



Water Security in  
Peri-Urban South Asia

*Adapting to Climate Change & Urbanization*

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Adapting to Climate Change & Urbanization



**SaciWATERS**



## CONTEXT

Urbanization is a defining process and characteristic of South Asia. The peri-urban zone, conceptualized as a transition between rural and urban, and emerging out of development activities, manifests itself in the dynamic social and economic interactions. This process of changing peri-urban landscape is leading to acquisition of diverse water sources and iniquitous uses of water that contributes to making water supply unpredictable and variable. Water availability is also likely to be adversely affected due to climate change which is expected to alter weather patterns.

This could lead to increased water-induced hazards like floods, inundations, soil erosion, prolonged droughts etc., thus exerting a heavy toll on human life and livelihoods, especially in the South Asian region. Cities are particularly vulnerable because of the complex and fixed nature of urban infrastructure that is responsible for more runoff and less recharge during spells of shorter, but more intense rainfall combined with increased evapo-transpiration and groundwater exploitation. As more agricultural lands are acquired from peripheral areas to cater to the increasing

demand for housing in large cities – lives and livelihoods of the poor, marginalised, and other vulnerable communities undergo grave stress. The peri-urban residents are thus, at the receiving end of the urbanization processes as well as climate related vulnerability as they lose land, water and other natural resources to meet consumption needs of the growing city. These diverse impacts of urbanisation, and its implications for peri-urban water uses and the conflicts envisaged therein for the different users needs to be understood and analysed and in turn should be translated into effective policy actions.





## WATER SECURITY IN PERI-URBAN SOUTH ASIA PROJECT

This project is exploring the implications of rapid urbanization and climate change on water availability for vulnerable communities in four South Asian cities of Khulna (Bangladesh), Gurgaon and Hyderabad (India) and Kathmandu (Nepal). It also involves research on how their adaptive capacities can be improved through technical and institutional interventions. It seeks to bring together a large number of key stakeholders which is important as many issues of peri-urban areas fall neither under the mandate of urban nor rural authorities, and thus tend to be neglected by both. The project involves elements of research, stakeholder participation as well as capacity building of target groups – both government and civil society- in meeting these challenges more effectively.

A series of interactions is proposed to bring forth the nuances of this uneven development process in South Asia.

Supported by Canada's International Development Research Centre (IDRC), Water Security in Peri-Urban South Asia Project is being coordinated by **SaciWATERS**-South Asia Consortium for Interdisciplinary Water Resources Studies and executed in association with Bangladesh University of Engineering and Technology in Khulna, Bangladesh, and Nepal Engineering College in Kathmandu, Nepal. This action-research project endeavours to bring in peri-urban water resource dynamics in the wake of climate change at the forefront of research, action and policy agenda at the South Asia level.





## GOAL

To understand the implications of urbanization processes for water access and use in peri-urban locations in 4 select research sites in South Asia and to examine water related vulnerability, adaptation and resilience of different social groups in the context of climate change.

## OBJECTIVES

- 🍃 To understand decreased water availability, competition and conflict as a result of urbanization and to draw out its implications for vulnerability and variability in the context of climate change
- 🍃 To examine how different social groups, women and men, respond and adapt to increased water stress – as shaped by a mix of technology and institutions, and what strategies they employ to cope with or adapt to the situation
- 🍃 To assess and evaluate the cost effectiveness of technical and institutional alternatives that facilitate adaptation and/or build resilience in communities at risk to climate change
- 🍃 To identify avenues for collaboration with a wide range of stakeholders who are engaged at the peri-urban interface, and to find out the institutional gap in adequately addressing the situation

### WHAT IS PERI-URBAN?

Several concepts exist regarding this term;

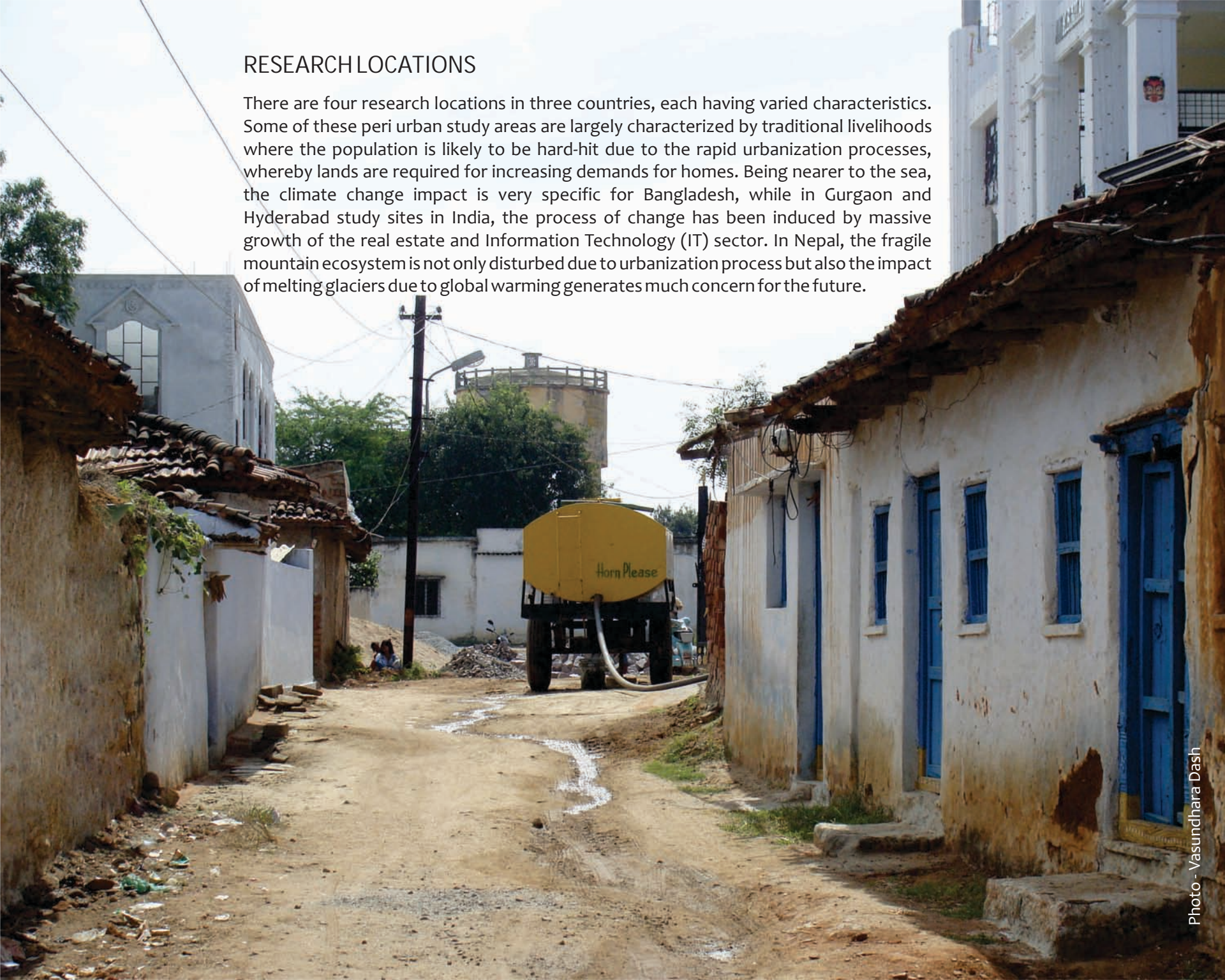
- A geographical space where rural meets urban
- Transitional zone of intense interactions, flows and linkages between urban-rural
- Located within metropolitan areas of a country but often outside formal urban jurisdictions
- Multiple use of resources, co-existing in the same area





## RESEARCH LOCATIONS

There are four research locations in three countries, each having varied characteristics. Some of these peri urban study areas are largely characterized by traditional livelihoods where the population is likely to be hard-hit due to the rapid urbanization processes, whereby lands are required for increasing demands for homes. Being nearer to the sea, the climate change impact is very specific for Bangladesh, while in Gurgaon and Hyderabad study sites in India, the process of change has been induced by massive growth of the real estate and Information Technology (IT) sector. In Nepal, the fragile mountain ecosystem is not only disturbed due to urbanization process but also the impact of melting glaciers due to global warming generates much concern for the future.





## KHULNA, BANGLADESH

A southern metropolis of Bangladesh, Khulna is the third largest city of the country. Located on the banks of Rupsha and Bhairab rivers in south-west Bangladesh, it has been identified as one of the 15 most vulnerable cities under climate change impact. An acute water crisis exists in the urban and peri-urban areas since Khulna city is dependent on groundwater as its source of supply, which is becoming saline due to sea water intrusion in fresh water bodies. The municipal corporation serves only one-third of the population and the city's fresh water sources and their adjoining areas are being polluted due to rapid industrial development and unplanned urbanization.

Since urban wastewater gets diverted to peri-urban areas and surrounding rivers, the flood water is also heavily polluted with urban wastes. The major surface water bodies including *khals* (water canals) in the city are now water logged or extinct due to encroachment and solid waste dumping. The municipal corporation is trying to import water from peri-urban areas of the city, which may hamper access of the peri-urban people to local water sources and their traditional rights to local resources. Water-related health problems and diseases are on the rise. These issues are increasing the water conflict amongst different water users and the nature and dynamics of these complexities mainly depend on social, economic, institutional and political factors.



## GURGAON, INDIA

Gurgaon's growth has mostly been characterized by the real estate boom since 1990s. Several factors have contributed to this growth of the city—most importantly, the proximity to Delhi, located about 32 km away. The population is growing steadily and this growth is exerting stress, both on the surface and groundwater supplies. Efforts at supply augmentation have meant the acquisition of lands in peripheral villages to build water treatment plants. Changes underway in peri-urban areas – like policies for land acquisition, contribute to making water supply insecure. The population is growing steadily and this growth is exerting stress, both on the surface and groundwater supplies. The city's water table level is falling at an alarming rate and new forms of rural-urban water flows are emerging. Scientists at Central Ground Water Authority have been warning that Gurgaon's water table has been declining at a rate of about two meters (six feet) every year since 2006.

They have warned that at this rate, the city will have no water left by 2017. The usual response of urban planning authorities has been supply augmentation either by building water treatment plants to supply water to the city or by tapping groundwater resources for urban, industrial and residential purposes. In the latter case, competition increases directly for groundwater, while in the former peri-urban areas, residents lose access to water indirectly as the lands on which water treatment plants are built are acquired from peri-urban residents and since rights to water are tied to rights in land, they also lose access to water sources such as tubewells or village ponds located on those lands.





## HYDERABAD, INDIA

Hyderabad has experienced growth of new residential colonies, sprawling out in the direction of newly developing industrial, educational and research centers, and along high value lands and lines of highest accessibility. However, this development has proved to be quite unsustainable and has turned out to be a serious threat to the city and its environs. These activities have aggravated the urban heat island effect and in turn affected basic amenities especially water supply for the increasing population in the newly developing areas. Hyderabad being located in an area with hard-rock aquifer has very limited percolation while water drawn from the aquifer far exceeds the amount that is actually recharged.

The present rate of access to water varies over socio-economic and physical terrain in the localities chosen for the study. In many of the villages, water quality is a serious problem faced by the locals and due to lack of political and economic power, they are not able to improve their situation and those responsible for degradation, like chemical factories are still operating at the cost of water from the surrounding villages. With privatization of water and tariffs being same for commercial and domestic use and within domestic, between large residential complexes and residences of the lower socio-economic classes, a conflict is anticipated in the core and newly developing peripheries of Hyderabad.





## KATHMANDU, NEPAL

The urban fringes around the core areas of Kathmandu valley, known for production and supply of food grains and vegetables to the city centres have undergone rapid processes of change due to continued urbanization and conversion of agricultural land into residential dwellings. The city's expansion is resulting in water stress in rural areas and urban fringes of the valley and changing the surface and groundwater hydrology. The groundwater level in the valley is estimated to have dropped between 9m to 68m at different locations. The changing pattern of water availability has led to commercial water extraction for urban needs involving multiple actors in the thriving water business, leading to a virtual tanker economy growing in size and number which is dependent on water from peri-urban locations.

This has resulted in reducing the supply for domestic and agricultural uses and accelerated the degradation of traditional water management systems in the rural areas. The emerging concerns with commercial water extraction and lack of initiatives of the local government to regulate this are a cause of serious concern. Rampant sand mining, accelerated soil erosion and land degradation is also seen at many sites in Kathmandu. Farmers in the area report of damage caused to their lands and standing crops due to increasing sediment flow from these mining sites. Apart from this, there is a clear pattern of shifts from agricultural to non-farm employment and its implication to food security and water demand at the local level. This along with increasing climatic variability will not only intensify pressure and competition for available water resources in the rural and peri-urban areas, but also limit the access and availability of water for use by rural and peri-urban dwellers, generating a concern and possibility of conflict in the future owing to unequal access.







Photo - Vasundhara Dash

## PROJECT OUTCOMES

### Documentation and Analysis

- ☞ Understanding and documenting urban growth patterns and climate change impacts on research locations
- ☞ Use of vulnerability assessment tools for measuring differential vulnerability at the household and community levels
- ☞ Studies on cost-effectiveness of different interventions that reduce risks or facilitate adapting to increased climate risks, hazards and urbanization processes

### Intervention

- ☞ Advocacy action towards a pertaining problem in each of the research sites along with capacity building at the local level to address issues for policy change in favour of vulnerable communities
- ☞ Direct action and intervention in atleast one village at every research site
- ☞ Research findings to be shared with the community to ensure that vulnerable populations have the opportunity to participate in climate resilience processes and develop their adaptive capacities

### Policy Advocacy

- ☞ Research consolidation and dissemination by workshops, reports, peer reviewed papers, policy briefs
- ☞ Representation at various forums bringing peri-urban issues around public debate in order to address specific policies through lobbying and advocacy.



## PARTICIPATING INSTITUTIONS AND RESOURCE PERSONS

### Coordination:

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The project is being coordinated by **SaciWATERS**, Hyderabad, India. SaciWATERS focuses on transforming water resources knowledge systems with an interdisciplinary approach to understanding water resources issues, from a pro-poor, human development perspective, with an emphasis on exchange, interaction and collaboration at South Asia level.

### Partners:

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**Bangladesh University of Engineering and Technology (BUET)** is the oldest and leading university in Bangladesh in the area of technology. IWFM is a premier institute for the advancement of knowledge and development of human resources in water and flood management.

**Nepal Engineering College (NEC)** was established in 1994, as a non-profit organization under private sector initiative, to function as center for advanced learning in engineering and allied sciences. It has been offering the Interdisciplinary Water Resources Management (IWRM) Program since the beginning July, 2007 under the support of Crossing Boundaries (CB) Project funded by Government of the Netherlands.

### Associate Partners:

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**Bangladesh:** Institute of Livelihood Studies (ILS); Environmental Science Discipline, Khulna University-Khulna

**India:** Save Our Urban Lakes(SOUL)-Hyderabad; Lab for Spatial Informatics - International Institute of Information Technology(IIT), Hyderabad

**Nepal:** Environment Conservation Forum, Jhaukhel; Village Water Resources Committee, Lubhu; VDC Water Resources Committee, Dadhikot

### Support:

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This project is supported by Canada's **International Development Research Centre (IDRC)**. IDRC is one of the world's leading institutions in the generation and application of new knowledge to meet the challenges of international development. For nearly 40 years, IDRC has worked in close collaboration with researchers from the developing world in their search for the means to build healthier, more equitable, and more prosperous societies.

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