushing into the countryside. Sixteen major dams have burst in India, the worst disaster in 1979 sent a wall of water through the town of Morvi, in Gujarat State, killing 1500 people.

The country's water sector is faced with abrupt climatic changes due to global warming, increasing droughts, declining water quality, particularly of groundwater, unabled flooding, inter- state river disputes, inadequate institutional reforms and enforcement.

We need a comprehensive Multi – hazard watch service to support Humanitarian Preparedness. - hazard watch service to support Humanitarian Preparedness. The need is to build a new road to innovation to combat floods. The Government of India has initiated several steps to improve investment and management of water sector which includes Accelerated Irrigation Benefits Programme, Hydrology Project, Setting up of Water Quality Assessment Authority, Command Area Development and Water Management Programme, National Project For Repair, Renovation and Restoration of Water Bodies directly linked to Agriculture, Flood Management and River Basin Organisations.

The following strategic options should be considered in order to be well conversant with the change:

From "Water Resources Development" to "Water Resources Management" - India need to shift its

focus from water resources development to water resources management by restructuring and strengthening existing institutions for better service delivery and resource sustainability.

1. Promote River Basin Organizations- Adequate flood cushion should be provided in reservoirs.
2. Climate change increases the threat of water. The values to be protected have increased significantly in the last decades.
3. The need is to create a sustainable spatial layout of India and the layered approach seeks to improve the organizational preparations for a potential flood (disaster mitigation).
4. New standards are to be established on the basis of flood risk, which will be tested every six years against water levels and wave heights that are expected to occur after say a decade. It will undergo a cost benefit analysis and an analysis of the potential number of casualties.
5. Building robust and wide delta dykes.
6. With a view to sustainable spatial development, the provinces, water boards and the central government should jointly develop a flood risk zoning system.
7. Flood Management Taskforce to adopt a „Waterproof“ flood disaster infrastructure.
8. Multi – Layered approach to safety requires area – based customization.
9. Need to develop risk maps and flood risk management plans.
10. Treatment of waste water.
11. Along the coast line eco – friendly banks and fish ladders can be constructed.

Sand Replenishment as a way of enabling the coastal foundation zone to grow concurrently with the rise in sea levels- Nourishing the coast.

“You can never control floods” observes Philip William, President of the International Rivers Network “You can simply try to reduce the risk”. The idea is to bring about change through innovation.

The GEO-CLIMATIC CONDITIONS of India make the country prone to natural disasters like floods and tsunamis. The frequency and intensity of floods has grown in the country over the years primarily because of the increased encroachment of flood plains.

The need is to build security control framework in conglomeration with a multi – layer grid system. The security control framework comprises of an intelligent monitoring system which scans any changes in environmental/ climatic conditions through wireless sensory networks.

The wireless sensory networks will record any deviations in the hydrological parameters (rainfall-time series data), hydraulic parameters (river network chain age, cross section, river depth and runoff point).

The hydrological and hydraulic parameters are already fed into the intelligent (expert system) depending on the topography and demographic data (population data) of a region. The concept is somewhat a sub- system of GIS (Global Information System) which takes into account 3D built- up areas, road network overlay.

Appropriate water management is essential which tends to focus on flood prevention thereby utilizing the water for irrigation, water storage or power generation and if mishandled a dam would be empty (even if storing maximum flood) and would result in the risk of early spilling is increased, resulting in floods downstream.. Water storage in dams is also inefficient due to high evaporation losses, particularly in areas with hot temperatures. Floods are a key element of this environment. Dams cause variations in water quality and temperature that are different from the natural environment and disrupt downstream flora and fauna. Dams tend to give a false sense of security to

people living below dams and on flood plains; they believe they are 100 per cent safe, which is never the case.

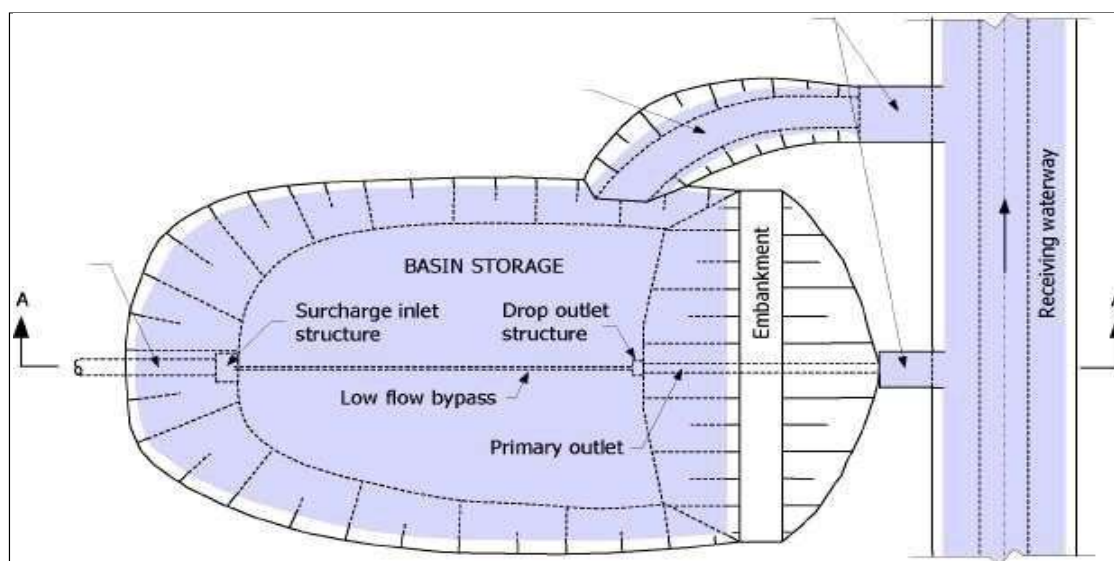
It results into a simulation conceptualizing water level profiling, runoff and flow simulation and visualizing and interpreting flooding process. For Indian coastline is prone to floods, so a multi-layer system to prevent flood should be inculcated.

The framework should take into account adequate town planning, road and river network facilitating in withstanding unprecedented rains, basic infrastructure underlying any area comprising of water supply, solid waste disposal and drainage.

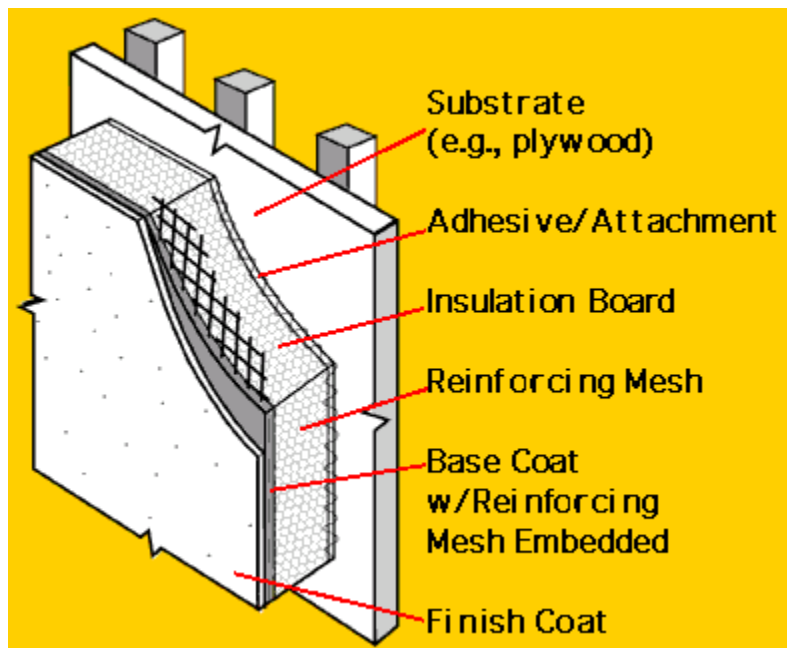
Having a three, five or seven layer depends on the intensity of flood, temperature, rainfall gauge and density of a region.

The need is to develop a basin storage which will subsequently result into multiple channels. One can use a gel pump (which injects hydrophilic gel into ground). The hardened gel will prevent movement of water. This will lead to flooded manhole. The manhole will have provisions of treatment of flood water. The manhole will re-route floodwaters to certain areas of the flood plains which will lead to a spread out. This can further lead to multiple channels for irrigation as a probable solution to flexible and responsive multiple cropping systems.. The reassessment of development regulation and possible moving homes or businesses might be part of the solution. The people using treated flood water (farmers, industrial firms or city dwellers) will pay the money for using floodwater as its supply will be regulated by a separate pipeline ( and mini flood metre) which would be separate from the fresh water pipeline. The money collected will be used by the government to build similar structures. The pre-requisite in this regard is transparency, fairness and commitment on part of the government and community promoted through social, non governmental, educational organizations efforts.

In addition architects and city planners should come up with new building designs and innovative solutions. This requires raising sea walls, strengthening dams and sluices, building more pumping stations, and filling coastal dunes or even covering them. The layered design of the various designs for water management are enumerated below:



Blueprint of Basin Storage



The sub components prevalent in the Layered Structure

### Conclusion

Sustainable water management means using water in a way that meets current, ecological, social, and economic needs without compromising the ability to meet those needs in the future. It requires water managers to look beyond jurisdictional boundaries and their immediate supply operations, managing water collaboratively while seeking resilient regional solutions that minimize risks.

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