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STATE OF INDIA'S ENVIRONMENT 2021

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STATE OF INDIA'S ENVIRONMENT

2021

FOCUS

A YEAR AFTER
COVID-19 pandemic and the world

STATE OF THE STATES
On development and environment

THE DECADE OF BIODIVERSITY
On state of flora and fauna and human colonisation

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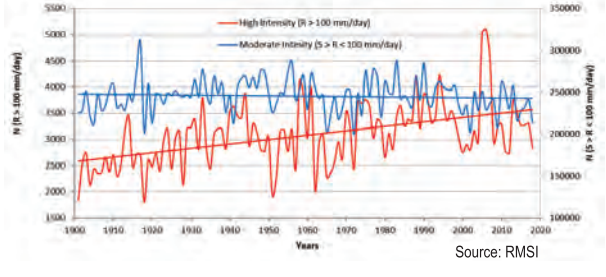
Climate Change | Rural Development | Renewable Energy | Water | Waste | Industry | Habitat | Air Pollution | Forest | Data Dive

RISING FLOODS IN THE COUNTRY

About 39 percent of the global disaster occurrences constitute flood events. In recent years, India has been witnessing a constant surge in the frequency and intensity of floods due to short-duration and high-intensity rainfall events. The severity and increasing frequency of such flood events across the country make the population and infrastructure highly susceptible to this peril.

A few studies have underlined that over Central India, the frequency of daily precipitation extremes with rainfall intensities exceeding 150 mm per day has increased by about 75 percent during 1950–2015. There has been a four-fold increase in the country's frequency of floods between 1976-1995 and 2001-2020. While flood-risk areas such as Bihar, Assam, Uttar Pradesh, and West Bengal continue to experience floods, cities like Mumbai and Chennai have become a centre of attraction due to flood conditions arising nearly every year.

Recently, it has been noticed that floods are happening in areas with no instances of historical floods, such as Rajasthan and Jammu & Kashmir. What is more alarming is that the urban spaces in western and southern India, such as Jaipur, Surat, and Hyderabad, have also started experiencing floods in the past few years. No wonder, there is a constantly increasing trend of casualties in India.



Analysis of high and moderate intensity rainfall in last 120 years

Climate variability impacts rainfall intensity

The increase in flood frequency and severity is being attributed to climate change. In fact, climate variability and change are projected to play a significant role in the coming years. Several research studies have unveiled that high-intensity rainfall frequency is likely to increase due to rising surface temperatures caused by climate change. In India, surface temperature has mounted from 1.1°C to 1.4°C since the 20th century. As warmer atmosphere can hold moisture, water vapour increases by 7 percent for every 1°C of warming. Consequently, excess water vapour results in thicker clouds containing bigger water droplets.

Climate models have also projected an increase in the mean variability of monsoon precipitation by the end of the 21st century, along with a substantial increase in the daily precipitation extremes. Thus, the chances of extreme weather are much greater now. Intense flooding is projected to be one of the most severe hazards. Even today, nearly 225 million people in the country are exposed to floods. In 2018, India encountered a loss of about Rs. 95,736 crores due to floods that is nearly 2.6 times the financial loss by floods in 2017. Hence, there is an urgent need to address flood risk in the country.

Building resilience by mapping future risks

One natural approach to build flood resilience is the integration of technological interventions to understand the flood risk. It is a critical input in answering the what-if scenarios and further planning risk reduction activities. As short-duration high-intensity rainfall is predicted to increase in the future, flood risk assessment and flood forecasting systems can help drive the roadmap to save lives, communities, and infrastructure.

Operational end-to-end flood warning and forecasting systems can also be of great benefit. These systems include building risk knowledge and response capabilities, real-time monitoring of rainfall, and forecasting water levels in rivers or urban areas. They translate forecasts into targeted warning messages to community members. As a developing nation, the socio-economic development must be resilient to flood and climate risks to build better and ensure sustainable development.

Assessing flood risk in the Ganges Basin

Ganges Basin in India, Nepal, Bangladesh and China

The Ganges Basin is frequently affected by floods due to widespread and heavy rainfall in the catchment areas and the river channels' inadequate capacity to contain the flood flows within the river banks. To understand the socio-economic impacts of flooding, RMSI executed a comprehensive study for the entire Ganges system to draw the geographical impacts of flood on various sectors exposed in the Ganges Basin spread across India, Nepal, and Bangladesh.

RMSI experts integrated hydrological and hydraulic models, advanced probabilistic risk modeling techniques, stochastic analysis, and GIS technology to derive results that helped in strategic basin assessment of the Ganges Basin. A GIS-based flood risk atlas was developed encompassing exposure data and probable financial losses due to flood in different return periods. These assessment findings can identify priority hazard areas for targeted risk management in cases such as flood forecasting, risk mitigation, and resilience building.

Fighting floods with early flood warning systems - Rapti Basin, Uttar Pradesh

Real-time flood forecasting system is critical in providing accurate warnings with a suitable lead time for the emergency response teams to take necessary actions to minimize loss to lives, communities, and infrastructure. RMSI is executing a similar technological intervention for the Rapti River Basin in Uttar Pradesh to reduce the loss caused by recurring floods due to extensive rainfall causing overflowing of rivers and embankments. The system provides forecasts as early as three days before the event's occurrence, enabling response teams to take necessary action to ensure safety of the people.

RMSI is a leading global natural catastrophe risk management consultancy offering solutions for risks associated with natural and man-made hazards. With more than two decades of experience, our expertise lies in hydrology, hydraulics, probabilistic hydro-meteorological hazard modeling, and climate change impact assessment. RMSI has a vast experience of working in varied geographies such as India, Bangladesh, Vietnam, Morocco, Yemen, Sana, Nigeria, Timor Leste, Romania, and Beirut. We can help States develop flood risk assessment and flood forecasting models and create emergency action plans for the flood-prone zones. For more information, connect with us at info@rmsi.com.

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