

Thursday, 28 March

---

InterMet 6: Warning, Response & Recovery

## **Urban Flooding and Threats to Sustainable Development A Study of Srinagar and Chennai Floods**

Himanshu Mishra, Editor (Government Affairs), New Delhi Television

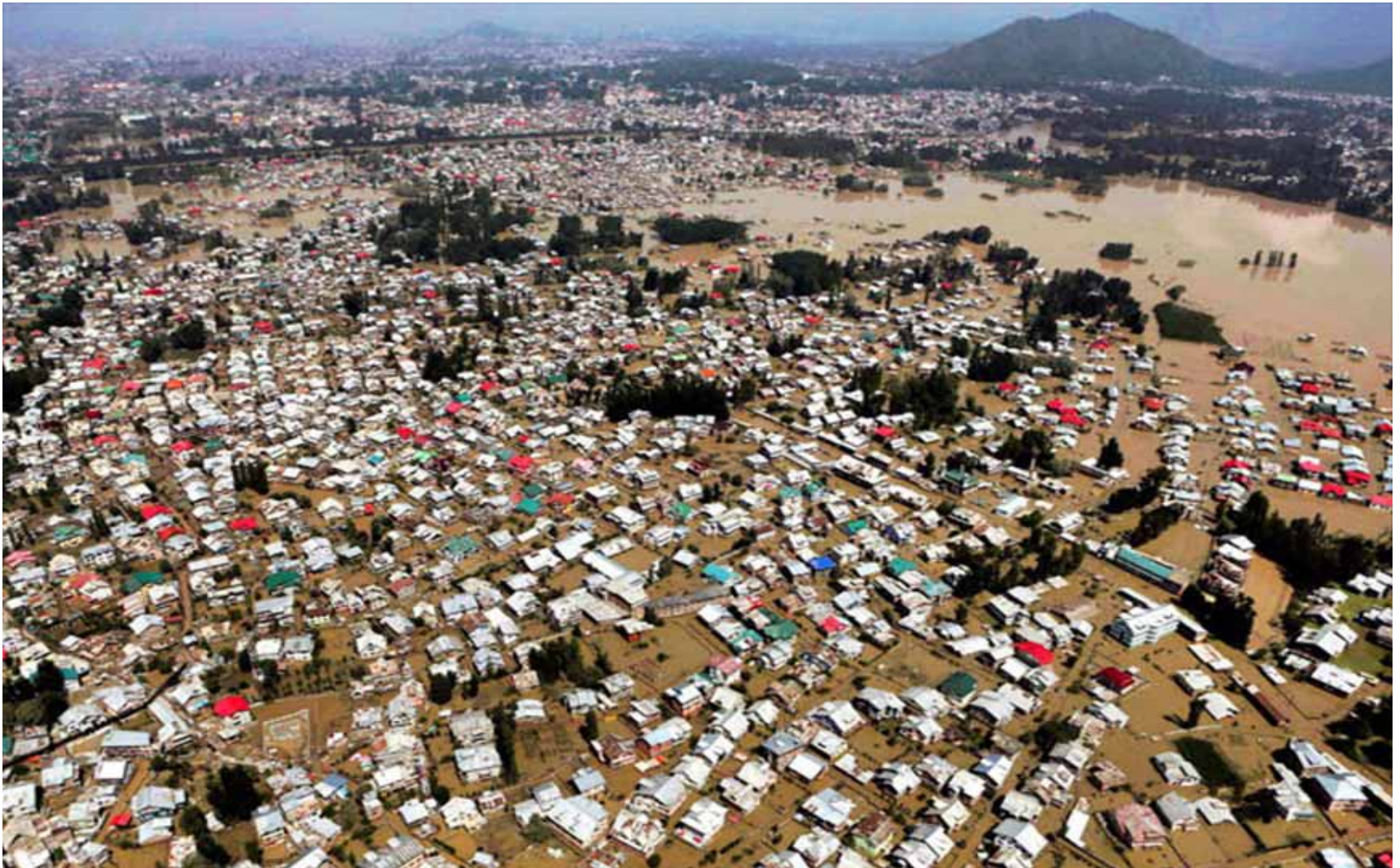
# **Urban Flooding and Threats to Sustainable Development**

**A Study of Srinagar and  
Chennai Floods**

# **Srinagar: A City under Floods (Sept, 2014)**



# **Srinagar: A City under Floods (Sept, 2014)**



# **Srinagar: A City under Floods (Sept, 2014)**



# **Srinagar: A City under Floods (Sept, 2014)**



# Worst Flood in 112 Years!

- Worst flood to hit Jammu and Kashmir since 1902. Large parts of Srinagar and adjoining districts remained submerged for more than three weeks
- Above average rainfall in 10 out of 22 districts of the state: the recorded rainfall was highest in Shopian district which received 2953% above normal rainfall while Srinagar district received 1410% above normal rainfall
- **(Parliamentary Committee Report – Dec, 2014)**

# **Srinagar Floods**

## **The Costliest Disaster of 2014**

- **Annual Disaster Statistical Review 2014**
- “The costliest disaster in 2014 was the flood in the Jammu and Kashmir region, in India, which cost US\$ 16 billion”
- Infrastructure including road communication, telecommunications, power, health, fuel distribution networks and drinking water supply system badly affected



# Srinagar Floods (Sept, 2014)



# Jammu & Kashmir Floods (Sept, 2014)



# Flood Impact on J&K Economy

- Jammu and Kashmir Finance Minister Haseeb Drabu said in his Budget Speech in state assembly on 22<sup>nd</sup> March 2015:

“The total income of the state has declined by 1.5 per cent in 2014-15 to a little less than 88,000 crore. With this the average per capita of a common man in J&K has declined from 59,279 to 58,888”.

Army deployed 329 columns (approx. 30,000 troops) along with 224 boats. 30 transport aircraft and 70 helicopters were deployed by Armed Forces. More than 3000 air sorties were done by Indian Air Force/ Army.

# Urban Flooding and Threats to Sustainable Development

- As per official data, 2.54-lakh houses were fully or partially damaged in the floods
- 287 people lost their lives
- 4207 power sub stations submerged in flood waters, Losses to Railways, Power and Communication sectors estimated at 2700 to 3000 Crores

# Chennai Floods (Nov-Dec, 2015)



# Chennai Airport under Floods (December, 2015)



# Chennai Airport under Floods (December, 2015)



# Chennai Floods (Nov-Dec, 2015)

- 470 people died, more than 12000 cattle killed
- 4.92-lakh houses were damaged or destroyed, crop area damaged upto 3.83 lakh hectares
- 19.35 lakh persons were rescued, evacuated and accommodated in 7,069 relief camps
- **Source: Rajya Sabha Secretariat - 2016**
- <http://164.100.47.5/newcommittee/reports/EnglishCommittees/Committee%20on%20Home%20Affairs/198.pdf>



# **Urban Flooding and Threats to Sustainable Development**

## **Aon Benfield Analytics's "Global Catastrophe Recap November 2015" on Chennai Floods:**

- Total economic losses in India were estimated to reach as high as INR 200 billion (USD 3- billion).
- State Government demanded Central assistance of INR 25, 912 crores (USD 3.7-billion)

# Chennai Floods (Nov-Dec, 2015)



# Chennai Floods (Nov-Dec, 2015)



# Chennai Floods (Nov-Dec, 2015)

- Hyundai, Ford, BMW, Nissan, TVS, Renault-Nissan and Ashok Leyland were forced to shut production
- Ashok Leyland plant at Ennore, two plants of Hyundai Motor India Ltd's facility in Sriperumbudur producing 680,000 units, Ford India's facility with an annual capacity of 3.4 lakh engines and 2 lakh vehicles, and a BMW plant were among those impacted
- With loss in sales of nearly 15,000 units, TVS Motor Company was another firm that took a massive hit.

# What caused Chennai Floods?

- **Parliamentary Committee on Home Affairs Report:**
- Encroachment of lakes and river beds played a major role in causing massive flood in Chennai
- Mafia involved in illegal construction for business and usurping water bodies for their real estate business
- The flood channels and riverbed should be cleared as soon as possible by removing illegal/ unauthorized constructions.

# What caused Chennai Floods?

- Storm water drains were clogged, Drainage system got choked in Chennai
- **Chennai Metropolitan Authority Report :**  
Construction of 1,50,000 illegal structures had destroyed around 300 water bodies
- The area of 19 major lakes shrunk from 1,130 hectares in 1980s to 645 hectares by 2000s

# Encroachments, collapse of drainage system in Srinagar

- **Parliamentary Committee on Home Affairs Report:**
- During the last 3-4 decades, maximum urbanization has taken place in low lying areas in Srinagar due to which there is no space for water to get stored during flood season
- The situation in Jhelum basin got aggravated due to siltation and encroachments/development of various waterways like river, lakes, marshy land etc resulting in limited carrying capacity of Jhelum and water bodies
- Centre for Science and Environment (CSE) : The collapse of the drainage system in Srinagar city was the primary reason behind the heavy damage caused by floods. Between 1911 and 2004, Srinagar city lost half of its water bodies.

# **Real Estate Mafia and Encroachment**

Real estate mafia had constructed illegal residential colonies on encroached land along the river bed which severely impacted on the water carrying capacity of Jhelum river in Srinagar and important lakes in Chennai

- Civic administration failed to undertake de-silting operations in water bodies



# Rise in Frequency of Flood Incidents

- India lost 97,691 precious lives in disasters between 1996 and 2015 (UNISDR and CRED - 2016, p-12).
- In terms of the number of people affected, India was the worst disaster-affected country in the world with 17 natural disasters affecting the lives of more than 330 million peoples in 2016 (Guha-Sapiret et.al - 2016).
- **The most disturbing is the rise in the frequency of flood disasters in India. Between 1996 and 2005, 13,660 lives were lost in 67 flood incidents but in the subsequent decade (2006-2015), a total of 15,860 lost their lives in 90 flood incidents. (UNISDR and CRED - 2016, p.14).**

# Urban Floods Disaster Management

- National Disaster Management Plan, officially released five months after the Chennai floods in May, 2016, has recommended a separate ‘Urban Floods Disaster Management’ strategy to strengthen the capability of Indian Cities to combat natural disasters. It has argued:
- “Urban flooding is significantly different from rural flooding as urbanization leads to developed catchments which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times. Consequently, flooding occurs very quickly due to faster flow times, sometimes in a matter of minutes” (National Disaster Management Plan - 2016, p.22)

# **Rural-Urban Migration and Unbridled Urbanization**

- Rapid urbanization is posing a serious challenge for disaster management as it is pushing millions of Indians to migrate from rural to urban centres in search of education, employment and better livelihood opportunities
- The consequent mushrooming of illegal colonies to house this growing mass of migrant population is especially alarming in high disaster prone zones

# **A New Strategy for Urban Floods Disaster Management**

- Municipal and Civic agencies need to take effective measures to strengthen the flood-control infrastructure and early warning systems
- Improve the network of storm sewers and initiate steps towards climate risk management
- Urban Development Ministry: Each city should have their separate Flood mitigation plans (floodplain, river basin, surface water, etc.) strongly embedded within the overall land use policy and master planning of a city.

# Model SOP for Urban Flooding

- Urban Development Ministry released an SOP on 5<sup>th</sup> May, 2017
- Model SOP has been issued for the guidance of States for preparation of their **city specific SOPs**
- **Pre-Monsoon Phase:** Preparedness: Planning for Disaster Reduction
- **During Monsoon Phase:** Early Warning; Effective Response; and Management Relief planning and execution
- **Post-Monsoon Phase:** Restoration and Re-habilitation

# Gaps in Legislative Framework

- India's nodal law to deal with disasters, the Disaster Management Act (DM Act) is silent on the challenges posed by Climate Change
- Concepts like "Climate Change", "Global Warming" and "Sustainable Development" do not figure in DM Act
- India urgently needs to amend and reform its DM Act

# Weaknesses in Cyclone Prediction Models

- Cyclonic storm “Okchi” of 2017 exposed the weaknesses in India’s Cyclone prediction models and highlighted the loopholes that existed in advanced cyclone warning systems along coastal zones
- Parliamentary Standing Committee on Home Affairs informed Indian Parliament about the failure of India Meteorology Department (IMD) to correctly predict the movement of Cyclone Ockhi which had hit states of Tamil Nadu and Kerala and Union Territory Lakshwadeep during November-December 2017

# Cyclone “Okchi”





# Cyclone “Okchi”



# Parliamentary Committee on Cyclone “Okchi”

- “The Committee observes that the advisory issued on 29th November did not clearly predict a cyclonic storm and, therefore, it was not taken with the seriousness it deserved. Moreover, rapid intensification did not leave enough time for the IMD to issue a cyclone watch or alert and, therefore, both the affected State Governments and the people were not sufficiently alert. Officially, a cyclone specific advisory was issued only on 30th November, the very date of the arrival of cyclone Ockhi but by then many fishermen would have already ventured out to sea”
- **(Rajya Sabha Secretariat - April 4, 2018)**

# Parliamentary Committee on Cyclone “Okchi”

- “While deposing before the Standing Committee, the Director General of IMD admitted that the next generation of ocean cyclone prediction models must be based on both “oceanic” and “atmospheric” models and that at present only “atmospheric” models were functional in India. His contention was that global warming was making ocean warm and it was behaving unusually”.
- **(Rajya Sabha Secretariat - April 4, 2018).**

# Climate Change and Climate-related Disasters



# UN Secretary General on Climate Change

- **UN Secretary General Antonio Guterres’ statement at the launch of UN’s “New Climate Economy Report” (September 05, 2018):**
- “Climate change is running faster than we are...Last year, climate-related disasters were responsible for thousands of deaths and \$320 billion dollars in losses. This year, we have seen the terrible flooding in Kerala in India...The last 19 years included 18 of the warmest years on record, and greenhouse gas concentrations in the atmosphere continue to rise...A significant gap remains between the national commitments and the emissions reductions we need ”

# Kerala Floods (August, 2018)



# Kerala Floods (August, 2018)



# Indian Met DG on Kerala Floods





# Indian Met DG on Kerala Floods

- Kerala Floods Because Of Climate Change, Top Weather Official KJ Ramesh Tells NDTV
- <https://www.ndtv.com/video/news/news/kerala-floods-because-of-climate-change-top-weather-official-tells-ndtv-499745>

# Rise in Climate-related Disasters (1976-2015)

Climate-related disaster events like floods, storms and heat-waves more than doubled from 3,017 events recorded between 1976 and 1995 to 6,392 events recorded during a twenty-year period between 1996 and 2015

- Emergency Events Database (EM-DAT) recorded an average of 341 climate-related disasters per annum since 2000 which is 44% above the 1994-2000 average and more than twice the level in 1980-1989
- **(Source: UNISDR and CRED Study Report)**

# Global Climate Risk Index 2018 Report

- India ranks sixth in the global list of most vulnerable nations.
- Extreme weather conditions caused economic losses up to USD 21-billion in 2016 in India.
- Around 1800 people were killed in extreme heat conditions which affected more than 330 million people in 2016

# National Aeronautics and Space Administration on Climate Change

- The level of Carbon dioxide (CO<sub>2</sub>) in air today is highest ever in last 6,50,000 years
- Seventeen of the eighteen warmest years in the last 136 years have been recorded after 2001 with year 2016 being the warmest ever
- The increase in global temperature since 1880 is 1.8 degree Fahrenheit

# NASA Data on Climate Change

- The average increase in global sea level is close to seven inches in last hundred years
- NASA's GRACE satellites have recorded a gradual decline in ice mass in both Antarctica and Greenland
- Global sea level has risen by an average of 3.1 millimeters per year (NASA – 2018) since 1993

# UN SDGs and Disaster Risk Reduction

- 10 of the 17 SDGs and 25 of the 169 Targets identified are related to disaster risk reduction
- SDG 13 deals specifically with Climate Change
- SDG – 13: International community needs to invest US \$ 6-billion annually on Disaster Risk Management measures alone
- SDG-13 aims to mobilize \$100 billion annually by 2020 to address the needs of developing countries and help them mitigate climate-related disasters

# India and Climate-Smart Growth

- **India's Nationally Determined Contributions (NDCs) submitted to UNFCCC (October 2, 2015):**
- India has outlined eight goals to be achieved between 2021 and 2030 period
- A commitment to reduce the emissions intensity of its GDP by 33-35% by 2030 from the 2005 level
- India has committed to create an additional carbon sink of 2.5-3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030

# India and Climate-Smart Growth

- A major NDC committed by Government of India includes achieving about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030.
- Union Government has set up a National Solar Mission and fixed a target of installing 175 GW of renewable energy capacity by 2022 for increasing the share of carbon free energy in the larger energy mix
- It includes developing 100 GW from solar, 60 GW from wind, 10 GW from bio-power and 5 GW from small hydro power sources (Lok Sabha Secretariat – August 02, 2018).



# India and Climate-Smart Growth

- **MOBILIZATION OF FUNDS:**
- Minister of State in the Ministry of Environment, Forest and Climate Change, Mahesh Sharma told Parliament on March 16, 2018:
- “As per India’s Nationally determined Contribution submitted to the United Nations Framework Convention on Climate Change in 2015, at least US \$ 2.5 trillion will be required to meet 2030 targets”  
(Source: Lok Sabha Secretariat)

# Sendai Framework for Disaster Risk Reduction 2015-30

- Sendai Framework categorically makes it mandatory for small and big Business enterprises to integrate disaster risk reduction practices in their management practices and enhance their investments in disaster risk reduction strategies
- To incorporate a disaster risk reduction vision in India's economic development agenda, it would be important to strengthen the risk coverage mechanism by promoting disaster risk insurance culture among both poor and the rich, small and medium enterprises and multi-national corporations

# Why Climate-Smart Growth?

- **National Disaster Management Authority-United Nations Office for Disaster Risk Reduction Report (January 2018) :**
- By 2030, 5-billion people would be living in Cities
- To meet the demands of this Urban populace by 2030, the annual investment in Transportation, Power, Water and Telecom alone is estimated to reach USD 53-trillion
- All of these new capital assets will be exposed to a plethora of natural hazards, with some of the hazard patterns continuously changing in view of climate Change

# Benefits of Climate-Smart Growth

- **UN's "The New Climate Economy" Report:**
- "We are significantly under-estimating the benefits of cleaner, climate-smart growth. Bold climate action could deliver at least US\$26 trillion in economic benefits through to 2030, compared with business-as-usual. There are real benefits to be seen in terms of new jobs, economic savings, competitiveness and market opportunities, and improved well-being for people worldwide.

# India and SDG-13 Targets

- **Challenges and Policy Bottlenecks**

Underdevelopment, institutional failure and bad governance aggravates the damages natural disasters cause to human life and economy

Absence of sustainable development practices intensifies the risk posed by disasters.

India needs to create a sustainable development framework and invest more in disaster governance research, especially on capacity building

# India and SDG-13 Targets

- **Challenges and Policy Bottlenecks**
- India has to further align its disaster risk reduction and climate mitigation strategies with SDGs and Sendai Framework for Disaster Risk Reduction targets
- An integrated approach towards disaster management and development planning would be necessary to improve the disaster governance measures and strengthen the mitigation and risk reduction capabilities of stakeholders.

# India and SDG-13: The Road Ahead

- **A significant gap remains between national commitments made by countries and emission reductions urgently needed**
- **United Nations Status Report on SDGs (2018):**
- “The year 2017 was one of the three warmest on record and was 1.1 degrees Celsius above the pre-industrial period...The world continues to experience rising sea levels, extreme weather conditions and increasing concentrations of greenhouse gases. This calls for urgent and accelerated action by countries as they implement their commitments to the Paris Agreement on Climate Change”

-