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## Urbanization, Climate Change and Water Security

### Adaptation Strategies and Approaches

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The relationship between urbanisation, water insecurity, and climate change is becoming evident as cities are expanding in the global south. The first key challenge is to establish the links between these three themes. The second relates to understanding the adaptation strategies of farmers and other stakeholders to address urbanization and climate change induced

water stress. This research brief looks at increasing water insecurity in four South Asian peri-urban locations, i.e., Khulna (Bangladesh), Gurgaon and Hyderabad (north-west and south India) and Kathmandu (Nepal). We show how communities adapt to water insecurity created by urbanization and climate change through a wide range of adaptive strategies.

## vulnerability and adaptation to peri-urban water insecurity

Urbanization processes create new demands for land and water. These jeopardize the water security of peri-urban residents. The effects of these pressures on peri-urban water sources are aggravated by climatic change such as frequency and intensity of rainfall, occurrence of extreme events like floods and droughts, sea level rise, and salinity intrusion. Urbanization and climatic changes are mostly addressed from rural and urban perspectives. Thus, the vulnerability and adaptation needs of peri-urban residents are ignored. Urban development plans see the peri-urban as a transitory spatial diffusion to the rural, and an unimportant component for development.

We conceptualize the peri-urban as a transitional contested space defined by unique biophysical and socio-economic features and processes. Therefore, we emphasize that the peri-urban is not merely the geographic fringe of a city. This research links peri-urban dynamics of vulnerability and water security closely to two important stressors - urbanization and climate change - and thereby offers a different perspective on peri-urban water security. The concept of adaptation demonstrates the role of human agency in relating to environmental and physical stresses; people are not passive recipients of adverse environmental changes, but exercise ingenuity and creativity in minimizing their negative impacts and exploiting their benefits. We define vulnerability as a chronic phenomenon rather than merely in terms of coping with extreme events.

## how are peri-urban communities adapting to a rapidly changing situation?

Based on intent/purposefulness, adaptation that is the result of a deliberative policy decision, based on an awareness, that conditions have changed or are about to change and that action is required to return to, to maintain, or to achieve a desired state. "Policy" includes actions by individuals, businesses, and institutions (Malik et.al 2010, IPCC).

Our study showed that in the absence of planned adaptation in the four research sites, autonomous strategies of the vulnerable social groups are critical. Strategies include technological, institutional, and those that bring about changes in livelihoods (see box).

### Major Adaptation Strategies

**Technological:** Using new technologies to access, store and distribute water, for example, use of sprinkler irrigation in peri-urban Gurgaon, India.

**Institutional:** Developing new forms of water allocation and distribution, the evolution of new norms for water sharing, collective efforts to tap water, and access to water markets, for example, water tankers operated by private entrepreneurs in Matatirtha peri-urban village in Kathmandu, Nepal.

**Changing in livelihood strategies:** Changes in water use practices, cropping patterns or choices, settlement patterns and short and long term migration, for example, shifting from rice cultivation to vegetable and fruit cultivation in peri-urban Hyderabad, India.

Khulna, which experiences increased flooding as a result of intense rainfall and urbanization, has built climate resilient infrastructure. Khulna municipality also initiated plans to provide an alternative water supply by building an impounding reservoir. However, these strategies are not targeted at improving water supply for peri-urban communities. Apart from the new plans, traditional mechanisms that protected the city from floods have not been maintained (see picture below).



Khals are water channels that pass through Khulna City, created naturally and used as drainage channels to flush out the flood as well as rainwater of the city to the surrounded outfall rivers. Disruptions of Khals and appropriation of Khal land has been one of the major reasons for increasing urban floods in Khulna city



Maximal use of water: Using household wastewater for washing clothes in Kathmandu, Nepal

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Women in peri-urban areas of Kathmandu, Nepal have evolved a system of rotational water collection based on mutual understanding and consent. They sequence households as they collect water and thus maintain local social bonds and prevent water conflicts.

In peri-urban Gurgaon, India, farmers have found sprinklers as an adaptive strategy to use water judiciously in the wake of scarcity. The use of sprinklers enables farmers to apply water closer to the crops; while optimising the use of scarce labour. With occupational diversification, farmers spend less time on the fields and to that effect automated irrigation technologies are a superior alternative to manual irrigation.



Sprinkler irrigation: An adaptive response to water scarcity in Gurgaon, India

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In Mallampet village in peri-urban Hyderabad, declining groundwater levels have led a few farmers to abandon cultivation and sell water from their lands to tanker companies for the city. This is more lucrative than tilling land as large parts of the newly developed city lack water infrastructure. Increased participation in localised water markets thus becomes an adaptation strategy. Communities are becoming inadvertent players in the city water market.



Water tanker at work in Mallampet village, peri-urban Hyderabad, India

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However, participating in water market depends on economic as well as social power. Hence, a small dominant group is engaged in drying up groundwater at the cost of the aquifer that is commonly owned. Others dependent on groundwater irrigation through water from the same aquifer are deprived, as aquifers are drying up due to groundwater mining. In Raviryala village, washer folks and fisher folks are looking for alternative livelihoods as their village lake has dried up. Therefore, within the communities, some groups are more vulnerable

## summary

- ▶ Within peri-urban areas, some individuals and groups are more vulnerable. Our research shows the different adaptation strategies that have been employed by different social groups.
- ▶ Adaptation strategies are divided between planned (initiated by the state) and autonomous adaptation (devised by water users themselves). The research shows that planned adaptation strategies are generally targeted towards improving water security in urban areas, not peri-urban.
- ▶ Autonomous adaptation strategies are more common among peri-urban communities. These include rotation system for water access, adapting to sprinkler irrigation, participation in water markets and changes in livelihood patterns.

## way forward

This research has demonstrated how urbanization and climate change impact peri-urban water security in four South Asian locations. We have also shown how vulnerable social groups adapt to such situations and innovate, technologically and institutionally.

## some issues

- ▶ Urbanization and climate change impact communities differently based on their social and economic power to adapt to the changing situation. Identification of vulnerable groups and supporting them is the key to developing peri-urban areas.
- ▶ The present urban water infrastructures are not tuned to address the challenges of urbanization and climate change. Peri-urban communities are at the receiving end of this process. While many have adapted as much as possible, many others are at a loss. The need of the hour is developing a framework for sustainable and equitable water access for urban and peri-urban residents.
- ▶ Autonomous adaptation strategies for water security in peri-urban communities should be mainstreamed.

This Policy Brief can be downloaded from [www.saciwaters.org/periurban/researchbrief.html](http://www.saciwaters.org/periurban/researchbrief.html)



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