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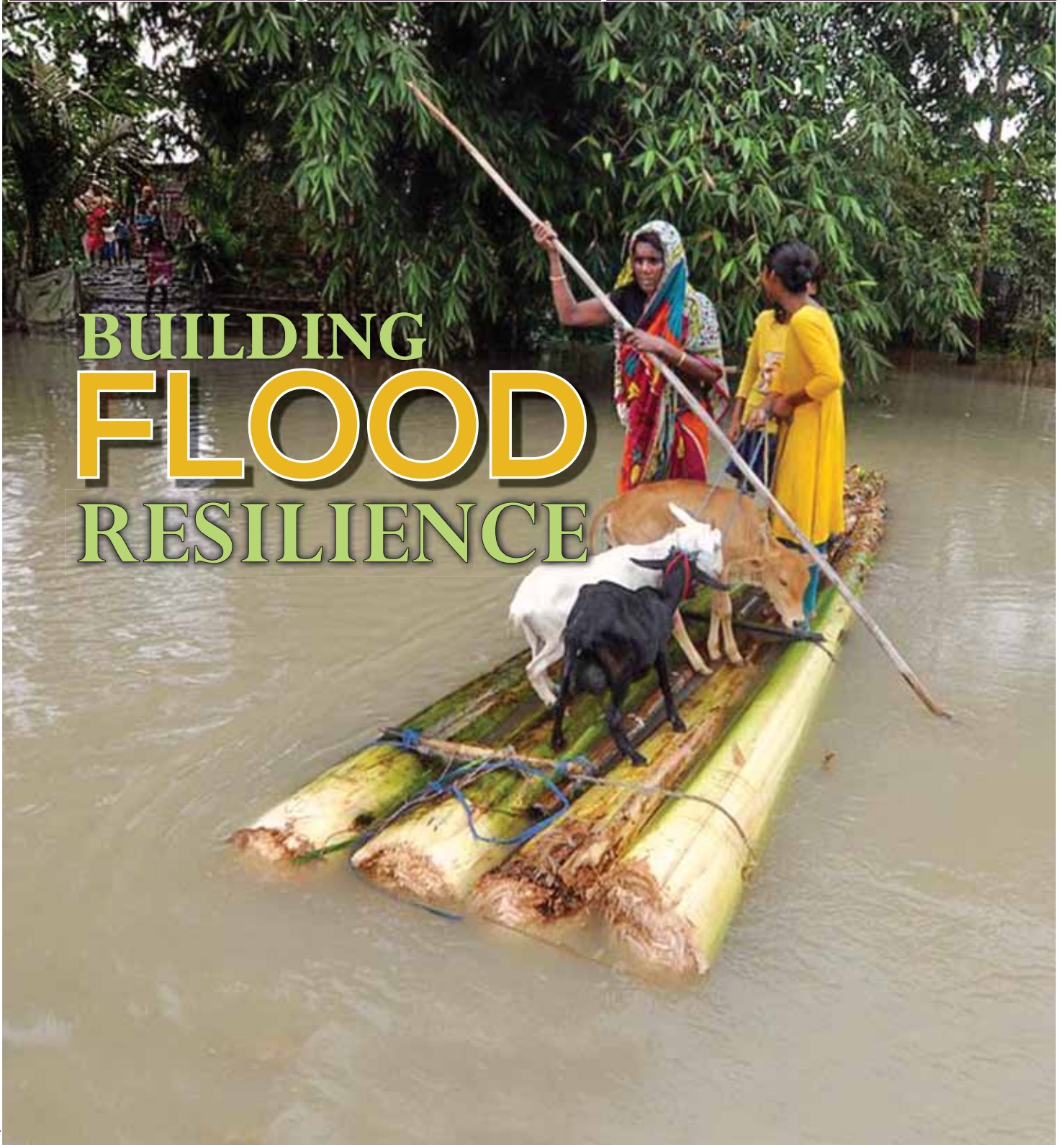


# KNOW DISASTERS

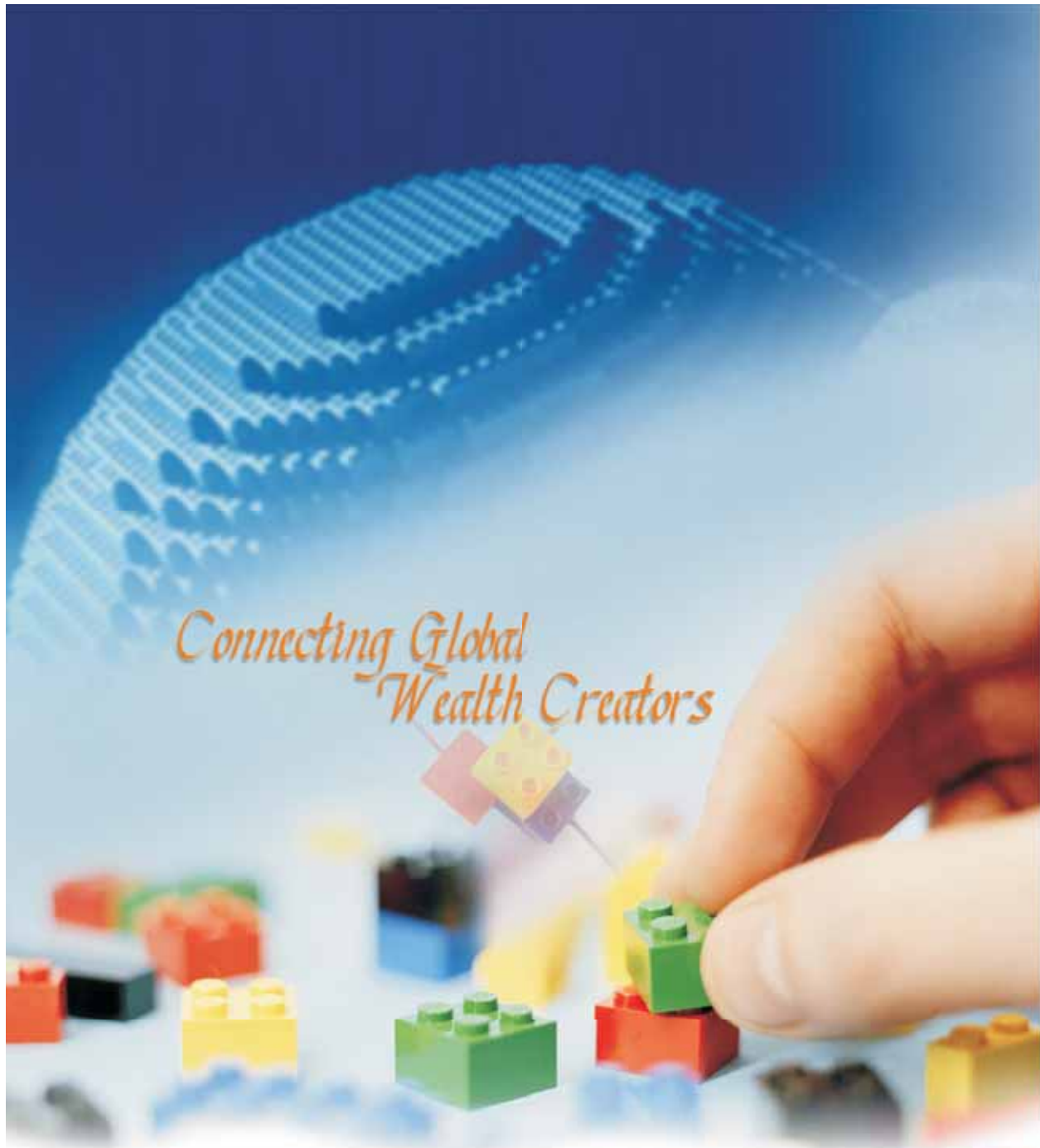


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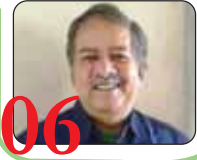


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## EDITORIAL



Dear Readers,  
Greetings!

Floods bring the most recurrent natural calamity. India faces floods almost every year, in varying degrees of magnitude. The country suffers huge economic losses annually besides the loss of precious human lives due to low resilience to floods. The devastation caused due to floods in the past has drawn attention of the planners of the country towards comprehensive flood management plans, policies and implementation thereof. The flood management practices have largely focused on reducing flooding and reducing the susceptibility to flood damage through variety of interventions. Different measures have been adopted to reduce the flood losses and protect the flood plains. However, if we could also learn to live with floods and also build resilience simultaneously, it would be beneficial to the overall economy. Therefore, Know Disasters has brought to you its July issue on 'Building Flood Resilience'.

Know Disasters has been trying to cover various critical dimensions of DRR and Resilience building to raise awareness and education, especially in bridging the gap between technical information available and information disseminated to the public. We believe that demystifying and simplifying the existing knowledge before it can be made friendly to the common man is the need of the hour and herein lies the greatest challenge. Notwithstanding, this magazine has been committed to Building Disaster Resilience by Making Disasters 'Everyone's Business'.

This issue has brought to you different articles, relevant news, viewpoints and studies, the creativity of children, and information about recent books around its central theme. You can read 'Recurring and Expanding Hydro-meteorological Disasters' by Loy Rego, 'Submerged: India's Tryst with Flood Management' by Niti Mishra, 'Frequent Flood's in the 21st Century India: A Governance Issue' authored by Dr. Jayanta Debnath, 'From the floodwaters of Silchar (Assam): Insights for effective disaster response and DRR' by Porag Shome, 'Is Flash Flood an Ignored Hydrometeorological Disaster?' by Eklavya Prasad and Aparna, 'Effect of COVID-19 on Health Care Financing: UK and India experience' by Dr Gajendra Singh and other young co-authors, and 'Living with Cyclones: Precautions to Take Before, During and After' by Colonel Razzaque Adil. You can also read the regular column of Dinesh Mishra Ji, and an interview of Dr. H. Kit Miyamoto, Global CEO of Miyamoto International, Inc. I hope you will like these articles.

With this, I would like to thank all our authors who have contributed their articles, and the readers for their encouraging responses. Please continue to share with your family and friends and encourage them to write their experiences and stories and share your valuable comments and contribution to the magazine.

Stay Informed, Safe & Healthy!

**Anil Kumar Sinha, IAS (Retd.)**

Hony. Editor-in-Chief, "Know Disasters"

Founder Vice Chairman, Bihar State Disaster Management Authority

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# Lightning Resilient India Campaign

## वज्रपात सुरक्षित भारत अभियान

1

2

3

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**Lightning Do's and Don'ts**

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### Staying safe during thunderstorms

Get inside a completely enclosed building

Be the lowest point, as lightning hits the tallest object

Stay away from trees

If there is no enclosed building, get inside a hard-topped vehicle

If there is no shelter, crouch in the open

Get out of the water and stay away from beaches

Avoid metal

- Avoid leaning against metal vehicles. Get off bicycles and motorcycles
- Do not hold on to metal items like fishing rods, tennis rackets or tools

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A lightning rod diverts lightning to the ground via a conductive pathway.

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दामिनी : बिजली चेतावनी  
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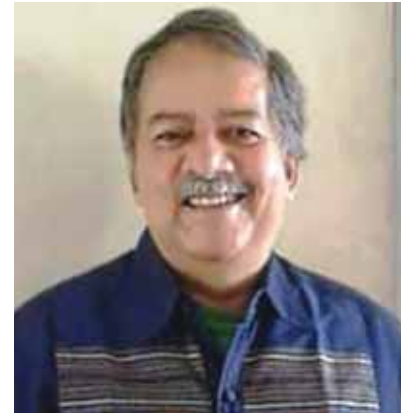


Source: CROPC (Climate Resilient Observing Systems Promotion Council), courtesy MMD

# Recurring and Expanding Hydro-meteorological Disasters

Loy Rego is a Tech Advisor, MARS Practitioners Network (DPRR and SDGs) & VERVE Volunteers. He also served as Deputy Executive Director, ADPC, Bangkok (1996-2011) & Joint Director, NSC, India (1986-96).

**This article analyses the available data on various hydro-meteorological disasters across the globe and in Asia to highlight the alarming impacts of these disasters, particularly floods, on lives, livelihoods, and the economy.**



Loy Rego

If we look at the data analyzed by the World Meteorological Organization’s (WMO’s) Atlas of Mortality and Economic Losses, specific to Hydro-meteorological disasters, worldwide, 11 072 disasters occurred in fifty years (1970-2019) that attributed to weather, climate and water-related hazards (WCWr), resulting in 2.06 million deaths and US\$ 3.64 trillion losses, also representing 50% of all disasters (including technological hazards), 45% reported deaths and 74% reported economic losses. This also means that a WCWr disaster occurred every day on average over these 50 years – killing 115 people and causing US\$ 202 million losses daily.

Further, worldwide, 44% of these disasters were floods (riverine 24%). While tropical cyclones and droughts resulted in 38% and 34% of disaster deaths respectively. 38%

of economic losses were caused by tropical cyclones, 31% from different flood types: riverine (20%), general (8%), and flash (3%). 91% WCWr deaths occurred in developing economies (UN classification), similar to 82% of deaths in low/lower-middle income countries (World Bank classification), while 59% of economic losses were in developed economies and 88% of economic losses occurred in upper-middle- and high-income countries.

## Top 10 disasters and losses worldwide

Hazards related to the top 10 disasters with the largest human deaths have been from four droughts (650,000 deaths), three storms (577,232), two floods (58,700), and one extreme-temperature event (55,736). Floods were the most common WCWr disasters recorded, but storms had

the highest human/ economic toll. The top 10 economic loss events were seven tropical cyclones (US\$ 521 billion) and three floods (US\$ 115 billion).

## Impacts in Asia: Floods being the Deadliest

A million lives and US\$ 1.2 trillion have been lost in Asia over 50 years due to WCWr disasters. Asia had nearly one-third (31%) WCWr global disasters, nearly half of deaths (47%), and one-third (31%) of economic losses. Most of these disasters were floods (45%) and storms (36%). Storms had the highest impacts on life, causing 72% of lives lost, while floods caused the greatest economic losses (57%).

Asia’s top 10 recorded disasters caused 70% of lives lost (680 837 deaths) and 22% of economic losses (US\$ 266.62 billion). Of these, tropical cyclones (TCs) were the most prevalent hazard. Three TCs (two in Bangladesh, 1970, 1991; one in Myanmar, 2008) accounted

Table 1: Decade wise Disaster’s, Impacts and Losses

Period (Years)	Reported numbers of disasters across the globe	Reported deaths	Reported economic losses (US\$ Billion)
1970-1979	711	556k	175.4
1980-1989	1410	667k	289.3
1990-1999	2250	329k	852.3
2000-2009	3536	329k	942.0
2010-2019	3165	185k	1381.0
Total	11 072	2 064 929	3.6 Trillion

for 60% of deaths regionally. China was the most affected Asian country by WCW events, suffering half economic losses (49.7%, US\$ 598 billion), in the last 50 years. Six costliest regional disasters occurred in China (60% of top 10 events). Floods were the most prevalent hazard causing economic losses.

According to the Centre for Research on Epidemiology of Disasters, (CRED), Belgium, across the globe, 2664 flood events occurred from 1900 to 2005 including 1068 (40%) flood events in Asia.

## Floods: Types and Causes

**Slow-onset riverine / monsoon floods** occur when major rivers and their side channels rise slowly and overflow, either by snowmelt or steady ongoing rainfall, causing extensive inundation with damage/losses and slow recession lasting for many weeks/ months. Rising flood levels can be forecasted, allowing people to evacuate to higher ground. Housing is often built on stilts. Flood peaks may occur simultaneously on many interconnected rivers, which causes extensive flooding.

**Rapid onset/flash floods** occur mainly in rivers with small, steep mountainous catchments after periods of intense rainfall, often accompanied by the rapid rise in water levels, and sudden high-flow velocity onrush from mountains, causing intense damage to crops/property and direct life loss.

**Localized urban floods** occur after intense local rainfall in areas with inadequate drainage, storm-water management, and flood evacuation systems. Floodwater often remains for a long duration.

Asia also has six major river systems namely:

- a) Ganges: India, Bangladesh,
- b) Brahmaputra: China, Bhutan,

India, Bangladesh,

- c) Meghna: India, Bangladesh,
- d) Indus: China, India, Pakistan,
- e) Mekong: China, Myanmar, Lao PDR, Cambodia, Thailand, Vietnam,
- f) Salween: China, Myanmar.

Populations residing in these river regions often suffer from floods. River's transboundary benefits are shared, but the way in which rivers are used in upstream areas affects river flow and its impact on downstream areas. This also creates conflicts over river water use and the construction and management of dams in each country they pass through. Therefore, balanced, shared use of these complex, dynamic river systems is needed.

## Floods also have levels of magnitude:

**a) Periodic 'annual' floods** with farming practices well-adapted. Forecasts give advice regarding sowing/ cropping times to minimize losses,

**b) Medium** (example: 5-years) floods cause some serious/ extensive economic loss, affecting people in low-lying areas by rivers, who are usually prepared,

**c) Severe** (example: 20-years) floods with river levels rising, affect large geographies including urban areas, damage/loss to physical environment/ economy generally significant,

**d) Catastrophic** (example: 100-years) flood inundating extensive areas, extremely devastating, multi-fold impacts to life, property, and economy.

Besides negative impact, riverine floods deposit rich fertile sediments that enrich nutrients lost through intensive agricultural practices of deltaic farmers downstream. These natural actions provide people

with food security and farmers' livelihood security.

Floods have meteorological, hydrological, and anthropogenic causes. Extreme, intense rainfall of long-duration and floods caused by cyclones, storms, and tidal surges are major causes of damage. Flooding is also caused by increased run-off due to ice/snow melts; saturated land, erosion, and impermeable surfaces with poor infiltration. Floods are greatly influenced by human activities: population growth, socio-economic development, land use, deforestation, intensive agriculture, unplanned flood control measures, urbanization, and climate change. The most flood-vulnerable people are from marginalized/ impoverished groups, living on low-lying land, have less employment, and have poor access to essential services.

## Conclusions

The practice of Integrated Water Resource Management (IWRM) is required to overcome the challenges and reduce people's vulnerability to floods. IWRM focuses on maximizing floodplain use with minimum loss to life, livelihoods, and biodiversity. It helps in reducing flood risks through risk assessments, developing and applying risk management strategies; preparing people for floods, and investing in mitigation, and risk reduction. We need to reduce vulnerability, but learn to live with and adapt to floods. Lessons should be learned from examples cited in two river systems. We must build resilience, anticipate accurately, and prepare for and adapt to floods, while recognizing, celebrating, routinizing, and expanding relevant successful pilots and learning from across the globe into regular good practices, including dealing with the challenges faced. ■



# Submerged: India's Tryst with Flood Management

*Niti Mishra is an Assistant Professor at the Centre for Disaster Management Jamsetji Tata School of Disaster Studies (JTSDS), Tata Institute of Social Sciences, Mumbai.*

**This article discusses the recurring floods in India and the challenges with its flood risk management systems.**

## Floods

Flood events are the result of cumulative causative factors such as monsoon rains, coastal location, high population density in low-lying areas, artificial and human-made environments among several others. Around two billion, which is 38 percent of the world population, live in flood-prone areas. Globally flooding is a result of storm surges and cyclones impacting 2 percent of landmass which is home to 13

percent of the world's population (Molina, 2016).

In India, floods are a prominent cause of loss of lives, livelihoods, and displacement (The majority of the population of India is concentrated in the riverine and coastal regions, leading to increased flood vulnerability of lives and livelihoods). From 2008-2019, approximately 3.6 million people were displaced due to floods. According to the National Disaster Management Authority



Niti Mishra



(NDMA), more than 40 mha of the total geographic area of the country is prone to floods. It's a prominent recurring event with an increasing trend of damage and loss. On average annually around 75 lakh hectare of land are affected by floods, 1600 lives are lost and multi-million worth of infrastructure is damaged including housing and public utilities.

### Flood Variability

The diverse topography, geomorphology, riverine system, and precipitation pattern across the country contribute to the different kinds of floods in the country (Mohanty, et. al, 2020). The impact of floods is determined by the magnitude, frequency, and duration of floods which are dependent on geomorphological and meteorological conditions. Based on these, four types of floods are identified in India: flash floods, single peak floods, multiple peak floods, and synchronized floods. In India, floods are generally attributed to monsoon rainfall. However, there is significant variability in spatial terms evident, where some areas always receive more than above average rainfall. Also, inter-annual variation in rainfall is characteristic of monsoon. This variation influences the spatial-temporal inconsistency of rainfall which results in flooding in various parts of the country. State-wise data on flood-affected regions exist since the 1950s. The increasing trends of flooding in various parts of the country in recent decades have also been attributed to anthropogenic activities (Valdiya, 2004). Other causes include floods by successive weather events, seasonal floods, coastal floods, and estuarine floods, caused by a dam failure, and melting of snow or glaciers (Dhar & Nandargi, 2003). The contemporary discussion on floods is not complete without mentioning



the challenges brought by flooding in urban areas.

Urbanization increases the flood risk increases by three times, resulting in flooding (peak flow) quickly impacting a large number of people residing in dense clusters that are characteristic of city life (Dhar & Nandargi, 2003). Also, flooding of cities due to cyclones and storm surges is intensified by rapid urbanization. Rapid urbanization and its processes have resulted in modification of land use and livelihood in the past decades and also affect riverine tempos. The risk of flood has increased due to silting of natural water courses and the lowering of water tables, followed by salt intrusion or land subsidence. The construction of new roads, bridges, and infrastructures has made it harder for rainwater to drain through the soil causing frequent flash floods. The loss of mangroves and sensitive ecosystems on urban fringes has increased the risk of coastal erosion and exposure to stormwinds and waves. In addition to this deforestation on hill slopes within cities has generated instability making areas more prone

to landslides (UN-Habitat, 2012). When factors of increasing floods are connected to ever-increasing agglomeration in coastal urban areas, the result will be a large number of people impacted by floods (Reid, A.2016).

### Indian Institutions for Flood Management

The country has a dual hierarchy structure for flood management at 1) State level and 2) Central Government. The institutional structure requires coordination and cooperation among the agencies at different levels (Mohanty, et. al, 2020).

The primary responsibility of controlling floods lies with the state government and several states have taken diverse measures to manage floods, thus making 'flood management' a state subject. At State Level flood management is generally under the purview of the Irrigation department. However, some states have set up different flood control boards. The public works department (PWD) is tasked with the construction

## Analysis

and maintaining structures for flood control. Lastly, the disaster management authorities are responsible for post-flood response, relief, and recovery activities (Mohanty, et. al, 2020). The state governments and their agencies are tasked with the responsibility to plan, investigate, and implement flood management schemes while the Central Government works in an advisory capacity through various committees, task forces, and policies to guide the state with technical and financial support.

Flood management at the central level is the result of coordination between various ministers such as the Ministry of Jal Shakti, the Department of Water Resources, River Development, and Ganga Rejuvenation; these generally are seen to take on supervisory roles. To monitor flood control several other committees and agencies have been set by the central government. The most prominent is the Central Water Commission (CWC) which is the nodal body for planning, management, and design of water resources development. It is the primary agency that provides technical advice on flood control to the state governments. The Government of India set up the



Ganga Flood Control Commission (GFCC) in 1972 and the Ministry of Water Resource (MoWR) (then Ministry of Irrigation) set up statutory bodies like Brahmaputra Board under Brahmaputra Board Act, 1980 to provide specific attention to major river basins in the country. Apart from these the National Disaster Management Authority also contributes to policy and action plan formulation for states and their agencies to manage disaster, provides guidelines, capacity building, and enforce action plan for preparedness activities (Mohanty, et. al, 2020).

### Existing Flood Management Programmes

India follows a twin approach to managing floods, specifically flood control and flood preparedness. While flood control focuses on activities to reduce flood impact through structural measures such as embankments, reservoirs, check dams, etc. Flood preparedness is about prevention to reduce vulnerability through non-structural activities like flood forecasting, flood hazard zonation, flood proofing, and disaster preparedness. These approaches have been reflected in various schemes and programs implemented by the GoI.

Flood Management Programme in the XI-five-year plan covered state-level projects related to flood proofing, drainage development, anti-sea erosion, rehabilitation and restoration projects, river management, flood control, river erosion, and such activities that would assist the states in building structures for flood protection. The MoWR approves projects by the states according to the FMP guidelines. The River Management Activities and Works Related to Border Areas (RMABA) is a central government



scheme initiated by the MoWR in Xth five-year plan to improve flood management. Under this several activities such as field surveys, investigation and preparation of Detailed project reports (DPRs) for dams, maintenance work for rivers on broader, flood protection on international borders, and flood forecasting operations in collaboration with neighboring countries on three systems Ganga, Brahmaputra, and Indus river systems were covered (Mohanty, et. al, 2020).

The Central Government had also constituted committees such as Rashtriya Barh Aayog (RBA) in 1976 for flood control and The National Water Policy of 1987, 2002 & 2012 for creating a sustainable flood management system. In the RBA the state governments were recommended to assess flood-prone and protected areas in their region every five years. The 2012 National Water Policy suggested states study the river morphology for planning and construction of flood control structures on major rivers. Another significant recommendation has been the preparation of flood inundation maps for flood-prone areas to develop flood management strategies. The mathematical models for flood forecasting provided by CWC would be used for the mapping. Flood forecasting was launched by CWC in 1958 and since then the system has evolved and grown significantly with 226 stations (in 2018) in the country. These stations provide information on water level and discharge forecasts to local and reservoir operating agencies for flood mitigation activities. Even though the current flood forecasting system is not extensive as the requirement in India, however as a non-structural measure it is vital for complementing flood management measures (Mohanty, et. al, 2020).



Along with several other measures, Dam safety for flood protection is also under the purview of Gol, which established the Dam Safety Organization in CWC in 1979 and evolved into the National Committee on Dam Safety in 1982 tasked with the responsibility of formulating the guidelines for the development and implementation of Emergency Action Plans in 2005. The NDS has suggested the states regularly undertake pre and post-monsoon inspections of the dams and share reports with the Dam Safety Organisation. The MoWR in 2012 launched the Dam Rehabilitation and Improvement Project to provide technical solutions and regulations, rehabilitation material, training, and capacity building for dam authorities. Other initiatives by CWC such as the National Register of Large Dams to regularly maintain information on large dams and the Dam Health and Rehabilitation Monitoring Application by MoWR are also well known (Mohanty, et. al, 2020).

### Challenges with the existing measures

Though these initiatives have been implemented and planned with the aim of flood prevention

and preparedness, they remain riddled with several gaps and face obstacles in execution. A decade after the FMP implementation, only 297 projects were completed of the 517, even when guidelines clarified that the project period is only for 2-3 years from the time of sanctioning. The state government was unable to provide its share of funds and there were delays in the timely submission of proposals. Also, the states have been unable to follow FMP guidelines such as disbursement of funds to the competent authority within 15 days of receiving the funds leading to several delays in completion. Several such guidelines and rules have been violated since the implementation of FMP. Similarly, the implementations of RMABA have seen interruptions in the completion of preliminary works of the projects. The projects suffered delays due to law and order issues and disagreements between India and the other countries on the issues of water sharing. Further, the delay in investigation, finalization of DPRs, and implementation impacted the time of project completion. The mechanism of finances was not smooth which impacted the protection measures. The suggestion of RBA to the states to assess, identify and update flood-

## Analysis



prone areas every five years has not been done proactively by any states. Several states have claimed the frequency-based flood inundation maps suggested by NWP, in 2012 have not been completed due to the unavailability of funds to obtain the Digital Elevation Model (DEM) from NRSC. There is general neglect seen in states in realizing the importance of non-structural measures for flood protection. The state agencies concentrate on flood control through hard measures (structural) ignoring the efficiency of soft measures. The current flood forecasting systems are challenged by the inadequate number of stations and malfunctioned systems. Only 41 percent of established stations are functional due to incorrect setup issues, equipment malfunction, and theft that has affected the provision of reliable data for accurate forecasts (Mohanty, et. al, 2020).

### Recommendations

Flood preparedness is incomplete without people and community participation in flood protection measures and training for emergency actions. Hence it is vital to adopt non-structural measures such as flood forecasting, land-use planning, flood warning, and flood plain mapping, along with a participative approach for all

stakeholders including people, civil society, and private and government agencies. Following global paradigms of multi-target policies and programs, similar action is also suggested for flood management that aligns with flood risk reduction, water resources management, development, and environment protection (Mohanty, et. al, 2020).

Flood risk management involves land use and environmental planning mechanisms. Traditional land-use planning however often neglects the hazard characteristics of the land. The integration of land use risk-based planning in development can make resilience more sustainable. There is increasing emphasis on the link between local comprehensive

planning and disaster management. Land-use and environmental planning concentrating on wetland areas, water retention areas, and permeable surface design provide a strategy for reducing flood risks. Further integrating drainage systems with land-use planning provide another strategy to create robust flood resilience (YuS 2016). However, flood risk prediction involves several uncertainties. This includes both geological causes and the changing nature of social interactions that make hazard prediction difficult. At the same time, flood risk assessment neglects those most vulnerable to floods, such as landless farmers in rural areas or urban poor in informal settlements that are frequented by floods and storms (Reid, A. 2016). Poor land reform and land ownership issues are the root causes of flood risk vulnerability in India.

Managing flood risk also entails ensuring accessibility of information about flood hazards to the public in an easily understandable manner, which includes creating flood maps, and conveying flood information to the community to enable them to undertake preparedness. The design of existing structures makes them frequently overwhelmed by recurring flood events above their capacity. However, with the increase in instances of extreme and frequently occurring rainfall events





due owing to the changing climatic conditions planning for various low-probability and high-intensity flooding scenarios would need to be adopted. It is important to look at lessons from past disasters rather than just investment in infrastructure development for risk reduction. The residual risk from structural measures can be reduced by adapting binding non-structural measures with the structural measures, as they ensure a higher degree of flood preparedness and prevention of exposure to flood water (Mohanty, et. al, 2020).

The integration of local knowledge in governance can enable people to state their own actions. Consequently, the application of local knowledge in flood management and risk reduction has brought in “agency and voice” in the community. It paves the way to encourage leaders in risk reduction and management bodies along with the opportunity to apply and support their own agenda of disaster governance. They would voice opinions, present original perspectives complementary to exercise and promote governance, and ultimately influence better participation in disaster governance.

This is reflected in the early warning system where communities decide their own procedures for risk communication and preparedness mechanism. The integration also provides local population ownership and identity as the process of governance provides a way for engaging in practice learned from ancestors. Disaster governance is not just based on expertise or scholarship on disaster studies but also engages with the existing capacities of people. Therefore flood risk governance needs a wide-ranging, inclusive, multi-sectoral, multi-disciplinary, and multi-stakeholder approach (Molina, 2016). ■

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# Frequent Floods in the 21st Century India: A Governance Issue

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**The frequency and magnitudes of floods are an increasing trend across the globe due to climate change effects. India is one of the worst flood-affected countries in the world. Floods are no longer a purely natural event. In the 21st century, flood is a governance issue, and for robust flood risk management, good governance needs to be ensured at the national, regional, and local levels.**



Dr. Jayanta Debnath

## Introduction

India is among the top 10 disaster-affected countries in the Global Climate Risk Index 2021 published by Bonn-based environmental think tank, Germanwatch. Over the last five years, the country has suffered from large-scale floods in the states of Uttarakhand, Tamil Nadu, Assam, Bihar, Kerala, Maharashtra, and West Bengal, and cyclones like Phailin, Hudud, and Fani in Odisha, Okchi in Tamil Nadu, Titali in Andhra Pradesh and Odisha, Gaja in Kerala and Tamil Nadu, Bulbul, Fani, Amphan, and Yaas in West Bengal, and successive droughts in the states of Rajasthan, Maharashtra, Karnataka, Andhra Pradesh, and Telangana. Also, various studies say that vulnerable people in developing countries like India suffer the most from extreme weather events like storms, floods, and heatwaves, while the impacts of climate change are visible around the globe.

In the context of floods, in the year of 1980, the Rashtriya Barh Ayog (National Commission on Floods) assessed that the overall area of about 40 million hectares (MHA) in the country is vulnerable to floods. It was revised further to 49.815 MHA by the Working Group on Flood Management set up by the Planning

Commission for the 12th Five-Year Plan, based upon the information furnished by the state governments (CWC, 2020). According to the UNDRR's Annual Report of 2019, India has an average of 17 flood events annually, impacting 345 million people. The frequency and magnitudes of flood events are an increasing trend in India. Globally, due to the climate change crisis, coastal areas will see continued sea-level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion. According to the report, India's vast coastline of 7,517 km, including big port cities: Mumbai, Kolkata, Chennai, Kochi, Surat, and Visakhapatnam, will be at higher risk of frequent flooding. Therefore, it will require more sustained government actions to cope with the future risk of floods.

## Flood Control to Flood Risk Governance - A Paradigm Shift

The government of India set up the Rashtriya Barh Ayog under the Chairmanship of Shri Jaisukhlal Hathi in the year of 1976 to evolve a coordinated, integrated, and scientific approach to flood control problems and to draw out

a national plan fixing priorities for implementation in the future. The Commission submitted its report in the year 1980. In this report, it was said that in the past, the emphasis was on structural methods of protection from floods. But it advocated for the consideration of non-structural measures in flood management (Rashtriya Barh Ayog, 1980). This includes physical, biological, economic, social, and administrative such as soil conservation, afforestation, reservoirs, embankments, drainage channels, dredging, flood plain regulations, flood forecasting and early warning, emergency measures, flood insurance, etc. (ibid.). Thus, for the first time in India, a shift in the conventional thought regarding flood management was observed. But, unfortunately, its recommendations were not followed by most of the states as poor flood risk governance systems continued in the country.

United Nations Office for Disaster Risk Reduction (UNDRR) defines disaster risk governance as “The system of institutions, mechanisms, policy, and legal frameworks and other arrangements to guide, coordinate and oversee disaster risk reduction and related areas of policy”. Here, the concept of governance is critical. It refers to the transparent, inclusive, collective, and efficient governance system to reduce existing disaster risks and avoid creating new ones. Previously, flood management has been looked at from a controlled measure and relief-centric approach. Now, many aspects like investment, preparedness, awareness, education, participation, capacity building, risk transfer, risk assessment, accountability, research, and development have started getting important in flood risk management. Capacity building and strengthening DRR institutions have also started gaining importance. Therefore, the National Policy of India on Disaster Management (2009) emphasized that the capacity of existing institutions needs to be upgraded in accordance with regional and local requirements (NDMA, 2009). This also aims at strengthening the disaster risk governance at all levels for robust management of risk and to make the governance systems more responsive. Hence this policy-level visualization is also in line with The Sendai Frame Work for DRR, Priority 2 (strengthening DRR governance to manage DR), and Priority 3 (investing in DRR for resilience).

### Prepared Enough?

Despite these policy-level visualizations and commitments, India is yet to move beyond rescue and relief to truly prepare for reducing and managing flood risks. we can understand this pily implementation gap by the example

of flood management financing. After the 2018 Kerala flood, a study published by the Ministry of Water Resources ranked Punjab, West Bengal, Bihar, Uttar Pradesh, Andhra Pradesh, Haryana, Kerala, and Assam, Gujarat, and Odisha as 10 most vulnerable states to flood in India. This study was based on the data collected by the central government on areas

### Investing Adequately in Flood Risk Governance

The Fifteenth Finance Commission of India recommended empowering local governments, especially Panchayati Raj Institutions for disaster preparedness and management. It says the lack of disaster preparedness and mitigation planning at the local level,

Table 1: Actual Funds released for Flood Management against the estimated cost (during 2007-17)

State	Flood management cost estimate in Crore (Rs)	Funds actually released	Funds actually released against the demand in percentage (%)
Assam	2383	1059	44
West Bengal	2261	867	38
Bihar	1818	908	50
Himachal Pradesh	1365	475	35
Jammu & Kashmir	971	533	55
Uttar Pradesh	959	415	43
Uttarakhand	836	204	24
Tamil Nadu	636	60	9
Sikkim	366	92	25
Kerala	280	138	49

Source: (Ministry of Water Resources, GoI)

flooded from 1950 to 2016. In this report, two significant aspects were highlighted: preparedness level and fund release. Concerning the former, it was said that flood disasters occur in India, mainly owing to the unpreparedness of the state governments. While looking at the disaster financing aspect, the report found a considerable gap between fund allocation and actual fund release for flood management. It stated that till March 31, 2018, the total approved work for flood management was estimated to cost Rs. 13,238 crores (for both XI and XII plan years). But only Rs. 4873 crores of the total estimated cost was released (The Times of India, 2018).

especially at the Gram Panchayat level, gives rise to considerable problems in the management of disasters. The Commission is also of the view that State Governments should allocate some reasonable amount out of the allocations made for SDRF and SDMF to districts. These financial mechanisms would strengthen a decentralized approach to disaster management (XV Finance Commission, 2020). Similarly, justified and adequate investments in disaster financing and Capacity building of the institutions at central, state, district, and village levels through good governance should be the key to effective flood risk management in India. ■

# From the Floodwaters of Silchar (Assam): Insights for Effective Disaster Response and DRR

Porag Shome is an Assistant Professor at Azim Premji University with 12 years of experience in academics and another 12+ years of experience in Social Change and Impact Management.

**Based on community-sourced insights, this case study collates the impact on people's life following the Barak river flood in June 2022, the relief and humanitarian aid process while (re) emphasising the need for timely and time-bound disaster response and the importance of HRVA-based local DRR plans. The paper also assesses the disaster management strategies and approaches adopted by the community, local citizen associations, NGOs and state agencies to comment on the future DRR strategies essential for Silchar (Assam) and geographies with similar hazard profiles.**



Porag Shome

Globally, it is well recognized that natural and man-made disasters and the associated losses have increased manifolds in the last two decades. The increasing frequency and intensity of disasters have led to tremendous loss of life, property, and ecosystem while undoing and eroding the gains from Development interventions. While there is widespread loss of

life and property after disasters, the long-term impacts (economic loss, psychological and social breakdown) are more damaging for any community.

The international frameworks [See: *Hyogo Framework for Action 2005–2015 and its successor document, the Sendai Framework for Disaster Risk Reduction, adopted in Japan*

*in March 2015, and The Paris Agreement on Climate Change, 2015]* and the National Policy of India on Disaster Management emphasize institutionalizing community-led disaster risk reduction to make all stakeholders disaster resilient and significantly reduce the loss of lives and assets while being prepared for the post-disaster situation. The increased inability to recover from the overlapping disasters reinforces the need for a two-pronged disaster management strategy at the National and local levels. A strategy committed to institutionalizing and mainstreaming DRR into development intervention on the one hand and a robust response mechanism if any disasters happen on the other is urgent.

Based on community-sourced insights, discussions with CSO representatives, and sitreps by State agencies, this paper collates the process and impacts of relief and







humanitarian aid following the Barak river flood in June 2022 while emphasizing the need for timely and time-bound disaster response and the importance of HRVA-based local DRR plans. It also brings out the dynamics of State and non-State actors engaged in the relief operations.

### Background: Silchar Floods (2022)

Due to incessant rains in the upper catchment area, the water level of the Barak river was rising steadily. On June 19, in the late evening, the Betkundi dyke on the river collapsed, resulting in the Silchar's complete inundation and marooning. The sudden surge of water left the people scrambling for dry land and saving themselves. By June 20, Silchar was rendered helpless with no electricity and disrupted communication with no rail, road, or air connectivity. Water in several places was reportedly neck-deep, while the rest were submerged up to waist level.

### Initial Rescue, Response, and Aid

The inundated situation continued to be grave for the next ten days, with water gushing in from the broken dyke on the Barak river. The

situation of people worsened with no access to water, food, medicine, electricity, or communication. The mobile phones and water purifiers became useless because of no electricity supply.

The people of Silchar (themselves) were the first responder to this condition, along with different citizen groups and civil society organizations (CSOs), on June 20, 2022. The CSOs focussed their limited resources on such people who were struggling in the standing water, especially families with elderly and children. A handful of CSOs and citizen groups with access to boats rescued people from inundated situations and transferred critical patients and pregnant women to hospitals. Many people were rescued and moved to higher grounds, local hotels, or administrative buildings.

The roads, railways, and air connectivity were severely impacted, and little could have been done to operationalize those in the standing water. The Silchar airport was operational and provided an opportunity to ensure a speedy inflow of supplies and evacuation of the most vulnerable or who required tertiary level medical care. The challenge was to reach the airport. Many who traveled during these days mentioned that they had

to wade through standing water for more than 2-3 km to reach the nearest taxi point or bus point (*Sadarghat was where people could get a taxi or ASTC bus to the airport*). Wading through flowing water along with the elderly and children, and luggage became challenging and risky for all who had the scope of leaving the city.

Eight NDRF teams consisting of 207 personnel and an army unit of 120 personnel were deployed from June 21 for immediate rescue operations and aid distribution. The Assam government had also requisitioned the IAF to airlift petrol, diesel, and geo-bags to Silchar to address the flood situation. Dry foods, water, and other essentials were air-dropped by IAF in several places of the city, bringing required respite to the people without food and water for 3-4 days. The State's humanitarian response was in tandem with the initial response by the citizen group and civil societies. Mr. Nabarun Purakayastha, President of Bangalore Sreehatta Samellani (BSS), says, "*we are from Silchar but residing in Bengaluru currently. BSS bought a small boat with the help of partnering NGOs of Silchar on the first day of the flood. We used the boat to rescue people who were entirely in water. We were able to rescue many elderlies, ailing*

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and pregnant women, and helped them to reach safe places and hospitals.”

The reports from local volunteers and people revealed that many families did not have access to food and potable water for 3-4 days and had no means to boil or purify the water for drinking. Many resorted to collecting rainwater for drinking. The condition of the children was very deplorable, with no food, water and medicines. Over time, these civil societies (such as BSS, Team Milaap, Rising Youth Society, Khalsa Aid, Marwari Yuva Manch, Hemkunt Foundation, Eco Alarmist, Jubashakti, and Robinhood Army, to name a few) provided dry food, potable water, medicines, and sanitary napkins. Most of these CSOs were present on the ground ZERO from day one. Due to closed markets, flooded godowns, and strong water currents flowing through the city, it was challenging to access relief materials and distribute them to every corner of the town.

### Water, Sanitation, and Hygiene

It is a well-established fact that public health is seriously disrupted in disasters and more so in floods due to lack of clean water, absence of sanitation and the filth left by

the receding water. Silchar now faces the enormous challenge of clearing the debris, mud, silt, and dead bodies as the stagnant water recede. Several families discharged dead bodies in the flood water with severe inundation and no access to the cremation ground and dry woods. The contamination of water bodies has made water quality questionable and increased the risk of water-borne diseases in the city and nearby areas. The State pressed 13 water pumps into service to clear the water-logged areas. Another challenge as the water started receding was restoring the water supply and ensuring proper sanitation in public places. Most water sources were contaminated with debris, and toilets were rendered useless due to standing water and later silt



deposition. All the relief agencies provided packaged drinking water to the people. However, provisions for temporary toilets were not reported by any respondents. The administration provided drinking water through tankers in localities adjacent to main roads (after the third and fourth day of the flood). While the administration was able to distribute water on main roads through tankers, the volunteers from different NGOs reached the interior areas from day one of the floods.

### Food, Nutrition, and Health

Access to food and potable water was severely disrupted during the flood and further accentuated due to closed roads, railways, and a marooned airport. Food storage units were also inundated, and the stored grains were damaged. The only source of food and water was the supplies made by the administration, CSOs, and the Indian Army in the initial days. As the water recedes, there is a high risk of food shortage and malnutrition, especially amongst the poorer section of society. With most of the vegetables and crops destroyed, tillable lands covered with flood residues, sludges, and loss of other livelihood means, access to food and proper nutrition will be a big challenge in the near future.

Along with possible food insecurity,

there is a high risk of water-borne diseases and other ailments, while the danger of widespread Covid-19 infections looms large. The human and animal dead bodies washed away in the flood water might contaminate the water bodies and underground water. Another immediate challenge (in the first 4-5 days) was access to prescribed medicines, as most of the pharmacies were closed. Those functional could only partially meet the demands as the leading distributors' storehouses were inaccessible. Many could not reach these medical shops because of standing water. The Silchar Medical College and Silchar Civil Hospital were functional but on less staff. The service providers, in many cases, could not reach their duty location. Several CSOs used boats and braved standing water to distribute medicines in the initial days and later organized medical camps in the most underserved localities. There was an urgent need to prevent disease spread due to widespread debris, contaminated water, rotting plants, animals, and human bodies.

Dr. Sanhita Nath (one of the doctors who volunteered for the several medical camps organized by BSS) says, "we are providing both curative and preventive medicines on a case-by-case basis. Most people complain of gastric issues, skin irritation, fever, cold, and loss of appetite. Fever and scabies are



*common among children*". The women across the age groups specifically faced severe challenges in maintaining personal hygiene. Several women said they could not relieve themselves due to limited or no access to private or covered toilets. This has furthered health issues among many. Dr. Sulagna Roy adds, "It was tough for the pregnant women considering the special care required at this time. Many women reported UTI, tingling sensations, weakness, loss of appetite, and menstrual problems. Many reported upset menstrual cycle of the extreme mental stress." Besides addressing the physical ailments, it would be pertinent to address the increased risk of mental stress and post-traumatic disorders, especially amongst the vulnerable sections of the city. Identifying post-traumatic disorder

symptoms and indicators would be a daunting task that requires immediate attention. Along with medical camps, awareness camps for understanding and identifying trauma and mental stress would be an immediate health need.

### Livelihood and Economy

The discussion with the flood-affected families reveals that there is widespread loss of productive assets, employment, and income sources, and widespread loss of resources to restart livelihoods. Agriculture, one of the prominent livelihoods of the area, is badly affected. The entire investment in land preparation was lost, and the farmers were unsure of sowing crops after the water receded. Many lost their entire vegetable crop (such as ridge gourd, lady's finger, chilly, etc.), which was ready to harvest.

Mr. Amit Das (a volunteer with local CSO and general secretary of Hari Naam Kirtan Committee, Phulertal) informed that as the water started entering Silchar city, people on the outskirts started evacuating their animals to higher grounds or left them on national highways. However, many animals died from hunger as they were stranded on higher grounds and roads for a long time. A poultry farmer said, "as we came to know water level in Barak is reaching the danger



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level, we started selling our birds at substantially low rates. We will not be able to recover the input cost." Farmers practicing pisciculture reported that all the fishes have moved out of the ponds along with the flood water. Mr. Amit adds, "it will be tough for people into pisciculture and poultry to bounce back and restart their livelihoods."

It is pretty early to provide an estimate of the total loss and the impact on the economy as well as the life of the people; however not hard to predict that the economy of the area would be severely affected due to the flood and bouncing back to normalcy would take humungous effort from the State and time. In the coming days, the failed crops and uncertainty will push people into poverty and add to the food crisis discussed earlier.

Mr. Tapan Das (AVP, IMF Growth Initiative, Max Life, Bangalore) adds, "The people should learn from such disaster. They must take insurance (life, assets, health, crops, and general categories) to protect their livelihood resources, life, and houses. Such financial vehicles help people to tide over such crises with less difficulty." A comment which reemphasizes the importance of crop and other insurances for people living in high disaster risk zones and highlights the role of the State in ensuring the social

security of the citizens, especially those who are particularly poor and vulnerable.

### Way Forward

The author's close association with different CSOs in Silchar and the interactions with the community have offered several vital lessons on the potential DRR strategies essential for Silchar (Assam) and geographies with similar hazard profiles.

Although it is challenging to anticipate floods of this nature and scale, it is not entirely impossible considering the history of the region's disaster. The Assam State Disaster Management Authority (ASDMA) has access to advanced technology (FRIMS and flood inundation mapping by NRSC) for a real-time flood reporting system. Such advanced technology could be instrumental in developing disaster preparedness plans and reducing the impact on the historically poor and marginalized people's lives, livelihoods, health, education, and financial assets. Such advanced technology can provide strategic information to local government agencies for appropriate action.

Immediate and quick response during any disaster is critical for effective disaster management, and an empowered community can considerably reduce the response

time. This is a critical lesson for the local civil administration and the health system to have a community-led response plan in readiness along with institutionalized community-based risk reduction mechanisms. Timely response from NDRF, Army, CSOs, and citizens also (re) emphasizes the criticality of the inter-agency cooperations for search, rescue, and extending humanitarian aid. Such inter-agency coordinated effort should result in a local "Rapid Disaster Response Team" comprising of professionals (healthcare, firefighters, and rescue), civil administration and police, representatives of the local community, panchayat/corporation, and CSOs. Nevertheless, such actions must agree with the guidelines and protocols on disaster preparedness, disaster response, and DRR issued by the NDMA of India.

The Silchar flood experience also calls for conducting Hazard Risk and Vulnerability Analysis (HRVA) systematically and frequently. It is pertinent to identify and analyze the region's hazards and risk data, differential exposure, community's coping mechanisms and resilience, and vulnerability at the granular level to work toward dynamic disaster risk reduction strategies for the region and the State. Moreover, it must be considered a part of the region's regular

development initiatives. Along with conducting HRVA, educating the community on risk reduction and an early response would be equally essential. The experience of the 2022 flood reestablished the fact that the community if empowered adequately, can be the first agency to respond to any disaster. They can respond immediately in the initial critical period and, if adequately capacitated, will not require any external aid immediately. The empowerment and education process can start at various levels and reemphasize the need for DRR education at the school level. The State Education Department with ASDMA can plan for the appropriate inclusion of DRR at the school level or special drive at the school level to raise awareness of flood preparedness and response. In the long run, such efforts will eventually lead to an empowered set of citizens ready for effective and immediate flood response.

The third critical aspect would be built in appropriate preparedness plans and capacities within the health system at the district level. Availability of emergency medical support within a few hours or days (*as may be the case*) is crucial for the people. While the system ought to be prepared for immediate first aid and medical care, it should also be prepared for communicable and water-borne diseases, a common phenomenon after the water recedes. Continuous capacity building for the health professionals and community members on aspects such as rescuing, administration protocols during emergencies, mass casualty management, appropriate communication, and medical care during disasters are essential and non-negotiable. Finally, the State and non-State agencies providing medical services should also look into the immediate and long-term psychological impacts. The agencies should be well-prepared to provide such services as a policy in geographies prone to annual



disasters.

The fourth critical consideration is to strengthen disaster risk governance. The NDMA and SDMA are committed to strengthening disaster risk governance in every part of the country (see *Disaster Management Act of 2005 and the National Policy on Disaster Management, 2009*). Connected to this is the investment and political will required to enhance the resilience of communities and promote effective DRR. Such investments should not only focus on infrastructural resilience but also on strengthening community-level reliance through appropriate training and developing adequate social capital. The practice of preparing 'district-level preparedness assessment scorecards' by ASDMA should be institutionalized and regularly reviewed to identify critical gaps and strengthen the flood preparedness of all stakeholders.

The next critical lesson from the Silchar flood is understanding human behavior. The panicky and lawless behavior of the affected population, which is widely discussed academically, was observed in Silchar. Several cases were reported where relief materials were snatched away, or boats carrying relief materials were diverted. Several localities reported attempted burglary cases. Though

such experiences were few, yet highlight crucial considerations for disaster preparedness.

On the other hand, the Silchar flood also brings forth the overwhelming prosocial and altruistic behavior of citizen groups and CSOs aimed at promoting the welfare and protection of fellow citizens. Such experiences again highlight the importance of investment in bolstering social capital, reciprocity, and resilience within the community. The presence of formal and informal networks at the disaster site results in an instant trigger of the support mechanisms and thus calls for an investment in a more organized formal citizen's disaster management group at a granular level, structured disaster risk education and training, and appropriate decision-making capacity vested at the local level.

Finally, academic research and practitioners' experiences have continuously revealed that the impact of any disaster on individuals, households and societies is multidimensional. And any attempt to reduce the impacts would include conscious interventions towards understanding vulnerabilities, reducing risk, enhancing resilience, and strengthening community preparedness, while mainstreaming disaster risk reduction (DRR) measures into development thinking and planning. ■

# Is Flash Flood an Ignored Hydrometeorological Disaster?

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**The paper has attempted to respond to a popular belief that flash floods in Indian hinterlands are normally inconsequential, and they are recognized only when the event occurs.**

## Flash flood events in India

Flash floods preceded by heavy rains were observed in Ahmedabad city and six other districts in Gujarat, on July 11 and 12, 2022. Just two days prior, a cloudburst accompanied by heavy rains had resulted in a flash flood near the holy Amarnath shrine in Anantnag district in Jammu and Kashmir. Marangching village in Noney district in Manipur received heavy rains that caused landslides and flash floods in the first week of July, 2022. Likewise, flash floods were encountered by people of Assam in Darrang, Cachar, Nagaon, Kamrup, Dima Hasao, Dhemaji, Hojai, Karbi Anglong West and Guwahati districts. Furthermore, in mid-June this year, East Khasi Hills, and Ri-Bhoi districts in Meghalaya had comparable experiences.

The region specifically between Northern India and south of the Hindu Kush Himalayan (HKH) region, is one of the well-established flash flood prone topographies of India. (Refer Map 1)

This region has most instances of heavy rain followed by flash floods, especially in the monsoon season. The Leh flash floods in 2010,

Kedarnath flash flood in 2013 was a result of cloudbursts, the very recent floods in Kullu district of Himachal Pradesh, Ganderbal district in Jammu and Kashmir, and the Chamoli district flash floods in Uttarakhand in 2021 were all triggered by heavy rains.

The western part of the country along with the western coast have frequently witnessed flash flood occurrences. Gujarat was recently in news because of the flash flood events. However, this is not the first time that the state experienced this disaster event. Many might recall that similar occurrences had devastated Gujarat in 2001, 2005, 2015, and 2021. The districts of Ahmedabad, Surat, Banaskantha, Patan, Kachchh, Junagarh, Saurashtra, Rajkot, and Jamnagar were affected. In 2006 and 2010, Rajasthan's Barmer and Jaisalmer districts had experienced flash floods respectively.

The peninsular region of the country has also witnessed innumerable flash floods in the recent past. The most recent ones being in Kottayam and Idukki districts of Kerala in October 2021, along with flash floods of 2018 in Kochi, 2019 flash floods in Wayanad, Malappuram, Nilambur, and Idukki followed by



Eklavya Prasad



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2020 in which Wayanad, Idukki, Pathanamthitta, Palakkad and Kozhikode districts were affected. The Virudhnagar flash floods in Tamil Nadu took place in 2021. Andhra Pradesh and Telangana have also experienced flash floods due to heavy rain and storm surge in the recent past.



Map 1 - The Hindu Kush Himalayan region and 10 major river basins

Central India too has been frequently encountering flash floods events. In 2013, three districts of Uttar Pradesh - Saharanpur, Bijnor, and Lakhimpur Kheri were impacted due to flash floods. Similarly in June 2015, due to cloudburst in Nepal, districts of Bahraich and Lakhimpur Khiri were impacted. The districts of Burhanpur, Harda, Balaghat and Betul in Madhya Pradesh were severely affected by flash floods in July 2014. A similar event took place in August 2021, across Madhya Pradesh in Shivpuri, Sheopur, Datia, Gwalior, Guna, Bhind and Morena districts. Because of the incessant rains over three days in September 2021, three districts, Dhamtari, Gariaband and Jagdalpur literally got disconnected from the capital city of Chhattisgarh and resulted in flash floods.

The north-eastern states, have already witnessed many instances of flash floods this year. High intensity rains triggered flash floods in the states of Assam, Arunachal Pradesh, Meghalaya, and Manipur in the month of May. The second cycle of intense rainfall in June, 2022 caused flash floods in Assam, Meghalaya, and Arunachal Pradesh.

The enumeration of flash flood events in the country indicates its expanse and severity. However, it is observed that flash floods, despite being a common recurring phenomenon in the country, do not get mentioned as a distinctive entity. Instead, it often gets either clubbed, referred, or confused with riverine floods, and ends up getting mentioned merely as floods. With the increase in the incidence of flash floods, it is critical to espouse the use of the relevant terminology while articulating or writing about them to make them visible. Visibility is an important channel for establishing consciousness. Therefore, this paper on several occasions, will be referring to flash floods of North Bihar with the central objective of making the least acknowledged recurring disaster of the state known, and deliberated.

Bihar is prone to flash floods, especially the districts along the India-Nepal border – Pashchim (West) Champaran, Purbi (East) Champaran, Sitamarhi, Madhubani, Supaul, Araria and Kishanganj. The floods in 2017 affected a total of 9.56 million people in the above seven districts. Similarly in 2019, floods triggered

by intense rainfall affected a total 14.9 million people in 27 out of 38 districts of Bihar. Approximately 42 percent of the total affected population in 2019 were from the seven districts. Lack of focused strategies towards riverine and flash floods, has led to total absence of segregated data for these two different typologies of floods in the state. Lack of visibility, absence of related data and apathy towards flash floods in Bihar makes comprehension and substantiation of the disaster extremely difficult too. On the other hand, the field-based observations clearly authenticate the occurrences and impacts of flash floods in these districts of Bihar. Therefore, this paper intends to provoke thoughts by citing examples from Bihar to deliberate on the importance of acknowledgment, recording and reportage of flash floods as a regular phenomenon but with separate and distinct entity.

### Raising questions

The main reason for the unfolding of fear with each burst of high intensity rainfall is the obvious calamitous facet of flash floods. Globally flash floods are recognized as one of the worst kinds of disaster, largely because of their unanticipated character, rarity, small scale, peak discharge, fast and violent movement. They are known for their catastrophic impact on human lives, livelihoods (on farm and off farm), basic services (drinking water, sanitation, medical, health and education facilities), and habitations. The expanse of damages further include movable and immovable properties (public and private), infrastructural facilities (public and private), communication and diverse ecological systems. The element of uncertainty surrounding

flash floods has the most impacting consequences on people who are in the vulnerable region.

In the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2013), there is an emphasis on the linkage between climate change and intensification of heavy precipitation events, with regard to frequency and severity. The report has clearly articulated that the hydrological cycle will have a far-reaching impact due to the changing climate leading to heavier precipitation, and more severe (flash) flood events.

The elaboration of the chronicle of the country's flash flood events earlier in the paper is proof enough of the increasing incidences over the years. Despite the technological advances and significant improvement of the knowledge base in this field, we always end up being an unwitting accomplice. And eventually the population that is affected by flash floods ends up wanting and waiting. Numerous documents, research papers, field-based narratives have iterated that flash floods are difficult to predict, thus it not only surprises people but leaves them with extremely limited time to respond and arrange for protection measures for their safety and survival.

In view of the above arguments, there are questions that continue to emerge time and again regarding flash flood and its management. Why flash floods do not get due attention, and priority? Are flash floods actually acknowledged as a distinct typology of floods? Are the preparedness and response approaches and strategies different for flash floods? Have flash floods been typologized in the country as per the location of its occurrences and the triggering factors? Has there been a vulnerability

mapping of flash floods keeping the streams, small and seasonal rivers, tributaries, and main rivers in focus? What measures are being adopted to generate consciousness and recognition about flash floods amidst state functionaries, research, educational and governance institutions, civil society etc.?

By attending to diverse features of flash floods, this paper will attempt to establish a comprehensive understanding on the hydrometeorological disaster.

### What is a flash flood and why is it a hydrometeorological disaster?

The increased flow in streams, short and seasonal rivers, tributaries and the main river stem within few hours after the initiation of high intensity rainfall is largely the genesis of flash floods. Globally they are accepted as a short-term event, occurring within six hours of other causative events such as dam break, levee failure, rapid, snowmelt and ice jams. In addition, slow moving or multiple thunderstorms occurring over the same area has high probability of causing flash floods.

It is important to recognize and accept flash floods distinct from other typologies of floods such as

- Waterlogged region (adjacent to the embankment)
- Riverine floods (between the embankments of the same river system)
- Riverine floods and river erosion (adjacent to the embankments – riverside)
- Riverine floods and river erosion (adjacent to the river – no embankment)

- Riverine floods (post the breach of the embankment – countryside)
- Floods, inundation and waterlogging (Between the embankments of two river systems)

Along with a generic understanding of flash floods, it is critical to apprehend the reasons why flash floods are considered as a hydrometeorological disaster. All hydrometeorological hazards are either of atmospheric, hydrological or oceanographic origin. And in terms of flash floods, the intermix of diverse hydrological and meteorological circumstances and their varying intensities often result in the catastrophe. For example, regions located in undulating terrain and at the foothills or in close vicinity to mountains and hills often experience flash floods triggered by relatively less intensity rainfall, as compared to areas in the plains. More often than not, flash floods occur within a small catchment with a truncated response time. These determining factors qualify flash floods as a hydrometeorological disaster.

The different flash flood events mentioned earlier in the paper are examples of diverse hydrometeorological circumstances that trigger them. Of all, the most common factor responsible for the flash floods is the varying intensity of rainfall. Often newspaper articles or thematic papers while reporting or describing flash flood occurrences clearly mention cloudbursts, rainstorms or incessant rains as the causal factors. Hence, it is extremely critical to elaborate on varying characteristics of rains that cause flash floods.

- **Cloudbursts** – In a generic parlance, a cloudbursts refers to



an extreme amount of rain that occurs in a short span of time, and at times accompanied by hail and thunder. According to the India Meteorological Department (IMD), any unexpected precipitation exceeding 100 millimetres (mm) per hour over a geographical region of approximately 20 to 30 square km (km<sup>2</sup>) can be categorized as cloudburst. As per IMD, predicting cloud bursts is extremely difficult due to its small scale in space and time. Mountainous regions and its surrounding terai, valley and plain areas are more prone to incidences of cloudbursts due to orography as compared to the plains. It is extremely important to note that heavy rain in a short period are the main constituents of cloudbursts but all heavy rain in a short period are not cloudbursts if they do not adhere to IMD's criterion.

- **Rainstorms** – Rainfall triggered flash floods are mostly produced by rainstorms. According to IMD, rainstorms are characterised by either substantial, extreme or heavy rainfall over a particular area for a particular period. It is always in association with various weather systems of different spatial scales (monsoon, thunderstorms, cyclonic storms etc.). A rainstorm of any considerable duration typically consists of spurts of high-intensity rain punctuated by variable periods of low-intensity rain.

- **Thunderstorms** – Weather phenomena like thunderstorms are short lived but extremely disastrous. They are either accompanied with rain or hails. Thunderstorms over the Indian region occur throughout the year with large spatial and temporal as well as diurnal, seasonal and annual variability during different seasons. Its frequency varies from region to region. Thunderstorm activities during monsoon, post-

monsoon and winter seasons are mainly governed by the large-scale synoptic weather systems with some alterations caused by local topographical effects. However, the highest frequency and the most severe thunderstorm events occur in general during the pre-monsoon season (March to May) throughout the length and breadth of the country. Flash flood is normally a result of repeated thunderstorms over the same area, and this event is termed as 'training' thunderstorms.

Many times flash floods get triggered only because of heavy rainfall. This happens because of orographic precipitation, as moist air is forced upward over mountains by the wind flow. Whenever the air forced upward is excessively moist, it often results in heavy rainfall. The undulating terrain contributes towards rapid runoff.

However, it is important to enquire whether flash floods are triggered only due to hydrometeorological factors? No doubt that cloudbursts, rainstorms and thunderstorms are the established causes. However, the flash floods of 2013 in Kedarnath valley, Kerala's Kochi district in 2018 and the most recent occurrence in June 2022 in northern Assam's Darrang district along with many others do suggest that flash floods get amplified and triggered due to human induced interventions as well. In June 2022, Assam experienced breaches in 297 embankments in 20 districts, of which 33 were in Darrang district alone. In February 2021, avalanche burst open the Rishiganga Hydroelectric Project dam in Tapovan (Chamoli) destroying it completely, which resulted in a deluge throughout the valley in Uttarakhand.

All the above examples suggest

that it is precarious to limit the discussions regarding the causes of flash floods to only the hydrometeorological factors and excluding the others. For a better understanding of flash flood events it should be mandatory to adopt an approach that will assist in assessing the events and to arrive at accurate reasons behind the occurrences. Alongside, it is equally important to sight, record and highlight flash flood events which often are either ignored or masked. The example of flash floods in North Bihar is a case in point. Hence, the paper focusses on the recurring, ignored and masked flash floods of North Bihar.

## Flash floods of North Bihar - Lesser Known Disaster

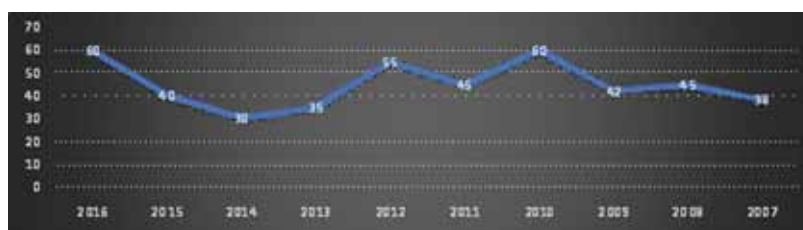
Flash floods are the predominant disaster associated with the small and seasonal transboundary rivers in North Bihar. As they are solely rainfed, hence flash flood occurs whenever there is a long spell of rainfall in the catchment irrespective of monsoon season. Given the multi-layered dependencies and proximity of these rivers with the densely populated riparian population, hazards like flash flood and its spill off have multidimensional risks.

Research by Megh Pyne Abhiyan (MPA) on small and seasonal transboundary rivers systems in Bihar, brought forth unknown facts regarding the small and seasonal transboundary rivers flowing from Nepal into Bihar. The small and seasonal transboundary river and streams across the India (Bihar) - Nepal border traverse downstream by draining the rainwater either from the Chure, i.e. Shivalik range, or from the terai region in Nepal. These rain-fed rivers and

**Table 1 – Months when flash floods normally occur**

Years	January	February	March	April	May	June	July	August	September	October	November	December
2016	-	-	-	✓	-	✓	✓	✓	✓	-	-	-
2015	-	-	-	-	✓	✓	✓	✓	✓	-	-	-
2014	-	-	-	-	✓	✓	✓	✓	✓	-	-	-
2013	-	-	-	-	✓	✓	✓	✓	✓	-	-	-
2012	✓	-	-	-	✓	✓	✓	✓	✓	-	-	-
2011	-	-	✓	-	✓	✓	✓	✓	✓	✓	-	-
2010	-	-	✓	-	✓	✓	✓	✓	✓	-	-	-
2009	-	-	-	✓	-	✓	✓	✓	✓	-	-	-
2008	✓	-	-	-	-	✓	✓	✓	✓	-	-	-
2007	-	✓	-	-	-	✓	✓	✓	✓	-	-	-

streams are ephemeral in nature with highly variable flow, and they flow as long as rainfall lasts. The rivers flow into Pashchim (W) Champaran, Purbi (E) Chamapran, Sitamarhi, Madhubani, Supaul, Araria and Kishanganj, from the adjoining districts Parsa, Chitwan, Bara, Mahottari, Sariahi, Rautahat, Dhanusa, Siraha, Saptari, Sunsari, Morang and Jhapa in Nepal. The research identified 148 small and seasonal transboundary rivers, with stark variations, local reputation, and well-defined individuality. Many of the rivers remain little known hence unexplored. MPA's broad understanding of these small, seasonal and transboundary rivers is based on a collaborative research study in 2016 on Post Disaster Recovery - Assessment of Needs in Moderate Flood Conditions, that MPA had undertaken in Gawnaha block of Pashchim (W) Champaran district for the National Institute of Rural Development and Panchayati Raj (NIRDPR), Hyderabad. The period of the study covered in the research was from 2007 to 2016. Six villages - Harkatwa village (Rupwaliya panchayat), Pashchimi



Graph 1 – Frequency of floods in Harkatwa

Tola Rupwaliya (Rupwaliya panchayat), Harpur (Gaunaha panchayat), Naya Tola Manguraha (Gaunaha panchayat) and Poorvi Tola Rupwaliya (Rupwaliya panchayat), were part of the study. The example of Harkatwa village is being used to picture the impact of the recurring flash floods.

River Chegraha in Harkatwa village brings flash floods after it rains heavily for 1-2 hours in the upper catchment of the river. The flash flood trends between 2007 – 2016 suggest that the probability of floods in a year was from January to October. It is only in the months of November and December that flash floods have not occurred in Harkatwa village. The maximum probability of floods is from May till September. (Refer Table 1)

In past 10 years (2007-2016), the frequency of floods in Harkatwa village has been from 30 to 60 times in a year. Between 2007 and 2016, maximum number of flash floods in Harkatwa was 60 in 2016 and minimum was 30 in 2014. (Refer Graph 1)

During normal period, the width of River Chegraha is approximately 60 meters (m), during monsoon it increases to 500 m and during extreme weather conditions, the width of the river expands up to 700 m. The flash floods impact in the following manner

- Destruction of standing kharif crop (Paddy) – In Harkatwa village, on an annual basis approximately 50 acres of standing paddy crop gets destroyed because of flash

floods. The total produce projected in 50 acres is 600 quintal

- Destruction of standing sugarcane crop – Huge quantity of sugarcane is destroyed during the flash floods in the village. During the catastrophic floods of 2010, approximately 2000 quintal of standing sugarcane crop was destroyed
- Indebtedness – In one year (in 2016) almost 140 households out of total 344 households in the village took loans with an average amount of Rs 3000, because of the recurring flash floods
- Loss of compost manure – During flash floods, 30 – 35 tractors worth of compost manure gets destroyed
- Siltation – The flash floods on an average impacts 50 acres of agricultural land in the village which produces 360 quintal of paddy and 3000 quintals of sugarcane
- Destruction of farm bunds – Flash floods destroys the farm bunds, reducing the productivity by approximately 25 percent
- Land erosion during floods – The transformed landscape from flat to undulating because of flash floods, impacts the drainage and the irrigation potential for the standing crop. This too reduces the yield. In Harkatwa, annually, 15-20 acre of land gets affected due to flash floods. In which paddy is grown in 15 acre and sugarcane in 5 acre of land
- Restricted safe zones for open defecation – Between 2007-2016, during flash floods people had to invest an extra hour to access safe zones for open defecation. Accessing

sanitation services was extremely difficult for women and adolescent girls

Flash floods induced by River Harkatwa is indicative of the nature of destruction one small and seasonal transboundary river can cause on one habitation. Extrapolating the destruction caused by one river to the 148 small, seasonal and trans-boundary rivers flowing across the India(Bihar)-Nepal border is simply beyond imagination. These small and seasonal transboundary rivers similar to the large ones in the region also have considerable

which parts of the district was affected by riverine floods, and which were devastated by flash floods. The frequency and duration of flash floods in River Harkatwa between 2007 and 2016 suggests the urgency and importance of segregation of typologies of floods in districts along the India-Nepal border to understand the reasons behind the flooding.

The study by MPA showed that flash flood had multiple impacts on the lives and livelihoods, and on several occasions in one calendar year. (Refer table 1)

Destruction of the standing crops	Increase in indebtedness	Loss of compost manure	Loss of household items
Transformation of landscape	Land erosion	Destruction of houses	Psychological stress
Destruction of farm bunds	Destruction of grain storage facility	Inaccessible safe and hygienic sanitation facilities	Increase in migration
Siltation	Loss of agricultural tools	Loss of non-farm livelihoods	Multiple burden on women

Table 2 - Multiple impacts of flash floods

local relevance, influence and impact on the communities.

According to the Disaster Management Department, Government of Bihar flood reports, between 2000 and 2020 cumulatively 393 districts were affected. These districts also included ones from South Bihar. Approximately 28 per cent of 393 districts i.e., seven districts were along the India-Nepal border. In last two decades, the annual tryst with floods along the India-Nepal border districts has continued, though the number of districts vary on an annual basis. Years like 2002, 2004, 2017, 2019, all the seven districts were declared flood affected. Despite being declared as flood affected, it remains unclear

Even though flash floods triggered by small, seasonal, and transboundary streams and rivers have multiple and consistent impacts, the focus of the administrators and political leaders remains on big-river-centric floods. Strategically, disregarding or masking of flash floods necessitates a change. There is a need to transmute the present system, through constant reminders and consistent iteration promoting legitimate space that flash floods by small, seasonal, and transboundary rivers in Bihar thoroughly deserve. Ironically, flash floods along with the small and seasonal rivers and streams remain inconsequential, unrecognised, and unreported despite impacting lives.

## Takeaways

Flash floods are now becoming an increasingly common sight and it would only continue in the future owing to climate change and erratic patterns of rainfall. There are few occurrences that make the headlines but many hinterlands affected by small and seasonal rivers still go unreported. While proceeding towards the end of the paper one must question to oneself as to how many Chegraha's, Pandai's and Amhawa's does one know? To answer this question, the present approach towards flash floods necessitates a change, if the desired outcomes are to be realized. This change can be possible only if a comprehensive strategy is developed keeping the following areas of intervention in mind.

Flash flood forecasting is an extremely challenging task because of their short time scales and occurrence on small spatial scales. To overcome this challenge, the IMD commissioned the South Asia Flash Flood Guidance Services (FFGS) on October 22, 2020. IMD acts as the regional centre covering Bhutan, Bangladesh, India, Nepal and Sri Lanka, providing forecast products, data and training. IMD tested the performance of the system during the monsoon of 2020 in the preoperational mode, during which flash flood bulletins were issued to National Hydrological and Meteorological Services (NHMS) in the region for its validation. The FFGS is a robust system designed to provide the necessary products in real-time to support the development of warnings for flash floods about 6-12 hours in advance at the watershed level. The priority in future should be towards ensuring decentralized dissemination of

the real-time warnings, so that the communities in the vulnerable locations are able to access it without having to depend on multi-layered bureaucratic and administrative processes.

Postulating ways for addressing the following concerns relating to flash floods should be of precedence

- Due attention, and priority
- Acknowledgment as a distinct typology of floods
- Different preparedness and response approaches and strategies
- Typologized as per the location, occurrences and triggering factors
- Vulnerability mapping in view of the streams, small and seasonal rivers, tributaries, and main rivers
- Consciousness and recognition amidst multi-stakeholders

The above highlights aids to apprehend plausible strategies for prioritizing and addressing flash floods in India, and they are

- Formulating state-level policy
- Drafting a state-level standard of practice to ensure that sub-regional and local diversities (rainfall, terrain, hydrology, people, human intervention etc) are recognized while charting the ways forward
- Developing a robust, responsive and contextual methodology for vulnerability and impact assessment to officially register the consequences
- Establishing institutional mechanism at the panchayat, district, state and national level for attending to flash floods (preparedness, planning, response, recovery, relief and rehabilitation)

- Institutionalizing social, cultural and localized knowledge and practices for developing local warning systems and to build collective resilience
- Creating a platform for facilitating interaction between disaster-related institutions (grassroots, district, state and national) to prioritize and strategize the inclusion of flash floods in the disaster discourse

The above suggested strategies will assist in elevating the current understanding of flash floods amongst multi-stakeholders, with the objective of a transformation. ■

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## भागलपुर में १९६१ में बाढ़ नहीं, प्रलय का दृश्य था

डॉ. दिनेश कुमार मिश्र,

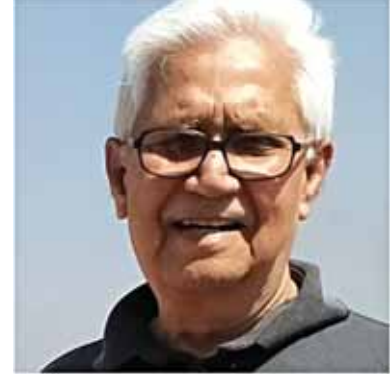
श्री दिनेश कुमार मिश्र ने आई.आई.टी खड़गपुर से सिविल इंजीनियरिंग (1968) तथा एम. टेक (1970) की डिग्री प्राप्त की. दक्षिण गुजरात यूनिवर्सिटी से पीएचडी के आलावा वे निरंतर 3 वर्ष अशोक फेलो भी रहे हैं. नदी कार्यकर्ता के रूप में विख्यात मिश्र जी अपने प्रभावी लेखन कार्य, रोचक व्याख्यानों व जन जागरण के माध्यम से सारिता संरक्षण को प्रमुखता दे रहे हैं. उन्होंने बिहार की लगभग सभी प्रमुख नदियों पर गहन शोध किया है, जिसके आधार पर तटीय जीवन से जुड़े तमाम पहलुओं को उन्होंने दृष्टिगोचर किया..

हथिया की बाढ़ ने बिहार को तबाह किया

30 सितम्बर, 1961 से बिहार में प्रायः हर जगह जो मूसलाधार बारिश शुरू हुई वह रुकने का नाम ही नहीं ले रही थी। 30 सितम्बर से 2 अक्टूबर के बीच राज्य में भारी वर्षा के कारण गंगा के दक्षिण पहाड़ी नदियों में बाढ़ आ गयी और पूर्वोत्तर रेलवे की मेन लाइन तथा ग्रेंड कार्ड होकर गाड़ियों का चलना ठप हो गया। इसके परिणामस्वरूप पटना, मोकामा, जमुई, गया तथा अन्य महत्वपूर्ण जगहों पर हजारों यात्री असहाय होकर रुके हुए पड़े थे।

अकेले पटना जंक्शन में करीब चार हजार यात्री फँसे पड़े थे। 3 अक्टूबर को पटना जंक्शन पर दिन में ग्यारह बजे से लेकर एक बजे तक के बीच में कोई भी रेलगाड़ी नहीं आ पायी थी क्योंकि उनका आना-जाना बाधित हो गया था। ग्रेंड कार्ड रेलखंड पर गया के बाद भूस्खलन के कारण रेलगाड़ियों का आना जाना बन्द था।

पटना से खगड़िया, दरभंगा, गौहाटी, कटिहार, लखनऊ, गोरखपुर, दिल्ली, वाराणसी, रांची, बेगूसराय, बिहार शरीफ, छपरा, झरिया, भागलपुर, मोकामा, मुजफ्फरपुर, मोतिहारी, आरा और हाजीपुर के बीच 2 अक्टूबर से ही टेलीफोन सेवा बन्द



दिनेश कुमार मिश्र

थी। इसके अलावा उत्तर बंगाल, असम और वाराणसी के बीच की लाइन भी खराब थी। भारी वर्षा के फलस्वरूप पिछले 3 अक्टूबर को 24





घंटों में गंगा का पानी पटना में खतरे के निशान को पार कर गया था।<sup>2</sup>

### बाढ़ के निशाने पर मुंगेर और भागलपुर

लगातार वर्षा और बाढ़ से भागलपुर तथा मुंगेर जिले के बरियारपुर, खड़गपुर, तारापुर, बेलहर और संग्रामपुर थानों के लगभग ढाई सौ गाँव जलमग्न हो गये थे। सुल्तानगंज नगर का कुछ भाग भी पानी में डूबा हुआ था और यही स्थिति भागलपुर शहर और वहाँ के मेडिकल कॉलेज के अस्पताल की भी थी। ग्रामीण क्षेत्र से मिल रहे समाचारों के अनुसार एक हजार घर इस अप्रत्याशित बाढ़ की वजह से ध्वस्त हो चुके थे और बाढ़ पीड़ित अपने परिवार के साथ घरों की छतों

या मचान पर शरण लिये हुए थे। कल्याणपुर और बरियारपुर रेलवे स्टेशन के समीप रेलवे लाइन के धँस जाने की वजह से उन खंडों में रेल सेवा बन्द हो गयी थी।<sup>3</sup>

### कमिश्नर की बाढ़ग्रस्त क्षेत्र की यात्रा

13 अक्टूबर के दिन भागलपुर प्रमंडल के कमिश्नर डॉक्टर जैकब ने लखीसराय और बड़हिया टाल के बाढ़ग्रस्त इलाकों का दौरा किया और उसके बाद उन्होंने बताया कि वहाँ जो क्षति हुई है वह कल्पना से परे है। उनका कहना था क्षतिग्रस्त इलाके के छः लाख से अधिक लोग बाढ़ से पीड़ित थे और दो हजार आदमी और लगभग पाँच हजार पशु मरे हैं। कमिश्नर ने बताया कि मनुष्यों और पशुओं की लाशें हटाने

के लिये तत्परता से प्रबन्ध किया गया है और मुंगेर जिले के बाढ़ग्रस्त इलाकों में रिलीफ का काम शुरू कर दिया गया है। उन्होंने यह भी बताया कि बाढ़ के पानी से कई गाँव बिल्कुल लापता से हो गये हैं। बिहार सरकार ने राहत कार्यों की निगरानी करने के लिये छः डिप्टी कलक्टर और छः डॉक्टरों को प्रभावित क्षेत्रों में नियुक्त कर दिया गया था। उनके साथ आये भागलपुर के जिलाधिकारी ने सूचना दी कि भागलपुर, सुल्तानगंज, पीरपैँती, बिहपुर तथा नौगछिया में रब्बी की खेती के लिये पर्याप्त बीज की व्यवस्था कर दी गयी है।

भागलपुर के नवगछिया क्षेत्र में और सभी पंचायतों में एक-एक सस्ते गल्ले की दुकान खोलने का प्रबन्ध किया जा रहा था और कठिन श्रम

## स्तंभ

की योजनाएं जहाँ भी सम्भव हैं उन्हें शुरू करने के लिये व्यवस्था की जा रही है। उत्तरी भागलपुर में अक्टूबर के दूसरे सप्ताह तक गोपालपुर थाना क्षेत्र में करीब 35 गाँव बाढ़ में फँसे हुए थे जहाँ सबसे अधिक क्षति मदरौनी बाँध के टूटने से हुई। इस बाँध के टूटने से मदरौनी, चापर, सधुआ, इसमाइलपुर, कमलाकुंड, लक्ष्मीपुर आदि गाँव विशेष रूप से क्षतिग्रस्त हुए थे। करीब दस हजार एकड़ में लगी अरहर, कलाई, कुर्थी, मिर्च की फसल बिल्कुल बरबाद हो गयी थी और हजारों मकान धराशायी हो गये हैं। पीड़ित परिवारों ने सुरक्षित जगहों पर आश्रय ले लिया हुआ था लेकिन यह सच था कि वह बेघर थे।

13 अक्टूबर के ही समाचार के अनुसार भागलपुर जिले के बेलहर थाना अन्तर्गत बडुआ नदी की भीषण बाढ़ से धौरी, राजपुर, चौरा, डुब्बा, बड़हरा आदि गाँवों को बहुत

क्षति पहुँची थी। 50 प्रतिशत के आसपास मकान बह गये थे। मौजा चप्पातरी में करीब 50 बीघे में धान की लहराती फसल बालू से भर गयी। इसी दिन भागलपुर के सुल्तानगंज थाना क्षेत्र में सैकड़ों बाढ़ पीड़ितों ने प्रखंड विकास अधिकारी के दफ्तर के सामने प्रदर्शन किया और उनकी माँग थी कि बाढ़ से प्रभावित लोगों के बीच में खाद्यान्न का वितरण किया जाये और उनके रहने-सहने तथा दवा-दारू का प्रबन्ध भी किया जाये।

भागलपुर में बाढ़ के बाद पैदा हुई परिस्थिति से निपटने के लिये वायदे तो बहुत किये गये थे लेकिन उसका कितना पालन हो सका वह थोड़ा सा सन्देह के दायरे में आता है। बिहार के मुख्यमंत्री ने जो आदेश दिया था कि 15 दिन का मुफ्त राशन बाढ़ पीड़ितों को दिया जायेगा और पानी सूखने तक तकावी ऋण, प्राकृतिक आपदा ऋण दिया जायेगा

तथा कठिन श्रम योजना चालू की जायेगी। इस आश्वासन से लोगों में बहुत सी उम्मीदें जगी थीं लेकिन इसका पालन कहाँ तक हो पाया, यह बहस का विषय हो सकता है क्योंकि 10 अक्टूबर की सन्ध्या तक भी नाथनगर और जगदीशपुर अंचल के पीड़ितों को भी यह सहायता नहीं मिल पायी थी।<sup>5</sup>

### आवागमन ठप और राहत की तलाश में भटकते लोग

बाढ़ ग्रस्त क्षेत्रों की बदहाली की चर्चा करते हुए आर्यवर्त-पटना अपने 15 अक्टूबर 1961 के सम्पादकीय में 'बाढ़ क्षेत्र में सहायता कार्य' शीर्षक से लिखता है कि बाढ़ ग्रस्त क्षेत्रों से जो समाचार मिलने लगे हैं वह बहुत ही विदारक हैं और अविलम्ब क्षेत्रों में ऐसी व्यवस्था होनी चाहिये जिसमें उन पीड़ितों के बीच सभी आवश्यक चीजों की पूर्ति की जा सके। यह अनुमान करने की बात है





कि जहाँ बाढ़ में आदमी अपनी जान तक नहीं बचा सके हैं वहाँ उनके पास न कपड़ा होगा न खाने की चीज बची होगी। लाखों की संख्या में लोग गृह विहीन हो गये हैं, बहुत बड़े क्षेत्र में सड़कें टूट गयी हैं और पानी अब तक जमा हुआ है। इन क्षेत्रों में हैजा अलग भयावह रूप ग्रहण करता जा रहा है। इस प्रकार स्थिति ऐसी चिन्ताजनक हो गयी है कि कपड़ा और अन्न की बात तो दूर रही, लोगों के पास नमक और किरासन तेल मिलना भी कठिन हो गया होगा। इसलिये बाढ़ग्रस्त क्षेत्रों में उन सब चीजों की सहायता की आवश्यकता है जिनके बिना लोगों का काम नहीं चल सकता। इस संकट के समय किसी विवाद में न पड़ कर सहायता की व्यवस्था की ओर ध्यान दिया जाना विशेष वांछनीय है।<sup>6</sup>

मुख्यमंत्री ने जो राहत कार्यों के लिये आदेश निर्गत किये थे उनसे बाढ़ पीड़ितों के बीच में कुछ उम्मीद जगी थी लेकिन निर्देशों का पालन क्षेत्र में हो रहा था या नहीं यह सन्देहजनक था और ऐसी खबरें कई जिलों से आ रही थीं और भागलपुर उनमें से एक था जहाँ मुख्यमंत्री के आदेश से 15 दिन तक मुफ्त राशन मिलना था और उनका यह भी आश्वासन था कि पानी हटते ही तकावी ऋण और खेती के लिये अन्य सुविधाएं मुहैया की जायेंगी मगर आधा अक्टूबर बीत जाने के बाद भी इसका कोई अता-पता नहीं था। राहत कार्य कायदे से शुरू होने में वहाँ अक्टूबर का तीसरा सप्ताह



लग गया था।<sup>7</sup>

भागलपुर में इस वर्ष अक्टूबर महीने में भारी वर्षा हुई थी और हथिया का पानी भी खूब बरसा था। यह पानी इतना बरसेगा इसकी किसी को उम्मीद नहीं थी। गंगा और चांदन नदियों का पानी 2 अक्टूबर से बढ़ने लगा था और यह बढ़ोतरी महीने के पूरे पहले सप्ताह में जारी रही और इन नदियों का इस तरह से बढ़ते जाने का परिणाम यह हुआ कि भागलपुर जिले के उत्तरी भाग में गंगा से और दक्षिणी भाग में चांदन से भारी तबाही हुई।

### बिहार सरकार के भागलपुर गजैटियर (1962) से

इस बाढ़ के पानी ने 569 गाँवों में रहने वाली 2,38,665 लोगों की आबादी को परेशानी में डाला और इसका विस्तार लगभग 1,000 वर्गमील (2,560 वर्ग किलोमीटर) से अधिक क्षेत्र पर रहा। इस बाढ़ की चपेट में सदर सब-डिवीजन के

पीरपेंती, सबौर, कहलगाँव, जगदीशपुर, शाहकुंड, नाथनगर, सुल्तानगंज, बिहपुर, नवगछिया अंचल और बांका सब-डिवीजन के अमरपुर, रजौन, बांका और शम्भूगंज अंचल आये। जिले में 11,105 घरों के क्षतिग्रस्त होने का अनुमान किया गया था। सबसे ज्यादा तबाही जगदीशपुर, नाथनगर, सुल्तानगंज, शाहकुंड, और बिहपुर अंचलो में हुई थी।

सुल्तानगंज, शाहकुंड, नाथनगर और बिहपुर अंचलों में धान की फसल को काफी नुकसान पहुँचा तथा 8,624 एकड़ पर लगी अरहर और कलाई की दलहन भी बाढ़ के कारण नष्ट हो गयी थी। कई दिनों तक इन अंचलों के निचले हिस्से में बाढ़ का पानी बना रहा और भागलपुर-दुमका सड़क के दोनों ओर पुरैनी से लेकर जगदीशपुर के दक्षिण तक पानी ही पानी था। दो दर्जन से अधिक गाँव इस इलाके में पूरी तरह पानी से घिरे थे।



सड़कों में पड़ी दरारों के कारण आवागमन प्रायः ठप पड़ गया था। चांदन पुल के पास पुरैनी गाँव से जगदीशपुर तक जाने वाला सुरक्षा बाँध जो भागलपुर-दुमका सड़क के समानान्तर जाता था, कई स्थानों पर टूट गया था। भागलपुर से मन्दार हिल को जोड़ने वाली रेल लाइन भी कहीं-कहीं नीचे से खोखली हो गयी थी। इसलिये इस खंड पर भी रेल चालन बन्द हो गया था। इसके अलावा अकबरपुर-शाहकुंड रोड, भागलपुर-दुमका रोड, भागलपुर-मुंगेर रोड, ढाका मोड़-बांका रोड, अमरपुर-शाहकुंड रोड, सुल्तानगंज-दारापुर बेलहर रोड, बांका-अमरपुर रोड और सुरया-साहेबगंज रोड सभी कई-कई जगह पर टूटी पड़ी थीं।

राज्य सरकार ने खुले हाथ से राहत कार्य शुरू किये। राज्य के बाहर से भी बहुत सी संस्थाओं ने भागलपुर

आकर अपनी तरफ से राहत कार्य शुरू किये। बाढ़ प्रभावित क्षेत्रों में फँसे लोगों को बाहर निकालने के लिये नावों को उतारा गया। राहत कार्यों में तेजी लाने के उद्देश्य से पूरे जिले को 20 खंडों में बाँटा गया और हर हिस्से को एक राजपत्रित अफसर के जिम्मे में लगा दिया गया था।

मुफ्त राहत के तौर पर बाढ़ पीड़ितों के बीच अनाज, कम्बल और कपड़ों का वितरण शुरू हुआ।

इसके साथ प्रभावित इलाकों में नमक और मिट्टी का तेल भेजने की कवायद शुरू हुई। दूध की आपूर्ति के दूध वितरण केंद्र खोले गये। गाँव में अस्थाई तौर पर रहने की व्यवस्था के लिये तारपोलिन और तम्बू की व्यवस्था की गयी और इस प्रक्रिया में सरकार के अलावा साहू-जैन औद्योगिक प्रतिष्ठान, आर्यन स्थान सेवा समिति, मारवाड़ी

रिलीफ सोसायटी और काशी विश्वनाथ सेवा समिति जैसी संस्थाओं ने बाढ़ पीड़ितों की मदद करने में हाथ बँटाया।

राज्य के अन्दर तथा बाहर से भी कई स्थानों पर आर्थिक संसाधन जुटाने की मुहिम चलायी गयी ताकि बाढ़ पीड़ितों की मदद की जा सके। राज्यपाल रिलीफ फंड ने सबसे अधिक राशि का संकलन किया और उसी के माध्यम से सबसे अधिक राशि भागलपुर जिले को दी जा सकी।

बाढ़ पीड़ितों को सस्ते दर पर अनाज उपलब्ध करवाने के लिये 79 अतिरिक्त सस्ते गल्ले की दुकानें खोली गयीं जो पहले से काम कर रही थीं यह दुकानें जिले की 250 ऐसी दुकानों के अलावा थीं। जिले में स्थिति से निपटने के लिये 24 स्वास्थ्य और स्वास्थ्य उप-केंद्र खोले गये और इतने ही ऐसे केंद्र

पशुओं के लिये भी खोले गये। जिले के बाढ़ प्रभावित क्षेत्रों के कुओं में दो बार दवाइयों का छिड़काव किया गया और लोगों के बीच बीमारियों से बचाव के लिये टीके लगाने की व्यवस्था भी सरकार की तरफ से हुई। बाढ़ क्षेत्र के कुछ गाँवों में हैजा फैलने की भी खबरें मिल रही थीं जिनमें 21 लोगों के मरने का भी समाचार था। लगभग 300 जानवर भी इस बाढ़ में काम आये।<sup>8</sup>

### विधानसभा की बहस में भागलपुर

6 अक्टूबर, 1961 की रात मुंगेर जिले में मान नदी पर बने एक 76 फुट ऊंचे बांध से पानी छलक गया और जो पानी किनारे तोड़ कर बाहर आ गया जिसने मुंगेर और भागलपुर जिले में भारी तबाही मचाई। सैकड़ों लोग मारे गये। पानी तो उस साल 25 सितम्बर से ही बरस रहा था और बाढ़ पहले से ही थी। स्थिति की समीक्षा के लिये बिहार विधानसभा का विशेष सत्र बुलाया गया। बहुत से भाषण हुए जिनमें एक भाषण ऐसा था जो हर साल दिया जा सकता है। यह भाषण था भागलपुर से विधायक राघवेन्द्र नारायण सिंह का जिसके कुछ अंश को यहां उद्धृत किया जा रहा है। बाढ़ पूर्व तैयारी, बाढ़ सह जीवन, आपदा प्रबन्धन, बाढ़ नियंत्रण, बाढ़ प्रबन्धन, राहत वितरण, जवाबदेही आदि सभी विषयों की महारत रखने वाले विद्वज्जनों को यह भाषण पसन्द आयेगा क्योंकि जो भाषण 1961 में दिया गया था वह 60 साल



बाद आज भी बिना किसी परिवर्तन के, केवल नदी और जगह का नाम बदल कर दिया जा सकता है।

उनका कहना था कि, "मुंगेर जिला बहुत बुरी तरह से तबाह हुआ है लेकिन भागलपुर जिले में भी कम बरबादी नहीं हुई। जिस तरह से मुंगेर में तारापुर और खड़गपुर की बरबादी हुई है वैसी ही बर्बादी भागलपुर के शम्भूगंज, बेलहर और कटोरिया की भी हुई है। हवाई जहाज रिक्विजिशन होना चाहिये हिंदुस्तान भर का और फूड पैकेट बाँटे जाने चाहिये।

"5 तारीख को जब हम वहाँ पहुँचे और सर्किल अफसर से पूछा तो मालूम हुआ कि अभी तक रिलीफ नहीं पहुँची है। पटना आने पर पता लगा कि 7 तारीख को रिलीफ पहुँची। आपने अपनी योजना में न मालूम कितने अंचल और ब्लॉक खोल रखे हैं शासन की सुविधाओं को जनसुलभ बनाने के लिये मगर रिलीफ के काम में जो काहिली आयी

है वह अक्षम्य है।

"15 आदमियों का परिवार है और उसे रिलीफ में दिया गया ढाई सेर अनाज और उसके बाद दूसरी रिलीफ का पता नहीं। बेलहर थाने में करीब 15 गाँव क्षतिग्रस्त हैं और 10 गाँव बेबुनियाद हो गये। चीफ मिनिस्टर ने अपने भ्रमण में यह बताया था कि 15 दिन का गल्ला हर आदमी को बगैर इसके विचार किये हुए कि वह जमीन वाला है या बेजमीन, सबको दिया जाना चाहिये मगर क्या सरकार इसकी जाँच करवायेगी कि इस हुक्म की तामील सरकारी मुलाजिमों ने किस हद तक की है? आज 10 दिन गुजर गये। धीरज और इमानदारी के साथ यह देखने का मौका है कि किन सरकारी अफसरों ने इतनी बड़ी मुसीबत का मुकाबला उतनी ही मुस्तैदी से किया और किन्हीं का कहिलपन दिखाया। जो रिलीफ थोड़ी बहुत पहुँची वह इतनी कम थी कि वह किसी का खुराक नहीं हो सकती। कपड़ा, किरासन तेल, नगद रुपये, इसका तो



कहीं नाम ही नहीं था।

"मुझे बहुत दुख पूर्वक कहना पड़ता है कि पीरपैती के बी.डी.ओ. ने उस मुसीबत में पड़े हुए लोगों को यह कहते हुए गल्ला नहीं दिया कि उनके पास जमीन है जबकि मुख्यमंत्री की घोषणा की खबर उनके पास पहुँच चुकी थी। मैं सब समझता हूँ कि ऐसी मुसीबत का मुकाबला करने का एक अल्पकालीन और एक दीर्घकालीन योजना बनी होनी चाहिये। अनाज, कपड़ा, दवाई, धान और चारा यथाशीघ्र पहुँचना चाहिये और दीर्घकालीन योजना में उसका पुनर्वास, कमजोर बाँधों और सड़कों की मरम्मत और टूटी हुई नहरों की मरम्मत होनी चाहिये। सरकारी अफसरों की गैर-जिम्मेदारी की यही कहानी है। खड़गपुर झील के जिम्मेदार ओवरसीयर्स, असिस्टेंट इंजीनियर सोते रह गये और फाटक नहीं खोला गया जिससे खड़गपुर नहर टूटी और पचासों बस्तियाँ तबाह हो गईं।

"मैं विनय पूर्वक सरकार से कहना चाहता हूँ कि इसकी जाँच सेंट्रल वाटर पावर कमीशन से करायी जाये। एक आदमी के खून करने की सजा फाँसी होती है मगर जिस

किसी ने सैकड़ों गाँवों को तबाह कर दिया सरकार उसके लिये कौन सी सजा मुकर्र करती है? 1961 का जो तजुर्बा हुआ उससे सरकार ने कुछ सबक नहीं सीखा और उसका नतीजा आज जनता को भुगतना पड़ा। उसके बाद भी रिलीफ का कोई प्रबन्ध समय पर नहीं किया गया। यह कितने दुख की बात है।

"हर साल जो हम पर बहुत बड़ा बोझ बन जाता है उसको मुस्तैदी से हम सामना कर सकें, इसकी सारी जिम्मेदारी इस स्टेट की है। पूना में महज 16 इंच बारिश हुई और हमारे यहाँ 25 इंच वर्षा हुई। वहाँ फौज उतार दी गयी और उन लोगों ने बड़ी तेजी से सम्हाला लेकिन हमारे यहाँ क्या हो रहा है? जो छोटी सी आमदनी स्टेट की है। उसके मौजूदा रिसोर्सेज में किसकी हिम्मत है कि सही तरीके से इतने बड़े काम को अंजाम दे लेकिन इसमें सरकार की तरफ से मुस्तैदी का नितान्त अभाव है।"<sup>9</sup>

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# Effect of COVID-19 on Health Care Financing – UK and India Experience

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**This article attempts to examine the effect of COVID – 19 on healthcare spending in the UK and India. It is also worth looking that how the two countries managed the crisis as well as how the countries are moving forward for encountering with unexpected shocks and road to Universal Health Care (UHC) through health system resilience and adaptability.**



Dr Gajendra Singh

COVID-19 has impacted the health and economic conditions across the globe. It has posed a challenge to countries regarding the investment in clinical services as well as in health systems. It also impacted the aspirations of countries to achieve universal health content (UHC). Healthcare spending can be understood by share of healthcare expenditure in gross domestic product (GDP).

## Healthcare Financing in India

Depending on the position of care needed, health institutions in India are mainly classified into three types primary care (at primary health centers), secondary care (at district hospitals), and tertiary care institutions (at technical hospitals like AIIMS). In the duration 2016-17 to 2020-21, per capita spending increased from INR 1308 to INR

1944 and budget allocation for health increased from INR 37061 crore to INR 65001 crore. However, the budget allocation has moved from 5% to just 5.4% of GDP in these 5 years

India's National Health Accounts 2017-18 shows that out-of-fund payment constitutes 55% of total health expenditure. In National Health Policy 2017 (NHP), India aimed to increase Govt. health expenditure from the being 1.15% to 2.5% of GDP by 2025 as well as to decrease the proportion of households facing catastrophic health expenditure from the current levels by 25%, by 2025.

In India Govt. expenditure is 30% of total health expenditure which results in 62% of total health





expenditure as an out-of-pocket expense. NHP also recommends that expenditure on health by states should be increased to 8% or more of their budget, however, the state governments in India have just allocated 5.4% of their total budget towards the public health care system.

More than 60% of all healthcare spending in India are out of pocket. Out-of-pocket expenditure is generally financed by household revenues. Tax earnings are the primary source of government backing for health in India, contributing close to 90 of total expenditures. Presently, the public sector contributes around one-third of total expenditure which is quite low as compared to other countries. Informal sector workers who have a high proportion in India have limited access to affordable health insurance or health care. The focus of the National Health Mission (NHM) seems to be on hospitalization (including pre and post-hospitalization charges). Still, most of the expenditure made by consumers is on buying drugs. Further, these purchases are substantially made for cases that don't need hospitalization. This section is hardly covered in social health insurance because of its unorganized nature and high duty-elusion rates. The situation

is further exacerbated by the lack of a public sector social health insurance scheme in the country. Among the ensured, content of government health schemes is the major portion. PM-JAY, launched by the Government of India as part of the Ayushman Bharat initiative, could increase the penetration of health insurance in India from 34% to 50%.

The hospital sector in India is expected to reach USD 132 billion by 2023 and captures 80% of the total healthcare market currently. The present government is committed to the investment of around USD 9 billion in coming years for health infrastructure and at least one

oxygen generation plant in each of India's nearly 750 districts. Public expenditure on health in India isn't increased significantly in the last decade which has caused an estimated 63 million Indians driving into poverty because of out-of-fund expenditure for health care.

### Healthcare Financing in United Kingdom (UK)

In a 2017 report by the Commonwealth Fund, the United Kingdom was ranked the best healthcare system in the world overall and was ranked the best in the following categories: Care Process (i.e., effective, safe,



## Analysis



coordinated, patient-oriented) and Equity. The UK provides public healthcare to all permanent residents. Healthcare content is free at the point of need and is paid for by general taxation. About 18% of a citizen's income tax goes towards healthcare, which is about 4.5% of the average citizen's income. Overall, around 8.4 percent of the UK's GDP is spent on healthcare. The UK also has a growing private healthcare sector that's still much lower than the public sector. In 1911 National Insurance Act was introduced, in which a small amount was deducted from an employee's wage, and in return,

they were entitled to free healthcare. The National Health Service (NHS), established in 1946, is responsible for the public healthcare sector of the UK.

In England, health and social care are funded separately. Patients have been required to contribute towards the cost of some NHS services since 1951. Exemption arrangements are in place that covers patients of age under 16 or more than 60. Tax-funded models typically seek to pool risk across large populations and make health services available on a universal basis. Taxes vary based on modality (direct / indirect taxes), source (central/ local government

and purpose (general purpose or earmarked tax). In 1990, to reduce pressure on NHS, tax relief for private medical insurance was introduced which was later abolished in 1997. In 2018, spending on health care in the UK totaled £214.4 billion, equating to £3,227 spent per person. This includes both government and non-government spending on health care. Healthcare expenditure represented 10.0% of GDP in 2018, up from 9.8% in 2017. This increase was a result of healthcare expenditure growing at a faster rate than GDP.

Public spending on health care in the UK totaled £177bn in 2019 which equates to £2,647 per person for the year. In the UK, government health spending per head of population grew by 21.9% in 2020. Public spending on health care was equivalent to 8% of GDP in the UK in 2019. In UK Govt. expenditure is 83% of total health expenditure which results in 9.7% of total health expenditure as an out-of-pocket expense.

The UK Health Accounts break healthcare expenditure down into a range of dimensions, healthcare financing, and healthcare function,





healthcare provider, and health spending. Government expenditure on health care, which includes spending by the NHS, local authorities, and other public bodies financing health care, was £166.7 billion in 2018. This equated to just under four-fifths (78%) of total current healthcare expenditure, an increase from 75% in 1997. In 2018, half of the government-financed health care was provided by hospitals, while 64% of long-term care was financed by the government. Around 26% was financed through out-of-pocket funds. Non-government expenditure was financed through four categories, namely out-of-pocket expenditure, voluntary health insurance, charitable financing, and enterprise financing. The available evidence suggests the UK health care system is relatively efficient. For instance, the UK has low spending on pharmaceuticals – owing to the use of cheaper generic drugs – and the average length of stay in hospital is shorter.

### Effect of COVID on Healthcare Financing

The COVID-19 pandemic proved the inadequacy of the healthcare system across the world irrespective of population size. However, on the positive side, it accelerated the growth of the home healthcare sector. Pre-pandemic, care at home was limited. In addition to the pandemic, an increase in urbanization and nuclear families were major factors driving this expected growth. COVID-19 will likely catalyze long-term changes in attitudes towards personal health and hygiene, health insurance, fitness and nutrition, and health monitoring and medical check-ups. The pandemic has also accelerated the adoption of digital technologies, including telemedicine. The preventive healthcare market in India was valued at USD 49 billion



in 2019 and is expected to reach USD 194 by 2025.

Total current healthcare expenditure in 2020 is estimated at £269 billion, a nominal-terms increase of 20% on spending in 2019. The share of GDP attributed to healthcare rose to around 12.8% in 2020, from 10.2% in 2019. Growth in total healthcare expenditure was driven primarily by a 25% (nominal terms) increase in government healthcare expenditure. Government healthcare spending in 2020 was in the region of £220 billion, accounting for over four-fifths (82%) of total healthcare expenditure.

COVID-19 testing and tracing activities, including NHS Test and Trace services in England and similar services provided in the other UK nations, came into operation in 2020. The NHS Test and Trace budget for the financial year ending (FYE) 2021 was £22 billion. Early estimates suggest spending up to the end of October 2020 was much lower, at around £4 billion, although expenditure in 2021 is expected to be higher. Expenditure on healthcare financed through non-government schemes was approximately £49 billion in 2020, an increase of roughly 2% in

nominal terms in 2019. Of the two largest non-government schemes, out-of-pocket expenditure increased by around 4% but expenditure on voluntary health insurance schemes fell by around 23%. The variation in growth rates is partly a result of the different types of healthcare services available through different schemes.

### How countries responded to healthcare financing during COVID -19

The complexities and contextual factors associated with the pandemic, particular policy responses, and health system differences make it difficult to draw definitive conclusions about the variation in spending increases in 2020. With the pandemic continuing, the total picture of how health spending will change across different countries remains to be seen.

The government reacted quickly to the COVID-19 crisis, provided massive financial support to protect firms, households, and vulnerable populations, and strengthened health systems, digitalization, and the transition to a carbon-neutral



economy. Digital intervention played a critical role during the Covid-19 pandemic response management and it also created a poll of non-integrated multiple platforms and duplication of digital intervention across center and state. Initially, looking to uncertainty around, a lockdown was imposed majorly in all parts of the country across the globe. Later, understanding the situation and gravity of the economic slowdown, the government gradually reopened the economy in steps. The full emergency lockdown is being lifted in phases, starting with the reopening of schools and recreation in outdoor public spaces. Next, non-essential retail, shops, hairdressers, gyms, and outdoor hospitality were reopened followed by the lifting of most social contact rules and the opening of indoor hospitality and hotels.

Moving ahead from conventional health systems, the Government of India has shown remarkable response in form of digitally driven solutions like Aarogya Setu and CoWIN to deal with unforeseen COVID crises. In the UK, the government increased taxes for ensuring better healthcare services. It was welcomed by one section while others considered NHS as a

black hole that is just engulfing the taxpayer's money. The Covid-19 response has required more than £30 billion of additional health spending and £4.7 billion of extra local government funding.

### Strategies for future

The NHS and local government may be dealing with these consequences and costs for many years to come. The process of working out what the demand for health and care services will be and how far existing budgets will stretch next year, or indeed next month, is all but a guessing game. Beyond the health and care system, the macro-economic outlook is equally uncertain. This, of course,

will have implications for public spending; overall the Chancellor is likely to have less to spend now than anyone would have anticipated at the start of the year. Growth in government healthcare expenditure is likely to have been driven both by direct costs of the pandemic, such as spending on new testing and tracing services, and indirect costs to existing services, such as additional personal protective equipment for frontline healthcare workers. Growth in non-government healthcare expenditure varied by financing scheme; the coronavirus pandemic reduced household spending on medical services but spending on medical goods increased.

Globally, the Covid-19 crisis has underlined that whatever is being done for healthcare, it's not enough. This statement summarizes the future need for more budgetary allocation for healthcare across the world. The COVID-19 pandemic requires governments to act on all fronts simultaneously to manage, exit, and recover from the crisis. This requires governments to reconsider their multi-level governance systems and regional development priorities. Many countries moved from a national approach to a more territorial approach when the crisis hit in the spring of 2020. This allows them to adapt the crisis



responses to local needs and limit the costs of national lockdowns.

Governments and healthcare industries can sense that consumer behavior is now more inclined toward non-traditional healthcare settings which include products, services, and modalities. Hence, Governments and industries are trying to equip their response with tech-enabled solutions which can integrate and customize as per patient needs. The market size for telemedicine in India (USD 830 million, as of 2019) is projected to increase to USD 5.5 billion by 2025, growing at a CAGR of 31% during 2020-2025.

Interestingly, in continuation of the need for curative services, more demand is for preventive, diagnostic, and rehabilitation services. It's time to work on prevention, addressing stalling life expectancies and redressing health inequalities, and reforming social care. The UK government had to increase spending as a matter of genuine urgency – a positive action reflecting the government's ability to rapidly redirect resources to respond to the crisis, and a core component of health system resiliency.

NHS in the UK is planning to scale up of video platform available to all providers to redesign the outpatient services and avoid the need for the third face-to-face hospital outpatient visit. Starting in early 2020, it has already delivered three million video consultations and 21.5 million virtual appointments including both telephone and video consultations, accounting for around 30% of outpatient attendances. The use of virtual consultation also saved 550 million patient travel miles and avoided around 112,000 tonnes of CO2 emissions, while importantly reducing risk to both patients and staff.

As a long-term plan, NHS funding



is supposed to be increased by £33.9 billion from 2023 to 2024. It will be used for the updation of healthcare infrastructure and clearing maintenance backlogs. The Govt. has also ensured non-ring-fenced financial support of £4.6 billion to local governments and an additional £1.55 billion to councils so that they can manage the immediate and long-term impacts of COVID-19. The increase in UK spending may, however, also reflect the UK's structural vulnerabilities going into the pandemic. Consistently low levels of investment in health care capital as a proportion of GDP meant less flexibility in the earlier waves of the pandemic to cope with rising Covid cases.

### Suggestions

1. Understanding the need of modifying and strengthening the existing healthcare system, Govt. has started preparing in the following ways

- a. Increasing budgetary allocation and spending on healthcare
- b. Addressing the health inequalities along with the focus on quality
- c. Including citizens in health coverage
- d. Making healthcare

infrastructure ready for future

- e. Preparing future healthcare workforce
- f. Strengthening the public health crisis response system
- g. Improving private sector participation and support, Regulation of private healthcare
- h. Embedding Digital health to bridge system gaps
- i. Investing in medical research

2. Strengthening primary healthcare is the key to fighting against any such unforeseen crisis in the future. This deeply embedded primary healthcare should be well complemented by a robust supply chain and a well-spread network of community healthcare workers. Focus on prevention and early management of health problems can reduce the need for complicated specialist care provided at the tertiary level.

3. Traditionally healthcare is financed by one or more methods like taxation, private health insurance, and social health insurance. Uniformly implemented Social Health Insurance is required to supplement tax revenues as a modality of healthcare financing. Successfully channeling current levels of out-of-pocket spending

## Analysis

into pre-payment pools would help reduce large and catastrophic, one-time payments.

India needs to strengthen the existing social health insurance schemes like Ayushman Bharat, Employees' State Insurance Scheme (ESIS), Rashtriya Swasthya Bima Yojana (RSBY), and other state-specific schemes so that all layers of society can be covered, and health inequality can be reduced. Identifying, engaging, and enrolling in the informal sector will be a challenge. It can be done through existing platforms like Jan Dhan, Aadhar, and extensive use of mobiles. Similarly, NHS in the UK needs to invest more to ensure coverage as well as equity issues.

4. Looking at the emerging variants and ever-changing scenario, countries may have to introduce multiple doses of vaccines as well as cover all age groups. Initially, many countries introduced free vaccinations for all their citizens. However, it may not be possible for Governments to arrange finance on a long-term basis. Forex. India may have to arrange for approx. USD 10 billion if aims to give one extra dose of vaccine to the entire population while the UK may require around USD 1 billion for the same. Except for vulnerable and marginalized populations, the countries must explore alternate channels and strategies for bridging this gap for the rest of the population. Also, additional funds for COVID-19 testing, tracing, isolation, and quarantine should not be missed while planning.

5. To augment healthcare financing, blended finance instruments like Social Success Note can be explored which work on the principle of pay-for-success. It is centered on increasing the quantum of financing for SDG projects. Donors are the main source of the catalytic funding that creates the

market-equivalent investments that mobilize private investment. It may help for-profit social enterprises to access affordable debt for scaling their operations and impact while delivering mission-aligned targets and outcomes. It can be used as a strategic partnership with the private sector to mobilize funds for healthcare initiatives. It needs some legal, regulatory, and administrative reforms in the domain of Corporate Social Responsibility (CSR) along with transparency. NGOs and CSOs should also open for commercial investments as they have a deep impact and reach vulnerable populations.

6. India faces dual challenges of shortage of healthcare workforce and need for upskilling of the existing healthcare workforce. It needs to set up healthcare skilling centers across districts to train community healthcare volunteers. Community centers can be connected to virtual institutes for skilling courses in a hybrid format. Such centers would help mitigate community health crises.

7. The Covid-19 pandemic led to multiple sources of information, a

lack of correct and timely information and challenges in navigating to avail required healthcare needs. A single national health mobile app, National Swasth Citizen App, is advisable to meet all healthcare needs of a citizen. India should move towards a One Nation One Health App for citizens to request ambulances, nearest hospitals, and doctors, bed availability status, appointment booking, laboratories, blood bank, oxygen, pharmacies, telemedicine/ online consultation, vaccination, and reporting.

8. During the first quarter of 2021, significant challenges hindered vaccine deployment, including limited vaccine supplies, inequitable distribution of existing supply between countries, and emerging viral variants of concern. Regional disparities in accessing vaccines are generally limited, but in countries with significant disparities, factors relating to health or demographic factors may be at play. The crisis has revealed weaknesses in many regions, including access to healthcare and housing, demographic changes, and digital gaps. ■

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[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1052209/commissioning-board-annual-report-2020-to-2021-web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1052209/commissioning-board-annual-report-2020-to-2021-web.pdf)

<https://www.gov.uk/government/news/7billion-for-nhs-and-social-care-for-covid-19-response-and-recovery>

# Living with Cyclones: Precautions to Take Before, During and After

Colonel Razzaque Adil is a multiple award-winning military veteran with more than 21 years of experience in HSE, Risk Management, Resilience & Disaster Response operations with the Indian Army, National Security Guards, and the United Nations Peace Keeping Force.

**This article looks at some interesting aspects of Cyclones – what causes them, how are they named, and precautions that need to be taken before, during, and after a cyclone by those residing in cyclone/storm prone areas.**

## Cyclones: Myths & Facts

Though they can often be quite destructive, Cyclones are a fascinating phenomenon of nature. As per Indian mythology, when Vayu Dev the lord of wind, gets angry, he blows fiercely in the form of a storm. His most fierce form, i.e., his 49th form 'Prabhanjana' (literal meaning - forceful breaker) can roughly be equated with cyclones.

In meteorological

terms, a cyclone can be understood as a wind system similar to the intense ring forming a whirl that rotates inwards (counter-clockwise in the Northern hemisphere and clockwise in the Southern hemisphere) around a strong low-pressure center. One often gets confused with the terms Cyclone, Hurricane, and Typhoon all three of which actually refer to the same phenomenon. Tropical Storms are called Hurricanes in the Atlantic, Typhoons in the Pacific, and Cyclones in the Indian Ocean (IMD, 2021).



Colonel Razzaque Adil

The term "Cyclone" itself has an Indian connection. Henry Paddington (1797-1858) was an English sea captain who settled in Bengal where he was well known for his pioneering studies in meteorology of tropical storms.



Studying the logs of several ships, he noticed that most tropical storms had a calm center while the winds around them ran anticlockwise in the northern hemisphere and clockwise in the southern hemisphere. In the 2nd edition of his book, "The Horn-Book for the Law of Storms for the Indian and China Seas", (published 1848), he introduced the word "Cyclone" derived from the Greek word, 'κύκλος' (kyklos, meaning "circle" or "ring").

### Naming of Cyclones

Cyclones are given names to help in their quick identification while transmitting storm warning messages because names are easier to remember than numbers and technical terms. Initially, they were named arbitrarily but later meteorologists prepared an alphabetical list wherein the first storm to occur in the year was given a name beginning with the alphabet 'A' and so on. Since 1953, tropical storms have been named from lists maintained by the International Committee of the World Meteorological Organization. Though the original lists featured only women's names, in 1979, men's names were introduced and

now they are used alternatively. Six lists are used in rotation. Thus, the 2022 list will be used again in 2028. The only time when there is a change in the list is when a storm is so deadly that the future use of its name is considered insensitive.

### Cyclones in India

In India, 13 coastal regions are prone to cyclones. Most of these coastal regions are located in the states/ union territories of West Bengal, Andhra Pradesh, Tamil Nadu, Odisha, Gujarat & Puducherry. Such cyclones are often accompanied by strong winds, torrential rains, and storm surges which cause damage to infrastructure, uproot trees, damaged property, and cause unprecedented floods which lead to erosion of beaches and embankments. Severe cyclonic storms often result in the loss of human, plant, and animal lives and can even affect the region's economy.

### Protection against Cyclones

If you live in any of the cyclone prone areas in India, the following precautions can prove to be useful

before, during & after a Cyclone. Many of these precautions can also be taken against severe storms in other parts of the country.

### Precautions to Be Taken Before a Cyclone

- Ensure your house is in a condition to withstand strong winds. If in doubt, get your house checked by your local building control authority.
- Trim down trees to make sure they do not fall over telephone/ electricity lines during the storm.
- Keep your mobile phone fully charged and other appliances like torches handy as there may be power cuts during a cyclone.
- Store essential items like groceries and medicines in advance. It is vital to store dry food items that are not perishable.
- Prepare an emergency kit containing - a portable battery radio, torch with spare batteries, a can opener, matches, fuel lamp, portable stove, cooking gear, eating utensils, and a first aid kit.
- Store drinking water because the water supply may be disrupted during cyclones.
- Do not leave any loose sharp objects lying around, as they can injure people during gusty winds.
- Steer clear of demolished buildings.

### Precautions to Be Taken During a Cyclone

- Remain aware of the official cyclone warnings by listening to the radio or other authentic sources.
- Install storm shutters or board-up glass windows.
- Ensure all household members

know which is the strongest part of the house, and what to do in the event of a cyclone warning or an evacuation.

- Keep all doors and windows closed.
- Take proper care of elderly / children who need attention.
- Switch off the electrical mains in your house.
- Park your vehicles beneath a solid shelter (hand brake on and in gear).
- If you are asked to evacuate, trust the government authorities and do not hesitate or delay. Move to a house/shelter built on higher ground.
- Do not move outside the house immediately after the storm passes, as there will be wind gusts from the opposite direction.
- Avoid rumors of any sort, and do not panic.
- Stay away from concrete walls and floors because thunder and lightning can pass through the metal bars in them.

### Precautions to Be Taken After a Cyclone

- After a cyclone, the chances of diseases increase due to stagnant water and floods can be there. Hence, eat fresh dry food and keep it away from pests and flies.
- Boil water before drinking or cooking.
- Keep your surroundings clean by using disinfectants.
- Cover drain holes to prevent backflow of sewage.
- Clear debris from your premises.
- Stay inside until you receive proper information that it's safe to move outside.



- Do not drive out immediately after a storm because the roads would be slippery & may be blocked by fallen trees etc.
- Do not go near loose electric wires.
- Avoid going to areas covered with floodwater.
- Stay away from sewerage lines, gutters, and drains.
- Check for gas leaks. Don't use electric appliances if they are wet.

### Way Forward

In the mid-19th century, Port Canning, a port city was being built on the fringes of the Sundarbans by the colonial authorities. The port was designed to welcome ships from all corners of the British Empire, promising to be a worthy twin to Calcutta, the colonial capital of India. In 1853, Henry Paddington (who by then was made president of the marine court of inquiry at Calcutta), advised the Governor General of India that Port Canning was best not built on the south-eastern side of Calcutta as it was vulnerable to storms. His warnings

were however ignored and the port was built at the same location. A few years after Paddington's death, Port Canning was devastated in 1867 by a cyclone and abandoned a few years later. What remains today is described by author Amitabh Ghosh in his book *Hungry Tides* as a "horrible, muddy little ghost town."

Damages caused by all tropical storms including cyclones are usually preventable. Studies of cyclones and their predictions have improved hugely today. India has made huge signs of progress in its early warning systems which ensure that the numbers of human casualties during cyclones are now minimal (human casualty during cyclone Fani in 2019 was less than 100). India needs to continue strengthening its Cyclone risk governance with robust early warning systems, cyclone risk reduction strategies, and community participation at local levels. Also, precautions at community and individual levels need to be taken continuously to ensure zero casualties during future cyclones. ■

# Disaster Resilient Infrastructures

Meet Dr. H. Kit Miyamoto, Global CEO of Miyamoto International, Inc. Dr. Miyamoto is a world-leading expert in disaster resiliency, response, and reconstruction. He provides expert engineering and policy consultation to the World Bank, USAID, UN agencies, governments, and the private sector. He is California's Seismic Safety Commissioner, Global CEO of Miyamoto International, and a structural engineer.

## How is Miyamoto International contributing to disaster resiliency and recovery across the globe and in India?

With a need for an estimated US \$90 trillion invested in infrastructure over the next 15 years, there is an opportunity for leadership and science-based models that will address gaps in data and technical capacity to mainstream resilience into all infrastructure programming. Miyamoto International is a global structural engineering and disaster-risk reduction firm providing resiliency expertise that sustains industries and safeguards communities around the world. From the devastating 2010 Haiti earthquake to Ecuador, Nepal, Indonesia, New Zealand, Mexico, and the 2020 Puerto

Rico earthquakes, Miyamoto International has led teams of experts on dozens of response and reconstruction projects around the world. We have also led critical seismic risk reduction programs in Turkey, the Philippines, Romania, and Bangladesh, as well as disaster risk mitigation policy works in Colombia, Costa Rica, Ecuador, and El Salvador.

India lost \$87 billion in 2020 alone due to disasters such as cyclones, floods, and droughts, as per the World Meteorological Organization. Prime Minister Narendra Modi in the COP 26 Summit also highlighted the need for countries to make adaptation a main part of their development policies and schemes. As part of its efforts to promote resilient infrastructure, Miyamoto International is working with the Coalition of Disaster



Dr. H. Kit Miyamoto

Resilient Infrastructure, an international coalition of countries, headquartered in India that aims to promote disaster-resilient infrastructure. It has partnered with the U.S. Agency for International Development to provide financial, technical, and institutional support





during a phase of rapid growth to strengthen the CDRI as a premier global resource for researching, assessing, funding, and managing disaster- and climate-resilient infrastructure investments.

**What is your expertise in earthquake-resilient engineering and how can India benefit from it?**

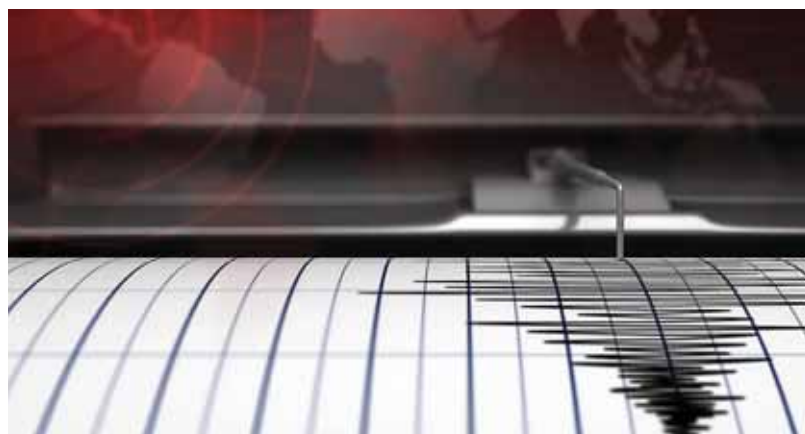
Miyamoto is the world leader in high-performance solutions for new construction and innovative techniques of retrofitting existing buildings and preserving historic treasures and assets. The company has designed numerous projects across the globe using all the advanced technologies in the world today. Miyamoto actively contributes to building code formulation by offering its expertise. The company’s global vision of achieving full seismic resilience combined with



high-performance engineering expertise enables us to provide the client with the optimal solution for both financial investment and risk reduction.

India is a fast developing nation and the need for quality infrastructure and housing that can withstand the earthquake risks is great here, as the country is growing exponentially. General awareness levels are still very low and the public at large has no idea that structures can be designed to Operational, Immediate Occupancy, Life-safety, and Collapse Prevention standards. Most buildings in India only adhere to the Collapse Prevention level of design but believe they are Earthquake Resistant construction without realizing what that implies and means. India also has a vast number of Heritage Structures that need to be preserved for future generations. Both structural and non-structural aspects need urgent design intervention.

Miyamoto India aims at bringing global best practices in seismic safety to India. By having global expertise in seismic safety just a phone call away, Miyamoto India wants to be the undisputed leader in seismic risk reduction, contributing to society by raising awareness levels and designing state-of-the-art structures. ■



Global

# Heatwaves and Fires Scorch Europe, Africa, and Asia

In June and July 2022, heatwaves struck Europe, North Africa, the Middle East, and Asia, as temperatures climbed above 40 degrees Celsius (104 degrees Fahrenheit) in places and broke many long-standing records. In Western Europe, which was already experiencing severe drought, the heatwave fueled fires that raged across Portugal, Spain, and parts of France. In Portugal, temperatures reached 45 degrees Celsius (113 degrees Fahrenheit) on July 13 in the town of Leiria, where more than 3,000 hectares (7,400 acres) had burned. More than half of the country was on red alert as firefighters battled 14 active fires.

“While there is a clear pattern of an ‘atmospheric wave’ with alternating warm (redder) and cool



(bluer) values in different locations, this large area of extreme (and record breaking) heat is another clear indicator that emissions of greenhouse gases by human activity are causing weather extremes that impact our living conditions,” said

Steven Pawson, chief of the Global Modeling and Assimilation Office at NASA Goddard Space Flight Center. ■

Source: [earthobservatory.nasa.gov](https://earthobservatory.nasa.gov)

## Weather-related disasters increase over past 50 years, causing more damage but fewer deaths

A disaster related to a weather, climate or water hazard occurred every day on average over the past 50 years – killing 115 people and causing US\$ 202 million in losses daily, according to a comprehensive new report from the

World Meteorological Organization (WMO). The number of disasters has increased by a factor of five over the 50-year period, driven by climate change, more extreme weather and improved reporting. But, thanks to improved early warnings and

disaster management, the number of deaths decreased almost three-fold.

According to the WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970 – 2019), there were more than 11 000 reported disasters attributed to these hazards globally, with just over 2 million deaths and US\$ 3.64 trillion in losses.

The report is the most comprehensive review of mortality and economic losses from weather, water and climate extremes to date. It assesses the entire 50-year period as well as by individual decade. ■

Source: [public.wmo.int](https://public.wmo.int)



## Disasters across the globe are interconnected: UN report

Natural disasters such as floods, cyclones, and droughts have been tearing across the globe at an unprecedented rate. The United Nations University, the academic and research arm of the United Nations, led a study that dived into ten such recent calamities that occurred in 2020 and 2021. The study revealed that, despite taking place at distant geographical

locations, these seemingly unconnected disasters do, in fact, have a common link.

Upon untangling the complex web that wove these disasters together, researchers found one common thread—human activity and behaviour. The recent report by the Intergovernmental Panel on Climate Change (IPCC) had

already chalked up the cause of global heating to human influence. But this new report builds on the IPCC report and highlights the linkages between human activity and various disasters such as the Amazon fires, Cyclone Amphan, COVID-19 pandemic, bleaching of the Great Barrier Reef and so on.

While most solutions necessitate international, national, or regional actions, the UN report highlights that individual actions or inactions are equally important. As this report emphasised upon, disasters are connected to human behaviour. So, the ball is in our court! If we make consistent, conscious decisions that promote solutions and avoid creating new risks, we can change agents and a part of the solution. ■

Source:

[weather.com](https://www.weather.com)



## CDRI is now an ‘International Organization’

The Union Cabinet of India chaired by the Prime Minister Shri Narendra Modi has approved the categorization of the Coalition for Disaster Resilient Infrastructure (CDRI) as an ‘International Organization’ and signing of the Headquarters Agreement (HQA) with CDRI for granting it the exemptions, immunities and privileges as contemplated under the United Nations (Privileges & Immunities) Act, 1947. Categorization of CDRI as an ‘International Organization’ and signing of HQA with CDRI for grant of exemptions, immunities and privileges as contemplated under Section-3 of the United Nations (Privileges & Immunities) Act, 1947 will provide it an independent and international legal persona so that it can efficiently and effectively carry out its functions internationally.



The CDRI was launched by the Hon’ble Prime Minister of India during the United Nations Climate Action Summit on the 23rd September, 2019, at New York. It is the second major global initiative launched by the Government of India and is a demonstration of India’s leadership role in climate change and disaster resilience matters,

globally. Since its launch, thirty-one (31) Countries, six (06) International Organizations and two (02) private sector organizations have joined as members of CDRI. CDRI has been expanding its membership consistently by attracting a wide variety of economically advanced countries, developing countries, and countries that are most vulnerable to climate change and disasters. ■

Source:

[pmindia.gov.in](https://pmindia.gov.in)

Global

# WHO declares Monkeypox a global emergency

The World Health Organisation has declared the global monkeypox outbreak a 'public health emergency of international concern' (PHEIC), one step below that of a 'pandemic.' A PHEIC, according to the WHO, constitutes "...an extraordinary event, which constitutes a public health risk to other States through the international spread, and which potentially requires a coordinated international response.." On January 30, 2020, the organisation had categorised COVID-19 as a PHEIC, when about 7,500 cases of novel coronavirus were reported. On March 11 that year, the agency elevated it to 'pandemic.' The latest decision followed a seven-hour meeting on Thursday, July 21, of the International Health Regulations Emergency Committee to discuss the monkeypox outbreak in several countries. It is this Committee of the WHO that decides on the



seriousness of a public health crisis. As part of the PHEIC declaration which is said to be "temporary" and reviewed every three months, countries are expected to follow guidelines. They are grouped into three categories: those with no reported cases or where the last case was from 21 days ago; those

with recently imported cases and experiencing human-to-human transmission and finally, countries where cases are being reported and have a history of the presence of the virus. ■

Source:  
*The Hindu*

## Sasakawa Award-2022 winners promote inclusion and protection of vulnerable people



Three individuals – Myriam Urzúa Venegas, Rajib Shaw and Glenn Suerte Felipe Banaguas – and three organizations – the Pacific Disaster Center, Save the Children Philippines, and SEEDS – are the six laureates of the 2022 United Nations Sasakawa Award for Disaster Risk Reduction. They have been recognized for initiatives which protect vulnerable communities

from disaster risk. The Sasakawa Award for Disaster Risk Reduction focuses on the promotion of inclusive and resilient approaches in disaster risk reduction, reflecting the centrality of inclusiveness and resilience in the Sendai Framework. The 2022 Sasakawa Award honours practices and efforts made by institutions, individuals and groups that have best contributed to building resilience through a multi-hazard approach.

"A key tenet of UNDRR's work is inclusivity. The Sendai Framework calls for inclusive disaster risk reduction to be integrated into planning, policy and funding. Unless we invest in prevention and building resilience, we will not be able to stop the spiral of disaster-response-recovery," said Ricardo Mena, Director, UNDRR. A record number of over 200 nominations from all regions were submitted for the 2022 Sasakawa Award. ■

Source:  
*undrr.org*

## Assam will take 943 years to protect itself from floods at current pace

According to a new study titled as 'Residual flood damage under intensive adaptation', Assam will need 943 years of flood protection measures to prevent a crisis like the one it is witnessing if its pace of preparedness and climate adaptation doesn't increase. The northeastern state has always been flood-prone. In 2022, the flooding started as early as May, with 62 per cent above average rainfall from March-May, a 10-year high, according to India Meteorological Department data. Other flood-prone states like Bihar, Uttar Pradesh and Meghalaya will need 966, 935 & 996 years respectively, the report found.

According to the study's estimate, residual flood damage (RFD) in South Asia is estimated to be around \$4 million (around Rs 31



crore) and adaptive costs around \$3 million. But the benefits from the measures employed amount to over \$50 million under Representative Concentration Pathway or 'business as usual' scenario where global greenhouse gas emissions remain

the same. On a global scale, the benefits run into \$74 billion. ■

Source:  
Down To Earth

## Delhi reports first Monkeypox case, India's fourth

Till July 26, four cases of monkeypox have been reported in India---3 from Kerala, 1 from Delhi. After a 34-year-old man from the national capital with no history of foreign travel tested positive for the monkeypox virus, the Union government held a high-level review meeting and advised airport and port health officers and regional directors from regional offices to ensure strict health screening. Health department in Uttar Pradesh has been put on alert as a woman in Auraiya district has shown symptoms of the disease. For further testing, the samples of the suspected monkeypox patient have been sent to King George's Medical University, Lucknow.



Reports claimed that the woman, a resident of Mohalla Jawahar Nagar of Bidhuna Tehsil, had fever for the past one week with symptoms

similar to that of monkeypox. ■

Source:  
India.com

### India

# Over 80% emergency response infrastructures at risk if a quake hits Uttarakhand

A seismic vulnerability assessment study of nearly 67% fire and emergency service building in the state, 60% police buildings and 18% local administration infrastructure, has revealed that 14,12% of these buildings are likely to collapse and over 67% may be damaged and put to disuse immediately after an earthquake. The study conducted by Disaster Mitigation, Management Centre (DMMC) and Uttarakhand Disaster Recovery Project (UDRP) adds that despite raising a well-equipped State Disaster Response Force (SDRF), primary response in the aftermath of a major earthquake has to be taken care of by local administration, police and fire emergency services, which are located in the proximity of the affected areas. Lack of



maintenance, faulty design, poor quality of construction, corrosion of reinforcement, settlement of foundation and extreme loading were observed to be the main causes of vulnerability in the

surveyed buildings which exhibited in the form of cracks in the building elements. ■

Source:  
*Times of India*

## Around 4.9 million Indians displaced due to natural disaster

According to the United Nations Refugee Agency (UNHCR), close to 50 lakh Indians were displaced in 2021 due to climate change and natural disasters. In 2020 in India, 3,856,000 people were displaced by environmental disasters, 989 times more than the 3,900 persons displaced by conflicts according to data of the Internal Displacement Monitoring Centre (IDMC). The number of Indians displaced due to disasters in 2019 was about 27 lakhs. The 'Costs of climate inaction: displacement and distress migration' report estimated that by 2050 over 4.5 crore Indians will be forced to migrate from their homes due to climate disasters.

India is the fifth most vulnerable



country in the world when it comes to climate change. A 2021 study by the Council for Energy, Environment and Water (CEEW) had found that over 74 per cent of India's districts are vulnerable to

extreme climate events, with 27 out of 35 states and union territories being affected. ■

Source:  
*indiatimes.com*

## Desertification: ‘Droughts reduced India’s GDP by up to 5% in 20 years’

The frequency and duration of drought is increasing at an alarming rate across the world since the onset of the 21st century, according to the Drought in Numbers, 2022 report released May 11 at the ongoing 15th Conference of Parties (CoP15) to the United Nations Convention to Combat Desertification (UNCCD). The latest assessment analyzed droughts and impacts on life and livelihood over 122 years covering 196 countries. It said an entire new generation is growing up being “water scarce”.

India has featured in the assessment as one of severely drought-impacted countries. Nearly two-thirds of the country suffered drought during 2020-2022. India features on the Global Drought Vulnerability Index, which is part of the assessment. Geographically, India’s drought vulnerability compares with that of sub-Saharan Africa. “The effect of severe droughts was estimated to have reduced India’s gross domestic



product by 2-5 per cent over the 20 years from 1998-2017,” the assessment said. ■

Source:  
[downtoearth.org.in](http://downtoearth.org.in)

## Japanese Encephalitis claims several lives in Assam

Mosquito-borne disease Japanese Encephalitis has claimed 44 lives across Assam till July 27, according to the state branch of the National Health Mission (NHM). Japanese Encephalitis has become more critical in Assam post floods. A total of 274 cases of Japanese Encephalitis have been detected in the state in the last 26 days. According to the data of the Ministry of Health & Family Welfare of the Government of India, 660 people died in Assam due to JE during the period from 2015 to 2021.

A total of 135 people died of Japanese Encephalitis in Assam in 2015, while 92 people died in 2016, 87 in 2017, 94 in 2018, 161 in 2019, 51 in 2020 and 40 in 2021. Several districts of Assam, including Golaghat, Jorhat, Majuli, Sivasagar, Charaideo,



Dibrugarh, Lakhimpur, Nagaon, Hojai, Morigaon, Barpeta, Nalbari, Baksa, Chirang and Udalguri have been affected by the outbreak of the disease.

The NHM has issued a standard operating procedure and guidelines to tackle the situation arising from the outbreak and health workers

have been conducting massive awareness campaigns against the disease throughout the state. On the other hand, this year the death toll in floods and landslides in the state has gone up to Assam’s Cachar district. ■

Source:  
*The Print*

## children's corner

**Children are our future. It is, therefore, crucial that they are included in decision-making, designing and implementing policies, plans, and standards, as emphasised by the Sendai Framework for Disaster Risk Reduction 2015-2030. We dedicate this page to them to express creatively regarding issues related to disasters and ways to mitigate their impact.**

**Shrishty Chaturvedi**

Class: 7-D standard,  
Rajeev International School ,  
Mathura



**Aviral**

Class: 7-C Standard  
Rajeev International School,  
Mathura



**Vikrant Pawar**

Class: 8-B Standard  
Army Public School,  
Pune





*We are delighted to share a few insightful views received as feedback about the previous issues from different sections of society. We take note of these suggestions and will try to ensure that they are incorporated in the forthcoming issues.*



**Monika, Entrepreneur**  
New Delhi

I read the previous two issues on Gender and Disasters, and Heatwaves. Know Disasters has demystified concepts and helped me in relating to the terms that earlier used to feel heavy and distant. I also attend its webinars regularly to deepen my understanding of disaster-related issues and at the same time, I realize my role as an individual and as a member of society in disaster risk reduction.

### **Terminology**

#### **Residual risks of flooding**

are those which arise after the construction of flood defences or control systems, when the defences or systems are subjected to unquantifiable or extreme events. The events may exceed the design parameters and cause overtopping of the defences or they may subject the defences to large forces which cause structural failure and subsequent collapse of sections of the defences.

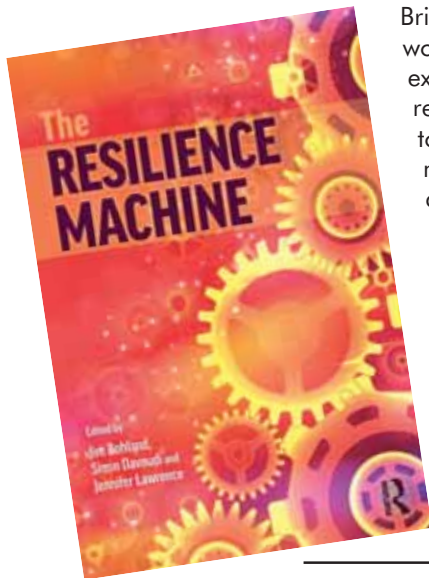
#### **Integrated Flood Management (IFM)**

Integrated Flood Management (IFM) is a new approach in which due consideration is given to the positive as well as the negative aspects of flood waters and to the valuable resource that is represented by the flood plains that these waters occupy on occasions. The approach is adaptive enough to accommodate increasing climate variability and potential climate change.

Source: Hamburg University of Technology

## The Resilience Machine

Edited By Jim Bohland, Simin Davoudi, Jennifer L. Lawrence



Bringing together authors from multiple disciplines and different parts of the world, the book unmask the often invisible effects of resilience strategies by examining ways in which neoliberal mentalities are fed through the rhetoric of resilience practices, policies and development projects. Drawing an analogy to Harvey Molotch's urban growth machine, this book explores different narratives of resilience and their policy and practice manifestations for cities, citizens and communities. It expands on the metaphor of the machine to show how resilience can be better understood as an assemblage. The contributing essays provide provocative accounts of several areas of inquiry, including biopolitics and smart bodies, resilient cities and communities, urban planning and disaster management, justice and vulnerability, and resistance to resilience. Holding out hope for critical potentials in 'resilience,' The Resilience Machine proposes to move beyond mechanisms of adaptation and into imagining what resilient life could look like in a more just, equitable and democratic world. The Resilience Machine is a current, vital addition to resilience, community and urban scholarship.

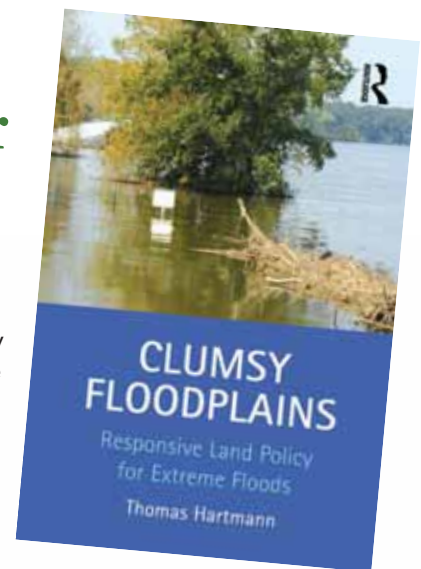
*This book is available for purchase at [routledge.com](http://routledge.com).*

## Clumsy Floodplains: Responsive Land Policy for Extreme Floods

By Thomas Hartmann

Adopting an innovative interdisciplinary approach, this book examines how society can manage the use of the floodplains along rivers in the face of extreme floods, focusing in particular on the relation between social arrangements and the elemental forces of floods. The book firstly analyses why contemporary floodplain management is so often clumsy and ineffective by looking at various real-life situations in Germany, using Cultural Theory to provide a much-needed, but previously neglected social perspective. These analyses show a pattern of activity resulting from different rationalities which dominate the floodplains in different phases. This book proposes an innovative concept - Large Areas for Temporary Emergency Retention (LATER) - in "Clumsy Floodplains" as an alternative to levee-based flood protection. The concept aims at reducing damage by extreme floods in a catchment area by inundating less valuable areas to protect places that are more valuable. It finally examines how this LATER concept might be implemented in areas where there is currently a clumsy style of floodplain management, what interventions are required and how these might come about effectively. Again, using Cultural Theory, the book puts forward a valuable land policy solution which aims at implementing LATER in clumsy floodplains and which develops an obligatory insurance against natural hazards as a responsive land policy for LATER. The book represents the author's PhD research, which he conducted as research assistant at the department for Land Policy, Land Management and Municipal Geoinformation at the School of Spatial Planning, TU Dortmund University, Germany.

*You can grab your copy at [taylorfrancis.com](http://taylorfrancis.com).*





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