**Urban flood resilience**

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August 8, 2018

The gaping sinkhole that emerged on Lahore’s Mall Road following heavy downpour in the city last month came as a surprise to many. For most observers, the problem stemmed from poor quality of roadwork done by the contractor.

But we must not forget that citizens welcomed the rain as a much-needed respite from the blazing heat and didn’t pay attention to the emerging risk of rapid urban flooding, which brought the megalopolis to a standstill.

Pakistan has been vulnerable to riverine floods during the monsoon season. Heavy flooding in 1950, 1965 and 2010 resulted in the loss of thousands of lives. Infrastructural damage worth billions was also reported and many people lost their livelihood due to the destruction of crops and the loss of livestock.

The country’s socioeconomic characteristics, punctuated by a dependence on agricultural and pastoral activities, and its largely rural communities are unable to withstand the effects of heavy rain and winds. This aggravates the impact of flooding. The economic effect of large-scale floods that ravaged all four provinces of the country in 2010 was estimated at a whopping $43 billion.

While urbanisation is viewed as a harbinger of development, it has increased environmental risks. The movement of people from rural areas to developed urban areas is a direct cause of overcrowding, with migrants taking up residence in marginal lands around urban centres that are prone to flooding and other risks. Research indicates that urbanising 50 percent of watershed land (the area that separates water flow) can drastically increase the incidence of floods.

Improper land use planning results in an increase in impervious ground surfaces. This has consequently reduced water absorption and, thereby, increased the potential damage that results from urban flooding. Urban sprawl and development over floodways can also impede water drainage. Another phenomenon that may contribute to urban flooding is the formation of an urban heat island – a heavily urbanised area that maintains a higher average temperature than its rural surroundings.

Urban flooding has recently taken centre-stage as a new type of natural hazard that can quickly turn into a disaster. In July, Lahore witnessed over 280 millimetres of rain swept the city that left many people dead. The intense rain also damaged roads, triggered power outages, and paralysed routine life in the city. These impacts of urban flooding have far-reaching effects on social life, development, and economic growth.

Through its significant body of scientific research, the World Meteorological Organization has deduced that precipitation levels in the future will continue to vary, leading to altered run-off patterns. Complex modifications in weather system circulation will affect rainfall patterns. As a result, monsoon rainfall is expected to increase.

Flood loss prevention and mitigation requires large-scale measures, including the construction of dams and dykes along waterways. Non-structural interventions based on a cohesive institutional approach entail effective flood forecasting and early warning systems; the utilisation of GIS-based inundation maps to simulate flood extent; and increased awareness and capacity-building among first responders and vulnerable communities.

The participation of NGOs and private entities in disaster management, with effective coordination among key government stakeholders and mandated first responders, must also be encouraged. A combination of the aforementioned interventions and grassroots-level community outreach programmes will be instrumental in bringing about a change in Pakistan’s disaster management spectrum. It will primarily enable us to shift our focus from a traditional, reactive practice to a proactive approach.

Proactive management requires more effort, time, and financing to integrate both short- and long-term interventions. But the proactive approach is what ultimately matters at the critical time before and after a disaster strikes.

It is no secret that local communities are the first line of defence and response in the event of a natural disaster. Since it takes time for trained rescuers to reach the site of a hazard, immediate assistance is almost entirely provided by communities. The capacity of a community to collectively anticipate, act, and recover from a natural hazard prevents it from becoming a disaster.

Over the last decade, the concept of community-based disaster risk management (CBDRM) has sought to identify, analyse, monitor and evaluate disaster risks and reduce vulnerabilities. It simultaneously enhances the capacity of vulnerable communities to deal with natural or manmade disasters. CBDRM heavily relies on local knowledge and traditional best practices to address regional problems. Allowing communities some degree of ownership over interventions improves sustainability and empowers people to act collectively.

The impacts of floods in urban areas is far more complex than what it is in rural areas. A number of factors, such as depth, flow velocity, and duration, must be taken into account to assess the true extent of damages. Urban flood risk management (UFRM) is a multidisciplinary approach that is built upon diverse cross-cutting roles by both government and non-government agents to develop a comprehensive, regionally-specific, integrated and balanced mechanisms for flood-risk management in urban settings.

URFM has three components for strategising flood management frameworks. The first component is flood hazard control and defence through structural measures to lower water levels, limit inundation, and reduce the destructive effects of flooding.

The second component seeks to address exposure by enhancing preparedness and adaptation through hard and soft capacity-building. Hard capacity-enhancement measures include structural measures whereas soft capacity-building tactics include risk foresight and anticipation, adaptation, improving administrative aspects, and social management to avoid being in the path of risk in the first place.

The third component of this approach addresses vulnerability by promoting measures to build resilience. These measures entail awareness campaigns, flood-risk financing, and relief, recovery, and reconstruction activities.

In order to ensure the effectiveness of UFRM in Pakistan, a series of considerations must be taken into account. First, the geographical environment of various cities along with the identification of relevant hazards and risk factors must be utilised to create regionally tailor-made plans.

Second, UFRM must take all key stakeholders onboard. This includes government authorities and departments, particularly those involved in water management, civil defence, planning and development, public finance, and health. NGOs and private entities, including those with a diverse health and safety portfolios, should also be taken onboard. Institutional linkages between these sectors will facilitate cooperative planning and preparedness.

Third, depending on the available standards of flood control, weather forecasting, and emergency response, realistic targets and goals must be established for the harmonious implementation of UFRM. These goals may also serve other purposes, such as water supply and management, groundwater recharge, and overall environmental improvement. Fourth, key development and construction activities in both urban and rural areas must be thoroughly reviewed to assess their potential impact on flood management.

Vulnerability to floods is a complex combination of interrelated dynamics and mutually reinforcing conditions that require strategic cohesion to have a long-term effect. Existing water management and flood-risk control measures may not be robust enough to cope with extensive urban flooding and its impact on all sectors of society. Therefore, climate variability should be incorporated into development projects with an emphasis on water-related management as the key priority for all interventions in commercial, infrastructure, and social sectors.

Moreover, the effective use of technology to prepare inundation maps and simulated water flows in conjunction with a robust flood forecasting and early warning systems may help alleviate the damage caused by floods in the future. In addition, vulnerable communities in flood-prone areas can be encouraged to use mobile phones to learn basic preparedness measures, and report damages to initiate timely relief and rescue efforts.

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