

NEW ANGLE

Nepal Journal of Social Science and Public Policy

Volume 6

Number 1

2020

Water Scarcity and Sustainability in the Himalayas

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EDITORIAL INTRODUCTION: UNDERSTANDING WATER INSECURITY IN SOUTH ASIA

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South Asia is home to over a fifth of the world's population. This is also the region with the fastest rate of urbanisation, with increasing concentration of poverty in urban and peri-urban areas. Small to medium-sized cities in the lower Himalayan regions of India and Nepal are undergoing rapid expansion, population growth, and economic transformation. Although the Himalayas are considered the 'Water Towers' of South Asia, urban regions downstream are facing increasing water insecurity, due to the domino effects of various drivers such as increasing population, changing lifestyles, rising economic status, and the intensifying impacts of climate change. The round-the-year supply of water is being disrupted in

the Himalayan settlements, even in the rural areas due to the impacts of climate change.

The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) suggests that climate change is going to have widespread impacts on South Asian society and the natural environment. Climate change in this region has wide ranging impacts including flooding of settlements and infrastructure, deterioration of public health, and food and water shortages (Dupar, 2019). Recent research findings suggested that Asia's 'Water Towers' are being threatened by climate change, while seasonal rainfall patterns are changing

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with shorter monsoon period and higher post-monsoon precipitation, leading to extended water scarcity months and extreme rainfall periods (Pranuthi et al., 2014; Singh & Mal, 2014; Immerzeel et al., 2010). These studies also note that combined effects of temperature rise and erratic rainfall would decrease the rate of ground water recharge, leading to water stress in future. The latest report published by NITI Aayog (2017) of India on water security and springs contends that, in the Himalayan region, the springs are drying and discharge rate is gradually declining.

The cumulative effects of changing climate have affected agriculture, forest and biodiversity, and water resources, creating risks to human wellbeing in the region (Singh et al., 2011; Negi et al., 2012). Studies have also identified that climate change is impacting the water resources, implying that the urban water supply and demand management system would become adversely affected if improved practices are not adopted in a timely manner (Pandey et al., 2019; Dahal et al., 2019; Pandey & Bajracharya, 2017). The existing body of literature on water and climate change suggests that the combined effect of hydrological variability, socio-economic extremes, fragmented water institutions and policies and inadequate infrastructure, inter alia, make water systems particularly vulnerable to climate change at global, regional, national and local scales (Grey and Sadoff, 2007; MacDonald, et al., 2011; Pandey et al., 2019).

Studies undertaken by researchers working with a project called Climate Adaptive

Water Management Plans for South Asia (CAMPS) and others (Rai et al., 2019; Raut et al., 2019; Pandey et al., 2019; Pandey and Bajracharya, 2017; Béné et al., 2014; Mitlin and Satterthwaite, 2013; Seto et al., 2012) suggest high degree of vulnerability of marginalised groups, particularly slum residents, women, children, elderly and people with low economic status, to climate change and water scarcity. Besides, despite the proliferation of water policies and laws at national, provincial and local levels, the cities of Nepal and India are facing worsening levels of water deficit and are in need of sustainable and climate adaptive solutions.

In fact, securing water has become a global challenge, given there is very limited freshwater available for human use. Across the planet, only 2.5 percent of all the water is fresh-water and almost 2% of it is frozen. As there is small amount of usable water available, achieving water security has become difficult. Here, by water security, we mean access to enough water for domestic, social, economic, and ecosystem development, together with an institutional capacity to overcome technical and environmental barriers (Pandey, 2020; Ojha et al., 2020; GWP, 2000). The ever-increasing threat to global water security makes it imperative to understand the causes and consequences and to find possible pathways for achieving sustainable management of water resources. Hence, it has been critically important to understand the barriers and prospects of addressing urban water scarcity in the Himalayan cities in the context of rapid urbanisation and climate change.

Against this background, the goal of this special issue entitled, 'Water Scarcity and Sustainability in the Himalayas' is to consolidate emerging yet scattered evidence of water scarcity to contribute to the understanding of the dynamics of water insecurity, with particular focus on policy and institutional responses of the cities in lower Himalayas of Nepal and India. Four key questions investigated in this special issue include: 1) How climate change is impacting water resources, already scarce freshwater and water sustainability? 2) What are the challenges cities are facing for managing water resources in the context of rapid urbanisation and climate change? 3) How are climate, water and urban policies related or unrelated and what are the policy and institutional dimensions of water governance? 4) How are upstream-downstream water conflicts being managed? Considering these questions, the articles included in this special issue capture new research on the crosscutting themes of climate change, urbanisation and water. These papers critically review the existing water scarcity scenarios of cities in the lower Himalayan region, and analyse policies on water (surface water and ground water policies), climate change and urban development, and upstream and downstream water conflicts and institutional responses to manage and to improve water security of the cities. These papers also explore possible pathways for urban water security a move from scarcity to sustainability of water for South Asian region and beyond.

The first paper on *Securing Water in the Rapidly Urbanising Global South: Insights*

from Critical Analysis of 'Sectoral Policies' in Nepal (Maskey et al., 2020) investigates whether and how the sectoral policies on climate change, urban development and water address critical urban water issues, and how these policies are linked (or not linked). It presents the plight of cities in the global South highlighting that these cities are facing complex challenges of climate change, unplanned development and ageing water infrastructure. The paper notes that climate change is likely to undermine the ability of urban water supply systems to meet both the present and future needs of the population and there are serious concerns about the existing water management policies failing to address the challenges of climate change and unplanned urban development. Based on the analysis of urban, water and climate policies and drawing insights from water forum meetings organised in Dharan and Dhulikhel, the authors conclude that the existing urban, water and climate related policies have insufficient focus on urban water issues and lack effective interlinkages amongst these sectors. Constraints to policy implementation includes lack of awareness about the policy provisions, challenges and ambiguities in implementing the policy provisions, lack of recognition of the stakeholders' role in policy formulation and its effective implementation, and unclear provisions made in the policies. The authors suggest that a coherent policy framework would help to address the complex issues of urban water, shaped by climate change and urban development.

The second paper on *Groundwater Policy and Ground Water Dependencies: Reflecting on the Evolving Socio-Environmental Dynamics in Peri-Urban Kathmandu Valley* (Shrestha, 2020) highlights the issues related to groundwater use, groundwater policy and sustainability. In peri-urban Kathmandu Valley, the study shows, there is uncontrolled urban expansion, and rapid population growth, resulting into increased water demands with high dependence on groundwater. The paper argues that increasing groundwater exploitation has economically benefited only the influential ones, such as commercial users, but groundwater is degrading, both in quantity and quality, and the cost of groundwater access is increasing. The uncontrolled exploitation of groundwater by these influential people has led to inequalities in socio-environmental benefits and burdens, resulting into water-related conflicts in peri-urban Kathmandu Valley. Existing groundwater management policy, however, lacks attention to peri-urban dynamics of change and growth and does little to address the increasing peri-urban groundwater use. In this context, the author suggests to address the existing macro-micro gaps in groundwater management by improving the understanding of local hydro-geological complexities and paying critical attention to the socio-economic, political and institutional drivers of increasing groundwater use.

The third paper in this issue on *Mapping Institutional Landscape for Integrated Urban Water Management in Haldwani City, Uttarakhand* (Pandey et al., 2020) points out that water resources are

expected to affect gross domestic production (GDP) of India, and future climate change projections are far more upsetting for water resources availability. The paper assessed institutional challenges and prospects, mapping the existing institutions and their functions to explore the best possible adaptive strategy for urban water security taking the case of Haldwani city located on the lap of Indian Himalayas. The case study found that the city encounters the evident spells of water scarcity and has the resemblance with institutional arrangements and ecological resources to many other mid-sized cities in India. One of the key findings of the study is that rainwater harvesting system can be easily taken up as a nature-based solution which the institutions promote to meet the city's present and future water needs. In this background, the paper suggests that sustainable and adaptive strategies such as integrated water resources management and nature-based solutions need to be promoted globally for sustainable and integrated urban water management.

The fourth paper on *Incentives for Securing Water in a Himalayan Town: A Case from Dhulikhel, Nepal* (Joshi et al., 2020) explores the negotiations and the emerging socio-political relationships and alliances that were formed to reach a series of water-sharing agreements between upstream and downstream communities of Dhulikhel in order to secure water required for continued urbanisation of the city. The research examined the roles of socio-political relations among upstream-downstream actors in securing water for expanding towns. The authors

reported that during the negotiation process, political leaders from Dhulikhel municipality and upstream communities played key role in the formation and acceptance of the agreement for sharing water. The negotiation process that started during the 1980s culminated in a series of agreements resulting into cash incentives to the upstream community from 2011. The downstream urban community agreed and has been paying NPR one million per annum to the upstream community for their continued role in the sustainable management of the water catchment. The authors suggest that power relations between local rural and urban socio-political actors play a vital role in water access negotiations, and fundamentally influence the potentials and effectiveness of incentive-based mechanisms to secure water needs.

The fifth paper on *Cash and Climate: The Potential Role of Cash Transfers in Adaptation to Climate Change* (Rajouria, 2020) focuses on the need to integrate social protection programs with local adaptation plan for action (LAPA), making the social protection programs to be shock-responsive and adaptive. The paper notes while the national and local adaptation plans are already designed strategically aiming to strengthen the livelihoods and resilience of vulnerable households, the cash transfers as a part of the national social protection programs can be effectively employed for poverty reduction and strengthening the resilience of vulnerable groups. While both—the adaptation plans and social protection programs—embody clear and

overlapping objectives of reduction of poverty and vulnerability to shocks, they are functioning independently without any coordination. As social protection mechanisms are increasingly integrated with climate change adaptation and disaster risk reduction in other developing and emerging economies, this paper suggests that the concept of adaptive social protection and its relevance to the challenges of climate change in the context of Nepal is also appropriate.

Findings from the papers in this special issue support the arguments about growing challenges of water insecurity in lower Himalayan towns (Maskey, et. al., 2020; Shrestha, 2020; Joshi et al., 2020; Pandey et al., 2020) and the problem is getting escalated by climate change. The policy and institutional responses towards water security remains limited and fragmented across sectors and there is a need for policy coherence and integrated approach for the better response to manage surface water and groundwater. These findings concur with studies conducted by other scholars (Pandey and Bajracharya, 2017; Pandey et al., 2019; Pandey, 2020; Ojha et al., 2020) in the field identifying that sectorial fragmentation and non-coherent policies across water, climate and urban governance are leading to weak governance and institutional system to deal with emerging threats of urban water insecurity. Negotiation with upstream communities has been key challenge for the downstream towns for securing water. It appears that the payment of ecosystem services (PES) based on socio-political relations and understandings

play key role in forging and sustaining agreements between downstream towns and upstream communities for ensuring urban water security (Joshi et al., 2020). Climate change has emerged as a new amplifying challenge for water security and livelihoods in the 21st century, therefore, reducing local vulnerability becomes more prominent and adaptive social protection programs such as cash transfer can be options towards addressing local vulnerability (Rajouria, 2020).

The research on climate change, urbanisation and water strongly suggest that cities of Global South are extremely vulnerable to water scarcity and a range of integrated institutional and policy innovations are needed to address the climate-water-urbanisation vulnerability. The sectorial and fragmented institutions and policies need to be reviewed to develop a holistic, integrated and sustainable approach to deal with tripartite challenges of climate change, unplanned

urbanisation and water scarcity. Priorities need to be placed not only on mega water infrastructure to capture water from rivers far away but also on protecting locally available water sources through nature-based solutions. Examples of nature-based solutions⁴ could be building climate adaptive recharge ponds in the watershed areas, capturing rainwater for harvest and constructing climate adaptive recharge pits in every house in the city to allow water infiltration to reduced level of water due to ground water extraction (Devkota et al., 2019; Neupane et al., 2019). We believe that the contributions in this special issue suggest that integrated and coherent urban policy in the nexus of climate, unplanned urbanisation and water; nature based solutions, and adaptive social protection to safeguard the losses of climate impacts are immediately needed on the one hand and they also open up space for further policy and scientific inquiries for urban water security.

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4. Climate Adaptive Water Management Plans for Cities in South Asia has plenty of evidence based nature-based solutions inclusive of climate adaptive recharge pits, climate adaptive recharge ponds and rain water harvesting at institutional and household levels etc. among others.

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