

Recurrent Flooding in Delhi and Mumbai: Challenges and Prospects for Sustainable Urban Ecology

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Abstract

Devastating floods in major Indian cities have now become a regular phenomenon. Urban cities face multiple challenges due to increased stress on the urban ecology that increases the risk and adverse impact of floods. These include unplanned urban development, often on floodplains, haphazard and unscientific land reclamation, urban heat-island effect, land subsidence due to groundwater extraction and compaction, etc. Climate change risks include changing local rainfall patterns that can lead to more frequent and higher level of floods from rivers, more intense flash flooding and sea level rise in coastal cities, causing increased flood damage. After the 2005 Mumbai floods, 'urban floods' were recognized as a 'disaster' for which separate guidelines have been laid out by the National Disaster Management Authority in India. This paper looks at the causes of urban flooding and focuses on the man-made causes in two major urban cities of India – Delhi and Mumbai. While Mumbai faces the additional challenge of coping with coastal flooding, both cities face flash floods, river flooding and most importantly, urban flooding, which frequently occurs as a result of human activities, including rampant construction in floodplains and haphazard land reclamation. Risk management challenges in the context of land-use, city and population growth, waste disposal, etc. are discussed. An important challenge for India is to reduce the risk of urban flooding and enhance the resilience of its cities. To that extent, this paper stresses the need to integrate disaster management planning within urban planning agenda and process. The real challenge would be to coordinate the functioning of multiple sectoral institutions relevant to disaster management planning. It also conveys wider issues and lessons for flood challenges in other Indian cities and towns.

Keywords: *Urban floods, Urban Ecology, Floodplains, Land Reclamation, Urban Heat Island Effect*

1. Metropolitan Cities: New Clusters of Vulnerability to Natural Catastrophes

By the year 2008, for the first time in human history, more people lived in cities than in rural areas. The United Nations expects 6.3 billion people or 68% of the world's population to be living in urban areas by 2050, with the highest increase occurring in high growth markets. Many of these cities are located on the coast or situated on river flood plains or along river deltas and are threatened by floods, storms, earthquakes and other natural hazards.

A recent study by Swiss Re (2013) shows that flood risk threatens more people than any other natural catastrophe. During the first six months of the year 2013, floods across the world resulted in billions of dollars in losses and were the world's most expensive natural disasters, with central Europe being hit the hardest (Munich Re, July 2013). The deadliest disaster out of the 460 recorded "natural hazard events" worldwide, was a series of flash floods in Uttarakhand in India, in the month of June 2013 after early and exceptionally heavy monsoon rains.

Almost all large metropolitan areas are in danger of flooding to some degree. Asian cities, which host several million people, are likely to be the hardest hit by natural catastrophes, both in terms of absolute numbers of potentially affected people and economic impact. Several Indian cities are among the top ten most vulnerable cities in the world (Table 1). Mumbai currently faces the highest risk of damages from coastal flooding (OECD, 2007) amongst all the cities in the world, measured in terms of number of people affected. By the year 2070, Kolkata and Mumbai will have the largest number of people exposed to coastal flooding.