Urban water security in South Asia: Crucial policy lessons from the Nepalese town of Bidur

Abstract
The rapidly urbanizing and highly populated South Asian re- gion is facing a water crisis. As a key response, large central- ized water systems are being put in place, replacing small and community-based systems. In this discussion note, we present the case of Nepal's town of Bidur to show that Himalayan South Asian towns cannot ensure water supply by neglect- ing community-based and small-scale water supply systems. Using insights from qualitative and quantitative data collected during 2014–2019, we argue that decentralized and commu- nity-based urban water systems are more resilient than large ones during disasters. Our argument is based on the analysis of Bidur's response to the 2015 earthquake as well as the COVID- 19 pandemic. We show that a mixed approach of large and small water supply schemes provides a promising solution to water insecurity in the South Asian towns. This approach can be realized by promoting diversity of water management strat- egies and creating research-informed planning and discussion forums at the community and municipality levels. We also rec- ommend municipalities to formulate a comprehensive water security strategy, considering the current and future scenarios of water demand and supply.

1 | INTRODUCTION

South Asia is often represented as a continent of the Himalayas, which supplies meltwater to 10 major river systems of Asia. South Asia is also a region with a rich history of community action around water and natural resources management (Bhatt et al., 2012). In recent years, this region is facing risks of water insecurity due to climate change, weak governance, infrastructural gaps, population growth, and rapid urbanization (Bajracharya et al., 2019). With 1.89 billion people, the region is also one of the most densely populated and climate-vulnerable parts of the world. It has the world's fast- est-growing regional economy and hosts the largest proportion of people living in absolute poverty (Hirji et al., 2017). The current COVID-19 pandemic has further deteriorated the situation, creating disproportionate risks to the urban poor who struggle to access clean water and sanitation.

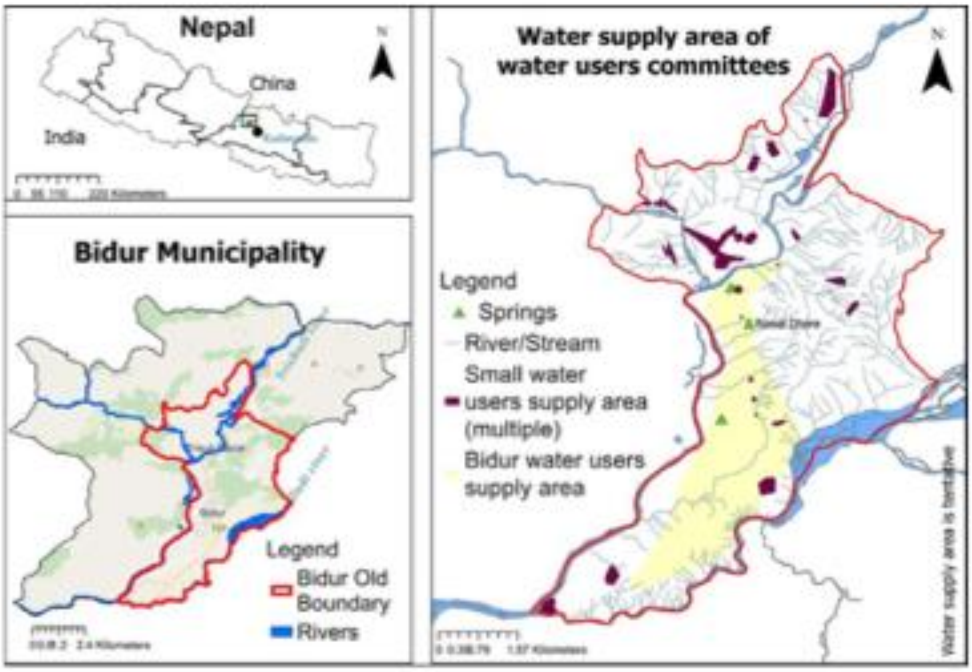
Globally, large scale centralized water systems are being promoted as a solution to address bur- geoning urban water challenges (Leigh & Lee, 2019). Smaller and community-based water supply systems are being replaced on grounds of their limited capacity to manage large infrastructures. South Asia is no exception. However, the exclusive focus on large infrastructure has led to several critical issues related to operational efficiency, cultural compatibility, and sustainability. Using the Bidur town case of Nepal, we argue that decentralized and community-based urban water systems offer greater resilience in water supply systems, especially in times of disasters. As elaborated later, these systems are geographically dispersed reducing the impact of system failures to small areas. Further, the small-scale water management systems also disperse operational risks, and save significant cost and energy in managing, operating, and replacing infrastructural networks, unlike the challenge faced by large-centralized water projects (Leigh & Lee, 2019).

These case-specific findings of Nepal can be related to the South Asia region facing water insecu- rity issues. The information and evidence underpinning this policy discussion note are based on 5 years of field research conducted between 2014 and 2019.[1] Data were collected through both qualitative and quantitative techniques. The field research started in 2014 with inception meetings with city-level of- ficials and community leaders to explain the purpose of the research and seek their cooperation. In the next step, we conducted a geographic mapping of 31 community water users committees followed by key informant interviews to understand and document the history and institutional arrangements for water management. We surveyed 32 visitors at one of the springs—*Rawal Dhara*—to understand their use and dependencies on the local spring along with structured observation to examine the frequency and reasons of people visiting the spring to collect water. We also conducted a household survey to understand the coping mechanisms of individual houses after the 2015 earthquake. More recently, we co-organized two city-level multi-stakeholder water forums with the Bidur Municipality in 2019.

2 | BIDUR TOWN: COMMUNITY-BASED WATER SUPPLY IN THE URBAN SETTING

Bidur is a small town located near the confluence of the Trishuli and Tadi Rivers in the central Nepal Himalayas, nearly 40 km northwest of the capital city of Kathmandu. It was one of the towns hardest hit by the 2015 Gorkha Earthquake, which devastated the Bidur Drinking Water Supply project. The main water supply of the town has been managed by the Bidur Drinking Water and Sanitation Users Committee (BDWSUC) with support from the Bidur Municipality since 1995. Figure 1 shows the location of Bidur Municipality and water supply system.

Spread around the towns, the local water sources are too small to meet demands beyond the 4 months of the rainy season (Dahal, 2014). Along with this, these community water user groups experience



F I G U R E 1 Supply area of the community water users committees and location of *Rawal Dhara*

internal conflicts and issues of water quality, quantity, and delivery efficiency (Ojha et al., 2020). In this context, Bidur water policymakers and planners have been facing a question: should they focus on renovating and strengthening the large water supply system, or should they also support dozens of smaller schemes that provide a critical water safety net in times of crisis?

Bidur has experienced the failure of a large water infrastructure project constructed for irrigation of a large section of the town. This system was built in the early 1980s to irrigate about 700 ha of land in the Battar and Pipaltar areas of Bidur with water pumped from the Trishuli River. It stood as a symbol of the pride and prosperity of Battar until it ceased operating in the mid-1990s (Dahal, 2014). This system failed because the system was not efficiently repaired due to a lack of finance and technical expertise. Around NRs 101.95 million (equivalent to US$ 0.87 million) was spent over 15 years but the project closed down just after finishing two-third of the work.[2] Some attempts were made to revive the project, but it could not be revived due to a fund crunch in 2005 which has left behind the hope of 1,000 families to increase the productivity of their irrigated land.

Another large-scale Asian Development Bank (ADB)-supported drinking water supply project is initiated in Bidur which is currently being developed by the Government of Nepal.[3] With an investment of seven million US dollars, the project aims to tap 89 L of water per second from the source in order to supply water to 58,659 people living in 10,114 households till 2035.[4] The ADB has provided funding for 70% of the costs, 25% was raised as a loan from the Government's Town Development Fund, and the remaining 5% is to be contributed by the local water users. As the region was among those most affected by the 2015 earthquake, the Nepalese Government paid a 5% contribution on behalf of the community. The ADB contribution is a mix of loans and grants offered on the condition that Bidur residents pay back their share of the project cost when the project begins operation. Bidur residents have been waiting for this project to be completed and operational, as construction work continues. The leadership of Bidur municipality has repeatedly said that the water crisis in Bidur will be resolved after the project is completed.

While the large-scale scheme of an integrated water supply system is in progress, small water schemes have been playing a pivotal role in meeting daily needs. The role of the smaller community-led schemes was never as instrumental as immediately after the 2015 earthquake. These local sources were then the only option for marginalized households, such as those from informal settlements and poor people who either have no access to the municipal water supply system or could not afford to pay.

In addition, the earthquake revealed glaring gaps in the large-scale municipal water scheme cur- rently under construction. The Bidur water supply project has been adversely affected by landslides and flooding, as the pipe systems and supporting infrastructures were either swept away, dislocated, or damaged due to these frequent disasters. The damaged system could not immediately resume operations due to technical and financial limitations. For an essential commodity like water, it was not possible to keep households waiting for their supply while the infrastructure was repaired. Despite being a matter of hope, delight, and anticipation, the large scheme turned out to be both a technical burden and a managerial complexity.

A survey carried out by the Southasia Institute of Advanced Studies (SIAS) in 2016 found that more than 55% of households suffered pipe damage to their Bidur water supply source from the 2015 earthquake. However, more than 80% did not suffer severely, as they had access to alternative water sources supplied by these smaller community-led projects. *Rawal Dhara* is a popular public tap erected at a spring source. However, this tap is also used by well-off people with access to piped water at homes. Each day, several hundred people come to collect water from this tap, and sometimes conflicts arise over sharing the tap water.

At the time of the COVID-19 pandemic in early 2020, Bidur residents once again had to rely on smaller community-managed water supply systems. This was because machines used by larger proj- ects had technical problems and could not be repaired for operation due to the lack of technicians available in the town. The COVID-19 induced government lockdown barred travel for technicians along with others.

3 | ARE THE SMALL SCHEMES SUSTAINABLE?

Recent disaster incidents have underlined how the 31 community-led small-scale schemes are crucial to meeting the water needs of Bidur residents, particularly to the populations from poor and marginal- ized groups. Further, the SIAS survey found that people have a strong preference for spring water over the river-sourced ADB-supported water supply project, arising from taste and cultural preferences. In SIAS' 2016 survey conducted among users of the community-led scheme *Rawal Dhara*, which is located in the middle of the town, 92 people were observed visiting the spring through a 90-min observation period. Among them, 32 people were surveyed in depth. Among those interviewed, 82% stated that they visited this spring due to the better taste of the water. More than 70% of the households who visited this tap also had individual pipe connections, yet they preferred the *Rawal Dhara* for their drinking water. In an interview a woman fetching water in Rawal Dhara noted (interviewed in 2019); *I have to walk 10 min to come to this tap but I am happy to invest my time and effort because of the water we get from Rawal Dhara is of very good taste and quality. This water, we can drink directly without boiling it. We feel lucky as we have this water source in our community*.

Small projects and sources such as these springs have proved to be a lifeline to people during times of "disaster" in Bidur. While 40% of households during the 2015 earthquake depended exclusively on local springs, others also used these local springs as an alternative or supplemental source of drinking water. This dependability has established the small schemes and springs as a reliable alternative water source when larger systems seem to inevitably fail in times of disasters.

Just as they prefer the taste of spring water, community members are fully committed to continu- ously manage and maintain these small water supply schemes. Although the ownership of these water sources is de facto, community groups fully own the small water and the supply scheme infrastructure. The community leaders we interviewed were very confident that they will continue to manage these schemes even after the large ADB-supported project begins to supply water to the town. The small schemes are also preferred by poor and marginalized groups as there are no or little tariffs to be paid to access the spring's water, unlike the larger project.

The large-scale schemes provide piped water to individual households, for which installation costs and monthly tariffs must be paid. On the one hand, the municipal water supply is too ex- pensive for poor families, as it is linked with a water tariff. On the other hand, people residing in informal settlements do not have access to the municipal water supply system because they do not possess the required documentation—a land registration certificate—to enable them to get a piped connection. Consequently, local water sources are likely to remain the continued source of water for these households.

Having recognized this nuanced situation, water is often difficult to share and distribute, and con- flict often arises between households. Under-privileged communities often depend entirely on ad hoc access to smaller, nearby water sources or local springs. They have to rely on community taps. During our survey, we found that 7% of the people visiting *Rawal Dhara* did not have piped water connec- tions. An interview from squatter settlement reported (Interviewed in 2019); *We have community pipe connection for water supply but not a drop of water comes through the pipe, we depend entirely on local springs nearby*.

4 | DIVERSITY MATTERS: A NEW WATER SUPPLY SYSTEM FOR THE HIMALAYAN TOWNS

The Bidur water supply system shows that diversity built into the urban water supply strategy is important for water security. Figure 2 shows the diverse water management schemes of Bidur. The town has multiple sources of water in its vicinity but accessing these in practice is not easy. The government-led and ADB-supported project taps water from the river. The water user committees tap one or more spring water sources from the neighboring mountains. Some of the schemes collect water supplied by one user committee and distribute it to households under the name of a different user com- mittee, though their source is the same.

As 60% of Bidur residents were left out from the existing municipality-supported formal, large system managed by the BDWSUC, the rest turned to several smaller community-led water supply systems in the town, especially in the southern suburban areas. Figure 1 shows the supply area of BDWSUC. These community-led projects emerged in Nepal after 1996 when the state was paralyzed by nation-wide conflict, which left the town without an elected local government.

This sort of diversity in water management strategies within a small town gives fascinating insights into how water could be managed within the urban community. Small springs and schemes are found to be reliable in terms of access, regularity, and quality of water. While large schemes can supply water to large portions of the town at a more efficient operational cost, small schemes are equally useful for water supply to the people living near the source areas. There is also a nominal effect of any damage in small water supply schemes. Hotels and small industries that require more water buy it from tankers or bottled supplies despite the high cost. In practice, diversification is the norm in Bidur, as several single house-holds are connected by multiple water pipes so that they can have alternatives in case the main supplies fail, which has occurred numerous times over the years. As the likelihood of unprecedented stresses to the

F I G U R E 2 Diverse water management schemes of Bidur

supply system remains high, including the risk of future disaster, the importance of diverse water sources to households is part of a strategy that constitutes effective water management in this context.

5 | BIDUR LESSONS FOR HIMALAYAN SOUTH ASIA

At least three lessons emerge from the Bidur case. First, the Bidur model of promoting diverse water management strategies could be useful for other lower Himalayan towns that have access to multiple local water sources. As the Bidur experience shows, a complex mix of government, community, and private systems of water supply can function side by side in Himalayan towns. Large-scale water sup- ply schemes may be vital for meeting growing water needs and some water quality standards, but the significance of small-scale and locally managed schemes should not be underestimated. Such schemes can be a lifeline during times of crisis to ensure water access to people who have limited finances and the capacity to participate in more expensive or complex schemes. Further, recognition of local people's preferences for spring-sourced drinking water is important and, where environmentally and practically feasible should be supported. Second, creating research-informed planning and discussion forums at the community and municipality level are important. Focused and continuing dialogues among municipal authorities, researchers, and all prominent water actors are vital to explore, inform, and develop meas- ures to ensure sustained and equitable supplies of water. In the *Pani Chautari* or Water Forum that we supported during our research, our research team stimulated discussions based on research-based evi- dence and knowledge. For instance, in the Water Forum organized in September 2019, the municipality came to recognize the need for better recognition of the twin-track strategy of supporting larger and smaller projects simultaneously. Following this *Chautari*, the municipality is actively supporting exist- ing small-scale schemes and local springs through municipal planning and budget allocations.

Since providing support to and regulating multiple small- water-user committees could be expen- sive for the Municipality, it is deliberating over whether to develop a policy to categorize different types of community schemes and to ascertain the developmental and regulatory needs associated with each category. These issues became a matter on the Municipality agenda following the sharing of research insights by the research team. This also demonstrates the value of independent research and its incorporation to support municipal-level planning.

Third, Municipalities need a comprehensive water security strategy, which takes into account the current and future scenarios of water demand and supply. Scenario-based planning has particular relevance in light of the growing problem of climate change affecting water supply. Along with this, municipalities could consider prioritizing low-cost technologies in line with nature-based solutions— such as source conservation, rainwater harvesting, climate adaptive recharge ponds, and pits, as well as generating awareness for behavioral changes for more efficient use of water (Ojha et al., 2020). These options require the collaboration and cooperation of multi-scalar governments and stakeholders as well as locally engaged interdisciplinary research teams. Above all, integrated planning is a prereq- uisite for making towns resilient to external shocks, whether from short-term, sudden shocks such as earthquakes, or longer-term changes arising from climate change.

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CONFLICT OF INTEREST

On behalf of the author, the corresponding author states that there is no conflict of interest.

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ENDNOTES

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2. [2] The Himalayan Times (https://thehimalayantimes.com/business/battar-pipaltar-irrigation-project-in-offing/).
3. [3] This is part of the nation-wide Small Towns Water Supply and Sanitation Sector Project (STWSSSP).
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