

Urbanizing flows. Growing water insecurity in peri-urban Kathmandu Valley, Nepal



Anushiya Shrestha

Propositions

1. Changing ways of accessing water are increasing peri-urban water insecurity and conflicts.
(this thesis)
2. “Development” in Kathmandu Valley is dominated by pro-urbanization policies and practices.
(this thesis)
3. As researchers are increasingly judged on the number of their publications, papers are increasingly written to meet this quantitative requirement.
4. An independent researcher is only a fantasy that fails to acknowledge unlimited supporting hands and encouraging minds that make research possible.
5. Situations of resource conflict strengthen the privileges of some at the expense of opportunities of others.
6. For a Nepalese woman, academic work brings additional career opportunities, but impedes socio-cultural responsibilities.

Propositions belonging to the thesis, entitled

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Urbanizing flows.
Growing water insecurity in
peri-urban Kathmandu Valley, Nepal

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Urbanizing flows.
Growing water insecurity in
peri-urban Kathmandu Valley, Nepal

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List of abbreviations

APM :	All-Party Mechanism
CBS :	Central Bureau of Statistics
CCMCC :	Conflict and Cooperation in the Management of Climate Change
CFUG :	Community Forest User Group
DBDWSCC :	Dadhikot <i>Brihat</i> Drinking Water and Sanitation Consumers' Committee
DCSI :	Department of Cottage and Small Industries
DDC :	District Development Committee
DFID :	Department For International Development of United Kingdom
DWRC :	District Water Resource Committee
DWSS :	Department of Water Supply and Sewerage
DWSSD :	District Water Supply and Sanitation Division
FAO :	Food and Agriculture Organisation
FGD :	Focus Group Discussions
GoN :	Government of Nepal
GWP :	Global Water Partnership
Ha :	hectare
GWRDB :	Groundwater Resources Development Board
HMG :	His Majesty's Government of Nepal
ICIMOD :	International Center for Integrated Mountain Developmpent
IDC :	Inter Disciplinary Consultant
IDRC :	International Development Research Centre
INGO :	International Non-Governmental Organization
JICA :	Japan International Cooperation Agency

Km ² :	Square kilometer
KUKL :	Kathmandu Upatyaka Khanepani Limited
KVDA :	Kathmandu Valley Development Authority
KVWSMB :	Kathmandu Valley Water Supply Management Board
LAPA :	Local Adaptation Plan of Action
MDGs :	Millennium Development Goals
MLD :	Million liters per day
MoE :	Ministry of Environment
MoFALD :	Ministry of Federal Affairs and Local Development
MoLD :	Ministry of Local Development
MoUD :	Ministry of Urban Development
MWSP :	The Melamchi Water supply Project
NAPA :	National Adaptation Programme of Action
NGO :	Non-Governmental Organization
NPC :	National Planning Commission
NTNC :	National Trust for Nature Conservation
NWO :	Netherlands Organisation for Scientific Research
NWSC :	Nepal Water Supply Corporation
OECD :	Organisation for Economic Cooperation and Development
ORR :	Outer Ring Road
RDWSS :	Raksidol Drinking Water Supply and Sanitation
RDWSSC :	Raksidol Drinking Water Supply and Sanitation User Committee
SDGs :	Sustainable Development Goals
STDWSSCC :	Shasambhu-Thulaghar Drinking Water Supply and Sanitation Consumers' Committee

UDDWSCC : Uttisghari Dadhikot Drinking Water and Sanitation Consumers' Committee

UN : United Nations

UNDESA : UN Department of Economic and Social Affairs

UN-Habitat : United Nations Human Settlements Programme

UNICEF : United Nations Children's Fund

USAID : United States Agency for International Development

VDC : Village Development Committee

WECS : Water and Energy Commission Secretariat

WHO : World Health Organization

WRA : Water Resources Act

List of terms

<i>Brihat</i> :	Extensive
<i>Chakhu</i> :	Safe granary
<i>Chunauti</i> :	Challenges
<i>Dalits</i> :	Untouchables / outcastes
<i>Dhap</i> :	Marshy area
<i>Gaun</i> :	Village / hamlet
<i>Jana Andolans</i> :	People's movements (during political transitions in Nepal)
<i>Khola/kholo</i> :	Stream
<i>Kulo</i> :	Canal irrigation system
<i>Kuwa</i> :	Community shallow wells
<i>Matwali</i> :	Liquor Consuming Castes
<i>Mohi</i> :	Tiller farmer
<i>Muluki Ain</i> :	The codified and written law applicable to the whole kingdom of Nepal
<i>Nani</i> :	Term that refers to a younger sister
<i>Pani nacalne choi</i>	
<i>chito halnu parne</i> :	Untouchable castes
<i>Pani nachalne</i> :	Those with whom higher castes were not to share water (to drink or use water offered or touched by them)
<i>Pani nachalne choi</i>	
<i>chito halnu naparne</i> :	Impure but touchable castes
<i>Raikar</i> :	It denoted the crown-land or state land until 1950. Since then <i>raikar</i> land denotes an individual's private land.
<i>Rajkulos</i> :	Royal canals
<i>Ropani</i> :	Unit of land measurement (1 hectare=19.65 ropani)
<i>Samasya</i> :	Problems

<i>Sarkis</i> :	Cobblers caste groups
<i>Sim</i> :	Groundwater spring
<i>Tagadhari</i> :	Castes wearing of sacred thread
<i>Tole</i> :	A small settlement within a hamlet
<i>Varna</i> :	The basic stratification of the caste system, which divides society into four layers: Brahmins, Kshatriyas, Vaishyas and Sudras.

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Chapter 1

Introduction

1.1 The water has gone

Farmers, both men and women, were busy, trying to drain water out of their paddy fields, water logged after an overnight rain. The paddy was not yet ready for harvesting and farmers were worried because the water could damage their crop and reduce the yield. During an interview, it became clear that in the past these fields had been irrigated from a stream-fed canal irrigation system. Over the years, these fields turned into rain-fed fields, making cultivation more difficult for the farmers:

Farmer 1 (man): *“until the monsoon begins, there is very little water in the stream” [that feeds this canal].*

Farmer 2 (woman): *“nowadays no one needs an irrigation canal; people only need roads. All these fields are going to be covered by houses”.*

Farmer 3 (man): *“these new houses and roads often encroach on the canal. It has already been encroached on at many sections”.*

Farmer 2 (woman): *“I thought you had also come to see the land to buy it”.*

(Field notes, 31-10-2015)

Experiences of being perceived as “someone looking for land to buy” are common in peri-urban Kathmandu Valley in Nepal, where, with rising land prices, the sale of land has become a tempting source of income for many. For many others, fragmentation of land through inheritance or the division between landowners and tillers leaves no option except selling their small land parcel. After the devastating earthquake in 2015, many people needed to rebuild their houses, and often the only means to arrange the needed finances is selling land. Often, land of such farmers in need of money is bought by speculators, converted into residential plots, and sold at much higher commercial prices, mostly to in-migrants seeking to settle nearby Kathmandu, the capital of the country.

Although complaints about rapidly changing land use are common in peri-urban Kathmandu, people also cherish hopes for development associated with these changes. In a group discussion about the future of agriculture in Kathmandu Valley, for instance, a group of female farmers

argued: “until and unless there is a road, there will be no development activities. With good roadways, people from outside come in; isn’t that the entry point for the development of the village?”. Amid these complaints and hopes about changing uses and ways of governing land, development agendas and policy priorities, Kathmandu Valley is rapidly urbanizing, mainly at the cost of its agricultural land. These rapid changes, however, resulting into a mosaic of agricultural and non-agricultural land, economic activities and livelihoods, have much wider implications. A major issue in Kathmandu Valley is the increased use of, and competition for, water resources, an example of which I presented in the beginning this chapter. Yet, the interrelations between changing land use, changing water use, and access to and control over water have not received much scientific attention. Relatively little is known about how diverse actors in the peri-urban context experience and deal with such rapidly changing water uses, the concomitant changes in access, rights and water security, and how these changes affect social relations and the “resilience” of communities in the increasingly diverse and dynamic peri-urban spaces. In this thesis, I aim to unfold the lived experiences of the peri-urban population with changing water access, right, water security and related conflicts in a context of this rapid urban expansion that is deeply transforming the, formerly, pre-dominantly agricultural areas into so-called “peri-urban areas”.

Derived from the word “peripheral” (Butterworth et al., 2007: 11), “peri-urban areas are the transition zone, or a zone of interaction, where rural and urban activities are juxtaposed, and landscape features are subject to rapid modifications, induced by human activities” (Douglas, 2006: 18). Although often seen as a transitional stage between rural and urban, the “peri-urban”, as discussed in this thesis, is better characterized by the co-existence of diverse and dynamic social groups, institutions and economic activities. In other words, peri-urban is “a sociological rather than a geographical term” (Marshall et al., 2009: 12). With its changing populations, growing pressures on resources and related claims and contestations, the peri-urban provides an important lens to understand the interconnected socio-ecological changes associated with growing flows of resources from rural to urban areas and activities, and how access and rights to resources are changing for increasingly heterogeneous social groups in these processes.

1.2 Peri-urbanization: the process of “becoming urban”

The world is rapidly urbanizing, with particularly radical urban expansion in developing countries.¹ Contemporary urban expansion in developing countries is typically marked by haphazard conversion of agricultural land into non-agricultural uses, resulting in still poorly understood socio-environmentally complex spaces characterized by flows of people, goods, resources, ideas, interests and waste. Although urban expansion occurs by appropriating land and other resources in the periphery of cities (Allen, 2003; Friedmann, 2011; see Narain, 2009a; 2009b; 2014, for South Asia), traditionally studies on urbanization relied on a simple urban-rural dichotomy in which little attention was devoted to the dynamics of, or implications for, the fringe areas (Simon, 2008). The rural-urban fringe, increasingly replaced in the scientific literature by the term “peri-urban”, started gaining more research attention only from the 1970s (Bryant and Charvet, 2003; Simon, 2008). In its report on peri-urban agriculture, the Organisation for Economic Cooperation and Development (OECD) states that the peri-urban “is a name given to the grey area which is neither entirely urban nor purely rural in the traditional sense; it is at most the partly urbanized rural area. Whatever definition may be given to it, it cannot eliminate some degree of arbitrariness” (OECD, 1979 in Butterworth et al., 2007: 11). Whether the peri-urban is defined as place, process, or concept (Narain and Nischal, 2007), or as a multidimensional continuum (Jaquinta and Drescher, 2000: 18) with an urban-rural gradient through the peri-urban, the ambiguity remains. However, the differences are relevant in terms of the different approaches to the peri-urban more generally, as will be explained below.

As a place, the peri-urban is referred to as “mixed spaces”, which are “midway between urban centers and rural spaces” (Dupont, 2005; no page number). The peri-urban, the “transition zone between city and countryside, between what is unambiguously ‘urban’ and supposedly typically ‘rural’ vary in width and nature, and are subject to rapid change with increasing urban pressures” (Simon et al., 2004: 236). Many authors, however, argue that urban proximity is not a defining feature of peri-urban spaces and that such a place-based approach to peri-urban as “fixed states” rather limits incorporation of the peri-urban dynamics and diversities, and restricts social and analytical relevance in analyzing peri-urban complexities (Jaquinta and

¹ The urban population of the world has grown rapidly from 751 million in 1950 to 4.2 billion in 2018. With this, 55 per cent of the world’s population lives in urban areas. The world’s urban population is expected to increase to 68 per cent by 2050, 90% of this increase taking place in Asia and Africa (UNDESA, 2018).

Drescher, 2000: 18; Brooks et al., 2003). They stress that, with changing frontiers, driven by urbanization, the peri-urban is “a restless landscape”, understanding of which requires a focus on the processes underlying these dynamics (Brooks et al., 2003; Friedmann, 2016: 164). In other words, a place-based conceptualization of the peri-urban is juxtaposed with, and often superseded by, a process-based understanding that emphasizes the flows of people, capital, commodities, resources, services and wastes in processes shaped by rapid economic, sociological, institutional, and environmental changes (Marshall et al., 2009).

As a process, peri-urbanization indicates “the coming together and intermixing of the urban and the rural, implying the potential for the emergence of wholly new forms of social, economic and environmental interaction that are no longer accommodated by these received categories” (Leaf, 2011: 528). Allen (2003), finally, emphasizes the relevance of the peri-urban as a conceptual lens to understand the interactions between urban and rural features. She notes that the peri-urban is characterized by a heterogeneous mosaic of “natural” ecosystems, “productive” or “agro-” ecosystems, and “urban” ecosystems with heterogeneous social groups that are in constant transition. Such a more conceptual interpretation of the peri-urban enables a focus on the linkages between co-existing agricultural, natural and urban activities and related institutions, thereby overcoming the over-simplistic and discrete mode of thinking in terms of urban planning and rural development (Narain, 2009a; 2009b; 2014; Narain and Singh, 2017).

Amid these diverse approaches to the peri-urban, the insight is growing that “the socio-spatial transformations of the peri-urban can never be understood in abstract, theoretical terms, apart from the many inter-connected context-specific phenomena that comprise it” (Friedmann, 2016: 164). Moreover, authors studying peri-urban issues argue that it is less important to define peri-urbanization than to better understand the underlying processes through which multiple actors, with competing and conflicting needs, interests, framings of realities and strategies, mobilize their technologies, institutions and socio-political connections in claiming and contesting access, rights and control over resources, and how these (re)shape the peri-urbanization process (Webster, 2011; Quarta et al., 2018).

Although generalizations are difficult, studies have noted that peri-urbanization processes often reveal some common characteristics. Generally, the peri-urban tends to have a subordinate position in relation to priorities for urban expansion and is, therefore, subjected to the rapid changes in land use driven by the latter. This not only transforms land, but also has profound impacts on use and governance of peri-urban landscapes, with a growing focus on these areas as providers of “resources”, thereby increasing competition among and between existing and

new peri-urban resource uses and users and their diverse interests (Allen, 2003; Marshall et al., 2009; Narain, 2009a; 2009b). These trends are also very clear in South Asia.

This urban domination over the peri-urban is particularly increasing in terms of water resources, which are massively appropriated to satisfy the ever-growing urban demands. This increases the occurrence of competing claims, contestation and conflicts, while it changes existing water uses, forms of access and rights (Celio et al., 2010; Janakarajan, 2009; Narain, 2014; Ruet et al., 2007). While peri-urban water is appropriated for urban areas and uses, peri-urban spaces often remain excluded from such urban-oriented water services and largely suffer from degrading water quality and quantity, with adverse impacts on their water-based livelihoods (Karpouzoglou et al., 2018; Narain and Singh, 2017; Ruet et al., 2007). These problems are aggravated by their rapidly changing demographic and social composition, changing and often conflicting interests, multiple overlapping, weak and often competing governance institutions. Thus peri-urban spaces become recipients of differential impacts of urbanization-induced changes, benefiting some while more burdensome for others. In such fluid contexts, access to water is increasingly a function of power, technology and economic reach, as both surface water and groundwater are appropriated by the urban and peri-urban elites and well-to-do, thereby (re)producing social inequities and inequalities (Mehta and Karpouzoglou, 2015; Narain, 2014).

The diverse experiences of urbanization-induced changes create and often enhance potential for conflict. However, issues of unequal abilities within peri-urban populations to exercise rights and access resources, how these (re)shape social relations, and with what implications remain over-shadowed by the discussion of unequal power relations between the village and the city (Vij and Narain, 2016). Hence changing water allocation strategies, access, rights and related conflicts common in peri-urbanization processes are still under-researched (Mehta and Timothy, 2015, Vij et al., 2018). More recently, however, “community resilience”, often based on a conceptualization of “community” as a homogeneous collectivity with shared interests and goals, are gaining popularity as a concept and as a means to both analyze and deal with socio-environmental issues, such as peri-urban water insecurities. Given the complex nature of the peri-urban, the growing popularity of such approaches underlines the need for a more critical understanding of what community and resilience might mean in this context (Roth, 2016; Roth et al., 2018).

Drawing on the real-life experiences of changing water access and rights of the peri-urban population of Kathmandu Valley, this thesis attempts to answer important questions about how and why some are able to access water and exercise water rights, while others are excluded.

Further it seeks to analyze how these differences in water (in)security relate to water-related conflicts and what these mean for the “community resilience”. While this is the central issue that I am dealing with in this thesis, I am aware that a water-only focus is not adequate for understanding peri-urbanization processes and that the links between changing populations, land uses and water security are crucial in understanding these flows and processes (Butterworth et al., 2007; Narain, 2014).

1.3 An overview of peri-urbanization in Kathmandu Valley

Fieldwork for this study was conducted in several locations in peri-urban Kathmandu Valley, where land and water uses are rapidly changing, also impacting on the water security of inhabitants of these areas. Kathmandu Valley, which includes Kathmandu, the capital of Nepal, is one of the fastest growing urban agglomerations in South Asia (Muzzini and Aparicio, 2013). Administratively, Kathmandu Valley includes two metropolitan municipalities and 16 municipalities in three districts: Kathmandu, Lalitpur, and Bhaktapur.² Together, these districts cover an area of 899 km², whereas the area of the valley as a whole is 665 km² (Shukla et al., 2010). Historically, Kathmandu Valley used to be known as Nepal and any early history of Nepal is actually the history of the Kathmandu Valley (ICIMOD, 2007). Many small towns were already established in this valley by the second century, and urban centers by the 11th century. The valley has always been an important cultural and religious center, and also constituted a hub in the trade route between India and Tibet (ibid). With the unification of Nepal after the Gorkha Conquest in 1769, Kathmandu was made the capital. Since then Kathmandu continues to be the center of power and politics in the country (Shukla et al., 2010).

The prosperity of Kathmandu Valley has been attributed to both its long history of local agricultural practices and its fertile and productive agricultural land, with crop yields significantly higher than national averages (HMG and USAID, 1986; ICIMOD, 2007). The low-lying farming areas of Kathmandu Valley had fertile soils and an elaborate network of irrigation systems, which made intensive farming possible (HMG and USAID, 1986; Pradhan and Belbase, 2018). The earlier settlements in this valley were located on the drier, less fertile elevated land. This land use practice was based on a conscious land use strategy for maximizing the area of agricultural land and preserving fertile and irrigable agricultural land (Tiwari, 1999; Shrestha and Shrestha, 2009). After the Gorkha conquest, the physical development of the

² The number of municipalities in the valley has increased from five until mid-2014 to 18 in 2017.

valley was greatly influenced by the construction of new palaces outside the city core. This practice was most prominent during the Rana regime (1840-1950) (ICIMOD, 2007). The Rana rulers deliberately kept the country in isolation so that their rule could be prolonged (Shukla et al., 2010). In Kathmandu Valley, they occupied agricultural land outside the urban core and restricted migration into the valley (ibid; Dixit, 1997).

The exclusively agricultural character of the landscape of the valley began to change from the 1950s onwards, with the abolition of the Rana regime (in 1951) and development of the first highway (in 1956) connecting the valley to the southern part of the country. A ring road around the existing urban core in the valley was built during the 1970s. This road significantly enhanced the urbanization process across the valley (Thapa and Murayama, 2010). Industrial activities also emerged and expanded from the 1970s, which increased employment opportunities. Between 1981 and 1991 the valley's urban population increased by over 82 per cent. Migration accounted for 59 per cent of this increase, while the population involved in agriculture decreased from three-fourth to one-third of the total population (ICIMOD, 2007).

This trend of urban expansion continued, deeply transforming the rural agricultural landscape of the valley into a peri-urban space characterized by the co-existence of agricultural and non-agricultural land and water uses, economic activities and livelihood practices. Growing about 4.3 per cent annually, the population of the valley increased by over 499 per cent between 1955 and 2008 (Bhattarai and Conway, 2010), and reached over 2.5 million in 2011 (CBS, 2012a). The built-up area in the valley has increased from 5.1 per cent in 1989 to 26.06 per cent in 2016, showing a tremendous increase of 412 per cent, mostly at the expense of agricultural land (Ishtiaque et al., 2017). The most intensive urban growth happened between 1999 and 2009, largely fueled by the influx of migrants from the countryside who had been displaced by political turmoil³ or stagnant growth in the agricultural sector (ibid). Not only cheaper land, but also weak enforcement of building permit requirements in the Village Development Committees (VDCs⁴) motivated migrants to settle there (ICIMOD, 2007).

³ The Maoist "People's War" in Nepal was launched on 13 February 1996 and officially ended with the peace accord of 21 November 2006. While over 13,000 people were killed during this ten-year (1996-2006) conflict, tens of thousands of people were displaced (USAID, 2006; UN, 2012). This resulted in massive migration to more urban areas in reaction to the Maoist insurgency in rural areas. In 2015, Nepal promulgated its new Constitution. Following the local and provincial elections held in 2017, Nepal formally adopted a new three-tiered federal structure of government. Nepal has seven provinces now, with a total of 753 local government units.

⁴ Prior to the restructuring of the local government in 2017, the VDC (administratively a rural area) was the smallest local government unit in Nepal, administratively divided into nine wards.

In addition to this rural-urban migration, attracted by low land prices and the greener environment, a growing number of city dwellers is moving out to settle in the peri-urban valley. Hence, the rate of growth is much higher in peri-urban Kathmandu Valley (4.8 per cent annually) than that in the urban areas (3.9 per cent) (Muzzini and Gabriela, 2013). This trend, which accelerated in the 1990s, continues under the influence of ongoing in-migration of people, even after the signing of a peace accord with the Maoists in 2006 and the new governance structure of Nepal after the promulgation of new constitution in 2015. Moreover, as Nelson (2017) notes, the recent political instability and inability of the government to provide basic public services have decreased the public's already shaky trust in government institutions and representative democracy. In this context, involvement of private actors in provision of basic services, including water, has surged, particularly in rapidly urbanizing areas like Kathmandu Valley.

With urban expansion and growing population, water demand in Kathmandu Valley has tremendously increased. The traditional water sources were based on both surface water — rivers, ponds and *rajkulos* (royal canals) — and shallow groundwater sources, which together met irrigation and other needs (ICIMOD, 2007; UN-Habitat, 2007). Unplanned urbanization and lack of maintenance and management have led to the drying up and degradation of many of these sources. Furthermore, disposal of solid and untreated liquid waste has massively polluted the Bagmati River, the valley's principal river, and many of its tributaries. Nonetheless, field observations show that such polluted water is increasingly used for irrigation. Increasing pollution of surface water sources and increasing water demand in the valley have resulted into an increasing use of both shallow and deep groundwater in the valley. Yet, there still is a massive and growing gap between water demand and supply. The water demand in Kathmandu Valley has reached 377 million liters per day (MLD), while supply is 120 MLD in the wet season, and further goes down to 73 MLD in the dry season (KUKL, 2017).

This increasing water demand-supply gap resulted in the emergence of private commercial urban water supply. Over 90 per cent of such private urban water supplies in Kathmandu Valley is based on peri-urban groundwater sources (Shrestha, 2011). However, studies have shown that the groundwater in the valley is already over-exploited (Creswell et al., 2001; Shrestha et al., 2012; Pandey and Kazama, 2013). In 2006, the government established the Kathmandu Valley Water Supply Management Board (KVWSMB), aiming at the improvement of drinking water supply services and control of unregulated use of groundwater. Nonetheless, with

unplanned urbanization, exploitation of groundwater for both public and private uses has continued.

Water supply and water pollution were identified as perennial problems of Kathmandu Valley already in 1987 (HMG, 1987 in Rest, 2018).⁵ Against this situation, the Melamchi Water Supply project, the first prefeasibility study of which dates back to the end of the 1980s, was launched in 2000, supported by several foreign investors (Domoench et al., 2012; Rest, 2018).⁶ This ambitious inter-basin water supply project, framed as the most viable long-term alternative to Kathmandu's water scarcity, is still under construction. It aims to augment water supply in Kathmandu Valley by bringing 170 MLD of water from Melamchi River to the valley through a 26 km-long tunnel.⁷ However, "with the host of unbuilt, delayed, unfinished, or suspended infrastructures" the Melamchi Water Supply Project continues to stand out as "the solution to Kathmandu's water scarcity" that is "always just beyond reach" (Rest, 2018: 3-8).⁸ In the meantime, population, pollution and water demand in Kathmandu Valley have increased tremendously over the past decades, with an enormous impact on peri-urban land and water resources (see chapters 3 and 5).

The National Urban Policy of 2007 states that "Kathmandu-centric urbanization, is a major cause for the imbalance in national urban structures" (MoPPW/DUDBC, 2007: 1). Various plans for urban development of Kathmandu Valley have been formulated at different times. Implementation of these, however, has largely been poor (KVDA, 2015). Thus, unplanned urbanization in the valley has continued, engulfing the agricultural lands at an alarming rate and adversely affecting the traditionally practiced collective initiatives around water management. Considering that the current developmental priority of the Government of Nepal is urbanization "as the best way to sustainable development" (MoUD, 2016: 3), urban-oriented changes in land and water uses in Kathmandu Valley, "the hub of Nepal's urbanization" (MoUD, 2017: 1), are likely to accelerate.

With the establishment of new municipalities in 2014 and restructuring of local government units in 2017, Kathmandu Valley has turned into an (administratively) non-rural municipal

⁵ In November 2012, the government issued a White Paper on the existing situation and an improvement plan for the drinking water services in the valley.

⁶ The major donor of the project, the Asian Development Bank (ADB), approved a loan on 21th December 2000 which was effective from 28th November 2001.

⁷ <http://www.melamchiwater.gov.np/about-us/melamchi-ws-project/project-description/>

⁸ <http://peoplesreview.com.np/kathmanduites-still-need-to-wait-a-year-for-melamchi-water/>

zone.⁹ Furthermore, Kathmandu Valley Development Authority (KVDA), the formal authority for physical development of the valley, aims to develop infrastructure to accommodate a 10 million population in the valley (Abhiyan National Daily, 2016). One of the projects selected towards this aim is the construction of the Outer ring road (ORR). This ambitious eight-lane road which encompasses all three districts of the valley, aims to delineate a “rural-urban boundary” (Department of Urban Development & Building Construction, 2008, cited in Shrestha, 2013). In these contexts, changes in land and water use in peri-urban Kathmandu are likely to become more intensive, deeply and differentially changing water access, rights and water security for a growing peri-urban population. Although Nepal has a long history of land and water rights, these institutions are unable to cope with these radical changes, as will be discussed below.

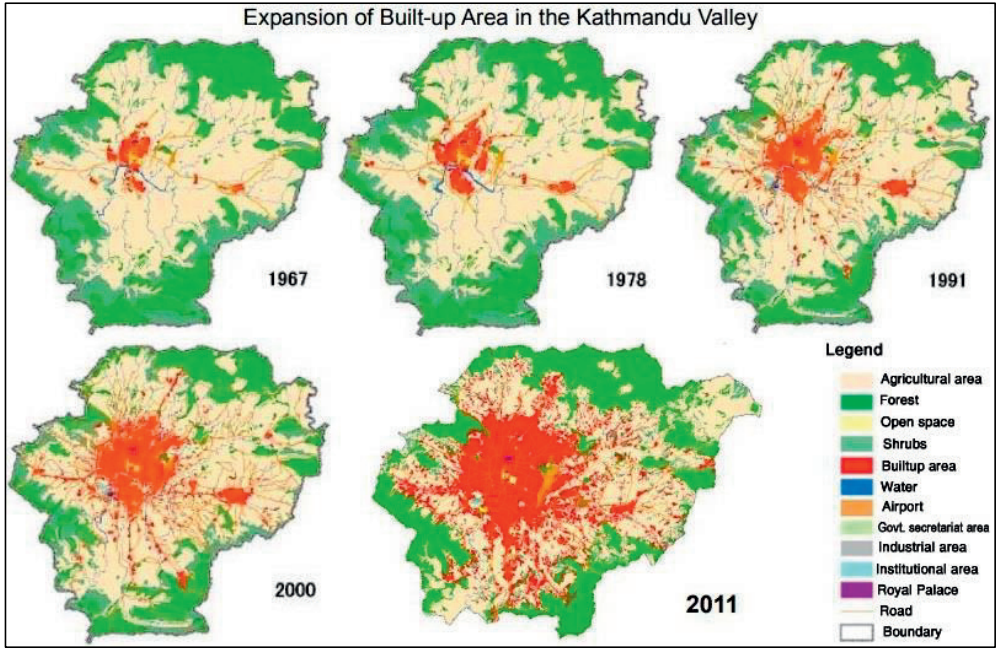


Figure 1.1. Expansion of built-up area in Kathmandu Valley (Source: JICA, 2012).

⁹ The number of municipalities in Nepal has increased from 58 in 2011 to 293 (six metropolitan cities, 11 sub-metropolitan cities, 276 municipalities) in 2017. In Kathmandu Valley, the number of municipalities has increased from five until mid-2014 to 18 in 2017 (two metropolis and 16 municipalities).



Figure 1.2. A view of urbanizing Kathmandu Valley (Source: author).



Figure 1.3. Built-up areas expanding into the formerly irrigated fields in Kathmandu Valley (Source: author).

1.4 Changing rights to land and water in Nepal

Nepal is among the least urbanized countries but also in the top-ten of fastest urbanizing countries in the world (UNDESA, 2015). Land tenure systems and land reform in Nepal have been extensively studied (Regmi, 1976; Adhikari, 2008; Dhakal, 2011), but relatively little attention has been paid to more recent, specifically peri-urban, processes and problems yet. Prior to the 1950s, land in Nepal primarily belonged to the kingdom, and was known as *raikar* land.¹⁰ As “owner” of the land, the king bestowed land on his subjects under a diversity of tenure arrangements (Pradhan, 2000). The 1950-1951 “revolution” —which ended the Rana regime and established parliamentary democracy and a constitutional monarchy— and a subsequent land reform brought changes in this total ownership by the king and the tenure privileges of the elites (ibid). After 1950, the term *raikar* land denoted an individual’s private property, for which he or she pays tax to the government and has full rights of selling, using, inheriting, transferring, dividing and leasing (Adhikari, 2008). Regmi (1976) provides an analysis of the evolution of private property rights to land in Nepal.¹¹ Although land reform continues to be a politically charged issue (Adhikari, 2008; Dhakal, 2011), enactment of the 1964 Lands Act, following a strong peasant movement in the 1950s, brought significant changes in land tenure in Kathmandu Valley. Following the Act, the formal system of subdividing land equally between landowners and tillers started in the valley.¹² Furthermore, the Act considerably reduced the land rent to be paid by tillers (for Bhaktapur, see Hacchethu, undated; Thapa, 1996).¹³ With growing in-migration and housing demand in Kathmandu Valley since the 1970s, the price of land quickly outpaced profit from rents based on agricultural production (Nelson, 2015). Soon, land transactions and speculation massively increased in the valley. These changes in socio-political relations and institutional practices around land use and

¹⁰ Raikar was the crown-land or state’s land; state was synonymous with the crown (Adhikari, 2008).

¹¹ Private property right to *raikar* land permitting sale, mortgage and tenancy without any restriction in all parts of the country, subject to the official registration and payment of the tax to the government was explicitly recognized by law for the first time in 1921 (Regmi, 1976).

¹² The Lands Act 1964 of Nepal uses the term “tiller” and “tenant” interchangeably and defines “tenant” (*mohi*) as “a peasant who holds the land that belongs to another landowner to till the same on any terms and cultivates the land by him/herself or his/her family’s labor”. The act requires a land tenancy right to be formally registered. Such registered tenants are entitled to half of the cultivated land. In this study “tiller” is used to refer to the farmers with such right. “Tenant farmers” in this study refers to farmers renting in land through rental payment in cash for land access, but with no rights upon the division of land or change in land use.

¹³ Prior to the Act, 2/3rd of the gross product was extracted as rent and various kinds of customary levies (Thapa, 1996). After enactment, landowners were entitled to a much lower share only (Hacchethu, undated)

governance continue to have considerable implications for current practices of rapidly changing land and water uses, access and rights in Kathmandu Valley.

In remarkable contrast to the history of land rights, but also closely related to changes in the broader political economy of the country, the history of water rights is characterized by increasing state control and growing dissociation of land and water rights. Linking water rights to rights to land and to contribution for construction or maintenance of irrigation systems, *Muluki Ain* of 1854, the first codified and written law applicable to the whole kingdom, and later amendments to it in 1952 and 1963, recognized the prior appropriation and riparian rights in defining priority in the acquisition, allocation and distribution of water for irrigation (Pradhan, 2000).¹⁴ Moreover, the different versions of the *Muluki Ain* focused on land rights, as land was a major source of revenue; except for a few sections dealing with irrigation, water and its regulation were seen as unimportant and left to local customary laws and uses (ibid).

With growing importance of water in the Nepalese political economy, the state began to be actively involved in planning, development and regulating water resources for public welfare. Hence, a need was felt to enact laws to empower the state to regulate and develop water sources. The 1992 Water Resources Act (WRA) broadly nationalized all water resources (surface and groundwater, on private and public land; rivers, lakes, wells, springs) of Nepal.¹⁵ Since the promulgation of this act, formally the state owns, regulates and controls all water resources of the country. The WRA deals with issues like licensing, taxes and license fees, beneficial use, expropriation, compensation for land and infrastructure, water use priorities, public use, and the role of Water Users' Associations for collective use. It stipulates the "beneficial uses"¹⁶ of water by laying down the priority order for water utilization, drinking water and domestic uses being the first in the priority list.

Soon after the government had formally expanded control over water in the early 1990s, Nepal underwent a decade-long Maoist insurgency. This conflict caused prolonged political instability and ended in a protracted and difficult process of political transition. Although the Local Self-Governance Act, promulgated in 1999, aimed to devolve the state's power, responsibilities and resources to local government bodies, the latter lacked crucial decision-making power and

¹⁴ see Pradhan (2000: 56-57) for provisions concerning irrigation in the three versions (1854, 1952, 1963) of *Muluki Ain*.

¹⁵ Water came to be seen as "blue gold", a potential source of enormous revenue for the state and wealth for the elite, especially if hydroelectricity were generated and exported to India (Shrestha, 2009).

¹⁶ This means rational uses of water within the available means and resources (WRA, 1992).

financial capacity. When the tenure of local representatives (elected in 1998) expired in 2002, the central government, through the Ministry of Local Development (MoLD)¹⁷, authorized its civil servants to take over the governance system. Lacking the capacity and ability to create local legitimacy, they had to rely almost entirely on personal relationships rather than formal procedures to perform their duties (Asia Foundation, undated). With the country in the midst of political conflicts, development decisions were largely made from safer distant district headquarters.¹⁸ In addition to hampering the overall notion of having elected representatives accountable to the people, such protracted political turmoil allowed for a high level of corruption, exacerbated long-standing issues of weak governance and hindered the country's overall development (ibid; Tamang and Malena, 2011). As Rademacher (2011: 55) notes, democracy "that seemed to hold infinite promise in 1990 eventually became synonymous with disorder, greed, corruption, loss, and ecological degradation in the capital". The impacts of poor planning and governance are prominent in peri-urban Kathmandu Valley where land and water uses have rapidly and rampantly changed in the past decades while interventions to regulate these have remained almost absent.

In this context of conflict and political transition, water governance also remained weak. Although formally all individual water rights are secondary to that of the state and rights over land and water have been dissociated, in actual practice water rights are still closely tied to land rights, and the mismatch between regulatory provisions and the organization of enforcement on one hand, and real-life water use practices on the other is widespread. For instance, KVWSMB is authorized for groundwater regulation and management in the entire valley and has formulated the Groundwater Policy (2012), which has been approved by the cabinet. Yet, its implementation has remained poor, and exploitation of this over-exploited, depleted, degraded resource (Shrestha et al., 2012; Pandey and Kazama, 2011; 2012) continues to increase in the radically changed waterscape of Kathmandu Valley. Nonetheless, state ownership of water resources, together with rapidly changing water use and (re)allocation practices, have weakened the water rights of existing users, such as those based on prior appropriation or riparian rights. Such rights have gradually become subordinate to those of the state (Pradhan, 2000) and, as the

¹⁷ Nepal abolished its monarchy in 2008 and with this the MoLD was renamed the Ministry of Federal Affairs and Local Development (MoFALD).

¹⁸ The absence of elected local representatives resulted in the introduction of the All-Party Mechanism (APM), members of which represented different parties on a one-party-one-representative basis in making consensus-based decisions for resource allocation at local level. This temporary remedy for the political vacuum at the local level acquired formal legitimacy in 2008 and was dissolved in January 2012, amid charges of widespread misuse of local funds (Asia Foundation, undated).

empirical findings in this thesis show, to that of the state-prioritized and increasingly urban-biased water uses, and socio-economically and politically powerful water users (see chapters 3, 4, 5 and 6). Dixit (1997), for example, argues that, through the promulgation of laws and policies in justifying the role of state organizations for development and management of water resources, the state has accentuated the dichotomy between the capital and the rural areas. This has resulted in rising competition and emerging conflicts between urban and rural interests in the use of land and water, particularly in Kathmandu Valley.

1.5 Researching “peri-urban water conflicts” in Kathmandu Valley

While I was familiar with the idea of a “rural-urban” dichotomy, the term “peri-urban” was new to me until some years ago. My acquaintance with the term “peri-urban” started in 2010, when I was working as a Research Assistant under the peri-urban water security project at Nepal Engineering College.¹⁹ This three-years’ research, which started with initial struggles in selecting research sites that reflected specific peri-urban characteristics rather than merely being locations peripheral to a city, provided me with opportunities over time to closely observe the diversity and dynamics of peri-urban spaces. One of the major insights of this research project was that urbanization is the major driver of the rapid transformations and increasing peri-urban water insecurity, and that increasing pressures on peri-urban spaces are giving rise to water-related conflicts in the urbanizing villages.²⁰

In-depth research on the issues of water-related conflicts started in 2014 under the NWO- and DFID-funded project “Climate Policy, Conflicts, and Cooperation in Peri-urban South Asia. Towards Resilient and Water Secure Communities”.²¹ When I was still a Research Assistant, I started exploring potential research sites and interacting with relevant governmental and non-governmental organizations. I particularly recall the interactions with an official from Kathmandu Upatyaka Khanepani Limited (KUKL), the organization responsible for the public water supply services in Kathmandu Valley. After I gave him a briefing about the project aims and objectives, the officer suggested me in a warning tone not to raise the topic about peri-

¹⁹ This action research project was funded by the International Development Research Centre (IDRC).

²⁰ This project also involved analysis of climatic data, which showed an increasing temperature while no clear long-term rainfall trend was found in Kathmandu Valley (see Sada et al., 2016). Climate change is noted to have adverse impacts on water resources in Nepal (WECS, 2011).

²¹ This research project was part of the research programme “Conflict and Cooperation in the Management of Climate Change (CCMCC)”.

urban water conflicts. He argued that such a research could distort and disrupt the existing urban water supplies from nearby rural areas in Kathmandu Valley. In the national context of recent civil war and ongoing political upheavals, the official could have referred to the term “conflict” relating it to the civil war or to demands for compensation against the transfer of water from the River Melamchi for urban water provision in Kathmandu Valley (see Domènech et al., 2013; Rest, 2018). Yet, his reaction gave me a first-hand experience of the sensitiveness of researching “water conflicts” in general, and in Kathmandu Valley with its water-based socio-cultural harmony in particular.²²

The rural-urban relationship in Kathmandu Valley is historically associated with water. The oldest stone spout, located in downtown Kathmandu, is believed to have been built in 554 A.D. Stone spouts in Kathmandu Valley were constructed in different historical periods and function through a network of traditional canals, called *rajkulos* (royal canal). Built in the ancient period, these long-distance canals tapped water sources originating in the hills, and served to fill up ponds, irrigate farmland along the canals, recharge local aquifers, and overall water needs of the traditional urban core settlements and their agricultural areas. These canals were repaired and expanded in the seventeenth century (GoN/NTNC, 2009; Shrestha and Shrestha, 2009; Tiwari, undated).²³ The network of canals, ponds and stone spouts provided water of sufficient quality and quantity throughout the year (UN-Habitat, 2007). Later, in the 1890s, piped drinking water for the urban core of the valley was introduced by tapping springs originating in the hills north of Kathmandu. With this started the domestication of water for private use, as opposed to the prevailing communal use. The nature, scale and pace of urban expansion since the 1950s, but especially since the 1980s, accelerated the breakdown of the religious-cultural milieu of the valley (Dixit, 1997). The haphazard urban growth continued, neglecting existing water management practices. While this caused a degradation of both quantity and quality of the surface water, it further increased water demands. These urbanization-induced changes soon resulted into uncontrolled exploitation of the natural aquifers in the valley (ICIMOD, 2007; UN-Habitat, 2007).

Since the 1980s, groundwater from both deep and shallow aquifers came to play an increasingly important role in fulfilling water requirements. Despite substantial investments for improving urban drinking (and domestic) water supply services over the years, with the ever-increasing

²² Sharma (2003) discusses continuities and changes in the socio-cultural values associated with water. Tamang (2016) also shows how socio-cultural and religious values are associated with water.

²³ <http://ecs.com.np/features/renovating-kathmandus-ancient-canals>; see also Tiwari, undated.

population and water demands these have since long been inadequate. These circumstances have led to a further increase of urban dependency on peri-urban water. Additionally, with urbanization, water demand is also increasing in peri-urban spaces, while the peri-urban population and its needs and priorities are changing.

Studies focusing on peri-urban issues in Kathmandu Valley have noted that major adverse impacts of changing land and water uses are degrading water resources, both in quantity and quality, and increasing water insecurity (see Sada et al., 2013; Sada et al., 2016). However, little is known about the processes underlying this changing water security. These processes are complex and often gradual, involving a multitude of actors and their day-to-day struggles and strategic plays in legitimizing their access to and claims over water resources, with uneven consequences for water access, rights and water security (Shrestha et al., 2018a, 2018b). However, these issues of increasing peri-urban water insecurities and dynamics of underlying water-related conflicts and cooperation have received little attention, both in academic and policy-oriented studies. With the existing gap in the understanding of these urbanization-induced socio-environmental dynamics, relevance of the increasingly popular policy priority for “building community resilience” (see MoUD, 2017) is questionable.

1.6 Research questions

A growing body of empirical research on peri-urban issues stresses that peri-urbanization produces advantages for some groups that, however, often come at the expense of others (e.g. Narain, 2014; Ruet et al., 2007). Reflecting more general insights from political ecology, such studies have noted that peri-urban spaces are zones of power differences that cannot be studied without contextual understanding of wider rural-urban dynamics (Celio et al., 2010; Randhawa and Marshall, 2014; Friedmann, 2016). As discussed above, urbanization and population increase have rapidly and radically transformed the waterscape of Kathmandu Valley. The dependency on peri-urban spaces is growing, particularly for water appropriated for urban-oriented uses and users, such as groundwater.

However, relatively little is known about the socio-environmental dynamics underlying these processes of urbanizing water flows and their impacts on water access, rights and water security of a growing peri-urban population. Moreover, while it is now well understood that peri-urban water problems grow in importance with ongoing urbanization, increasing competition for water and intensifying the potential for water conflicts, the dynamics of water-related conflicts

and cooperation in peri-urban spaces remains underexplored, especially in Nepal. Although only a few studies have been undertaken on the peri-urban dynamics in Nepal, these have stressed that urbanization has resulted in rapid changes in land and water uses, thereby increasing exploitation of peri-urban water resources and water insecurity for a growing population (Sada et al., 2013; 2016). These made important contributions to the analysis of peri-urban water issues in Kathmandu Valley. However, processes underlying the peri-urban water-society dynamics, their impacts on different social actors, actors' abilities and activities to deal with these and the implications on water-related conflicts and cooperation have remained largely unexplored. In this thesis, I focus on these underexplored issues and analyze the changing experiences of various actors with peri-urban water (in-)securities and their struggles and strategies in dealing with them.

Against the background of the issues and processes described above, and the gaps in existing research on them, I formulate my research question for this thesis as follows:

How does urbanization in peri-urban Kathmandu Valley, in a context of climate change and post-earthquake developments, bring about changes in water access, rights, water security, exclusion and water-related conflicts and cooperation for various actors, and how do they experience, frame and deal with these?

To operationalize this question, I developed four sub-questions, as discussed and motivated below.

This study builds on a growing body of literature on peri-urban issues, which has provided the important insight that socio-environmental changes in the peri-urbanization process reduce water insecurities for some, while (re)producing insecurities for some others. Urbanization processes alter water use and allocation practices and that current water use practices, water-related conflicts or the apparent absence of these cannot be understood and analyzed without understanding the historical and other contexts of water use, water rights and access for different social groups and the institutional mechanisms underlying such practices. In view of this, my first sub-question concerns these processes of changing water (and land) uses: *what are the major urbanization and climate change-driven changes in the use and governance of water resources in peri-urban Kathmandu Valley?*

A growing number of studies on peri-urban issues have shown that water-related changes in the peri-urban context involve a growing diversity of actors using and claiming land and water. Considering this heterogeneity of actors and their interests, a predefined focus on a single group

is inadequate for understanding the changes in a peri-urban context. Aiming to understand these changes from the perspective of multiple actors rather than focusing on a single group, I take an actor-oriented approach. Accordingly, my second sub-question is: *how do various water users, policy-making institutions and other relevant actors experience and frame these water-related changes, and how do they deal with them?*

Understanding the roles of actors, their behavior, interests and experiences and changes in these, and their socio-economic and political positions is crucial in understanding changes in water (in)securities. This also enables understanding the divisions within and across communities and the roles that forms of social differentiation (such as caste, class, or gender) play in producing or perpetuating inequalities and exclusion, and what this means for water security. Moreover, understanding changes in water security requires, but is not limited to, an understanding of changes in water access and water rights (Boelens et al., 2013; Delgado, 2011; Zeitoun et al., 2013). Therefore, I use my third sub-question to investigate: *in what ways do changing water use, rights and access (re)produce or reduce water (in)securities, social differentiation and exclusion?*

While urbanization has been a major driver in peri-urban processes in Kathmandu Valley (Sada et al., 2016), interest in climate change and its impacts is growing, particularly at the policy level. The concepts of “resilience” and “community resilience” are increasingly popular in both scientific and policy-related approaches (Nightingale, 2017). The earthquakes in 2015 have deeply influenced urbanization processes and also impacted water resources, water security and water-related conflicts. This study considers these wider socio-environmental changes as co-existing processes, and therefore focuses on the interplay between these in understanding the peri-urban water-society dynamics. My last sub-question relates to these complex interlinkages between socio-economic, political and institutional processes in understanding how these shape socio-environmental changes, the differential experiences with, and responses of various actors to changing water (in)security. Based on these insights I critically reflect on the notion of community resilience: *how do the experiences of changing water (in)securities and responses to deal with these relate to the concept of “community resilience”?*

1.7 Research locations in Kathmandu Valley

This research is based on fieldwork in three peri-urban locations in Kathmandu Valley: Dadhikot VDC, Jhaukhel VDC and Lamatar VDC, three urbanizing villages (formerly Village Development Committees) located in the Hanumante River Basin of Kathmandu Valley. Hanumante Basin provides ample opportunities for more in-depth exploration of water security issues in Kathmandu Valley, providing important insights into the interlinkages of changing (land and) water uses, access, rights, and the related (in-)securities and conflicts. The first two of my three study sites were among the research sites selected for the peri-urban water security project mentioned above. During my engagement in this project I noticed that water-related conflicts were emerging there. This inspired me towards undertaking an in-depth study of these water-related issues. This was made possible through my doctoral research under the project “Climate Policy, Conflicts, and Cooperation in Peri-urban South Asia. Towards Resilient and Water Secure Communities”.²⁴

In 2015, in scoping research sites for this new research project, a consultation meeting jointly organized by ICIMOD and MetaMeta²⁵, partner organizations in the project, also recommended the basin as an appropriate site for the in-depth study of changing peri-urban water (in-)securities and related conflicts in Kathmandu Valley. Hanumante River is among the most polluted tributaries of the Bagmati River in the valley (ICIMOD, 2007). Although this river is largely wastewater, it is an important source of irrigation for farming communities. Dadhikot, my first study site, is one of such urbanizing villages, the inhabitants of which increasingly use wastewater for irrigation. Traditionally, irrigation in Dadhikot was based on stream-fed canal irrigation systems. Elderly informants shared that Dadhikot was among the areas conserved as an agricultural belt where construction of houses was prohibited, because of its reliable canal irrigation system and high crop yield. Urbanizing at a rate of over 6 per cent annually, this peri-urban village has changed from an agricultural belt to an area with diverse land and water uses and economic activities. Increasing population and competition between agricultural and non-agricultural water uses have caused an intensification of groundwater exploitation.

Groundwater exploitation is also increasing in Jhaukhel VDC, my second research location, which lacks perennial surface water sources. Population in Jhaukhel, increasing by 1.6 per cent

²⁴ This project involved research in four cities of three countries: Kathmandu in Nepal, Gurugram and Hyderabad in India, and Khulna in Bangladesh. My PhD research was one of the activities in the framework of this research project.

²⁵ MetaMeta is a Dutch consultancy firm based in Nepal.

annually, depends on groundwater for domestic uses, agriculture and other economic activities. Brick factories emerged in Jhaukhel in the 1990s, and have continued leasing in land and extracting groundwater for brick production. Groundwater exploitation for commercial urban water supply started in Jhaukhel in the early 2000s and has continued expanding since then. Ongoing extraction of groundwater and its degradation, both in quantity and quality, is increasing water insecurity in Jhaukhel.

Unlike Dadhikot and Jhaukhel, I was still quite unfamiliar with Lamatar, the third site. Urbanization in Lamatar has been more recent and gradual, with an annual population growth rate of 0.8 per cent. Prior to its merging with neighboring urbanizing VDCs to form a new municipality in 2014, Lamatar was categorized as a rural VDC (Genesis Consultancy, 2015). In addition to its more rural features like the presence of community forests, Lamatar also includes a typical example of the real estate boom in Kathmandu Valley, a housing colony. While water sources are declining in Lamatar, water demands are increasing. Water security concerns emerged particularly after its water sources drastically declined following the earthquake in 2015.

I had visited Lamatar in 2012 when conducting an awareness campaign against increasing pollution of a stream. I was fascinated by its scenic beauty, with its hills covered by forest, its agricultural lowland and the water flows, stone spouts and canals. In early 2015, reviewing literature related to peri-urban Kathmandu, I came to know that a Local Adaptation Plan of Action (LAPA) related to climate change was prepared in Lamatar. This report, prepared by a non-governmental organization working on water issues, claimed to have focused on “detailing out impacts of climate change and potential adaptation activities on water resources”. Attracted by this information, I started field research in Lamatar, exploring its relevance as a possible site for my study. While my mind recalled a rural view of Lamatar, when I arrived there again in July 2015, I found that the conversion of its former agricultural land into residential plots and scraping of its hilly landscape for conversion into such commercial plots had progressed all over the place, while the commercial housing colony was already under construction.

I started exploring the site and interacting with actors involved in the making of LAPA, and could connect with many local actors involved in water management. Over time, I came to know that the LAPA for Lamatar had been prepared in coordination with a community forest users’ group committee—one of 11 such committees— but lacked wider participation and endorsement by the municipal government. Nevertheless, its changing land uses and increasing competition for water made Lamatar an interesting site for understanding how urbanization

(re)shapes changes in access and rights to water and how this reinforces inequalities and reproduces exclusion.

Together these three research sites represent some of the most pressing water security issues in Kathmandu Valley, including those added by the earthquake in 2015. In the following chapters, I will discuss the major hydro-social changes around surface and groundwater in the valley, which together provide an in-depth insight into how water uses, access and rights of the peri-urban population in Kathmandu Valley have changed in the process of becoming urban, and the implications of these changes for peri-urban water security and related conflicts. On the basis of the insights gained from these case studies on the socio-environmental changes in peri-urban Kathmandu Valley, I will also critically review the relevance of the notion of “community resilience” for understanding socio-environmental changes, particularly in this peri-urban context.

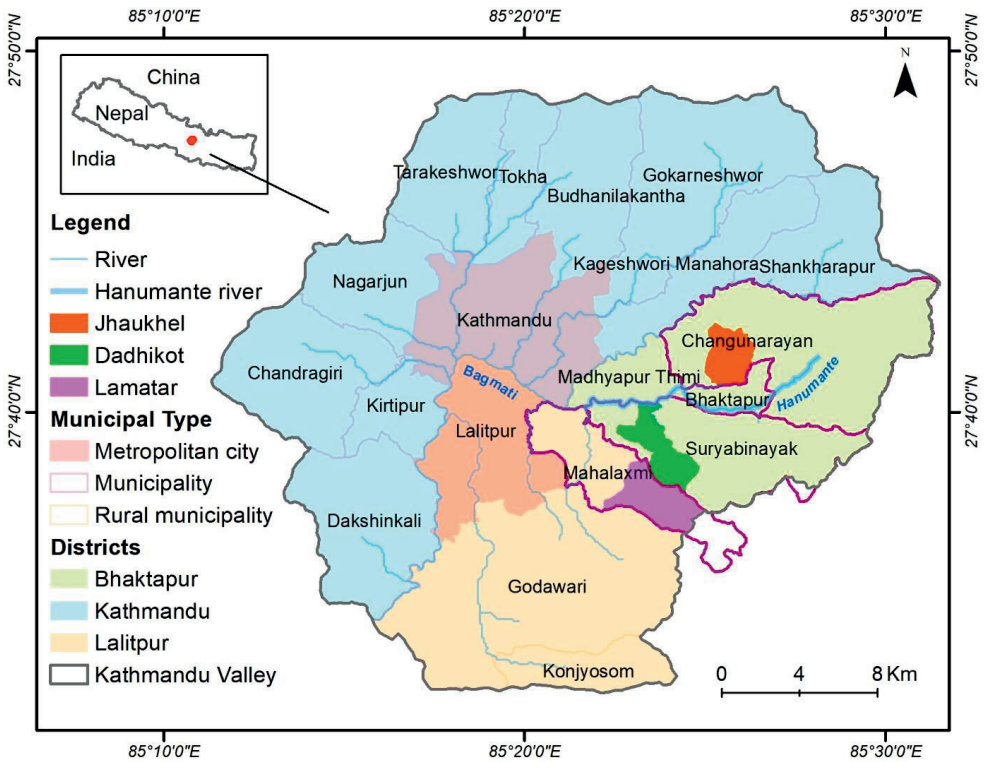


Figure 1.4. Jhaukel, Dadhikot and Lamatar, the three research locations in Kathmandu Valley (Credit: Dibesh Shrestha).

1.8 Overview of the chapters

This thesis is organized in seven chapters. In chapter 2, I present the theoretical framework and methodology on which the research and the thesis are based. My general point of departure is based on a major insight from the political ecology of water literature that hydro-social processes are never socially and ecologically neutral and that conflicts are part and parcel of these processes, which tend to create winners and losers. However, in the specific context of peri-urban spaces, with their changing social composition and increasing interests on the part of a variety of actors in gaining immediate benefits from urbanization, it is not always clear who the winners and losers of these urbanization-induced changes in water (and land) uses are. Nonetheless, these processes differentially change access and water rights for various actors, improving water security for some while increasing water insecurity for others, who often are holders of traditional water rights, particularly those socio-economically marginalized. An actor-oriented approach is essential in research on these processes, but my analysis is also guided by access theory, legal-anthropological approaches to property and a contextual and relational approach to water security. Further, I also draw upon insights from studies analyzing the nuances around resource-related conflicts, process of exclusion and critical reviews of the “community resilience” concept. In this chapter, I also discuss my research methodology and the methods that have been used in this thesis.

In chapter 3, I show how different water users experience the changing land and water uses in the peri-urbanization process. In presenting their diverse experiences, I focus on land and water-related changes over the past several decades, and their implications for changing water access, rights, security, and related conflicts and cooperation. This chapter shows that, while water-related changes cause contestations and conflicts between peri-urban water users, people are also using new sources and technologies, and are searching for negotiated solutions. This often involves strategies of co-optation of some water users by others to create or maintain access and avoid an escalation of conflicts. Yet, on the whole, water access is increasingly difficult for those with established rights, both in the case of traditionally used surface water and the relatively recent practice of using groundwater with increasingly advanced technology. The discussion of these various socio-institutional mechanisms, including power relations, in the emergence, avoidance, and prevention of conflicts and their implications provides an analytical understanding of the sociality of the changing water flows and the dynamics of conflicts and cooperation. This chapter is based on the paper I published in a special issue of *Ecology and Society* together with my supervisors Dr. Dik Roth and Dr. Deepa Joshi.

In chapter 4, I use the concept of social exclusion to analyze how historically deep-rooted socio-cultural inequalities, especially in relation to water, are persisting, reproducing exclusion and water insecurities in the process of peri-urbanization. In doing so, my focus is on socio-culturally embedded practices of caste-based discrimination experienced by the historically marginalized *Dalits* (traditionally considered an “untouchable” caste-groups). I investigate the role of agency in the complex hydro-social interlinkages of change on the one hand, and the lack of it on the other – as seen in the limited ability of Dalits to organize for access and rights to water, and to claim for water. This chapter shows that, while the characteristics of exclusion have changed, exclusion persists for the Dalits and is entrenched in evolving peri-urban water governance processes and institutions. This chapter is based on a paper I wrote together with my supervisors Dr. Deepa Joshi and Dr. Dik Roth, and is under review for publication in *Contemporary South Asia*.

Chapter 5 brings out the much ignored problem of increasing groundwater use, exploitation and governance in peri-urban Kathmandu Valley. This chapter elucidates how urbanization is causing an increasing use of, and dependency on, groundwater in peri-urban Kathmandu Valley, despite the fact that water governance mechanisms to regulate groundwater exploitation have been formulated and protests and worries about its consequences are increasing. In discussing these socio-environmental and institutional dynamics, I focus on the experiences, framings, interests, strategies and practices and the changing priorities of local institutions, groundwater users and policy makers. I reflect on their interrelations with the unregulated exploitation of groundwater, which has been declared an over-exploited resource in Kathmandu Valley a long time ago. This chapter is based on the paper I published together with my supervisors, Dr. Dik Roth and Dr. Deepa Joshi, in a special issue of the journal *Water Alternatives* on groundwater exploitation.

In chapter 6, I critically review the relevance of the concept of “community resilience” in the urbanizing setting of Kathmandu Valley. “Community resilience” is increasingly used as a concept, as a means to address socio-environmental problems and promote benefits for the community, as well as an ideal final goal of adaptation processes. I use cases from two peri-urban locations to show that peri-urban populations are very diverse and have varying abilities, interests, powers, strategies and actions to adapt to complex socio-environmental changes. These differences may reduce insecurities for some, while (re)producing inequalities and insecurities for others. My findings demonstrate the need for an important conceptual shift, away from the mainstream community-centric approaches to resilience, to one that recognizes

the more complex multi-actor, multi-level and multi-dimensional nature of socio-environmental changes. Using insights generated from the case studies, I argue that intra-community diversities and multi-scalar processes of socio-environmental change need much more critical consideration than they tend to get in such community resilience approaches. This is particularly so in the face of the rapid urbanization and increasingly differential impacts for different social groups in peri-urban communities. This chapter is based on my paper published in the journal *Critical Asian Studies*.

Finally in chapter 7, I present a discussion and conclusion based on insights from the six earlier chapters, and answer the main research question as formulated in this chapter. I also use the final chapter to critically reflect on the contextual, relational and political aspects of water security, and how these shape water-related conflicts and reproduce inequalities and exclusion in peri-urban contexts.



An interview in Dadhikot. (Photo credit: Dil Bhakta Jayana).



Interaction workshop in Jhaukhel. (Photo credit: Jyoti Dahal).

Chapter 2

Theories, concepts and research methodology

“We wanted something like a green Jhaukhel. We gathered [...] and blocked the road. We informed the village and district authorities that we would not permit the selling of water for some days, demanding improvement of management, as local people are not getting access to water. [...]. There was a meeting with the district level authority, but even then water-vending could not be stopped, [...] rather they gave new licenses [...] This was not something individuals could oppose. It could lead to violence [...] So people like us are still scared, while the responsible and authorized organizations are indifferent to these issues. This makes complaints made by local people more like personal disputes. So people try not to be involved in these issues” (interview, Jhaukhel, 24-09-2015).

“They have four water intakes, we don’t even have one. So there will be quarrels. Around April, I had laid a pipe and accessed water for my household use. I used to fill a 500 liter vessel and then let water run into their intake. But they stole and hid my pipe. I argued that all of us need to have access to “drinking” water, but they did not return my pipe.[...] Their intakes and tank are much more recent, while we had been using water from this spring since our grandfather and great-grandfather” (interview, Lamatar, 28-08-2016).

The above quotes are just two examples of water-related claims and competition in peri-urban Kathmandu Valley. These examples suggest that, while some social actors are able to claim and exercise their rights and gain and maintain their access to water, others are increasingly water insecure. Differences in experiences of water (in-)securities are increasing the potential for water-related conflicts in socially and institutionally fluid peri-urban spaces. Such water-related conflicts are often not violent, nor are they always openly expressed. However, their consequences can be pervasive, more seriously affecting socio-economically less powerful actors than those in a better position.

I begin this chapter by discussing the conceptual perspective on which I base my analysis of the processes of changing water (in)security, actors’ differential experiences of these changes, and the related dynamics of conflicts and cooperation in peri-urban Kathmandu Valley. This is followed by the research methodology that guided this study.

2.1 Conceptual orientation

2.1.1 Political ecology of water

To understand how various actors interpret and experience uneven outcomes of urbanization-driven changes in water use, allocation, access, water security, and related conflicts and cooperation, I draw upon general insights from political ecology. A political ecology approach differs from conventional ecology approaches that conceptualize the environment merely in terms of physical or biological environmental conditions and their interrelations, separated off from society, which tends to be seen as a distinct entity. Political ecology, on the other hand, starts from the premise that “natural or ecological conditions and processes do not operate separately from social processes, and that the actually existing socionatural conditions are always the result of intricate transformations of pre-existing configurations that are themselves inherently natural *and* social” (Swyngedouw and Heynen, 2003: 907). In other words, a political ecology perspective emphasizes that what we call “environment” is a co-creation of nature and society and that these inextricably co-determine each other through continuous and interconnected social, political, economic, and ecological processes. These relational processes produce uneven results with different enabling and disabling socio-environmental conditions over time and space. This implies that processes of socio-environmental change are never socially and ecologically neutral and that conflicts are part and parcel of such processes (Swyngedouw et al., 2002; Swyngedouw and Heynen, 2003; Budds, 2008). In line with this, political ecology has been defined as “the study of ecological distribution conflicts” (Martinez Alier, 2002, in Escobar, 2006: 8).

A strength of political ecology is that it provides a useful analytical tool for studying the conflicts and struggles involved in gaining and maintaining access and control over resources, while drawing attention to the role of unequal power relations inherent in defining, controlling, and managing nature (Peluso and Watts, 2001). In the political ecology of water, water is used as an analytical lens to understand nature-society interrelations, while understanding of the latter are crucial for an analysis of water transformations. It starts from the premise that water and society co-constitute each other in hybridized “hydro-social cycles” (Swyngedouw, 2009; Linton and Budds, 2014). Hydro-social changes are never socially or ecologically neutral, and thus simultaneously produce advantages and disadvantages for different social groups across geographical and temporal scales.

One of my informants in Jhaukhel, for example, expressed his dissatisfaction over increasing inequality: “one *brother* sells water, another mines out sand and wastes water. The third makes brick and spoils soil and water. They make profit (and increase power) while we, despite being local residents [and thus having water rights; A.S.], increasingly lose our access to water. What a shame is this!” (fieldnotes, Jhaukhel, 10-06-2015). This illustrates that water-related changes in peri-urban Kathmandu Valley, as elsewhere, “are not ‘natural’ processes but socio-ecological problems crucially related to how political choices are made, problems and solutions defined, and burdens and benefits divided” (Roth et al., 2014: 948). With outcomes of water-related changes experienced differently by various actors, conflicts are likely to occur in such changes (Swyngedouw and Heynen, 2003; Swyngedouw, 2009; Budds, 2008; Linton and Budds, 2014). At the same time, such changes bring into being new networks and forms of cooperation and co-option. More attention to the inherently socio-political nature of water (Mollinga, 2008) and how this plays a role in co-producing differential impacts is crucial for understanding the dynamics of water-related conflicts and cooperation in peri-urban contexts.

The socio-political nature of water implies that the ability to decide on, control, allocate, and access water intersects with and reproduces axes of social and power differences by class, caste, gender and other identities, thereby affecting different groups of people in varied ways. The political-ecological examination of hydro-social changes reveals how water and social power relations (whether material, economic, political, or cultural) intersect to (re)shape access to, control over or exclusion from water (and related benefits) for diverse social groups. This also requires analysis of strategies and arguments that social actors mobilize or defend to legitimize their access and rights to water, and how these hydro-social processes produce uneven waterscapes (Swyngedouw et al., 2002; Budds and Sultana, 2013). A focus on waterscapes is growing among political ecologists examining issues of inequality, conflicts and compromises around water and how these are shaped by wider spatial and temporal processes. Adopting a political ecology of water perspective, this thesis aims to develop an in-depth understanding of changing peri-urban water (in)securities as experienced, framed and dealt with by various actors. It recognizes that changes in water (in)security transform socio-technical relationships, institutions and associated values, ideas, and interests, thus further influencing actors’ strategies for and experiences of water access and control.

While a political ecology lens may be useful for exploring these changes, a more detailed analysis of the actors, differences in their abilities, strategies and constraints is also needed for better understanding the processes and mechanisms of hydro-social changes. As mentioned in

chapter 1, I use an actor-oriented approach and follow these changes from the perspective of diverse actors. Actors often legitimize their water access and control by claiming property rights. Similarly, actors may contest such water access and control by others on the basis of traditionally practiced, locally initiated and formally sanctioned institutions, making strategic legal-institutional choices that co-shape water flows. Nonetheless, property is not the only mechanism to access water, nor are water security and water-related conflicts merely about water access. Aside from the political ecology of water, critical attention to the mechanisms to access water and claim water rights, and the legal or other bases underlying such claims in relation to water (in)security and conflict are essential for understanding hydro-social changes. Hence, I also use insights from the theory of access (Ribot and Peluso, 2003), conceptualizations of property, water rights and legal pluralism developed in legal anthropology (von Benda-Beckmann et al., 2006; Spiertz, 2000; Roth et al., 2005; 2015), and a multi-causal, multi-level and multi-actor perspective to conflicts (see Bavinck et al., 2014). These enabled me to understand and reflect on the experiences of and responses to changing water security and water exclusion of diverse social groups in peri-urban Kathmandu Valley. They also enabled me to show how these relational processes influence the ways actors frame problems and solutions, and how these play out in conflicts about water, reshape the communities and their “resilience”.

2.1.2 Actors, agency and water security

As discussed in chapter 1, water-related changes in dynamic peri-urban contexts involve diverse actors. In this thesis, I aim to explore and understand the processes and mechanisms of water-related changes in peri-urban spaces, their impacts on water access, water rights, water security, and water-related forms of conflict and cooperation as experienced and dealt with by various actors. Hence, an actor-oriented approach (Long and Long, 1992) is well-suited for this thesis. This approach starts with acknowledging that any socio-ecological process constantly engages a wide range of social actors committed to different livelihood strategies, cultural interests, and political trajectories that interlink through social relationships, technologies, and other material resources constituting these relationships. An important methodological guideline of this approach is identifying the relevant actors without starting from preconceived notions about actor categories, uniform classes, roles or power relations. Actors may be individual persons, informal groups or interpersonal networks, organizations, collective groupings, or “macro” actors like national governments and international organizations. These include not only those

physically present in any situation but also those who are absent but nevertheless influence the situation, affecting actions and outcomes (Long and Long, 1992; Long, 2001). A key point of departure of an actor-oriented approach is that, despite existing constraints (such as physical, normative or politico-economic) and uncertainties, actors are not passive recipients of processes of change. They have, to various degrees, capacities to solve problems, to learn how to intervene in the flow of social events around them, to develop strategies, and to monitor their own actions, observing how others react to their behavior and taking note of contingent circumstances (Long, and Long 1992: 23). As such, social actors are “[...] active participants who process information and strategize in their dealings with various local actors as well as with outside institutions and personnel” (Long, 2001: 13).

These strategies, however, are embedded in different perceptions, interests and prevailing socio-political relations. Hence, actors are differentially capable to exert their “agency” and devise ways to pursue their interests (Long and Long, 1992; Long, 2001). Actors, therefore, are social constructions; it is their knowledge, experiences, and access to material and social resources that constitute the “(human) agency” that actors can exert in different circumstances. Agency, according to Long (2001: 17), “entails the generation and use or manipulation of networks of social relations and the channeling of specific items (such as claims, orders, goods, instruments and information) through certain nodal points of interpretation and interaction”. More clearly, agency is “embodied in social relations and can only be effective through them” (Long, 2001: 17). Thus, as the cases in this thesis demonstrate, the abilities and experiences of actors dealing with the same or similar situations can differ. A main task for analysis is, therefore, to identify and characterize differing actors, their interests, framings and interpretations, strategies, and potential role in solving any specific problems and the processes underlying these actions and their outcomes (Long and Long, 1992). Such an anthropological analysis of actors, their agency and interrelations in specific contexts is an appropriate starting point for understanding the diversity of experiences and related conflicts inherent in processes of socio-environmental change, such as changing peri-urban water security studied in this thesis. There are different approaches to understand water (in)security. In this thesis, I focus on how uneven experiences of changing water access, water rights and thus water (in)security, in- and exclusion are co-produced in the process of becoming urban.

2.1.3 Access, rights, water security and exclusion

In understanding the experiences of changing water access, I follow Ribot and Peluso's "theory of access" (Ribot and Peluso, 2003) which provides conceptual and analytical tools for "grounded analyses of who actually benefits from resources and through what processes they are able to do so" (ibid: 154). The authors define access as "the ability to benefit from things – including material objects, persons, institutions, and symbols" and stress that "ability" is closely related to "power". Power, according to Ribot and Peluso, is "the capacity of some actors to affect the practices and ideas of others [...] and [...] is inherent in certain kinds of relationships and can emerge from or flow through the intended and unintended consequences or effects of social relationships" (ibid: 155-156). Social actors gain, control, maintain, or lose their resource access in many ways, including legal and illegal rights-based (or "rights-denied") mechanisms. Other mechanisms of access are mediated by technology, capital, markets, labor, knowledge, identities, and social relations, or their combinations.

An example from my research can illustrate this. One of the investors in a brick factory in Jhaukhel shared how he gained and maintains water access for his brick factory, but also controls water access for farmers in the area: "we rent water from a landowner who is my neighbor in my hometown, Bhaktapur Municipality. We pay the landowner on an annual basis. Until a few years back, the area where this land is located used to be a *dhap*²⁶, and there was a small pond on this land. We could access water from that pond without using pumps. After that pond dried, we got a borewell drilled on that land, with our investments. The landowner does not reside there and the land did not have an electric power connection [needed for pumping water from the borewell; A.S.]. We made the landowner get the electricity connection and bore all the expenses for this. Now we pay the landowner around NPR. 40,000 per year for water, and additionally pay for the electricity used. When there is a power cut-off, we pump water using our diesel pumps. We have laid pipes along these fields to access water from that land and we also pay the landowners for the crop damage caused by us. If there is a damage of NPR. 500, we pay them NPR. 1000 or more, so that they can repair as per our needs". He added that "until there was water flowing from the *dhap*, the farmers used to manage water needed for the paddy transplantation on their own. As the *dhap* had dried and there was no rainfall, last year, I had given water to some of these farmers [from whom I have leased-in land for my brick factory; A.S.]. Then, there was rainfall and I did not give them water" (fieldnotes,

²⁶ A marshy area

Jhaukhel, 15-02-2016). In other words, as Roth et al. (2014) note, access to and control of water are crucially mediated by technology —such as water pumping technology in this example— but not in a socially neutral way.

Having access recognized as “property” and thus turning it “legal” is a major strategy used by actors to secure their access to resources (Sikor and Lund, 2009). The concept of “property”, as developed in legal anthropology, is often defined in terms of “bundles of rights (and obligations)” in relation to a resource (von Benda-Beckmann et al., 2006). This implies that property has to be understood as embedded in, and thereby shaped by, the society in which it arises. Property rights in natural resources provide powers to those who hold the rights to do various things, such as to use the resource, to take decisions in relation to its management, and to earn income from it. However, property is only property if there is a social institution that legitimates the claim to it. Often there is more than one legitimizing institution, with different legitimizing powers and effects on actual access to resources. In other words, institutions are dynamic socio-political practices and “what is legitimate varies between and within cultures and over time, and is continuously (re-)established through conflict and negotiation” (Sikor and Lund, 2009: 7), which are often dominated by socio-economically privileged actors.

Referring to a “bundle of powers”, access relates to but differs from property, which is only one of the multiple means of access (Ribot and Peluso, 2003). Compared to property, a focus on access facilitates attention to a wider range of actors, socio-political relationships and processes that can constrain or enable actors to benefit from resources. Nonetheless, it is important to recognize that power in relation to hydro-social changes is also intricately linked to water rights. Those with power are likely to be able to secure and defend their water rights, while those with recognized water rights have some bargaining power, even if they are otherwise less economically or politically powerful (Meinzen-Dick and Pradhan, 2005; see also chapter 3). Such a nuanced approach, combining access and property, acknowledges that having rights does not necessarily ensure access to a resource, while access is not necessarily supported by a right (that is: a claim acknowledged by a larger social group). Although claim-making is an important “access mechanism” (see Kronenburg Garcia and van Dijk, 2019; chapter 4 of this thesis), access does not always involve making claims as I will show in chapter 3 of this thesis.

Like property rights more generally²⁷, water rights are constituted under a situation of “legal pluralism” (F. von Benda-Beckmann, 1983, in Spiertz, 2000; Roth et al., 2005; 2015), whereby rules and norms of different origins and legitimization co-exist and interact as many actors with different perspectives, interests and power positions claim for water rights. The legitimacy of such a claim depends on the degree to which it is recognized by a group larger than the claimants, and protected through some form of law, social norm or system of rules among the co-existing legal repertoires and legalizing authorities (Meinzen-Dick and Bruns, 2000; Meinzen-Dick and Pradhan, 2001; 2002; Roth et al., 2005). Approaches to water rights (and, for that matter, rights to other resources) as “bundles of rights and obligations or restrictions” visualize the various types of rights and obligations that are dynamic, flexible, and subject to frequent negotiations (see Bruns and Meinzen-Dick, 2000; Roth et al., 2005).²⁸

These various kinds of rights, including the right to use water, derive income from it, the rights to control use and to make rules regarding its use and inclusion and exclusion of users, as well as the right to transfer rights to the water resource through sale, lease, gift, (re)allocation or inheritance can be broadly grouped into two categories of rights: 1) use rights and 2) decision-making rights to regulate and control resource use (Meinzen-Dick and Pradhan, 2002; Pradhan and Meinzen-Dick, 2003). Negotiations and conflicts over water, hence, are not just about the access to and distribution and allocation of water, they also concern the contents of different rules that determine the legitimacy to claim water rights and access for different uses by different users. Furthermore, they can be about the rights to participate and have voice in decision-making about the rules, and about the discursive framings of water problems and solutions, legality and legitimacy of rights and access, and related issues (Boelens, 2008; see also Meinzen-Dick and Pradhan, 2005; Roth et al., 2005).

Given increasing urban water scarcity problems, augmenting urban water supply has been a prime priority in Kathmandu Valley. Despite the fact that they are providers of land and water for urban expansion, the changing water needs and priorities of peri-urban locations have

²⁷ Categorical rights are defined as “the legal status of categories of persons and property objects as well as the type of rights and obligations among persons with respect to property objects”. These are distinguished from concretized rights, which are the rights that are inscribed and become materialized in social relationships among actual persons with respect to actual property objects (F. and K. von Benda-Beckmann, 2000, in Boelens et al., 2005: 7).

²⁸ Such a socio-legal approach to law and water rights moves ahead from conventional dichotomies such as of “state law” versus “customary law” and questions about the effects of law on society or even of society on law towards conceptualizing a more complex and interactive relationship between various forms of ordering (Meinzen-Dick and Bruns, 2000; Spiertz, 2000; Boelens et al., 2005).

received scant attention. A high-level official from the Department of Irrigation (DoI) explained: “first priority is drinking water, we do not invest in irrigation if there is a water conflict [...] Peri-urban areas are rapidly urbanizing, so investing in irrigation for staple food is useless. We can go for drip and sprinkler for cash crops, if there is demand and if farmers are willing to contribute to the investment. Even for that, water availability is the foremost criteria. For peri-urban areas, the government will not invest if such investments are high and return is low” (interview, 21-07-2016).

Framings of water problems and solutions are social constructions, mobilized to give legitimacy to certain institutions and social actors while excluding the interpretations, priorities and interests of other actors. Moreover, frames are not only instruments of strategic action, but are also built upon people’s underlying beliefs, values, and experiences (Kaufman et al., 2013). In seeking water security, various actors can frame, define, and interpret rights differently through different co-existing legal bases and authorities for legitimation, depending on which they believe is most likely to support their claims or most legitimate and just, in a process referred to as “legal shopping” or “forum shopping” (K. von Benda-Beckmann, 1981, in Boelens et al., 2005). This implies that water rights are embedded in socio-economic, cultural and political relationships and contexts. Furthermore, water rights are usually not permanent and have to be established, maintained and protected by investing in water infrastructure operation, maintenance and repair, either with money or with labor, and thus creating a kind of “hydraulic property” (Coward, 1986 in Boelens and Vos, 2014; see also chapter 3 and 4). However, actors do not always operate within legal frameworks, and may access water through non-legal strategies such as “stealing” or diverting water as well. Actors often use these strategies when they are unable to establish or protect water rights by operating within the dominant “legal” basis (Pradhan and Pradhan, 2000; see also chapter 4).

Moreover, water management and control are intrinsically contested processes that increasingly involve conflicts about access and rights as well as related issues of legitimacy, equity, and (in)justice (Joy et al., 2014; Roth et al., 2014). With rapidly changing land and water uses, dynamics of competing existing and new claims on water are particularly pronounced in peri-urban spaces. As several cases in this thesis will demonstrate, differences between actors in terms of their socio-political positions, interests and abilities to mobilize knowledge and social experiences—in short: in their agency—can affect the strength of their water rights, and thus their water security. Therefore, paying attention to water rights from the perspective of diverse actors, analyzing their claims, strategies in exercising their water rights and the constraints that

hinder them in protecting their rights and in gaining and maintaining access to water in any context, is crucial for understanding water security.

The concept of water security emerged in the 1990s. It was increasingly used after the Second World Water Forum²⁹ in 2000, in which the Global Water Partnership (GWP) introduced an integrative definition of water security that considered access and affordability of water as well as human needs and ecological health (Cook and Bakker, 2012). Over the years, water security has both evolved as a concept as well as a policy objective in global water policy (Grey et al., 2013; Hall and Borgomeo et al., 2013; UN-Water, 2013).³⁰ As its meaning is quite broad it is considered a “battlefield of ideas” emerging from many disciplinary, sectoral, ideological, and geographical roots (Zeitoun et al., 2013; Cook and Bakker, 2012). However, exploring the experiences, perceptions, and interpretations of different actors could be a more relevant entry point for understanding the complexities of water security than achieving consensus on its definition (see Lankford et al., 2013). Along similar lines, Loftus (2014) argues that the relational aspects of co-evolving water-society interrelations help in critically analyzing the diverse meanings and experiences of water (in)security and the processes that (re)produce, worsen or reduce water (in)securities, that I aim to understand in this thesis. Focused on understanding how unequal access to and control over water are (re)shaped by unequal power relations, studies have shown water (in)security is not just a matter of physical availability and scarcity. Instead, it emerges out of complex socio-political interactions that include some, while (re)producing exclusion for others (Delgado, 2011; Boelens and Seeman, 2014; Boelens, 2013; Zeitoun et al., 2013; Boelens et al., 2018).

The concept of social exclusion refers not just to the presence or absence of rights but to the broader array of powers that allow certain (groups of) people access and deny it to others (Hall et al., 2011; Kabeer, 2000; 2005). Given the deep-rootedness of exclusionary attitudes and practices, understanding exclusion requires studying dynamic interrelations between the

²⁹ The Ministerial Declaration of the Second World Water Forum (2000) called for water security, by which it means “ensuring that freshwater, coastal and related ecosystems are protected and improved; that sustainable development and political stability are promoted, that every person has access to enough safe water at an affordable cost to lead a healthy and productive life and that the vulnerable are protected from the risks of water-related hazards”.

³⁰ Water security has increasingly been considered from a risk science perspective (see Hall and Borgomeo, 2013; Grey et al., 2013 etc.). “Water security has social, humanitarian, economic, legal and environmental dimensions. [...] It is safe to state that investment in water security is a long-term pay-off for human development and economic growth, with immediate visible short-term gains” (UN-Water, 2013).

excluding and the excluded actors, with an emphasis on processes and mechanisms of exclusion, as well as the contested and contingent nature of power, institutions, agency, culture and social identity (Pradhan, 2006; Khan et al., 2015). Although “social exclusion” is a contested concept (de Haan, 1998; Sen, 2000; Hickey and du Toit, 2007), it offers important insights in analyzing how power relations, cultures, social and political identities intertwine in the making and breaking of agency of some actors over others and how these dynamics change contextually and over time. Inclusion and exclusion to water occur through often messy, multi-layered and multiple negotiations, in which power, politics and identity intersect (Zwarteveen, 2015).

Most contemporary approaches to “identity” emphasize the fluidity of identity. Along similar lines, Golubović (2011: 28) argues that identity “is socio-culturally impregnated expression of both individual / personal and collective way of existence and recognition”. The author adds that identity “is always a matter of choice, unlike its interpretation as naturally given and biologically inherited ways of understanding and explaining oneself and collective existence”. However, certain identities, such as those based on caste, are ascribed by default at birth and are almost “fixed and unchangeable”, particularly for the Dalits³¹ (Pariyar and Lovett, 2016: 143). Dalits, traditionally considered “untouchable” caste-groups, are a historically excluded social group in Nepal. Although caste-based discrimination in Nepal was constitutionally abolished already in 1963, caste-based exclusion persists, particularly for Dalits, who continue to have a lower social, economic and political status compared to other groups in Nepal (Pariyar and Lovett, 2016; Bishwakarma, 2016; Bownas and Bishokarma, 2018; Khanal et al., 2012). Motivated by the continued marginalization of Dalits in the context of increasing socio-political movements to include them, in chapter 4 I focus on how changing water access, water rights and water (in)security are co-shaped by caste-based disparities in peri-urban spaces. This provided the important insight that prevailing socio-economic and political differences defined by caste-based rigidity continue to shape uneven access to and control over water, and thus experiences of water insecurity. Nonetheless, as Mehta and Karpouzoglou (2015: 166) rightly stress, exclusion and inequalities in peri-urban contexts are not just limited to traditional lines of social differentiation. This implies that an analysis of hydro-social changes and the associated uneven outcomes in peri-urban contexts needs to be attentive to the socio-culturally embedded

³¹ Although I use the term “Dalit”, which is widely used to refer to the traditionally “untouchable” caste-groups, I am aware that the term is contested and that Dalits are not a homogenous group (see Dahal et al., 2002; Bhattachen et al., 2008; Bishwakarma, 2016).

inequalities in peri-urban communities, as well as to the inter-linkages between local-level manifestations of inequality with wider socio-environmental, institutional and political processes that transcend community boundaries, interests and benefits.

2.1.4 Dynamics of conflicts and cooperation

Relationships of property and access pertaining to water and other resources are often deeply contested and susceptible to conflict. Conflicts have been studied from many perspectives, and the term “conflict” has multiple definitions. Empirical studies on resource-related conflicts have increasingly been undertaken since the 1990s (e.g. Homer-Dixon, 1994). Many such studies focused on scarcity or abundance of resources as the root cause of (violent) conflicts, for which they have also been widely criticized (see Peluso and Watts, 2001). In a recent article on water-related conflicts in peri-urban South Asia, Roth et al. (2018: 3) summarize the criticism of “resource-deterministic” approaches for their (1) bias to violent conflicts; (2) assumptions of linear causality between “scarcity” (or “abundance”) and (violent) conflict; (3) labelling of conflict as “bad”, cooperation as “good”; (4) treatment of conflict and cooperation as mutually exclusive; (5) a one-dimensional perspective; and (6) assumptions of the “manageability” of conflict (see also Bavinck et al., 2014).

Inspired by such more nuanced approaches to conflict and cooperation, in this thesis I use the definition of conflict by Bavinck et al. (2014: 3), as “confrontations between groups or categories of people” regarding resource use, access and management. This approach recognizes that, although usually the term “conflict” is reserved for cases that involve violence, it also includes silent and non-violent social tensions emerging from human dissatisfaction and contrary objectives, as well as those hidden under the guise of cooperation (Kallis and Zografos, 2014; Bavinck et al., 2014; Fisher et al., 2018; Zeitoun and Mirumachi, 2008). Despite recent criticism and nuance, cooperation is often still seen as the opposite of conflict, under the assumption that actors with conflicting interests can (be made to) join forces to reach common goals, thereby turning a relationship of conflict into one of cooperation.

Nonetheless, there is growing awareness that actors may also work together if they still have different goals, as they can compromise and jointly deal with conflicting issues in ways that serve their (different) objectives as much as possible (Bavinck et al., 2014; Castro, 2007). Hence, conflicting interests do not exclude cooperation, and cooperation does not exclude the existence of relationships of conflict between actors at the same time. This implies that conflict

and cooperation can co-exist, with various manifestations and linkages, and that both can be better understood if they are thought of jointly in terms of socio-political interaction rather than as mutually exclusive (Bavinck et al., 2014; Zeitoun and Mirumachi, 2008; Zeitoun, 2007).

Conflicts may also provide an entry-point and window of opportunity for reaching more equitable transformations by challenging existing inequalities. Cooperation, on the other hand, may facilitate the perpetuation of injustices and legitimize an inequitable status quo (Fisher et al., 2018; Kallis and Zografos, 2014; Zeitoun and Mirumachi, 2008). This implies that conflict and cooperation are not a simple dichotomy of “bad” and “good”, but need to be seen in relation to their broader socio-environmental, economic and political contexts with attention to prevailing institutional practices and subjective perceptions that influence the underlying processes and uneven outcomes in any dynamic context (Bavinck et al., 2014; Frerks et al., 2014; Roth et al., 2018). Such a nuanced approach to conflict will help to analyze how and why some actors come into conflict while others cooperate or co-opt, and how such practices change their experiences of, and abilities to, deal with water (in)security. In chapter 3, I provide an in-depth analysis of this complex interplay of water-related conflicts and cooperation, and their implications for changing water access, rights and security of various actors in peri-urban Kathmandu Valley.

Water conflict is a situation (or rather a process) in which one or more parties challenge other actors’ access and / or rights to a particular water resource regarding quantity, quality, location, specific use, or the basic right to water in the first place (Cossio et al., 2010). Not just scarcity but also abundance, quality and various other issues, including demographic changes, inequitable power relations, competition for water, changing government priorities, structural injustices and institutional failure can lead to water-related conflicts (ibid; Mostert, 2003; Ravnborg et al., 2012).

Local water-related conflicts often involve competing claims for access and rights to the same water resource between different uses and users. A comprehensive understanding of the nature, dynamics and socio-economic and political impacts of local water conflicts in the context of increasing competition for water is crucial for water policies and legal and administrative reforms in many developing countries (Cossio et al., 2010). However, these receive little attention of responsible authorities and other social actors (Ravnborg et al., 2012). Negligence of the contextual issues of water insecurity and related conflicts is particularly experienced by peri-urban populations, who are bearing the burden of the increasingly adverse “spillover effects” of urbanization (Janakarajan, 2008; Randhawa and Marshall, 2014; Narain, 2014).

Several examples from my fieldwork demonstrate how peri-urban water security issues are subordinated to the growing urban water demands, despite growing peri-urban contributions to the provision of water and land for a growing urban population. For instance, the Groundwater Management Policy (KVWSMB, 2012), formulated to regulate and manage use of groundwater — an over-exploited resource in Kathmandu Valley (Cresswell et al., 2001; Pandey et al., 2012; Shrestha et al., 2012; Pandey and Kazama, 2014) — lacks attention for the growing problems caused by peri-urban groundwater exploitation.

As elsewhere (see Ruet et al., 2007; Janakarajan, 2008; Shah, 2009; Narain, 2014; Karpouzoglou et al., 2018), struggles to get access to groundwater in peri-urban Kathmandu Valley tends to benefit socio-economically powerful actors, who have access to the financial, technical and social resources needed for exploiting groundwater, while intensifying water insecurities for the socio-economically less privileged. Chapter 3 presents and analyzes the issue of ongoing groundwater exploitation in Kathmandu Valley, its uneven consequences, and the role of conflicts and cooperation in dealing with these inequalities. In chapter 5, I show how the lack of attention to the processes of peri-urban hydro-social changes comes down to promoting further groundwater exploitation, despite growing protests and conflicts about its consequences.

Water-related conflicts and cooperation, particularly in developing countries like Nepal, are deeply shaped by prevailing socio-cultural and political disparities along lines of social differentiation like gender, caste, and class that implicitly or explicitly privilege some over others in water-related decision-making (Joy et al., 2014; Udas, et al., 2014; Shrestha et al., forthcoming). Chapter 4 of this thesis shows, for example, how and why the changing divisions and solidarities pertaining to water security between different social groups in peri-urban Kathmandu Valley are particularly burdensome for marginalized groups. Such differences in inclusion and exclusion from water-related decisions can concurrently change actors' access and rights to water, and thus their experiences and perceptions of water (in)security. Attention to such differences within communities and the wider processes affecting resource use and local management outcomes “is critical if policy changes on behalf of community are to lead to outcomes that are sustainable and equitable” (Agrawal and Gibson, 1999: 633).

2.1.5 Community and community resilience

“Community” is a common focus in research and development policy and practice. Community, particularly in relation to resource management, is often conceptualized as a small and clearly bounded geographic unit with a homogeneous social structure characterized by shared norms. However, a rich literature based on in-depth case studies globally shows that communities are dynamic, with continually changing composition and interests. Such studies have stressed that the idea of “community” must be examined and unpacked by focusing on the diversity of actors, their often, conflicting interests, and the complexity of socio-economic, political and institutional interactions that co-determine resource use, users, their interests, decision-making practices, and uneven abilities and experiences in any context (Agrawal and Gibson, 1999; Stone and Nyaupane, 2014).

Yet the conventional view of “community” as a homogeneous collective unit continues to dominate development policies and practices. Furthermore, such views even “perpetuate the myth that communities are capable of anything, [...] and the latent and unlimited capacities of the community will be unleashed in the interests of development” (Cleaver, 1999: 604). Such an assumption forms the basis of the concept of “community resilience”, which is increasingly popular in studying the complex relationships between social and environmental changes, and as a means as well as end in addressing socio-environmental problems, promoting benefits for the community and thereby building and enhancing community resilience (Magis, 2010; Matarrita-Cascante and Trejos, 2013).

While the origin of the concept of resilience is attributed to several disciplines (Davidson, 2010; Norris et al., 2008), its meanings in the contemporary global environmental discourse have been mainly drawn from the field of ecology. Holling (1973) popularized the term “resilience” in relation to the environment, more specifically in the context of ecosystem (Gunderson, 2000). Over the years, its use has extended across multiple disciplines in a variety of ways, resulting in poor conceptual clarity and limited practical relevance (Brand and Jax, 2007; Boyden and Copper, 2007; Ensor et al., 2018). Nonetheless, the concept is increasingly taken up, “too uncritically” and “too rapidly” (Bene et al., 2014: 599), as central framework in development and climate change policies and research agendas (Roth et al., 2018; Levine et al., 2012; Bahadur et al., 2010; Brand and Jax, 2007). The evolving approach to resilience research argues that, as social-ecological systems are intimately linked complex and evolving integrated systems, “the ecological and social domains of social-ecological systems can be addressed in a common conceptual, theoretical, and modeling framework” (Walker et al., 2006). On this basis,

many users of the resilience concept stress that “social-ecological resilience” serves as a useful lens for analysis of the complex interconnections between environment and society (Folke, 2006; 2016; Walker et al., 2006; Berkes and Ross, 2013; Wilson, 2012).

Contrary to such claims, more critical authors argue that the assumption that social and ecological systems are essentially similar is problematic and that the “bouncing back” notion of resilience, with its definition stressing the status quo in social-ecological arrangements, is inherently conservative (Cote and Nightingale, 2012; Brown, 2014).³² Resilience has particularly been criticized for its emphasis on consensus and homogeneity, neglecting dynamics and diversity of interests, beliefs, values, unequal socio-political relations and agency of social actors involved in and affected by resource management (Cote and Nightingale, 2012; Cretney, 2014; Davidson, 2013; Cutter, 2016). Resilience of some might be realized at the expense of others across spatial and temporal scale. However, the resilience approach still largely tends to associate the concept with positive outcomes, and has focused too little on the social factors that limit the abilities to deal with and adapt to disturbances.

Recent perspectives on “community resilience” continue to ignore these dynamics of social differences, which are extremely important aspects underlying different experiences and outcomes of socio-environmental change in any context (Brown, 2014; Ensor et al., 2018; Robinson and Carson, 2016; Roth et al., 2018). The concept of community resilience assumes that a community is capable to collectively reorganize and adapt to socio-environmental changes and thus “build” resilience (Matarrita-Cascante and Trejos, 2013; Wilson, 2012; Magis, 2010). The concept is also criticized for the inherent risk of shifting the responsibility of dealing with socio-environmental changes — that are often too big for a community to deal with — onto those least able to carry the burden and, in so doing, reproducing unequal social relations (Ensor et al., 2018; Robinson and Carson, 2016; MacKinnon and Derickson, 2013). Given the multi-scalar nature of socio-environmental changes, it is questionable whether the “community” is the right place for dealing with socio-environmental issues, such as peri-urban water insecurities (Roth et al., 2018).

³² Resilience is “the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Walker et al., 2004). Social-ecological resilience is defined as “the capacity of social-ecological systems to absorb recurrent disturbances [...] so as to retain essential structures, processes and feedbacks” (Adger et al., 2005 as cited in Brand and Jax, 2007).

Heterogeneity within communities and their multi-scale linkages are inherent in peri-urban spaces, where people are migrating in and out, and livelihoods and economic activities, jurisdictional boundaries and governance institutions are continually changing (Narain and Nischal, 2007). It is particularly in these fluid peri-urban contexts that “paying attention to multiple actors forces researchers to consider different and dynamic interests” (Agrawal and Gibson, 1999: 637), and how these inter-relate and change as new opportunities and adversities emerge. In this regard, in chapter 6 I use insights from case studies in peri-urban Kathmandu Valley to critically reflect on the concept of “community resilience”. I stress the need to pay due attention to differences within “community” and their interlinkages to wider socio-environmental changes that simultaneously (re-)shape local “communities” and their ability to respond to changes at various scale.

2.2 Research methodology and fieldwork

“Qualitative case study is characterized by the main researcher spending substantial time, on site, personally in contact with activities and operations of the case, reflecting, revising meanings of what is going on” (Stake, 1994: 242).

“Social science has not succeeded in producing general, context-independent theory and, thus, has in the final instance nothing else to offer than concrete, context-dependent knowledge of real-life situations as they unfold in practice. And the case study is especially well suited to produce this knowledge” (Flyvbjerg, 2006: 223).

This research basically consists of two objectives: first, understanding the water-related changes in peri-urban spaces, impacts on various actors, and how these actors experience and deal with these changes; second, the analysis of water-related forms of cooperation and conflict, with a focus on aspects of changing water control, access and rights, and how these changes relate to water insecurity, inequality, and in- and exclusion. These experiences of water-related changes cannot be fully understood without identifying the actors and digging into the meanings they give to such changes and their impacts, and the way they frame problems and seek solutions to their water (in)securities. Such a deeper understanding and explanation of these processes and mechanisms of changes on the ground cannot be obtained without qualitative and interpretive social scientific and ethnographic approaches, using in-depth, multi-sited empirical field research based on case studies (LeCompte and Schensul, 2010; Marcus, 1995). Case studies are appropriate to develop a concrete, practical, and context-dependent knowledge (Flyvbjerg,

2006) on these peri-urban water-related changes and their implications. Using a qualitative case study approach and following an actor-oriented approach (Long and Long, 1992; Long, 2001), I explored and analyzed the everyday experiences, views, framings, interests, strategies and practices of actors involved and interlinked in changing peri-urban water uses, control and management.

With changing land and water uses and users, functions of the peri-urban are continuously changing (Bryant and Charvet, 2003), and peri-urban populations are experiencing many kinds of stresses. Peri-urbanization processes and experiences of these, however, cannot be generalized. Providing anthropologically “thick descriptive accounts of the events that transform these spaces” and analyzing why they are happening, considering historical perspectives and socio-political practices, could be valuable in understanding peri-urban processes (Friedmann, 2011: 430). In the context of Kathmandu Valley, peri-urban dynamics involve changing uses of and diverse claims around access and rights to both surface water, with which traditional water rights are associated, and groundwater, which is increasingly the main water source for the valley.³³ These socio-environmental issues lead to an increase of water-related conflicts, but also generate new forms of cooperation. A multi-sited case study approach has enabled me to contextualize these key dimensions of water-related changes in the valley and their implications for water security and related conflicts and cooperation.

The fieldwork consisted of repeated visits to three communities in my field sites, Dadhikot, Jhaukhel and Lamatar, and meetings with officials from various relevant governmental and non-governmental organizations during a period of four years (from 2015 to 2018). Research methods involved ethnographic fieldwork, involving participant observation, in-depth interviews, informal talks, key-informant interviews (Kumar, 1989) and focus groups (Parker and Tritter, 2006). Coming back to Stake’s statement, spending extended periods of time in the field to observe changes in the field sites has definitely helped me to better understand and directly experience the hydro-social changes in Kathmandu Valley.

It is also important to mention here that there were several unexpected and difficult situations that made the fieldwork period longer than planned. Thus, rather than a distinct fieldwork and a writing period, I was simultaneously conducting fieldwork, reviewing relevant academic as well as grey literature, including policy documents and writing my thesis largely from my home country.

³³ These are, of course, interlinked rather than discrete sources.

2.2.1 Initiating fieldwork amid unexpected challenges and selection of case villages

As discussed in chapter 1, Kathmandu Valley is rapidly urbanizing, primarily at the expense of agricultural land in its peri-urban spaces. With growing water quantity and water quality problems of both surface and groundwater, peri-urban water insecurity is growing, as is the potential for water-related conflicts. I returned to the valley immediately after the disastrous earthquake of 25th April 2015. While it was important for me to be with my family in such a difficult situation, returning to Kathmandu Valley, one of the areas most severely hit by the earthquake, was also needed for understanding the water-society dynamics that could have been caused by the earthquake. As the earthquakes continued, I (along with my family) stayed out of our home, arranging temporary shelters in nearby open spaces. The situation became more difficult after another earthquake with a magnitude of 7.3 had hit the nation on the 12th of May. The fear of earthquakes, that had been gradually declining, resurfaced. We stayed out of our house for about two months. Life was in disarray to such an extent that it was impossible to take up regular work and other routines of life again. However, I was constantly re-thinking my Ph.D. proposal, which was still incomplete then.

In July 2015, I restarted networking with some of the key-informants I had known from the earlier project. Yet, inquiring about water when people were concerned about the earthquakes and dealing with their consequences seemed odd. For example, I had an appointment with one of my key-informants in Dadhikot. When I reached the place, my informant was building a temporary shelter with zinc sheets. It was only then that I came to know that his house had been damaged by the earthquake. While we were having a conversation, my informant, helped by another man, continued building the temporary shelter for his family. After listening to our conversation for some time, his daughter-in-law angrily shouted: “people come to interview even in such a situation. We have hired a laborer for the work, but people take our time for interviewing. They don’t even seek an appointment in advance” (fieldnotes, 28-07-2015). It was clear she was hinting at me and I could clearly understand her anger. It was useless to explain to her that I had an appointment and, initially, no idea about the damage they experienced. I apologized to my informant and requested for his time some other day, when more convenient for him. This experience taught me to be more sensitive to the real-life struggles and experiences of people, which I realized are much more serious than my needs and stresses of initiating and conducting field research. In retrospect, I agree, as Flyvbjerg (2006: 236) pointed out, that “the proximity to reality, which the case study entails, and the learning

process that it generates for the researcher will often constitute a prerequisite for advanced understanding”.

As the shakes decreased and normal activities started, my fieldwork was gradually gaining pace. Nonetheless, it proved difficult to inquire about water issues, as people continued struggling with the damage. In an interaction with a woman who was residing in a temporary shelter with her two young kids after her house had been destroyed, I had provided her some financial support. Similarly, an elderly farmer requested me to visit his earthquake-damaged house. While I respected his request and made the visit, I was not in a position to be able to help him. I had to change one of my field notebook which, according to my respondents, looked like an official record book. They assumed I belonged to some organization working on relief activities. Although the fieldwork was yet to gain pace, I visited a number of urbanizing villages in Kathmandu Valley, exploring possible sites appropriate for in-depth research on peri-urban water security issues. In doing so, I tried to select sites that could provide insights into how peri-urbanization processes shape changes in water access, rights, water security, and related conflicts, both in relation to surface water, with its historically established rights through established use practices, and to groundwater, the use of which emerged relatively recently but has been rapidly increasing.

My fieldwork was gradually progressing, when a fuel crisis hit the country for several months, disturbing regular activities and, once again, making it difficult to continue my fieldwork smoothly. Nonetheless, the initial phase of the fieldwork provided me a better exposure to urbanization-induced changes in peri-urban Kathmandu Valley and proved very useful for determining the sites for in-depth case studies. I selected the three sites: Dadhikot (with a rapidly increasing population and competition over traditional stream-fed canal irrigation systems); Jhaukhel (with widespread urban-oriented exploitation of land and groundwater resource); and Lamatar (with community-based forest and water governance practices co-existing with the construction of a commercial housing colony, a small example of the real-estate boom in Kathmandu Valley). Although these three urbanizing villages are similar in terms of the prevalence of urbanization-induced water insecurity, the local contexts and main water security issues in them vary. Further, research in water security in the selected locations required interactions with a wide variety of individual and institutional actors, both in the selected sites and in the policy and administrative worlds beyond them.

2.2.2 Challenges for exploring under-researched water issues

As reaching my informants was difficult in the post-earthquake period, I started visiting relevant governmental and non-governmental organization, trying to collect relevant quantitative data and reports. While the changes in the stream flows in my study locations were not measured, I was aware that the Groundwater Resource Management Board had been monitoring groundwater levels in Kathmandu Valley. However, from my visits I came to know that monitoring was done in a limited number of wells only; for lack of proper management, monitoring was not continued in many of the wells. I could obtain some relevant studies related to groundwater in Kathmandu Valley, but it was clear that the quantitative data on groundwater levels that I aimed to use for understanding quantitative aspects of water-related changes in my field sites did not exist.

While I was still exploring ways to obtain quantitative data, I was proposed (by my former colleagues) to co-supervise a student who was pursuing a Master's in Interdisciplinary Water Resources Management at Nepal Engineering College. She was interested in estimating the groundwater availability and studying the implications of increasing groundwater exploitation for water access of various water users in Jhaukhel, one of the sites I selected for in-depth study. In the process of exploring ways to estimate groundwater availability, we managed to do this for the watershed (to which Jhaukhel belongs). However, we realized that downscaling such estimation to the specific study village would imply negligence of the local hydro-geology and its relation to the rapidly changing land and water uses in this urbanizing village. Hence, despite recognizing the significance of interdisciplinary study in understanding water-related changes, I had to give up the idea of substantiating my field-based qualitative data with quantitative data. Nonetheless, where available I have used quantitative data on population changes, land use changes, groundwater extraction etc. Such information was very helpful in relating the extent of urbanization-induced pressure on water resources and the people depending on these water sources for their daily water needs.

2.2.3 Multi-sited ethnographic case study

Unlike a traditional ethnographic approach focused on a holistic study of a single site, a multi-sited approach is designed around chains, paths, and conjunctions or juxtapositions of locations that are connected through the object of study. It empirically involves following people, things, connections, associations, and relationships across and within the sites where and through

which ethnography is conducted (Marcus, 1995). Such a research approach of following people, their connections and socio-political relationships is well-suited for understanding hydro-social issues in peri-urban contexts, as these involve socio-political interactions between multiple actors at different levels in different processes of changing flows of people, goods, and various resources. Marcus (1999) emphasized that multi-sited ethnography is more a matter of a contextualizing multi-sited social processes than literally an ethnography which covers many sites. Thus, as Falzon (2009: 13) points out, in a multi-sited approach “it is not important how many and how distant sites are, what matters is that they are different” and that research involves rethinking the problems under study through relationships or connections between the sites. In this thesis, using cases of three urbanizing villages in Kathmandu Valley, I focus on different actors and their differential experiences of diverse processes of hydro-social change as these shape and are shaped by wider socio-economic, political and institutional changes.

Rather than using a predetermined administrative or geographic boundary, in conducting my fieldwork I was “following the flow” of water across administrative units, sectors or communities, to understand the processes underlying the changing experiences and relationships of actors associated with such flows. With co-existing agricultural and non-agricultural activities and changing land and water uses and users, understanding and unfolding these peri-urban realities required engaging with many actors, both at the community level and at the level of policy formulation and decision-making around changing land and water uses. Living in Kathmandu Valley and having knowledge of the local language were definitely advantages in communication and rapport building. Interviews were primarily conducted in the Nepali language, the national language and the common means of communication in Kathmandu Valley. In some circumstances, my knowledge of Newari, the local language of Kathmandu Valley, was also useful in communicating with respondents.³⁴

Yet, conducting fieldwork simultaneously in three urbanizing villages³⁵ and networking and interacting with relevant governmental and non-governmental organization alone (without field assistant and local supervisor) was challenging. Nonetheless, being involved as a primary “tool” of data collection (LeCompte and Schensul, 2010) proved very useful in this journey of developing my research skills of exploring, analyzing and documenting data collected between 2015 and 2018. I adopted open-ended, mostly conversational interviews, which provided me opportunities to better connect with my informants and understand and interpret their

³⁴ I belong to the Newar community.

³⁵ Administratively these belong to new municipalities.

experiences and perspectives. Equally important in my fieldwork were informal talks and observations, for example those conducted during visits to water sources, conversations at tea shops, as the local residents fetched water from public or commercial water sources or complained about their water problems with the community water suppliers.

On March 4, 2016, for example, together with my informant, who was a member of Raksidol Drinking Water Supply and Sanitation Committee in Lamatar, I went to see the water source used for this community-managed water supply scheme. As we were returning from their water intakes, we saw a man who was laying a pipe, while two women were standing over the terrace. When my informant saw them, he immediately shouted in a warning tone not to take water from their source. The two men started debating over their rights to water from this contested water source. It became clear that the women standing on the terrace were actually there to check if they were being observed by anyone from the drinking water supply. Being present when my respondents were claiming and counter-claiming was an uneasy situation. This was not the only time I was present when my respondents with conflicting claims and interests met. In such situations, I remained quiet, observing them and paying attention to their arguments and reactions. Yet, I understand that my presence, as an outsider familiar to both conflicting parties as someone interested in water-issues, could have influenced their choice of words and actions in confronting each other. Nonetheless, paying attention to the dialogues as people claimed, contested or restricted water access provided me with important insights that helped me understanding how urbanization shaped water (in)security and relationships between various actors.

While I recorded most interviews (with approval from my informants), in cases where my informants were hesitant I took notes instead of recording. Recording helped in continuing the conversation, but re-listening, transcribing and translating the interviews into English took many hours and required careful attention to the conversations. These intensive processes of reviewing interviews provided me opportunities to gain more clarity about the conflicting issues and to critically revisit my questions and reactions to interviews, which helped me to prepare for follow-up interactions and future interviews. In addition, these also helped me to reconsider the actors that I would need to connect with to better understand the cases. However, I realized that transcribing and translating was not a simple transferring of the information. In some cases I felt I was unable to accurately translate and thus could not avoid loss of information, for example, where actors expressed their anger or regretted their decisions. In such cases, I also transcribed the interviews and made notes in Nepali. Such notes and transcripts turned to be

helpful during detailed elaboration of the cases and in selecting quotes for presentation in different chapters of this thesis.

2.2.4 Building trust and negotiating access

Although I was able to reconnect to some informants through my linkages from earlier project engagements, probing into the hydro-social issues documented in this thesis would not have been possible without reaching and (re)connecting with a much greater variety of actors. In addition, new land and water uses and users had also emerged in the meantime. For Dadhikot and Jhaukhel, I expected that some of the cases used in my earlier research engagement could be instrumental in understanding the processes and experiences of changing water security and related conflicts. However, reaching the relevant actors and interacting with them turned out to be more difficult than initially expected. Commercial water users, for instance, often proved to be reluctant to interact with me. With their experiences of government monitoring and sealing of water factories (if water quality did not meet the national drinking water standard), many of them suspected that I might be a journalist or disguised government official. In such cases, the fact that I was studying abroad and my affiliation with a foreign university were useful.

Yet, in many cases commercial water users remained hesitant, selectively responding to some questions while ignoring others, particularly when questions concerned the way they managed to access water for commercial uses. To gain their cooperation with my study, I explored and identified individuals whom I could refer to in order to gain the trust of such respondents. For instance, one of the water bottling company owners was a relative of a local resident I had known through a common friend. This connection worked to explain to him that I was studying at a foreign university and that for my study I had to transcribe and translate my interviews into English. In his words: “I am answering your questions because you are studying abroad. Otherwise I would not have interacted with you. Many people like you come here to inquire. They look for our weaknesses and file cases against us. Journalists have troubled us a lot. They even blackmail us” (interview, Jhaukhel, 18-03-2016).

Realizing my study among the wastewater-using farmers in Dadhikot was similarly challenging. Initially most of them avoided interactions with me. Those who interacted complained that sharing their experiences with outsiders was no use, as the outsiders would inquire and question them on many issues, but not help them in dealing with their water struggles. I could sense some kind of irritation among these farmers, while their hesitations

made me feel uneasy approaching them as a researcher. However, I was able to get the initial information that they collectively cleaned the canal every year under the leadership of an elderly farmer. Reaching the farmers' leader to request an appointment was not easy, as he did not carry a mobile phone. Waiting at his field to meet him in person was not of any use either, as he was moving back and forth between different plots in various parts of this area. Even when I finally reached him, this made little difference, as initially he refused to interact.

As I was exploring alternative ways to get connected with these farmers, I came to know that they are residents of the municipality adjoining Dadhikot. Fortunately, some of my close relatives reside in this municipality. Through one of them, who was the neighbor of some of these farmers, I came to know about the day on which the farmers would clean the canal for their winter cropping that year. It was the 14th of November 2015, a Saturday. On this day, from early in the morning and accompanied by my husband I participated with the farmers. Throughout the day, we were observing and interacting with them, and offering help such as passing the sacks or picking waste as they cleaned the canal and built the temporary intake at the stream. During this activity many farmers expressed their agitation about the fields getting converted into built-up areas and what, in their view, could be long-term consequences of such changes in land use. Some complained about in-migrants being inconsiderate to *their* irrigation canal. At the end of the day, as they completed making the intake, they invited us to join them for a late lunch. The farmers asked me to explore ways to help them in their effort to maintain the canal. I felt to have been accepted then to inquire about their experiences. Following this, I started regular interactions with these farmers, which became a very insightful journey in understanding how peri-urbanization brings changes in water access, rights, and security. I have discussed this case in detail in chapter 3.



Figure 2.1. Farmers having their lunch after cleaning their irrigation canal (Source: author).

2.2.5 Approaching the issues for in-depth study

Landeo (2017) stresses that studying a conflictive issue requires time and energy to establish the trust needed to have meaningful conversations and interviews. When I mentioned the topic of conflict during interviews for my research, I experienced how respondents' attitudes could suddenly turn from friendly into cautious and reluctant. Therefore I was careful not to use the words "*bibad*" and "*jhagada*" which mean "conflict" in Nepali. I had just begun my fieldwork in Dadhikot, when I had an opportunity to interview the chairperson of a drinking water user committee, whom I knew from my engagement in the earlier project. The chairperson shared that the committee was struggling to find additional water sources, after the farmers had opposed the plan for making a well for drinking water supply at the irrigation intake. This event had taken place only a few months back. As the issue was still fresh, I expected that the farmers would be willing to share their experiences about the issue. However, quite the contrary was the case: people were hesitant to discuss this conflict event. Alternatively, when I started inquiring about their "*chunauti*" (challenges) and "*samasya*" (problems), respondents were more willing to interact with me. In doing so I was careful not to blame any actors or show

other biases about the situation in the study area. Rather, I adopted a conversational approach, in which actors could share their experiences, views and arguments. With the amicable relationships that had developed during the research process, communication continued with my respondents. However, this often required me to take into account the perspectives and interpretations of my respondents in framing my questions. Thanks to this flexibility, most informants cooperated with me and shared their experiences and opinions about sensitive issues, even though many of them had conflicting relations.

My informants included diverse water users (both male and female, of different ages, caste affiliations, occupations), including farmers, water vendors, brick factory operators, community-level water managers, farmer leaders, in-migrants, teachers, shopkeepers, community-forest managers, local leaders, and elected local representatives. I also regularly interacted with actors from various governmental and non-governmental organizations, discussing their views and challenges concerning changing land and water uses and management in Kathmandu Valley. As the actors at the decision-making level, both at the community as well as organizational levels, were mostly males, my respondents were largely males as well. However, as the following chapters will show, I have also included experiences and views of female respondents. Attempting to letting my respondents speak on key issues, I have extensively used quotations where this was relevant. However, I am aware that some information will always be lost, particularly during translation but also in the intricate process of interpretation and re-interpretation that is characteristic of this kind of qualitative and ethnographic research.

Over time, I became familiar with community people and government officials, the latter particularly at the district level. However, not all respondents were willing or could give their time for interaction. For example, I could not interview the developer of the commercial housing project in Lamatar. As he regularly changed his phone number, getting an appointment with this economically and politically powerful actor was not easy. One of my informants helped me to get his phone number. Explaining that I was a student at a foreign university, he gave me an appointment for a meeting. However, he did not show up at the agreed time and place. Upon a reminder call, he explained that he had not been able to give me time due to his busy schedule. After a couple of failed appointments, he suggested that I sent him an email with a list of questions that I wanted to discuss with him. He did not respond to that email either. When I phoned to remind him about the email, he refused to respond. According to him,

answering my questions would not do any good to him and his company. After so much effort, I found this quite embarrassing.

However, upon critically re-reading the email I had sent him, I realized that my questions were actually quite strongly driven by the interests of the local residents who had been seeking to negotiate with the housing developer to gain access to water from his well. This experience definitely sensitized me to the advantage of taking a more neutral position in doing research on contentious issues. Nonetheless, in view of the postponement of meetings, I wonder if the housing owner would have responded to my email if I had framed the questions in a neutral way. The individuals who were said to be the initiators of large-scale sand mining in Jhaukhel also refused to provide time for interviews. In this case, I could obtain useful information through interactions with others who were also involved in sand mining or had suffered its impacts.

Gradually, in each of the sites I was interacting with many actors and getting connected to new respondents, getting answers to some questions or clues to new directions for further inquiry. I could sense connections between information that had initially seemed unconnected. Thus, fieldwork and analysis, reflection and interpretation were a recursive process, often involving repeated interviews with informants, clarifying confusions and jointly interpreting the findings. In this regard, I agree with de Vries who stresses that the conventional view of ethnographic work as divided into two separate phases of data collection followed by analysis is simplistic and ideologically tainted (de Vries, 1992: 48).

2.2.6 Informal talks and telephone communications

In addition to open and semi-structured interviews, which were often planned by getting appointments in advance, my fieldwork involved several informal talks as I “followed the flow”, exploring and visiting the sources of water for different social groups and investigating the changes around use, access, and control of such water sources. For instance, the issue of the caste-class intersection and how these reproduce exclusion and water insecurity that I present in chapter 4 of this thesis was inspired by information and insights gained during such informal talks. When I began the fieldwork in July 2015, I did not anticipate that caste-based dynamics could be a key to understanding hydro-social changes in relation to water access, use, and control in Lamatar. During one of my visits to Lamatar, a woman and I got into a public bus from the same location and happened to sit next to each other. I made some notes in my

notebook. The woman looked at me and said she had noticed me a couple of time and asked what was I doing there. I gave a brief answer that I was a researcher studying water-related problems in Lamatar. She immediately replied and suggested me to come to her village Tehrabise, which was new to me. As the bus was full and noisy we did not continue our interaction then, but I asked for her mobile phone number. During my follow-up visits to Lamatar, I came to know that Tehrabise was the Sarki *gaun*³⁶, to which some respondents had referred when asked about the location of their source of water. In another informal interaction, a Dalit woman shared that “our water sources are poorly managed. *Nani* (sister), we are *Sarkis*. Wherever you go, you will find that Dalits like us are excluded and socio-economically backward” (fieldnotes, Lamatar, 4-10-2016). When caste-class intersection began to emerge as a key issue of difference and divide around changing access and rights to water, I started interactions around changing caste-based discriminatory practices. This approach to understanding exclusion helped drawing out how these deep-rooted caste-based disparities continue to influence attitudes, practices, and interrelations between different groups of people seeking water security (chapter 4).

2.2.7 Group discussions

At the community level, I conducted some focus group discussions (FGD), pre-informing and requesting respondents for participation. Most of these group discussions were informal. Such discussions often took place at local tea shops, grocery shops, in fields or in the shade on hot sunny afternoons. In addition to narratives of how land and water use changed, benefited some and adversely affected others, these also provided opportunities to better understand social relationships, triangulate information and cross-check the interpretations of my findings. For instance, in an informal talk that started with a grocery shopkeeper in Jhaukhel while I was purchasing lunch one afternoon, soon both men and women who had come to get their groceries joined in the discussion. This turned out to be a very informative discussion about changes in water sources and land use, about the individuals who had been leasing their land and water sources for water vending and those who had given up water vending as the water sources had dried up. This discussion also revealed information for follow-up interactions with an informant whom I had interviewed earlier as a former ward-level leader. However, I had no idea before

³⁶ Gaun usually refers to a village or a hamlet. In this thesis, I use it for a village or follow specific local use of the term.

the follow-up meeting that he had been leasing (out) his well for brick-making and commercial water supply. Similarly, informal discussions at tea shops in Lamatar provided important information, for example about the increasing water insecurity for the local people after the housing colony had drilled a deep borewell for commercial use. In Dadhikot, many of my open interviews became group discussions, as people joined and shared their views and experiences. One of such important discussions was about the misuse of the development funds allocated for the management of irrigation systems, and how this was linked to the Water Users' Association turning inactive.

2.2.8 Workshops, individual appointments and policy analysis

In connecting with relevant government officials, MetaMeta and I jointly organized three formal workshops, one at the community level, and two more to connect and share our research findings with relevant government officials. In preparing for such workshops, we identified officials from relevant organizations, and pre-informed and invited them for the workshops. However, with the limited participation of invitees, and subordinate staffs often representing the invitees, the workshops did not seem very effective for understanding the views and experiences of actors at the decision-making level. As an alternative option, I switched to getting individual appointments and interacted with officials from several relevant governmental and non-governmental organizations, as well as national, district and village-level politicians. This approach of individual interviews proved very useful for explaining the my research to informants and discussing important issues with them. I started these interactions through semi-structured interviews, using the check-lists that I had prepared in advance. As the interviews progressed, they often became more open-ended interviews, in which the informants more openly shared their views, opinions and experiences. Some of such interactions also provided new information about my field site and helped to triangulate the information that I had obtained earlier during the fieldwork at the three research sites. For instance, I first came to know about the submission of a petition against the drilling of a deep borewell by the Sashambhu-Thulaghar drinking water supply in Lamatar (discussed in chapter 5) and the years of delay of Nambla-Hamsi drinking water supply in Jhaukhel (discussed in chapter 6) during interviews with government officials. Interviews with government officials also involved discussions over various land and water-related policies and their views on the often problematic relations between policies and real-life practices in peri-urban and other contexts.

Another important source were policy documents. I have limited analysis of such documents to those that are directly related to peri-urban land and water use issues. In addition to national policy documents, I also collected and reviewed policy documents and decisions made at the valley, municipal and local levels, such as those made by community-managed drinking water users' committees and community forest users' committees. In some cases, my husband's position as an urban planner became very helpful in getting telephone numbers required for getting appointments with government officials, for example at the Ministry of Urban Development and the Kathmandu Valley Development Authority. This also helped me in accessing grey literature, such as a document on the long-term development strategy for Kathmandu Valley, which was not publicly available then. In understanding policy-practice discrepancies, I was inspired by anthropological approaches to public policy, the starting point of which is the need to be conscious about the assumptions in policy documents and debates, and to regularly examine and critically reflect on the processes resulting from the gaps between policy and practice (Wedel et al., 2005; Heijmans, 2012).

2.2.9 Participation and applied ethnography

Although I had sympathy for those struggling for access and rights to water and was raising issues of increasing water insecurity of peri-urban residents during interviews with relevant government officials, through my papers and presentations at national and international seminars I also understood that these meant very little for the local people who are struggling to manage their daily water access from water sources of deteriorating quantity and quality. Thus, from the beginning of my research, I have been exploring ways through which I could help my informants in dealing with their increasing water insecurity. According to Arce and Long (2000: 7), a good ethnography must repudiate the idea of the detached, objective and neutral observer, as understanding complex socio-cultural practices requires being involved in experiential and subjective social life. Taking such a stance enables fully acknowledging the "battlefield" of everyday relationships and organizational practices, wherein multiple actors engage in struggles over meanings, values and principles, identities, knowledge, access and rights to resources (Delgado, 2011).

Furthermore, as LeCompte and Schensul (2010) note, an application of ethnography is understanding social problems and using these understandings to bring about positive changes in communities, institutions, or groups: "applied ethnography". Accordingly to Clarke (2010),

such an “engaged ethnography” not only converges theory and praxis, but also allows exploring ways to transform social inequalities. In conducting my research, I was engaged in applied ethnography as an actor and active participant. For example, at the request of the farmers’ group in Dadhikot, I wrote an application in which I raised their concerns about the increasing competition for water and about canal encroachment. Together with the farmers, I prepared their request for municipal support and submitted the application to the municipality office. Similarly, I was in regular interaction with the users of the Mahadev *khola* (stream) irrigation canal in Dadhikot and the Irrigation Division office of Kathmandu. This resulted into the former submitting the application for the maintenance of this historic irrigation system to the latter. Following this application, a feasibility study was done, which concluded that rehabilitation of this system was socio-economically feasible. However, in the end the project was not selected for implementation, reasons for which can be related to the explanation given by the high-level official from DoI (see section 2.1.3).

Considering the degrading groundwater quantity and quality in Jhaukhel, I was exploring organizations that could support the Jhaukhel residents in dealing with these issues. In 2018, my colleague at MetaMeta and I came up with the idea to use the remaining budget of the CCMCC project to install a water filtration system for Lakhaju, where residents were struggling to access water for daily needs, as their traditional water sources were damaged by sand mining (chapter 6). However, this initiative got disturbed because their communal well dried up. In Lamatar, where the traditional water source declined and water insecurity intensified, interactions largely focused around arranging an additional water source (chapter 6). After such interactions, the Raksidol drinking water supply and sanitation committee (RDWSSC) members had approached the District Drinking Water Supply and Sanitation division and the Kathmandu Valley Water Supply Management Board for possible support. The option of using groundwater as an alternative for community drinking water supplies, however, turned uncertain after a group of local residents became worried about adverse consequences of groundwater extraction, and submitted a petition against such activities (chapter 5).

Involvement in these initiatives for improving the ability of the peri-urban water users to deal with water insecurity provided me experiences of the challenges of peri-urban water management. Furthermore, this interactive research approach helped me better connect to my informants in getting an in-depth account of events and processes, and in interpreting their real-life experiences of dealing with changing peri-urban water (and land) use and management. In addition, it provided me a sense of self-satisfaction that I was not only drawing information

from my respondents but also applying jointly generated insights to the exploration of ways to deal with their real-life water insecurity problems.

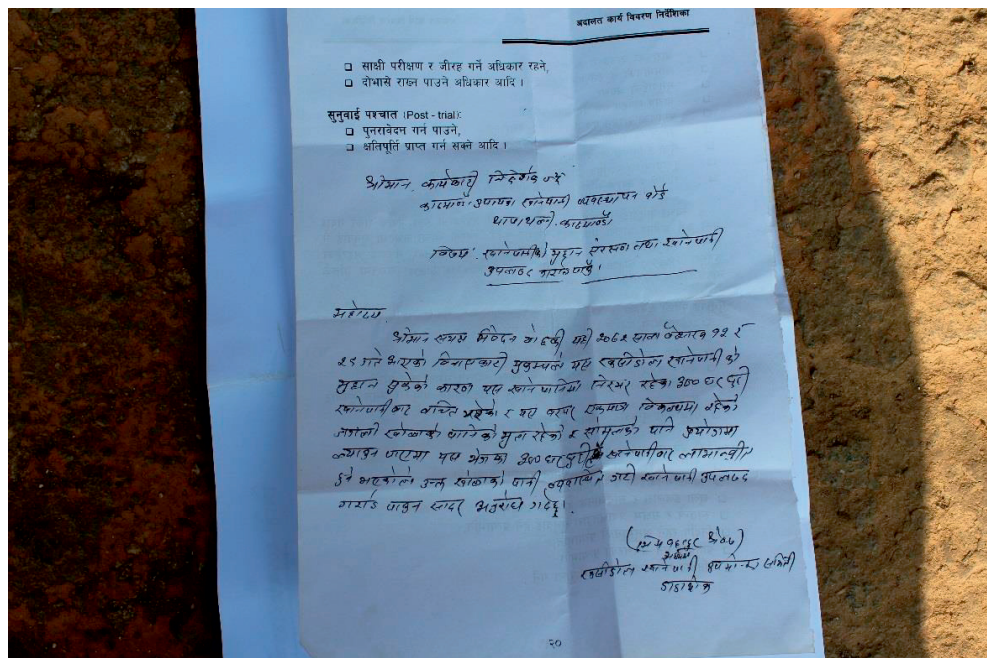


Figure 2.2. Application letter drafted by RDWSSC requesting Kathmandu Valley Water Supply Management Board for possible support.

2.2.10 Ethical dilemmas: the fear of worsening disputes

In researching and documenting water conflict issues, I was particularly careful not to refer to names or any other information that could reveal the identity of my respondents. However, in probing into and particularly cross-checking the information I had collected, I had to refer to information that was provided to me by other informants. In these situations, I was worried that such discussions for my research could result in worsening relationships between my respondents. I often cross-checked my information through informants who were aware of the issues but themselves not directly involved in the conflicting issues. Further, rather than bringing conflicting actors into common interactions, I had separate interactions with them, so that my informants could more openly share their conflicting views and experiences. However, the processes and outcomes of water-related conflicts that I researched involve claims and counterclaims, and there were cases where I had to refer to the arguments of conflicting actors

during interactions with them. I brought such information into discussions as my personal queries rather than interpretations of my informants. Although such triangulation processes were very gradual, taking much time for follow-up interactions with a variety of actors, they were a great help in gathering new information and cross-checking such information with the information from other sources. Over the period, my respondents were aware that I was studying and reporting the cases not only from their perspective but also from the perspective of those with whom they were competing and contesting for water. However, as I took great care not to reveal the identity of my respondents, my research did not result in any visibly adverse effect in the relations between my respondents.

Chapter 3

Flows of change: dynamic water rights and water access in peri-urban Kathmandu

Abstract

Urbanization and the changing climate are increasingly influencing people's access to land and water. Changes in use of, and rights and access to, land and water are most acutely experienced in peri-urban spaces. This article analyses these changes in peri-urban Kathmandu, Nepal. Increasing pressures on land and growing water needs of an expanding population in Kathmandu Valley are creating new patterns of water use, water-related conflicts and (in)securities. We use two case studies characteristic of these changes, with a focus on the micro-level redefinitions of and struggles about rights, access and notions of legitimate water use, and what these mean for water security and water conflict in a socially and institutionally complex and dynamic environment. Our findings show that these water-related changes cause contestations and conflicts between peri-urban water users. Amid increasing competition for water, people are using new sources and technologies, searching for negotiated solutions based on local norms and rights, and co-opting other water users through cooperation to create access opportunities and avoid conflicts. Our cases show self-restraint in practices of claiming or accessing water, while avoidance of conflicts also derives from an awareness of unequal power relations between user groups, past experiences of violence used against protesters and lack of active intervention to regulate increasing exploitation of peri-urban land and water resources.

Keywords: access; land and water use; peri-urban; property; urbanization; water-related conflicts; water rights; water security

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3.1 Introduction

The world is rapidly urbanizing, and this deeply transforms places still rural or “peri-urban” (United Nations, 2015; Leaf, 2011; Friedmann, 2016). The latter term refers to “the coming together and intermixing of the urban and the rural, implying the potential for the emergence of wholly new forms of social, economic and environmental interaction that are no longer accommodated by these received categories” (Leaf, 2011: 528). Although peri-urban changes have long received little scientific and policy attention, the peri-urban lens is increasingly used to explore processes of “becoming urban” (Leaf, 2011). Following several authors (e.g. Iaquinata and Drescher, 2000; Narain and Prakash, 2016), we approach the peri-urban as (peri-)urbanization *processes* rather than a spatially bounded *type* of region. This better captures its fluid and emergent character as a hybrid of “rural” and “urban”, as flows of people, resources, ideals, identities and institutions (Iaquinata and Drescher, 2000; Allen, 2003). Even if we use “areas”, we think primarily of their dynamic character.

Major peri-urbanization issues are changes in land tenure, and overexploitation and pollution of water (Simon, 2008). Water reallocations and changing flows between urban and peri-urban spaces, and within the latter, may lead to contestations and conflict (Allen, 2003; Butterworth et al., 2007). Another problem is how these processes, and the places shaped under their influence, are governed. Peri-urban dynamism is at loggerheads with generally static governance structures, institutions and jurisdictional boundaries (Allen, 2003; Simon, 2008). Overlapping governance institutions, legal frameworks, and competing claims of authority are common, causing characteristically peri-urban “fuzziness” and conflict-proneness (Butterworth, 2007; Arabindoo, 2009). Yet the implications of peri-urban water insecurity for the dynamics of conflict and cooperation have hardly been explored (Narain and Prakash, 2016).

In this article we use this peri-urban focus to analyze conflicts around rights, access and control of a resource that is fluid by nature, yet often related to land or infrastructure in ways that “fix” it as property and make it follow the logic of power rather than gravity: water. Peri-urbanization around Kathmandu, capital of Nepal, involves changes in availability, allocation, use and control of water and land for human livelihoods. With changing populations, land conversion, increasing building activities, and the emergence of more diversified livelihoods, pressures on these resources are growing. Urban water needs, demand for products from the peri-urban, and practices of waste disposal are deeply influencing water security. These processes are further

compounded by the impacts of a changing climate on precipitation, temperature and water availability (Shrestha et al., 2014; Sada et al., 2016).

In line with the special issue theme and focus, we present an in-depth, context-specific description and analysis of water-related changes in peri-urban communities, to gain a more empirically grounded understanding of their consequences for water access and rights, security and conflict. The article is structured as follows: first, we clarify our conceptual-theoretical and methodological choices. Next, we briefly introduce Kathmandu Valley, its context of urbanization and policies, and the study locations. We then present two case studies on changing water flows and uses, and their implications for water security and conflict. Each case represents a key dimension of water-related changes: the first concerns developments around a canal irrigation system (*kulo*) in Dadhikot; the second looks into increasing groundwater exploitation in Jhaukhel. These are followed by a discussion of the findings and what they mean for future water policies.

3.2 Research approach, methods and case selection

3.2.1 Resource-related conflict: a property and access perspective

The study of resource conflict was long dominated by resource determinism and assumptions of linear causalities between scarcity and (violent) conflict (e.g. Homer-Dixon, 1999). Problematic were also its focus on large-scale violent conflict (war), dichotomic understanding of conflict and cooperation (conflict is “bad”, cooperation “good”), and simplification of the multi-dimensional character of “resource conflicts”. Criticism from political ecologists (e.g. Peluso and Watts, 2001) has initiated more nuanced approaches from a “multi-causal, multi-level and multi-actor perspective” (Frerks et al., 2014; Bavinck et al., 2014; special issue introduction), while noting the important mediating role of socio-political processes. Scarcity and conflict are not “natural” but politically and socially produced by situated actors (Frerks et al., 2014). Although still focused on large-scale violent conflicts, the arguments basically apply to other scales and manifestations of conflict as well. We use the definition of conflict by Bavinck et al. (2014: 4) as “confrontations between groups or categories of people”, whether violent or not.

In the study of “water conflicts” more specifically, attention shifted from “water wars” (conspicuously absent) to local water conflicts, which are abounding (Wolf, 2007; Joy et al., 2008); and from the conflict-cooperation dichotomy and the assumption of their being mutually exclusive (Zeitoun et al., 2011). Further, a critical perspective of water scarcity as socially and politically produced rather than “natural” and an understanding of how scarcities are locally experienced and lived with are crucial in understanding water conflicts (Mehta, 2007). Likewise, rather than assuming simple causalities and clear “drivers” of conflict, our point of departure is that (the potential for) conflict is socially produced through political choices, policies and changing practices of land and water use, management and control.

When researching social-environmental relationships, two major approaches are available: complex adaptive systems and social-ecological resilience (e.g. Folke, 2006), and social-constructivist and political ecology approaches that foreground the co-constituted character of “the natural” and “the social” in hydro-social changes (Swyngedouw et al., 2002). The first-mentioned “systemic” approaches have been criticized from social-scientific (e.g. Brown, 2014; Olsson et al., 2015, Boas and Rothe, 2016) and political ecology perspectives (e.g. Taylor, 2015). Taking the latter approaches as starting point, we aim to understand peri-urban water conflicts from an interdisciplinary perspective combined with insights from political ecology (e.g. Swyngedouw et al., 2002; Budds, 2009), access theory and legal-anthropological approaches to property. The political ecology of water has stimulated critical analysis of urbanization-related water flows, their relational and spatial-scalar dimensions, and the co-constitution of technical-hydrological and social processes. It also stresses the political, conflict-sensitive and power-laden character of such changes. Therefore we need to research how they differentially affect water rights, access and in- and exclusion of different actors.

However, this requires in-depth analysis of micro-level changes in and struggles about water, how water users experience and deal with them, and the implications for water conflicts and cooperation. Access to water basically involves complex interactions between power, authority, and control, creating a conflict-prone “[...] ‘grey zone’ between what people have rights to and [...] access to” (Sikor and Lund, 2009: 2). Claims are mostly expressed through a property discourse. Hence, we use the concept of property as developed in legal anthropology: rights and obligations with regard to valued goods (Benda-Beckmann et al., 2006). Adding to this, Ribot and Peluso (2003) have theorized access, the ability to actually derive benefits from resources. These allow us to analyze in detail the often fuzzy and gradual changes in water access and rights, and their impacts on peri-urban water security. We approach “water security” as

contextual, experiential and relational, as a general frame for asking questions like: which changes influence whose access? Who stand to gain, who are losing? Whose social networks, authority and power count? Such questions can only be answered in the specific context in which water (in-)security is experienced (Zeitoun et al., 2013).

3.2.2 Research questions, methodology and case selection

Thus we try to answer the following questions: (1) what changes are occurring in peri-urban water uses, rights, access and water security? (2) How are these experienced by various actors? (3) What water-related conflicts are emerging and how are they socially and institutionally dealt with? Two locations were selected as cases for this paper, using two major criteria: (1) the type of conflicts must be representative of peri-urban water issues in Kathmandu Valley more generally, and (2) cover both groundwater and surface water, each of which has specific hydro-social, property and access characteristics. Together, these sites provide an in-depth insight in the hydro-social changes around surface and groundwater, and their implications for water security. Dadhikot, the first location, highlights changes in rights and access to surface water, while Jhaukhel, the second location, illustrates problems of groundwater exploitation.

Field research was carried out by the first author in 2015 and 2016. The research was designed as ethnographic case study (LeCompte and Schensul, 2010). Case studies are most appropriate for developing concrete, practical, contextualized knowledge (Yin, 2003) pertaining to specific issues. Data were gathered by “following the water”: tracing and mapping water sources, following changing flows and exploring how various actors are differently linked to, re-linked with, or-delinked from these sources and flows, and hence also (re-)aligning with other actors. Data collection methods included study of policy documents, informal conversations, open and semi-structured in-depth interviews with actors and key informants, and focus group discussions. Field observations on water-related activities (irrigation maintenance; lifting and pumping water; meetings) were crucial for understanding the on-the-ground peri-urban water dynamics. In Dadhikot, 38 informal talks and interviews, 17 open and semi-structured interviews, and three focus group discussions were held with irrigators, male and female residents, in-migrants, farmers’ group leaders, water suppliers, managers, entrepreneurs, teachers, local politicians and other relevant informants. In Jhaukhel, 39 informal talks and interviews, 30 open and semi-structured interviews, and three focus group discussions were held with similar persons, including activists, brick factory owners, water vendors and sand

miners. In addition, informal talks and interviews were held with 26 government officials for both areas.

3.3 Kathmandu Valley, policy context, and case study locations

3.3.1 Kathmandu Valley

Nepal is the least urbanized country of South Asia with the highest urbanization rate in the region. Kathmandu Valley is one of the fastest-growing South-Asian urban agglomerations (Muzzini and Aparicio, 2013). Its population increased from 1.6 million to over 2.5 million between 2001 and 2011 (CBS, 2001; 2012). Kathmandu Valley lies in the upper Bagmati River basin, which sustains most socioeconomic activities of the country (Babel et al., 2014). Its population, growing about 4.3 per cent annually, increased by over 499 per cent between 1955 and 2008 (Bhattarai and Conway, 2010). The valley's built-up area has increased from 2.94 per cent in 1967 to 24.7 per cent in 2011 (Thapa and Murayama, 2009; JICA, 2012), involving rapid changes in land and water uses in areas that were predominantly rural and agricultural until recently (Thapa and Murayama, 2009; Haack and Rafter, 2006).

Unplanned urbanization has significantly increased water demand and uses, and deteriorated groundwater and surface water quality (Pandey et al., 2012; Shrestha et al., 2015). The water demand in Kathmandu Valley has reached 377 Million Litres per Day (MLD), while supply is 120 MLD (wet season) and 73 MLD (dry season) (KUKL, 2017). The possible impacts of climate change receive growing attention. The National Adaptation Programme of Action (NAPA) has ranked Kathmandu Valley among the areas most vulnerable to climate change in Nepal (MoE, 2010), with possibly profound impacts on agriculture and water availability (WECS, 2011). Climate change in Nepal is going faster than the global average (Chaulagain, 2006; Baidya et al., 2008; Shrestha et al., 2000), probably also influencing agriculture and water in Kathmandu Valley. Further, land fragmentation due to redistributive land reform, inheritance practices, and selling is a major problem in the valley (Shrestha, 2011; KVDA, 2015).

3.3.2 The policy context

The 1992 Water Resources Act (WRA) vests ownership of water in the state, which formally owns, regulates and controls all national water resources (see Pradhan, 2000). However, both in surface irrigation systems and groundwater exploitation such formal rules often deviate from established practices, as we will show below. The WRA sets a priority order for water uses, drinking and domestic uses being the first and irrigation the second priority. The government has set the national target of universal access to drinking water and sanitation by 2017 and encourages the use of surface and groundwater for improving these services. The Kathmandu Valley Water Supply Management Board (KVWSMB), a government body formed in 2006, is responsible for managing water supply and sanitation services in Kathmandu Valley. While these services are largely limited to urban centers, KVWSMB has the authority to regulate groundwater use in the entire valley. It formulated the 2012 Groundwater Policy to monitor and regulate the increasing groundwater exploitation. However, implementation has been weak. Public and private groundwater use is increasing with unplanned urban expansion, while the growing urban demand, which is not satisfied by public water provision, creates among authorities an attitude characterized by discretion and non-intervention rather than strict enforcement. Kathmandu Valley Development Authority (KVDA) has drafted the long-term development strategy 2015 for Kathmandu Valley, which aims at improving urban services and discouraging unplanned urban expansion into agricultural areas, in line with the National Land Use Policy of 2012 (KVDA, 2015) and national programmes and policies for reducing the impacts of climate change. This requires more coordination among land, water, urban, and climate change policies and responsible organizations (KVDA, 2015; NPC, 2013).

Dadhikot

Dadhikot VDC is located 12 kilometres east of Kathmandu (figure 3.1). Covering 6.27 km², Dadhikot is a rapidly evolving peri-urban settlement. Annual population growth increased from 1.17 per cent (1981-1991) to 6.05 per cent (2011). Population increased by over 60 per cent and the number of houses by 99 per cent between 2001 and 2010 (CBS, 2001; 2012). Agriculture is still a major livelihood for many inhabitants, with paddy as the main monsoon crop. Wheat, traditionally the main winter crop, is increasingly replaced by vegetables. Agriculture is traditionally based on surface irrigation: Dadhikot has three so-called *rajculos*, state-recognized “traditional” canal irrigation systems, fed by Ghatte *Kholo* (stream), a tributary of Hanumante

River: Mahadev Khola Rajkulo, Idole Rajkulo, and Chakhu Rajkulo (figure 3.2). In this paper we focus on water-related changes in Chakhuphant, the area irrigated by Chakhu Rajkulo. Water mills for grinding grains used to be powered by the water of Ghatte Khola. Before new technologies replaced this system, the water was stored for use by the mills and then made available for irrigation purposes.

After road improvements in the 1980s, farmers started growing vegetables and Dadhikot became a major vegetable producing area for Kathmandu Valley (Bhaktapur DDC, 2002). With ongoing land conversion, Dadhikot changed into a peri-urban patchwork of agricultural fields, multi-storey buildings, and more diverse economic activities. Land transactions and building have increased considerably since then. The built-up area has increased by over 250% between 1992 and 2010, and is expected to grow by about 110% between 2010 and 2030 (Sada et al., 2016). Important causes are in-migration during the Maoist insurgency (1996-2006), fragmentation through inheritance, legally mandatory land division between tillers and landowners, and sales for cash needs. Aside from outside farmers increasingly leasing in land for commercial farming, Dadhikot landowners also rent out agricultural land to brick factories that cater to the building boom in Kathmandu Valley. These changes deeply affect water availability and quality, especially with the conversion of arable land into housing plots and the growing demand for domestic water. Uttisghari, the largest drinking water supply system in Dadhikot, was started in 1995 and is expanding its services.

Jhaukhel

Jhaukhel VDC, situated in the northeastern valley about 20kms from Kathmandu, covers 5.41 km² (figure 3.1). Between 2001 and 2011 its population increased by 1.6% annually, while the built-up area increased by 3.7% annually (CBS, 2001; 2012), and by over 80% between 1992 and 2010. It is expected to increase by over 110% between 2010 and 2030 (Sada et al., 2016). Although livelihoods are diversifying, about 60 per cent of the population is involved in agriculture (VDC Profile, 2013). Agriculture is primarily rain-fed; paddy is the main monsoon crop in the plains, and maize on the slopes. In winter, farmers cultivate wheat, potato, vegetables and mustard. As Jhaukhel lacks perennial surface water sources, groundwater has become the main agricultural water source. Easier access to groundwater (pumping technology) has stimulated farmers to cultivate vegetables for urban markets and also attracted other economic activities. Brick kilns emerged in the 1990s; leasing out fields to brick factories has often

replaced wheat cultivation. Jhaukel has also become a major source of water for the adjoining Bhaktapur Municipality, where water demand is far exceeding supply. Commercial urban water supply started in the early 2000s and has continued expanding to other urban centres, both within and outside Kathmandu Valley.

Below we present case studies of Dadhikot and Jhaukel to explore changes in these areas from a perspective that relates water rights and access to water security and conflict. We discuss hydro-social changes over several decades, from rural and agriculture-based towards diversifying peri-urban spaces with changing populations and linkages with the urban world, and a growing diversity of land and water uses. The cases focus on different (but related) dimensions of these changes: (mainly) surface irrigation systems and other surface sources in Dadhikot, and expanding groundwater uses in Jhaukel.

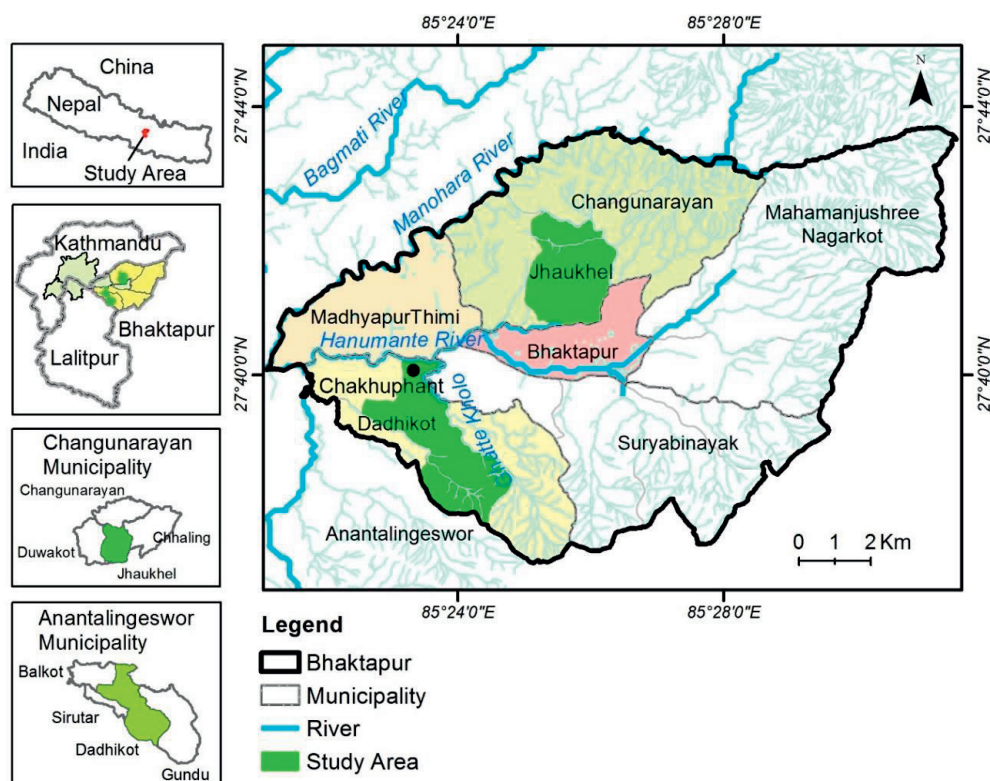


Figure 3.1. Location of study sites in Kathmandu Valley (Credit: Dibesh Shrestha).

3.4 Dadhikot: competing for rights and access to surface water

3.4.1 Changing users, flows and connections

Elderly farmers in Chakhuphant share memories of the glory of Chakhu Rajkulo, one of three irrigation canals fed by Ghatte Kholo (figure 3.2). This area is called *Chakhu* (safe granary) locally because of its historically high paddy and wheat yields. However, according to farmers the canal is much narrower now than before. Prior to 1990, the area was an agricultural belt where construction of houses was prohibited. The canal was managed under leadership of the (then) local head of a village adjoining Dadhikot. The irrigation system had a central place in local life and economy. Guided by village functionaries, farmers with land in the command area of the canal made a temporary intake and voluntarily contributed cash and labor for maintenance. Until 1990, the canal was maintained twice a year, before monsoon and winter crops. However, according to farmers, water competition had already emerged from the 1970s, when electric mills started replacing traditional watermills in Ghatte Kholo. Before this, during the dry seasons watermill operators stored water in ponds on land rented from farmers. After use for operating the watermills, this water was drained into the canal (figure 3.2), providing farmers with reliable year-round irrigation and equitable water distribution between Chakhuphant and other areas. As this system disappeared, water scarcity became felt.

A second canal, Idole Rajkulo (figure 3.2), originates at the middle section of Ghatte Kholo and ultimately drains into Chakhu Rajkulo. However, after replacement of the water-mills, access to irrigation water from Idole Rajkulo became difficult, particularly for tail-end farmers depending on water from this canal. The tail-end fields contained many brick factories that had been established in Dadhikot in the 1980s with formal permission. Needing soil for brickmaking, they made deals with surrounding farmers. Expecting that scraping the soil would make their elevated terraces irrigable, farmers agreed renting their fields to the factories. Soil scraping continued until the early 2000s, but not without consequences. Due to partial erosion of Idole Rajkulo, farmers depending on Chakhu Rajkulo were affected in two ways: reduced water supply from Idole Rajkulo (which had drained into Chakhu Rajkulo before), and growing competition for scarce water, as farmers of scraped fields started accessing water from Chakhu Rajkulo, thus increasing water competition.

In addition, in-migrants purchasing land and building houses in the fields started extracting water for construction from stream and canal. Houses constructed along the canal also

encroached on it, reducing its capacity. Further, since 2010, brickmakers, who leased in land from farmers in the command area of the uppermost irrigation canal, pumped water from the stream, further adding to water scarcity. In the meantime, commercial farming in Dadhikot and the upstream area where Ghatte Kholo originates has also been drastically increasing. Upstream construction of a permanent dam and expanding commercial farming further reduced downstream water availability. Commercial farmers include both so-called “ancestral” (holding inherited land rights) landholders and new (in-migrant) farmers, leasing in land from them. While ancestral farmers accessed canal water, land leasers accessed water directly from the stream to avoid conflicts with the former about their canal water use.

With increasing urbanization, the Uttisghari Drinking Water system, Dadhikot’s largest system, started tapping a local spring in 1995. Its sump well, made in 1999-2000 to shift from public to private taps, contains seepage water tapped from Ghatte Kholo. At present it is supplying around 1,500 private taps, with 750 new taps being added. There are six community-managed drinking water schemes in Dadhikot, each tapping different springs. The two registered schemes, Uttisghari and Syangtyang, are also extracting groundwater through deep borewells. Similar cases are elsewhere in the Ghatte Kholo catchment. Groundwater extraction by households and commercial farmers has also increased. An unpublished household survey conducted in 2012 showed that 27 per cent of the households in Dadhikot extract groundwater. Field observations show that dugwells are common among recently constructed houses. These water-related changes impact water flow in the Ghatte Kholo, which feeds water into the irrigation canals.

3.4.2 Growing competition, avoiding conflicts, exploring new sources

An elderly farmer has been leading canal management from the 1990s. Under his leadership, around fifty farmers cultivating in Chakhuphant participate every late November in ploughing, weeding and making a temporary water intake into Chakhu Rajkulo, using sacks filled with soil managed by the leader from the brick factory or owners of houses under construction. According to the leader, “irrigating fields could be completed in a single day when the mills were still operating. To prepare for paddy transplanting we would jointly clean the canal and irrigate. I had taken the lead to make the intake for the Idole canal. Maybe thanks to that, people still look to me for canal-related activities” (farmer, Chakhuphant, 27-11-2016).

However, organizing participation in canal maintenance is not always that easy. While paddy is the main monsoon crop in Chakhuphant, in winter the ancestral farmers — particularly those with land in the lower reach— cultivate commercial vegetables. These ancestral farmers also rent in land from other ancestral landowners in winter to cultivate commercial vegetables, while ancestral farmers in the upper reach have continued cultivating wheat. Unlike wheat farming, vegetable farming needs regular irrigation. This need to irrigate the commercial vegetable winter crop could explain the fact that the ancestral farmers in the lower reach continued canal maintenance for the winter season, while those cultivating wheat in the upper reach refrained from participating in maintenance.

There was also growing competition with the nearby brick factory, which accessed water from the stream in which Chakhuphant farmers had made their temporary intake. While the factory owners had earlier rented land to store stream water, gradually they bought much of this land along the stream bank. Having landownership, the factory fixed a large pump and pipes to transfer stream water to the factory. Importantly, the factory continued accessing water without claiming water rights, to avoid conflicts with prior rights-holders whose access became increasingly difficult with erosion of the Idole canal section due to soil scraping. In-migrants also increasingly accessed water from the stream and the canal, both for house construction and, later, for domestic water. Competition for stream water has been steadily growing with the increasing use of electric pumps. An ancestral farmer: “as they lift using pumps, only little water enters the canal. It seems that, once water is in the canal, the in-migrants consider we have the right to water. So they lift water from the stream and argue: ‘can’t we even lift stream water?’” (farmer, Chakhuphant, 24-02-2016). Thus, while ancestral farmers base their water rights on customary claims of canal water, in-migrants access water by pumping from the stream, or from dugwells based on their landownership. Furthermore, awareness of people’s water needs and the fact that all are in the same boat struggling to access water play a role in avoiding water conflicts.

Despite their management efforts, access to canal water has been declining for rights-holding farmers. A farmer: “we have been struggling for twenty-five years. But water does not come for a prolonged period, only until early January. After that, water does not reach the canal. In the past there was enough to irrigate all fields. Nowadays, people are pumping water everywhere, so we have to use water from Hanumante River” (farmer, Chakhuphant, 14-11-2015). This started in the 1970s, as the quantity of water in Ghatte Kholo decreased. With urbanization, water quality in Hanumante River degraded, due to lack of sewerage treatment

(Sada, 2010). However, by the late 1990s farmers in Chakhuphant were largely irrigating from this river, using the new technology of fuel pumps. Hanumante, which used to be dry in April and May, now carries water year-round. Although this is largely wastewater, Hanumante has become the main irrigation water source for Chakhuphant farmers, both for paddy and vegetables. Farmers have their own diesel pumps and pipes, or rent them from others. Irrigating land, therefore, increasingly requires resources: money, diesel, a pump, and several metres of pipes, but especially social networks to arrange these.

Irrigating from Hanumante is not, however, a panacea. Although farmers do not see great difference in their paddy yields, they shared that irrigating from the river damages leafy vegetables. Some landowning farmers have shifted to groundwater extraction through dugwells, but most farmers chose to irrigate from Hanumante less frequently or in the early morning or evening, as otherwise it “kills” most of the green vegetable saplings. Tenant farmers, whose access to land is controlled by owners, have no right to make changes in land or water use. For them Hanumante remains the only alternative source, increasingly also polluted by sewage from in-migrant settlements, causing another conflict with the Chakhuphant farmers. Similar conflicts arose after seepage of water from the irrigation canal into the sewer line laid out by in-migrants reduced water flow in the canal from which the farmers with ancestral rights accessed water.

3.4.3 Changing irrigation turns, tensions about maintenance

By 2000, use of the irrigation canal had already been limited to winter crops. However, the farmers’ group from Chakhuphant commonly participated in annual canal maintenance. All ancestral farmers had a right to canal water. A basic rule for distribution was: who comes first irrigates first with half of the share, latecomers divide the other half. Nonetheless, farmers were flexible in sharing irrigation turns according to needs and availability. A farmer: “we discuss and cooperate [in the group]. If there is good flow, we share among three or four users; otherwise single users will take turns. We try to avoid quarrels in the group”. However, with growing competition for water and conflicts about participation in canal cleaning, things have changed. According to the farmer leader, simple turn-by-turn irrigation, starting from the head reach and then into the lower reach is no longer accepted: “now we give an irrigation turn first to those who maintain the canal. Is it correct to give water first to those who do not work but whose fields are in the head reach?” (farmer leader, Chakhuphant, 27-11-2016).

This suggests that increased water competition made access for prior rights-holders difficult and disturbed the location-based irrigation turns. As participation declined, the farmers' group started collecting cash contributions from irrigators who don't contribute labor. Even only those riparian ancestral farmers who contribute cash or labor have the right to use water. However, there are free riders: "the canal is as public as the king. There isn't anyone who does not irrigate from it". Further, contributing to maintenance does not ensure access to water. Farmers in the lower reach of Chakhuphant blame those in the upper reach of Chakhu Rajkulo for "shamelessly" using canal water without contributing labor, to irrigate "land that is not even theirs". Land in this upper reach belongs to ancestral farmers who refrained from participating in canal cleaning since the 1990s. Many of them cultivate rice in the monsoon season, and — afraid of leaving the land unused— in the winter season invite farmers from the adjoining village to cultivate wheat on their land, without demanding a cash or crop share. These farmers divert half of the water share from Chakhu Rajkulo into "their" (branch) canal and irrigate "the land that is not even theirs". They base this practice on the ancestral farmers' rights, without, however, participating in canal cleaning. To avoid confrontation, these farmers irrigate a few weeks after those from Chakhuphant. Farmers from the lower reach critically commented: "the struggle is ours while they just take the water".

Increasing competition for canal water has decreased farmers' flexibility in sharing water. Farmers with fields far from the canal do not contribute to maintenance, as physical access to canal water is uncertain. Hence they also avoid using water from the canal, even when it is available, to avoid "bitter words" from their fellow-farmers who do contribute labor. Farmers whose adjoining fields have been converted into houses often cannot use canal water either, even when available. Lacking drainage, canal water logs their fields and damages crops. Thus, without having conflicts, these farmers do not participate in management and irrigate from Hanumante.

Thus the area irrigated from Hanumante has increased, while availability of canal water has decreased. The canal depends on stream flow, and the stream on rainwater. The latter, according to farmers, has considerably decreased while the number of diversions has been increasing, thus reducing the flow reaching the canal intake. Notwithstanding this trend of growing canal water scarcity, according to farmers the number of conflicts has decreased compared to the past, when the canal was guarded at night. This can be explained by the fact that Hanumante River (see above) became an alternative water source.

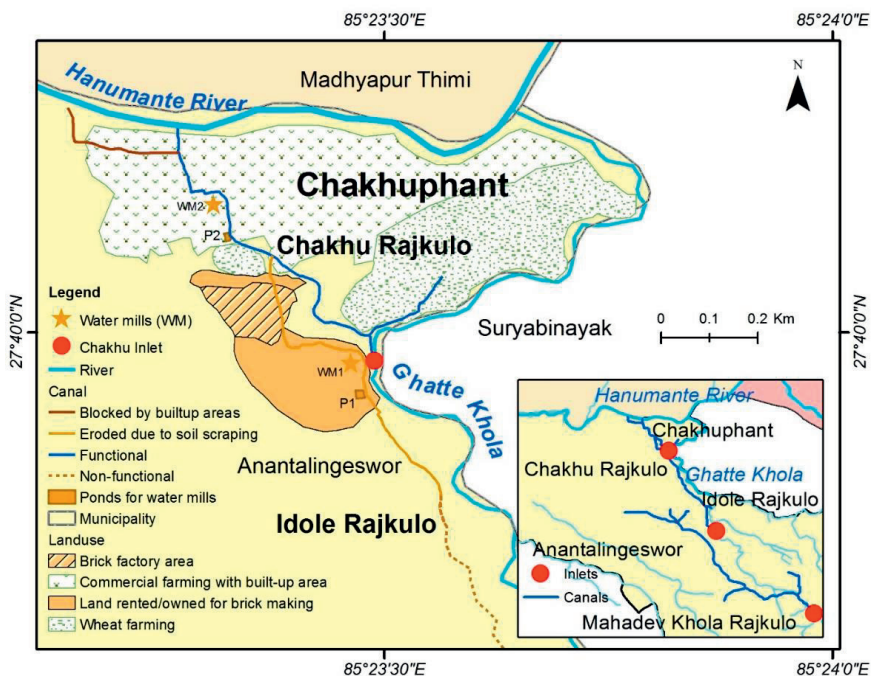


Figure 3.2. Three rajkulos fed by Ghatte Kholo, the water structures and canal sections that existed in the past and that still exist in Chakhuphant (Credit: Dibesh Shrestha).



Figure 3.3. Farmers cleaning the Chakhu Rajkulo (Source: author).

3. 5 Jhaukhel: increasing groundwater dependency

3.5.1 Growing importance of groundwater

With only seasonal streams providing water after the monsoon, stone spouts, wells, community shallow wells (*kuwa*) and ponds were the main water sources in Jhaukhel. Managing daily water needs was difficult, particularly in the dry season. Wells were used but quickly ran dry; private dugwells emerged from the 1980s. In the 1990s, the emergence of brick kilns brought more changes in land and water use and access. Brick factories mostly rented land in winter, returning it for monsoon cropping. On rented land, the factories started scraping soil and extracting groundwater for brickmaking via borewells. This new technology also stimulated local residents to extract groundwater for domestic and other uses. A commercial farmer: “there was no irrigation. We used to conserve water overflowing from wells and reused water after washing and bathing for irrigation. People could cultivate paddy but irrigating was difficult, so all started making borewells” (farmer, Jhaukhel, 31-12-2015).

A piped drinking water supply system started functioning in 1993 and extended its service to households through a metered tap connection by 1994. With increasing settlement, water demands rose while supply turned irregular. Over the years community-managed drinking water systems emerged and expanded in various hamlets. Shrestha et al. (2013) found eleven such systems in Jhaukhel, while this study shows a further (unregistered) increase. Settlement increased from the mid-1990s, converting agricultural fields and sand-mined land into residential plots. Early 2000s, Jhaukhel had changed from a rain-dependent agricultural village into one with diverse land and water uses based on groundwater. Commercial urban water supply from Jhaukhel started in 2001, after which the number of water bottling factories rapidly increased; Jhaukhel now harbors fourteen such factories. Additionally, unregistered water vendors started selling “raw water” to tankers and tractors that cater to urban water needs. A vendor: “I had a dugwell for drinking water and other needs, and made a living from farming. When we saw others selling water, we thought we should also try this. We drilled our first borewell and started selling water six years ago” (water vendor, Jhaukhel, 23-12-2015).

3.5.2 Claiming and negotiating rights and access to land and water

Until land sales for residential use started, land in Jhaukhel was largely owned by people from nearby Bhaktapur. This landownership influenced land and water use in Jhaukhel. A brick factory owner: “we started renting about 40 *ropanies* (1 hectare=19.65 ropani) of land. Landowners were mostly friends from Bhaktapur. This year we use 300 ropanies, of which we own less than 15 per cent, all other land is rented” (factory owner, Jhaukhel, 26-04-2016). Farmers who lack irrigation water often willingly rent out their land, and see it improve: “we used to plant maize on the slope, but rented the land to brick factories two decades back. Since fifteen years we have been planting paddy” (farmer, Jhaukhel, 17-12-2015). The rent is often higher than the net income from cultivation. Brick factories also have to prepare the rented land for farmers to cultivate paddy. In case of delayed monsoon rain, they also provide irrigation water. Thus, while factories gain access to land through renting, landowners can continue benefitting from their land. However, they do not always have a choice. A man renting out his land: “brick factory owners ask landowners. If they refuse, they are not compelled but their land will become a useless elevated plot with low paddy yields. That compels farmers to rent out land to the factories, which again influences adjoining land” (landowner, Jhaukhel, 15-02-2015). This shows that landownership does not always guarantee the owner’s benefit from it, while brick factories, which do not own land, gain access and even determine what surrounding farmers can do with their land.

Access to land is also crucial for gaining access to water. Although ownership of water is formally vested in the state, in practice access to land is widely accepted as giving a right to water. Landowners have a right to groundwater use based on their land right. An old farmer who purchases water for his household needs: “some buy half a ropani of land and make a borewell. In some areas with borewells, people contract out the land for profit at a specific rate per month” (farmer, Jhaukhel, 01-04-2016). While purchasing land provides unlimited rights (to use, sell or rent out land and water), renting land provides land control and water rights for a specified period. As this shows, changes in the right to land also change the right to (ground)water.

Water rights are also claimed on the basis of government registration. A bottling factory owner: “we do not operate without permission, we have registered our industry and have a permit. As a rule water cannot be sold without certificate. We renew it annually and pay the government tax. Moreover, we do not consume all water but also provide it to the locals. We give it for free to those who cannot afford purchasing it” (factory owner, Jhaukhel, 18-03-2016). The

Groundwater Policy of 2012 (and related guidelines, 2014) aims to restrict use of shallow groundwater (within 98 feet) to domestic uses. A permit from KVWSMB is required for the use of deep aquifers. Water factories in Jhaukhel are registered by the Department of Cottage and Small Industries. This practice has been continued, using the argument that the water factories started operating before KVWSMB was established. KVWSMB admitted in an interview that, contradicting the groundwater policy, shallow aquifers are commercially used. Nonetheless, KVWSMB limits its interventions because commercial water suppliers are important in filling the increasing gaps between urban water demand and supplies. Thus, commercial water users gain legal access to water through overlapping and weak government registration. They also supply water to local people, mainly as a strategy to avoid resistance and secure continued access. Unregistered water vendors, from which the municipality collects road tax, are commonly said to be illegal. However, with or without extraction permit, the common perception is that the right to groundwater comes with the right to land, either by permanent or temporary land control.

Those without well are weakest in accessing water: they depend on commercial users and those owning a well. A woman with unirrigated land next to her neighbor's irrigated land: "the brick factory owner installed the borewell on my neighbor's land, from which my neighbor irrigates. When we need to irrigate, they give us a little water, but everything depends on how we behave [towards them]" (female farmer, Jhaukhel, 21-1-2016). Dependency on commercial users for water compels others, including landowners, to maintain good social relations with the former. Similar problems can be seen in access to water for domestic uses, the burden of which falls mainly upon women. A Jhaukhel woman: "we had drilled a borewell for household use early 1990s, but it dried after ten years. We had a new borewell drilled but it also quickly dried. Since then we are fetching water from water factories. Even if these factory people hesitate and shout at us, we do not have other options. It is mostly women who do this job. If we do not succeed at one factory we try another. Sometimes we return empty-handed or with water that turns yellow in a day, they are reluctant to give filtered water. It is very difficult to get water. What shall we do if it dries up in the future? It will be difficult even to get drinking water" (Jhaukhel, women fetching water from a factory, 26-04-2016).

3.5.3 Protest, power and the avoidance of conflicts

With declining traditional water sources and groundwater table, making deeper wells is common practice. A well user: “we used to get water from a stone spout near our house. After that source had dried, I installed a hand pump. People all around also started making borewells as water sources were drying. Water could be accessed everywhere at around 40-50 feet. Until the late-1990s well water was good, but then it started declining. Around 2005, when the bigger factories had come and the well dried, I made a new well, 100 feet deep. For about eight years the water level was very good, but now there is no water even at 100 feet. People go to 130-140 feet now. The deeper we go, the worse the water quality, with a high iron content” (well user, Jhaukhel, 15-02-2016). Such developments make people more critical of commercial water exploitation. In 2009, residents demonstrated at the VDC office, demanding a stop to water sales. A woman fetching water from a “raw water” seller: “as water sources dried, people demonstrated at the VDC. We demanded that water selling should not be permitted. Then the VDC said that, except for registered factories, water sales will not be allowed, but later they did not follow that. This created animosity between vendors and protesters. The water sellers said that we are jealous of them. From then they hesitated even more to give us water. Those who raise their voices are considered enemies” (water user, Jhaukhel, 26-04-2016).

Although groundwater depletion and deterioration of water quality have increased, open opposition has remained rare. This can be related to an earlier event: Jhaukhel residents had encountered violent conflict in 2002, when a campaign against the brick factories, organized by a group of environmentally proactive local residents to sensitize villagers not to lease out their lands, turned violent. Leaving some injured, this conflict made residents avoid open conflicts until today. Other issues play a role as well: protests often create antagonisms with friends and relatives involved in these businesses. Hence people seldom report or oppose such practices: “even if we are suffering, we do not raise our voices. To reciprocate, water vendors allow neighbors to take water for free. They say ‘take as much water as you need, Why bother if your water source has dried’. That is how they operate” (farmer, Jhaukhel, 17-12-2015).

Women often bear the burden of fetching water from the few functional water sources, taps or vendors. A woman whose wells had dried: “mostly people fetch water in the water factories, often by quarrelling. We say: “you have water for sale but do not give us some for drinking?” Sometimes we return empty-handed, sometimes we fill our buckets. What else can we do? When water is extracted in such intensive competition, it will definitely run dry in the future” (woman, Jhaukhel, 26-04-2016). This shows the daily struggles for water: although local

residents have a right to domestic water, actually accessing it is difficult and requires courage. With loss of access, farmers also lost potential livelihood options in agriculture. Some wells installed for irrigation came to be used exclusively for drinking water, as traditional sources dried up. A woman leading a farmers' group: "for water, it is not appropriate to exclude those not belonging to the group. We acquired and have the right to use these wells for irrigation, but they [drinking water users] do not let us do so" (group discussion, Jhaukhel, 05-10-2015).



Figure 3.4. Local residents fetching water at a “raw water” vendor (Source: author).

3.6 Discussion

We have investigated changing water uses and water security in two communities in Kathmandu Valley, Dadhikot and Jhaukhel, explored how these changes are experienced by various actors, and looked into the role of conflict and cooperation in dealing with them. The cases show that peri-urbanization brings advantages and opportunities for some (commercial farming; water vending; brickmaking), often at the expense of others (ancestral farmers; groundwater-dependent Jhaukhel citizens). The cases abound with examples of growing water insecurity. However, the overall picture of benefits and disadvantages is rather fuzzy: a brick factory, for instance, may provide benefits to surrounding farmers, but also cause long-term damages (pollution; disturbance of groundwater; canal erosion). One thing is clear: with

increasing peri-urban water insecurity, the incidence of contestations and conflicts may also increase. Changing ways of accessing water, based on claims (e.g. traditional residents' rights as inhabitants; water factories with government registration) or otherwise (unregistered water vendors; brick factories) are further driving changes in peri-urban land and water uses and thus increasing water insecurity and conflicts. Fuzzy as these processes may be, women tend to bear much of the burden. They are often responsible for managing domestic water needs. In Jhaukhel, for instance, access to groundwater has become difficult for households that depend on shallow wells or spouts, adding to the workload of women. Aside from this, these hydro-social changes are too complex to clearly distinguish winners from losers and culprits from victims.

However, some key issues in negotiating, claiming and denying of water rights and water use can be discerned, around which water-related conflicts easily develop. First, the relative positions of water inlet structures of canals and locations of farmers' land in command areas and along canals (head, middle, or tail-end positions; close to the canal or at greater distance) are increasingly important determinants of access to surface water. Second, the origin of farmers (ancestral or in-migrant) is often used normatively in relation to statements about water rights, water use practices, and problems of water insecurity. Third, issues of (non-)participation in canal maintenance, often related to local notions of good behavior and justice, seem to be the only non-negotiable. People should participate, pay, or otherwise abstain from taking water to avoid moral indignation and exclusion. Fourth, issues of different sources and uses of water (e.g. irrigation of commercial crops and canal water use; commercial groundwater use and its environmental consequences) are sensitive and may lead to conflicts. Often these issues are framed and perceived as interconnected, such as participation in canal maintenance and farmers' origin, or seasonal cropping practices in relation to location and participation in maintenance. In this complex hydro-social landscape, negotiations about water rights and access for rights-holders are increasingly difficult, both for surface and groundwater.

3.6.1 Continuity and change in water rights and access

How are these water security issues related to changing water rights and access? Growing water competition in Chakhuphant (Dadhikot) is distorting customary water rights and allocation in surface irrigation canals. Ancestral farmers, the prior rights-holders, are gradually losing access to water and no longer able to materialize their rights (see Roth et al., 2005). This

compels them to use polluted stream water to avoid conflicts about scarce canal water. Irrigation turns are becoming less flexible as rights-related responsibilities are less adhered to. On the other hand, the case shows that customary notions of water rights as inseparable “bundles” of rights and obligations are, to some extent, still respected by ancestral farmers and even immigrants, and continue to structure irrigation practices. In Jhaukhel, groundwater emerged as a new water source, initially based on shallow aquifers but gradually moving into deep aquifers as well. Historically, the right to use groundwater is strongly associated with land rights, either through ownership or other arrangements. Although this strongly established notion of legitimacy of groundwater use is increasingly circumscribed by restrictive policies and regulations, in Kathmandu Valley these are not strictly enforced. Commercial water vendors have become powerful actors, crucial for filling the gaps between urban water demand and public provision, and hence benefit from the discretionary powers of responsible agencies.

The relatively recently introduced pumping technology is deeply influencing surface and groundwater uses. Where rights-based forms of access are weakening or disappearing, pumping technology creates new options for accessing water on an ad-hoc and highly individualized basis. Pumping from surface canals and streams has become a new solution to water scarcities. Although these practices create new contestations about their legitimacy (pumping canal water impinges on the canal water rights of ancestral farmers; pumping from a stream feeding irrigation canals has an impact on water availability for downstream canals), they also contribute to the temporary alleviation of scarcity; an example is pumping water from the heavily polluted Hanumante River. In groundwater, pumping technology brought a temporary relief from the water insecurity caused by seasonal drying up of shallow wells, spouts and springs. However, this relief was short-lived, as increasing exploitation for urban demands (e.g. water vending) worsened groundwater problems, even excluding rights-holders from their access to water. Large-scale groundwater exploitation has now become a major conflict-sensitive issue in Jhaukhel.

As groundwater use requires material and other resources, which are commanded primarily by well-to-do people like water entrepreneurs, it may have an exclusionary effect on poor groups. Peri-urban rights-holders, for instance, often become dependent on non-rights-holders for access to water. After drying up of their water sources, Jhaukhel residents depend on water vendors, despite the fact that the former have water rights and the latter’s practices are illegal. This shows that water access is not always rights-based, nor do rights always ensure access (see Ribot and Peluso, 2003). Notwithstanding the existence of a governmental permit system for

commercial exploitation of deep aquifers and a prohibition of commercial exploitation of shallow ones, transgressions of both are tolerated because of the urgency of urban water provision. Restrictions on groundwater exploitation are further complicated by the fact that groundwater exploitation is still widely regarded as legitimate for those who control the land, even though over-exploitation may lead to loss of public access to water spouts and other sources like shallow wells.

3.6.2 Avoiding conflicts, co-opting farmers and households, suppressing protests

Water use in this “grey zone” between rights and access (Sikor and Lund, 2009) to water in the peri-urban context is conflict-sensitive. Where government authorities do not actively intervene to regulate commercial exploitation like water vending and brickmaking, and seem to tolerate or even support these activities, tensions may run high. When the local government did not forbid water selling in Jhaukel, tensions increased considerably; and when citizens protested against the pollution caused by brick factories, violence broke out. In view of the key importance of water, however, there are remarkably few conflicts that actually escalate into physical violence. Our cases show several mechanisms that, together, provide an explanation for this: flexibility and awareness of local norms and rights; co-option through cooperation and mutual benefits; and conflict avoidance, power relations and dependence.

Flexibility and awareness of local norms and rights

Realization that water access problems are experienced by many creates a degree of tolerance towards other people’s water accessing behaviour. As in Jhaukel, where a well constructed for irrigation came to be fully used for drinking water, this attitude may be further strengthened by shared norms about the inappropriateness of denying people access to drinking water. Several other examples of awareness of local norms and rules emerge from the case studies. First, in-migrants leasing land in Dadhikot show awareness of local water accessing norms by taking water from a stream, regarded as public property, rather than from an irrigation canal, to which water rights are attached. The same goes for brick factories in Chakhupant that pump stream water rather than using canal water. Further, rights-holding farmers whose access to irrigation water has become uncertain and hence no longer join maintenance, also abstain from using canal water, to avoid conflicts about free-riding. Third, although farmers in upper Chakhu

Rajkulo, invited in the winter season to cultivate wheat, are using irrigation water without participating in maintenance, they at least postpone irrigation to avoid confrontations.

Co-option through cooperation and the creation of mutual benefits

Entrepreneurs in both areas are dependent on local people in many ways. They can only do business (water vending, brickmaking) if the local population at least tolerates—but even better: actively supports—their activities, allows them access to land and water, and is willing to cooperate in other ways (e.g. by providing labor opportunities). Hence, they have a clear interest in increasing the legitimacy of their operations by providing support and seeking forms of cooperation that make their presence look like a win-win situation. Both cases show how brick factory owners make deals with surrounding farmers. In Jhaukhel, the factories rent land, scrape and level it for another cropping season, and provide irrigation water. In the short term, farmers benefit from such services, but the long-term consequences may be less beneficial: canal erosion, more water scarcity and competition in Dadhikot; pollution, lowering of the groundwater level, and no option for landowners but to accept cooperation with the factories in Jhaukhel. Similarly, commercial water vendors provide limited access to their water for surrounding households, provided that they “behave”. Labor opportunities further strengthen the networks of local support by creating loyalties to the enterprise among laborers and their relatives. Such deals, which create mutual benefits, make people increasingly dependent on and supportive of the activities of commercial enterprises, thus silencing critical voices.

Conflict avoidance, power relations, and dependence

Fear of conflicts may make people explore alternative water sources. Aided by pumping technology, irrigating from Hanumante River in Dadhikot became such a solution for farmers who did not want to compete for scarce canal water and can mobilize the resources needed for pumping. Even though forced by growing scarcity and competition, these farmers have a degree of choice. Others are less fortunate because of their dependence on water providers. Thus, for households in Jhaukhel who depend on commercial water vendors or brick factories for their water, maintaining good social relationships with the provider is crucial. In such situations, criticism of commercial entrepreneurs may endanger the continuity of their access. Since the violence in Jhaukhel there is widespread fear of protesting or campaigning against brick

factories and water entrepreneurs, powerful groups whose interests even find support in government circles. Likewise, fear of disturbing social networks of relatives and neighborhood explain people's restraint in openly contesting and opposing commercial extraction practices.

Even though the first of these mechanisms may be based on power relations that maintain a property status quo in society, it is important in preventing conflicts from developing by behavioural choices of water users. The second one, on the other hand, co-opts water users into the agendas of commercial exploiters, which may postpone or dampen conflicts but will probably not solve them. The third one is ultimately based on fear of social conflicts, the exertion of power and threat of violence, and might well raise tensions in the long run.

3.6.3 Implications for dealing with water conflicts

Our analysis shows the importance of in-depth research on changing water security, conflict and cooperation in specific socio-environmental contexts (see also the introduction to this special issue). While it is clear that, in a situation of growing scarcity and water insecurity, the potential for conflicts also increases, these changes cannot be understood from a linear causal scarcity-conflict perspective, as suggested in earlier work (e.g. Homer-Dixon, 1999). Water scarcity and insecurity are socially produced in the multiple changes taking place around both surface water flows and groundwater (see e.g. Mehta, 2007; Zeitoun et al., 2013). The same goes for water-related conflicts and the various ways in which such conflicts are expressed, managed, dampened, avoided, or suppressed, including through forms of cooperation. Understanding these processes, mechanisms and dependencies concerning water scarcity and (in)-security is imperative in understanding peri-urban dynamics of conflicts and cooperation.

Our focus on property and access proves to be indispensable for really understanding the sociality of the changing water flows that we analyzed. Placing a hyphen between “the hydro” and “the social” explains nothing in itself, but is given deeper meaning by looking into the changing practices of claiming and accessing water in a setting characterized by institutional complexity, multiple competing authorities and shifting powers. The changing ways of claiming and accessing water and land crucially involve conflicts, contestations and negotiations. While formerly relatively clear water rights associated with surface irrigation canals are weakening, access to water is increasingly shaped by access to technology, social networks, power and capital. Peri-urbanization has distorted traditional water use practices and introduced new ones, but also created new divisions and disparities between various water

users. It provides opportunities for some, but has specifically increased water access problems for the poor, who are often dependent on those with access to land and water. With ongoing urbanization in the context of a changing climate, the local water conflict potential will probably increase.

In view of this, developing more conflict-sensitive ways of governing peri-urban resources should be a priority of scientists and policy-makers. Understanding the complex institutional and regulatory landscape through which water is currently governed is highly relevant in estimating future options for peri-urban water governance. Currently, urbanization is a largely unplanned and uncontrolled process. When changes in water rights, access, and security are concerned, state agencies are mainly muddling through processes that they cannot—or least do not—fully control (e.g. Dadhikot: canal irrigation; Jhaukhel: commercial groundwater exploitation). As can be seen in surface irrigation canals (Dadhikot) and the local norms of groundwater use (Jhaukhel), water is also governed through non-state institutions. In this peri-urban context of multiple, partly ineffective, governance arrangements the danger of conflict is very real.

Urbanization is likely to worsen peri-urban water competition and conflicts, despite ongoing efforts for augmenting urban water supply (Domènech et al., 2013). For lack of basic water supply services, many peri-urban residents depend on those who are exploiting peri-urban resources commercially, even if such exploitation increases water insecurities. This growing gap between those who are able to create, maintain and expand access to water for commercial purposes, and those who are missing or losing that access, lays bare the basically political character of water distribution and allocation in a context of growing scarcity caused by uncontrolled changes in peri-urban land and water uses. Clear long-term priorities will have to be set and acted upon by governing bodies responsible for regulating land and water uses and providing water services. Peri-urban spaces need specific attention because of the extremely rapid socio-environmental changes taking place there and the multiple state-based and other regulatory institutions and arrangements that play a role in water provision. In addition to the improvement of basic water services by political priority-setting in a context of growing scarcities, a much neglected yet crucial contribution to water security is to ensure that water users, service providers, and those affecting water sources (sand miners, polluting industries) contribute to water conservation (e.g. rainwater harvesting and recharge, wastewater treatment), both in quantity and quality. These could help address growing concerns about peri-urban water insecurity and water conflicts.

Chapter 4

The hydro-social dynamics of exclusion and water insecurity of dalits in peri-urban Kathmandu Valley, Nepal: fluid *yet* unchanging

Abstract

Processes of urbanization create peri-urban spaces that are socially and institutionally fluid. In this article, we analyze how contestations and competition over declining water resources in peri-urban Kathmandu Valley in Nepal reshape water use, access and rights as well as the user communities themselves, by creating and reproducing exclusion and solidarity. Traditional caste-based discriminatory practices, prohibiting Dalits from physically accessing water from sources used by higher castes are said to be no longer practiced in Nepal. However, our findings show that, while its characteristics have changed, exclusion persists for the Dalits, reproduced in evolving peri-urban water governance processes and institutions. In situations of competing water claims in the research location, Dalit households are unable to exercise their prior use water rights, unlike higher-caste groups. Further, their water insecurity is compounded by their relative inability to mobilize political, social and economic resources to claim and access new water services and institutions. By juxtaposing the hydro-social and social exclusion analytical frameworks, we demonstrate how exclusion as well as interpretations and experiences of water (in)security are reified in new social, political, economic and ecological milieus in post-Maoist, supposedly inclusive Nepal.

Keywords: caste; Dalits; exclusion; hydro-social dynamics; peri-urbanization; water (in)security

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4.1 Introduction

Nepal presents a paradoxical urbanization situation: Kathmandu Valley, where the capital Kathmandu is located, is one of the fastest-growing South-Asian urban agglomerations in the least urbanized country in South Asia (Muzzini and Aparicio, 2013). Rapid urbanization entails dynamic movements and reallocations of people, resources and spaces between expanding urban and neighboring peri-urban spaces. These hybrid (intermixed “rural” *and* “urban”) spaces are rapidly changing, both ecologically and socio-economically (Leaf, 2011; Narain and Prakash, 2016). The dynamic character and complexity of the peri-urban landscape leads to a reshaping of resource uses, particularly land and water, which results in diverse forms of contestation and conflict. The problem is aggravated by the fact that the governance and jurisdictional boundaries, as well as sector-based institutional arrangements and policies for resources (like land and water) are at loggerheads with peri-urban fluidity and complexity (Allen, 2003; Butterworth et al., 2007).

Several studies discuss the dynamics of competing claims on water in contested peri-urban spaces (Mehta et al., 2014; Narain, 2014; 2016; Narain and Singh, 2017; Shrestha, et al., 2018). Yet, few studies discuss how disparities and inequalities are reproduced across institutional scales, mechanisms and processes of water governance. We draw attention to these issues by exploring how changes in flows of water and movements of people in peri-urban spaces result in “water and society mak(ing) and remak(ing) each other” (Linton and Budds, 2014: 170). Bringing together the conceptual frameworks of social exclusion and hydro-social processes allows us to understand the meanings and experiences of exclusion through a water lens. Our findings help analyze how and why some, relative to others, are better able to claim access to and control of water in a rapidly evolving peri-urban location in Nepal – particularly in relation to the continued water exclusion of the Dalit community.

Boelens et al. (2018: 6) note that water is both a medium and source of complex inequalities and exclusion at various scales. Unpacking complex and deep-rooted politics of water (in)security requires understanding the dynamic nature of exclusion by “recognition, participation and distribution” at scale, as well as knowing that water injustices are often “embedded in sensitive, dynamically socio-natural environments or ‘socio-ecological contexts’” (ibid). There are some studies of caste-determined water exclusion for Dalits in peri-urban contexts in South Asia (Prakash and Singh, 2016; Vij and Narain, 2016; van der Woude, 2016). However, these studies mostly report on the traditional nature of exclusion, while little attention is paid to how exclusion by caste inform and mediate evolving water governance

institutions, processes and mechanisms. In this paper, we have analyzed how the plays of politics and power shape, and are in turn shaped by, the dynamic socio-ecological and institutional context of the peri-urban, to result in persistent caste-based water exclusion for the Dalits. Conducting research in one location —Lamatar, an urbanizing VDC in Kathmandu Valley— was particularly useful for an in-depth analysis of how water and society (re)shape each other over time and space.

But first it is important to know that water has been both a medium and source of exclusion in the South Asian Hindu context. This goes especially for the Dalits, who are placed outside the four-fold social hierarchy of the Hindu caste³⁷ order, and hence also known as “untouchables” or “outcastes” (Joshi and Fawcett, 2006: 119). The term “Dalit”, meaning “the oppressed”, is a relatively recent term, a conscious political rejection of discrimination by the community, known colloquially through various titles in Nepal (Dahal et al., 2002; Geiser, 2005; Bhattachan et al., 2009). As we discuss below, entanglements of water, caste and exclusion observed in traditional practices concerning pollution and purification (see Joshi and Fawcett, 2006) no longer rigidly apply in peri-urban spaces of Nepal. Nonetheless, exclusion persists, and quite prominently through water, for the Dalits.

It has proved difficult to bring about changes in the deep-rooted exclusion of the Dalits across South Asia. It is widely reported that, despite affirmative action, positive discrimination policies and interventions for the Dalits announced in the new democratic Nepal (after two rounds of *Jana Andolans* —people’s movements— in 1990 and 1996-2006), caste hierarchies continue to define the social fabric of everyday living and being. While constitutional reforms on caste and political mobilization have resulted in an increased social and political awareness, these changes are reported as being largely “symbolic [...] with little substantive practical outcomes” (Sharma and Donini, 2010: i). Reversing historically entrenched disparities by caste is not easy. Firstly, caste is inherited at birth and articulated in one’s name. This means that it is difficult, if not impossible, for the Dalits to transform their identity and to become absolved of their culturally assigned “polluted”, unequal status. Further, caste norms traditionally stipulated that Dalits should not own land or property, be educated and have public voice. This confluence of social, economic and political unfreedoms continues to create impediments for Dalits to access

³⁷ Caste is an elaborate traditional system of social stratification that combines elements of occupation, endogamy, culture, social class, tribe affiliation and political power. Each caste is further divided into sub-castes, which are often used as surnames (for Dalit castes, sub-castes, surnames and traditional occupations, see Bhattachan et al., 2009: 48-49).

resources in a changing economy (Bownas and Bishokarma, 2018). As Sen (2000) has argued, while situations might evolve, capability deprivation is deep-rooted and impacted by relational aspects of disparity and inequality that pervade all social interactions and access to resources.

Finally, a lot is changing in peri-urban Lamatar: community, institutions and the landscape itself. As competition for water intensifies between older, more settled residents and newer migrants, the rule of prior use rights to water, a practice recognized in Nepal both informally and by law (Pradhan, 2000), is often used to stake historical (prior use) claims to water. Unfortunately, this does not seem to work for the Dalit residents of Lamatar. They seem to easily lose “their” prior use water rights, an exclusion that happens relatively easily, because they are essentially placed outside the boundaries of the “community”. But this is not the only way in which caste-based inequalities play into new water solidarities and exclusion, even in rapidly changing peri-urban spaces. Exclusion is not only “embedded in culture ... and manifest in customary norms and laws”, it occurs and evolves in diverse “social domains” (Delgado and Zwartveen, 2007: 2).

The article is structured as follows: firstly, we discuss how a nuanced analysis of social exclusion is pivotal to understanding the dynamics and politics of hydro-social interrelations. Then we introduce Lamatar VDC and explain the research methodology adopted for this study. This is followed by a detailed overview of the research findings, which illustrate how some become water secure and others water insecure, some get included and others excluded in this changing peri-urban village, with Dalits often on the losing side. We conclude by noting that it is essential to understand the historical, contextual fabric of exclusion in order to understand contemporary hydro-social complexities.

4.2 Exclusion and the hydro-social dynamics of peri-urban water (in)security

The concept of “social exclusion” was first discussed in France in the 1970s to bring attention to “processes through which individuals or groups are wholly or partially excluded from full participation in the society within which they live” (European Foundation, 1995 in de Haan, 1998). The term was quickly adopted in development policy and currently, refers to a broad array of disparities: economic, social and political dimensions of inequality; individual exclusion from basic human, social and political rights and needs; and other contextual, circumstantial factors that result in certain individuals and groups having differential, unequal access to rights, resources and agency (Kabeer, 2000; Khan et al., 2015). Indeed, processes of

exclusion are complex and dynamic. Understanding them requires paying attention to context, capabilities, and power relations between actors (Hall et al., 2011; Sen, 2000). A social exclusion perspective helps to analyze the entanglement of multiple overlapping experiences of disadvantage and inequality, which are otherwise generally dealt with separately and individually in development policy and practice (Kabeer, 2000; 2005; Lakhani et al., 2014; Khan et al., 2015). The framework also helps explain how disparities are mediated and resources and opportunities granted or denied through complex intersections of economic, social, political and cultural processes, and how these are mirrored in policies, institutions and institutional norms and rules at various scales.

The elemental notions of purity and pollution that shape Hinduism rivet the Dalits at the bottom of the social hierarchy, outside the four-fold *varna*³⁸ hierarchy of Hindu society. Identified as “outcastes”, Dalits were considered to be inherently impure - capable of polluting others in the caste hierarchy (Joshi and Fawcett, 2005; 2006). In Nepal, Dalits were identified as those who are “*Chhoyi Chhito Halnu Parne*”; in other words, “those whose touch pollutes others” (higher castes), requiring them —when touched by or coming into contact with the Dalits— to undertake a ritualistic purification by sprinkling water (further purified by the touch of gold) over themselves.³⁹ Dalits are thus distinguished from the Sudras, the fourth tier of the caste hierarchy, who are identified as “*pani nachalne*”, i.e. those with whom higher castes were not to share water (to drink or use water offered or touched by them). However, the practice of ritualistic purification (by water) is not emphasized here. It goes beyond saying that Dalits are “*pani nachalne*”.

The traditional four-fold caste hierarchy was formally legalized in Nepal in 1854; a century later, in 1963, it was abolished constitutionally. However, Lawoti (2010) notes that, even though the constitution has for some time now guaranteed political rights and freedom to organize and mobilize against exclusion, the state historically discouraged critique of caste-

³⁸ *Varna* is the basic stratification of the caste system, which divides society into four layers: Brahmins, Kshatriyas, Vaishyas and Sudras. According to Pariyar and Lovett (2016: 135), “tasks assigned to the Dalits are considered to be too ritually polluting to merit inclusion within the traditional Varna system and so the Dalits experience social exclusion”.

³⁹ The Legal Code of 1854 defined the grounds of caste-based hierarchy and dictated the norms and behaviour of various caste groups in Nepal. It organized Nepali caste groups into the following four broad hierarchies: i) *Tagadhari* (wearers of sacred thread), ii) *Matwali* (liquor Consuming castes), iii) *Pani nachalne choi chito halnu naparne* (Impure but touchable castes), and iv) *Pani nacalne choi chito halnu parne* (Untouchable castes). The fourth are referred to as Dalits or untouchables (with heterogeneity and hierarchy within the group) in present Nepali society (Dahal et al., 2002).

based exclusion and inequalities. This explains why caste disparities continued in Nepal and were, until relatively recently, a subject of socio-anthropological study rather than a political agenda. An exclusionary nationalism promoted by the state began to be challenged after the 1990 Constitution that guaranteed considerable political rights to organize and mobilize against marginalization (ibid). The Maoist insurgency between 1996 and 2006 provided a more enabling environment for the socially marginalized to mobilize against various types of exclusion (Lawoti, 2010; Nightingale, 2011; Bownas, 2015). “Social inclusion” was finally identified as one of four pillars of a just, democratic state of Nepal, as outlined in the Tenth Period Development Plan of Nepal (2002-2007) (Bennett, 2005). It is therefore not surprising, that many, including the Dalits themselves, argue that traditional caste-based discriminatory practices no longer apply in post-Maoist, democratic Nepal.

There is definitely a significantly greater awareness of the illegality of caste-based discriminations, particularly among the Dalits. Yet, there has been limited success in reversing historical injustices and inequalities, which continue to be reproduced or mutate into newer forms of difference and divide (Lawoti, 2010; Nightingale, 2011; Thapa, 2015; Bownas and Bishokarma, 2018). Discriminatory social divides by caste (among others) are deep-rooted and continue to permeate social practices and cultures as well as national, regional and local planning and political processes. This explains why “in relation to all human development indicators, Dalits score far below the national average” in Nepal (Khanal et al., 2012: 17). It is in this context of persisting caste-based social stratification in South Asia that scholars emphasize the need for detailed and contextualized studies in understanding how caste operates and shapes differentiation in access to resources in evolving socio-political and economic contexts (Gorringe et al., 2017).

In this article, we research this important but under-researched issue with a focus on the peri-urban space, which is dynamic and characterized by administrative and jurisdictional ambiguities and fluidities (Allen, 2003; Leaf, 2011; Narain and Nischal, 2007). In such a dynamic context, the fluidity of both water and space has been noted to increase water conflicts and contestations (Butterworth et al., 2007; Narain, 2009a; 2009b; 2016) in situations of socio-political and institutional “bricolage” (Cleaver, 2001). How do these changes shape unequal contestations around water? Does such dynamism help transform caste-defined exclusion, especially if policies are enabling? These were the key questions for us. Unfortunately, analyzing how different communities explore innovative ways to claim and access contested water sources in peri-urban Kathmandu Valley, our findings indicate that, for the Dalits, caste

operates as a persisting determinant of social differentiation, intersecting with and shaping water (in)security in the peri-urban space.

The concept of water security is quite broad and rightly considered a “battlefield of ideas” emerging from many disciplinary, sectoral, ideological, and geographical roots (Zeitoun et al., 2013; Cook and Bakker, 2012). More recently, there has been a distinct shift in the understanding of water security, from physical access to water to how unequal access is (re)shaped by unequal relations of power and control (Zeitoun et al., 2013; Boelens, 2013; Delgado, 2011). Such a relational approach acknowledges that an analysis of processes and mechanisms underlying differential water access, allocation and rights is central to an understanding of water security.

Conceptually, a hydro-social approach explains how water and society shape each other and co-evolve (Loftus, 2014). This widely applied approach allows analyzing how water and power intersect to shape inequalities of access, control, and exclusion between diverse social groups in different physical, economic, cultural, and political settings (Budds et al., 2014; Linton and Budds, 2014; Swyngedouw, 2009). Few studies provide an in-depth overview of localized natures of water (in)security in peri-urban settings. Our research objective was to understand how notions like “community” and “identity” are shaped by power, difference and divide in fluid, evolving peri-urban spaces, and how these are manifested in existing as well as evolving forms and processes of water governance and management. Our findings show that water insecurity is both inevitable and complex in the urbanization process. In order that this does not also translate into being inevitably inequitable, we argue the need for more nuanced analyses of co-evolving water-society interrelations in these spaces.

4.3 Study area and research methodology

Our research case study is the Lamatar VDC, which lies some 16 km southeast of Kathmandu city. This urbanizing area was merged with four other peri-urban VDCs to form the Mahalaxmi Municipality (urban body) in 2014. Despite the administrative transition from rural to urban, Lamatar VDC is not completely urban. The urban administrative units, called “wards”, in Lamatar consist of villages and hamlets, the latter (often) named after the majority sub-caste group (see footnote 37) living here traditionally (e.g. Thakuri Gaun, Khadka Gaun, Karki Gaun). Also, while Lamatar is considered administratively urban, rural socio-cultural norms and practices still prevail. For example, Lamatar has 11 community-managed forests, which are

also the sites of several groundwater springs tapped for domestic and drinking water purposes. As a typical peri-urban space, Lamatar is neither rural nor urban. While its increase in population (0.8 per cent annually) and number of houses (from 1,497 to 1,759 between 2001 and 2011; CBS, 2001; 2012) have been gradual, the landscape is changing rapidly. The conversion of agricultural land into residential plots, which started in the 1990s, intensified from the mid-2000s; a commercial housing colony lies side by side with still rural hamlets in Lamatar.

Studying a particular location, event or process helps to understand the “how” and “why” of contemporary issues in a real-life context (Yin, 2009). In Lamatar, we adopted an actor-oriented approach (Long and Long, 1992; Long, 2001) to analyze conflicts and contestations over water. This required studying relevant actors and their interactions in relation to making decisions about water access and use. An actor-oriented approach “points to who is doing what, in relation to whom”, which helps in identifying power relations, particularly in shaping access and exclusion (Khan, et al., 2015: 3). According to Seur (1992), this is an ideal way to understand processes of social change. Following this approach involves interviewing key informants more than once and using the snowball method to interview a network of relevant actors. In our study, we have focused on understanding attitudes, perspectives, values and practices, including the meanings people give to their experiences (Elliott, 2005). Thus, our findings show not just what happened, but how events and processes relating to water are perceived and experienced as complex and often conflicting stories by the various actors narrating their experiences.

We primarily interviewed residents of three villages and hamlets, Tehrabise, Dandathok, and Sisneri in Lamatar (see figure 4.1 and 4.2) and, as and when relevant, residents of nearby villages. These respondents were male and female, youth and elderly, old inhabitants and new in-migrants, all with various caste and class backgrounds. We also interviewed key-stakeholders in relation to water governance and management: chairpersons and representatives of village-level drinking water supply committees, chairpersons of community groups (the forest committee, teachers, the ward secretary and the coordinator of the ward-level citizen forum), the elected ward chairperson for Lamatar, and various officials from governmental and non-government organizations. Most of these respondents were higher-caste men, who took decisions on water and built, operated and managed water infrastructure. The empirical data presented here are based on interviews with 74 informants, which included 44 men (of which 9 were Dalits), 30 women (14 Dalits), 4 government officials and 2 staff members of non-governmental organizations. Many respondents were interviewed more than once. We

conducted numerous informal talks and, specifically, 41 conversational interviews and 24 open and semi-structured interviews. We also reviewed recently published and grey literature to understand the dynamics of caste-based disparities in Nepal, focusing particularly on Dalits. Our findings describe and analyze the hydro-social dynamics of a continued exclusion of Dalits in peri-urban landscapes, to conclude that, while the overall context is rapidly evolving, disparities by caste seem socially static, resulting in new forms of water exclusion for the Dalits living in the above described location.

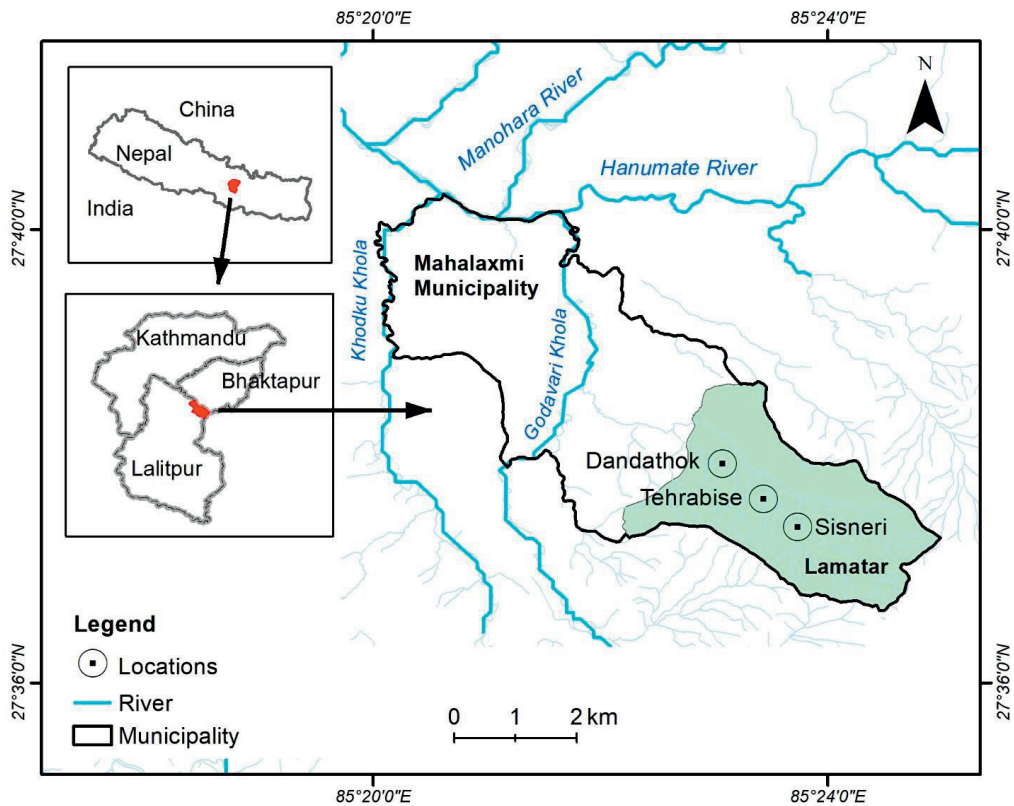


Figure 4.1. Location of study area: Lamatar (VDC), Mahalaxmi Municipality (Credit: Dibesh Shrestha).

4.4 The hydro-social dynamics of exclusion and water insecurity in Lamatar

4.4.1 Static caste-based institutions and the control of a dynamic resource

In the early-1990s, higher-caste villagers living in an upstream ward (number 7) of Lamatar VDC secured government funding and support to develop a piped water scheme from a reliable groundwater spring (known locally as *sim*). This community had been using the water source historically, i.e. they had secure prior use rights to the source. Water provision from this Sim Drinking Water Supply scheme (as it was named) was extended (on request) to a neighboring downstream village called Dandathok⁴⁰, whose residents relied on distant traditional water sources that they shared with neighboring villages. Although village-level data are not available, with over 200 houses Dandathok is the largest settlement in Ward 7 of Lamatar and is known as an affluent village. Dandathok's residents are involved in farming and cattle rearing; supplying milk and vegetables to the growing population and neighboring urban areas makes for a reliable business. Many inhabitants have new urban "office-based" occupations. Only around five per cent of the residents in Dandathok, mostly Dalits, rely on manual labor for their livelihoods. In sum, with increasing in-migration, the population in Dandathok is growing and water demands are increasing.

After a few years, the upstream villagers of Ward 7 realized that it was not a wise decision to "share water" with an expanding Dandathok. The Sim water supply was stopped, and Dandathok villagers accepted this decision. It was the prerogative of the uphill villagers to decide to share (or not) "their" water source through the rule of prior water use rights. We contrast this story with another event, which shows that historical prior use rights do not work for the Dalits.

Having briefly experienced a reliable piped water supply, Dandathok residents knew that the only reliable solution was to secure water access by staking a claim to a water source. The residents got together to form an informal water user committee and intensified the search for a more reliable water supply. They approached a non-governmental organization (NGO), which offered technical and financial support, provided the following criteria were met: an undisputed and reliable water source, the requisite number of water-using households, upfront cash contributions to the scheme's construction costs, and agreement of full responsibility for

⁴⁰ This includes several hamlets, including one of 16 Dalit households. Uphill villagers commonly refer to the area as Dandathok, one of the hamlets.

operating and maintaining the scheme. Dandathok residents identified a spring source, Raksidol, which originated in the uphill Patle community forest⁴¹ (figure 4.2) and was known to have a reliable annual discharge. It was another matter that the prior users of this spring outlet were Dalit (Sarki) residents living in Tehrabise hamlet, which lies upstream to Dandathok.

There are about 35 Sarki households living in Tehrabise hamlet, who have been resident here for as long as they and other settled Lamatar residents can recall. Unlike other higher-caste residents, most Sarki households in Tehrabise have only a small plot of homestead land. Only a few have small agricultural land-holdings. As determined in the caste order, Dalits in Nepal (as elsewhere in South Asia) do not own land. The traditional caste-determined occupation of the Sarkis was shoemaking⁴², which no longer sustains in a modern economy. In the recent past Tehrabise residents, both men and women, worked as daily agricultural wage laborers. Following the rapid conversion of agricultural land into residential plots in the valley, many of them are now engaged as construction workers in new construction sites. Options for work are often limited by caste prejudices. According to a female Dalit resident of Tehrabise: “a few from our village were selected for the position of guard cum helpers in a nearby school.”⁴³ However, local higher-caste residents complained to the school management to not appoint Dalits. We lost these jobs to other higher-caste people”.

Her husband is a labor migrant in a Gulf country, and she adds: “people say there is no need to go abroad [...] if we seek opportunities in our own locality. However, this is not quite true for us Dalits” (interview, 23-12-2017). Without land, with limited education and few capital assets, livelihood options are limited for the Dalits. Some rear cattle and sell milk in dairy collection centers, as higher-caste residents in Lamatar do not purchase milk directly from the untouchable Dalits. Only three males in Tehrabise have studied beyond high school. Most older men and women are illiterate or have attended only a few years of primary education.⁴⁴

⁴¹ Dandathok belongs to the Padali Community Forest User Group (CFUG). Raksidol spring now lies in Padali CFUG after GPS-based boundary delineation in 2016.

⁴² Among Dalits, the titles (surnames) correspond to their traditional occupations, e.g. Sunar (goldsmiths), Tamta (coppersmiths), and Sarkis (shoemakers). There are many sub-clans and sub-castes, so a social hierarchy exists amongst the Dalits themselves, even though they are all considered untouchables and impure (Dahal et al., 2002; Bhattachan et al., 2009).

⁴³ An expensive private school with a secondary branch is in Sisneri since the late-1990s. The school management provided financial support to the school managed by Patle CFUG Committee and gained access to its water.

⁴⁴ Alcoholism was common among Tehrabise elders.

Whatever else their problems, access to water had not been a problem for the Dalit residents of Tehrabise who live in two neighboring smaller hamlets (*Tole*⁴⁵ 1&2, see figure 4.2). Water from the Raksidol spring fed a traditional stone spout, providing reliable water for drinking and other domestic purposes. The overflow continued downhill, flowing into an irrigation canal used for downstream paddy fields. Additionally, the Sarki community living in Tole 2 of Tehrabise hamlet had access to another spring source (known as Kalidevi), located on the boundary between Tole 2 of Tehrabise and Thakuri Gaun, an upstream higher-caste hamlet in Sisneri village. The Thakuris of Thakuri Gaun unwillingly shared water with Dalits, a practice not conducive to caste norms of pollution and purity.

The higher-caste, relatively well-endowed residents of Sisneri are also elected members of several local government organizations. This privileged position enabled them in the mid-1990s to allocate village development funds to build piped household water supply schemes from spring sources originating in the Patle Community Forest. These schemes provided individual household connections in all hamlets in Sisneri, including Thakuri Gaun. Five public standposts were also provided in the neighboring Tole 2 of Tehrabise. The Dalit residents of Tehrabise saw no reason to question this development. They had been provided (free of cost) with public standposts, which meant that they no longer had to keep distance from the higher-caste Thakuris when fetching water from the Kalidevi spring. Little did they know that this was the start of stark changes in their water security.

Soon after the above development in Sisneri, Dandathok residents formally registered their community organization as the Raksidol Drinking Water Supply and Sanitation User Committee (RDWSSC).⁴⁶ They identified the Raksidol spring as an uncontested water source and addressed all other formalities outlined by the supporting NGO. A member of RDWSS recalled: “the population in our village did not match NGO norms of a ‘beneficiary community’, hence we included households from a village across the stream as water users” (interview, 05-04-2016). The decision of Dandathok residents to include higher-caste households from a rather distant village instead of the Dalit households in Tehrabise who reside close to the Raksidol spring, suggests a conscious political strategy to avoid any possible prior use right claims.

Lack of secure access to water was key in bringing together an otherwise diverse Dandathok community. An elderly resident in Dandathok donated land needed for the scheme (water

⁴⁵ *Tole* refers to a small settlement within a hamlet.

⁴⁶ No other community-managed drinking water supply in Lamatar has been formally registered.

supply tanks). The community agreed to contribute financially and through labor inputs, with technical and additional financial support from the NGO, and “additional households” were conveniently identified to meet the criteria of number of users. Tehrabise residents were unaware that a committee, named after the spring source that was traditionally “theirs”, had been formally registered. This decision had been approved by the Patle Forest Committee, headed by higher-caste Sisneri residents.

Lamatar residents mentioned that during the period of the Maoist conflicts (1996-2006), non-Dalit Maoist leaders of Lamatar had encouraged and facilitated the Dalits from Tehrabise to “enter” non-Dalit houses, defying an age-old practice of social exclusion. Both Dalit and non-Dalit respondents of Lamatar stress that exclusionary practices of untouchability no longer apply. Current policy guidelines in Nepal specify mandatory equitable representation (of the marginalized) in village-level political and governance institutions. For example, the Community Forest User Groups (CFUG) management committee must include at least 50 per cent female representatives as well as a proportionate representation of poorer, lower-caste groups, minority ethnic groups and indigenous people. The Patle forest committee also includes two Dalit representatives from Tehrabise. Yet, it is evident from the above examples (and several others, as we will note below) that these Tehrabise Dalit representatives were not involved in the decision-making process of this very institution and that caste divides exist and operate, albeit in different ways.

A higher-caste resident of Sisneri, a former elected local government representative and currently member of the forest users’ group, explained: “Tehrabise residents had been using this (Raksidol) spring. *We* assumed that the RDWSSC committee had consulted with the Sarkis of Tehrabise and provided the approval. In fact, *we* assumed that this scheme would also improve water infrastructure for the residents of Tehrabise. *We* thus supported it. But, as is evident now, it seems that [Dalit] members from Tehrabise have been unfairly treated. It appears no negotiations and agreements were made with them, when the source was taken over by the RDWSS” (interview, 23-09-2016).

When we asked him whether the committee would now intervene to question these discrepancies, he claimed that “everyone” was part of the same VDC (Lamatar) and taking any action against Dandathok residents was not possible. Interestingly, in 2017, when another downstream village in Lamatar had tried to do the same—that is: claim rights to a spring source used by Sisneri residents—the Patle CFUG platform had filed a petition against registration of the water committee at the District Development Office. This relative inaction in the case of

Tehrabise points to the persistence of historic caste-based disparities, and to the superficial and symbolic inclusion of Dalits in local governance structures and processes.

4.4.2 Processes of exclusion

When construction of the RDWSS scheme started, a few Tehrabise villagers tried to contest this development. However, these contestations were scattered and ineffective, leading RDWSSC to state that there had been no counter-claims by Tehrabise residents. Class burdens derived from caste-inequalities continue to limit the agency of the Sarkis in Tehrabise. Simply put, organizing for water is at odds with their struggles of everyday life. Further, challenging the authority of higher-caste groups is something that the Dalits are not used to. A Sarki resident of Tehrabise in his early-twenties explained: “two decades ago, most elders and adults [in our community] were uneducated. Discrimination by caste was prominent. None [among us] would dare to raise a voice. If someone among us attempted to confront the higher-caste groups and claim for our rights, we would [in fear] distance ourselves from such claims” (interview, 07-04-2016).

Times may have changed a bit; a woman explains: “we did say it was our water and we will not let them (RDWSSC) take it. But we failed to come together to challenge the development and collect the money needed for a counter-plan to RDWSSC” (interview, 22-01-2017). This lack of a mobilized collective in Tehrabise was in stark contrast with what happened between Dandathok residents. A RDWSS committee member said, “as our settlement depended on this [Raksidol] water source, it was crucial for us to secure the scheme. If anything was done in relation to water, the whole village would join [the committee] to defend our plans” (interview, 18-01-2016).

In 2008, the RDWSSC managed to get additional funding from another NGO⁴⁷ to repair the Raksidol scheme. The repair work included enlarging⁴⁸ the water intake. During this re-appropriation of the source, Tehrabise villagers managed to come together, but it was clear that they had now lost their prior use rights to the Dandathok residents. According to a RDWSSC member: “Tehrabise residents *requested* for water. The request was for an independent scheme,

⁴⁷ It worked in wards 1, 7 and 9 of Lamatar in two phases (2008-2011; 2011-2013). The first phase focused on improving drinking water supply in Dandathok.

⁴⁸ The 1-inch main pipeline was replaced by a larger (1.5-inches diameter) pipe.

a one-inch diameter water pipeline diverted to Tehrabise directly from Raksidol. We did not agree to this, but we agreed to provide a tap drawn from our main pipeline [....]”.⁴⁹

Tehrabise residents had initially rejected this plan but, much later [in 2015], driven by a worsening water insecurity, they again placed a demand for the above plan. Dandathok residents were fixed on what they would do: “we clarified that we can provide a tap for them from our scheme. Their demand is not viable technically. [....]” (interview, 05-04-2016). A Tehrabise resident explains: “initially, Dandathok had agreed verbally to give us a one-inch pipeline outlet from the Raksidol spring. Had that decision been written down, they would not have been able to deny this. [....] We have this weakness. Voice raised by a few individuals will not be taken seriously. But here only a few raise their voice. Most people in our village did not show concern nor raise their voice. [....] We would rather go to fetch water in other villages. When RDWSS users come, they come as large group. They argue and often dismantle our pipes. If there were people here who could debate and tackle them, we could have obtained our share of water” (interview, 07-04-2016).

In subsequent negotiations RDWSSC agreed to provide a 0.5-inch pipeline from the source, provided that the Tehrabise residents would arrange the finances for this plan. The finances, and therefore the plan, have not materialized. It is evident that the claims on water have now changed hands. RDWSSC states that Tehrabise residents relied on and used the stone spout (fed by the spring), not the spring itself, and denies the latter’s claims for prior use rights of the Raksidol spring. Meanwhile, water no longer flows from the stone spout that Tehrabise had historically used. A woman from Tehrabise: “when there were no obstructions [intake of RDWSS], the discharge of the stone spout was large. [....] We had accessed this water since generations” (interview, 07-04-2016). RDWSSC admitted that, although Raksidol spring yield has declined over the years, until the water flow drastically declined after the earthquake in 2015, it had exceeded their water demands.⁵⁰ Yet, they denied access to Tehrabise and say, “those Sarki people do not ask our permission to take water. When water is not sufficient for us, we simply dismantle their pipes” (interview, 07-04-2016).

⁴⁹ Note that there are 32 taps in Dandathok.

⁵⁰ They recall their water supply pipes were broken due to water pressure. RDWSS users also used this supply for construction of houses.

4.4.3 Hydro-social dynamics of exclusion and water (in)security

As Dandathok continued to expand and the demand for water kept growing, the Committee has innovatively expanded and maintained the scheme. Around 2008, they started collecting an annual fee (US\$ 4.84⁵¹) from water-using households and charging new in-migrants an additional annual membership fee (US\$ 48.6). In 2013, in exchange for a material support for the maintenance of RDWSS provided by a commercial housing developer, they allowed the former to use Raksidol water. Additionally, in 2015, they agreed to share the spring water with the housing developer, in exchange for significant financial contributions to improve the source (and thus RDWSS). The Committee also discussed plans to provide all Dandathok users with private household connections for an additional fee. However, the 2015 earthquake, which caused a drastic decline of water flow from the Raksidol spring, resulted in these plans being shelved. RDWSSC has added one additional intake from the spring. Several households in Dandathok have invested in dugwells, as has the housing developer, who has sunk dugwells and a deep borewell. In other words, capital can offset water insecurity in Lamatar village.

Since the earthquake, RDWSSC closely monitors any damage to the input pipelines by Tehrabise villagers. In desperation, Tehrabise villagers offered to become new formal members of the RDWSSC, but were told that they would need to “pay the same rate as new migrants to get water”, forgetting, as one Sarki respondent said, “that it is *our* water that they now control!” (interview, 28-08-2016). In these unequal contestations for water, the Tehrabise villagers are unable to do anything more than informally take (or “steal”, according to the RDWSSC) water from the Raksidol spring source. Accessing water in this way is unreliable and costly. The Tehrabise residents now mainly rely on the few public taps provided long ago from the Kalidevi spring, which, however, also has largely declined (figure 4.2).

Given an increasing water insecurity, Tehrabise villagers started requesting the Patle CFUG management committee for a new water source. After years of being ignored, a Tehrabise resident, who returned from working in a Gulf country and is better-off, took the lead to renegotiate access to water. He explained: “being a Dalit settlement, our village is disregarded. [...] Nobody here could demand water. I have been working to improve our water supply for seven years. In our village people depend on daily wages and cannot spend time or money on negotiating about water” (interview, 23-01-2017).

⁵¹ 1 USD = NPR 103.2 (12-12-2017).

Meanwhile a higher-caste, wealthy in-migrant⁵² had bought land in Tehrabise. Finally, in 2016, the Patle CFUG committee reallocated a spring source to Tehrabise villagers. This reallocation of the source was linked to the outcome of the search for water by the wealthy in-migrant who, in preparation of bringing water to his house, paid a membership fee to join the Patle CFUG⁵³ and also donated (undisclosed) funds to the school run by the Patle CFUG committee. A water-tank was constructed on his newly purchased land and the water from the newly supplied source collected in the tank was claimed to benefit Tehrabise residents. Five public standposts were built in Tehrabise, with technical and financial support provided by a NGO working on post-earthquake⁵⁴ relief activities. In return for his disproportionate investments (building the tank, storing water, mobilizing NGO support and investments), the in-migrant has a private household connection and controls the flow of water from the tank to the public taps.

No one in Tehrabise is contesting this development, even though everybody knows that this scheme is only rhetorically in their name. Women from Tehrabise say: “the house-owner has hired one of our villagers as a guard, to fill the private tank and to water the plants on his land. After all this is done, there is hardly any water left to share” (interview, 10-09-2017). As water insecurity intensifies, Tehrabise villagers are left competing with each other over water from the various public taps. Many are compelled to access water from villages further away, where caste dynamics still persist. According to a woman from Tehrabise: “few days back, children from our village went to fetch water from a village of higher-caste households [...] They were harshly scolded, humiliated and told never to come again to fetch water. We know that, compared to what we experienced in the past, the situation has changed, but this does not mean caste-based discrimination of Dalits has ended here, or in Nepal” (interview, 10-09-2017).

To conclude, Dalits might no longer be considered “pani nachalane, chhoyi chhito halnu parne”, but class-caste-water exclusion persists, recasts in multiple ways in post-democratic Nepal.

⁵² He was in-migrating from USA and had bought over 0.6 hectare of land, earlier owned by non-dalits. The interview was with his brother, who took care of the property.

⁵³ The rule under this informal resource governing practice is “right to water comes through right to forest”. Thus, to get the right to use water originating in Patle CF, in-migrants have to be a member of the Patle CFUG.

⁵⁴ Most houses in Tehrabise were damaged by the 2015 earthquake.

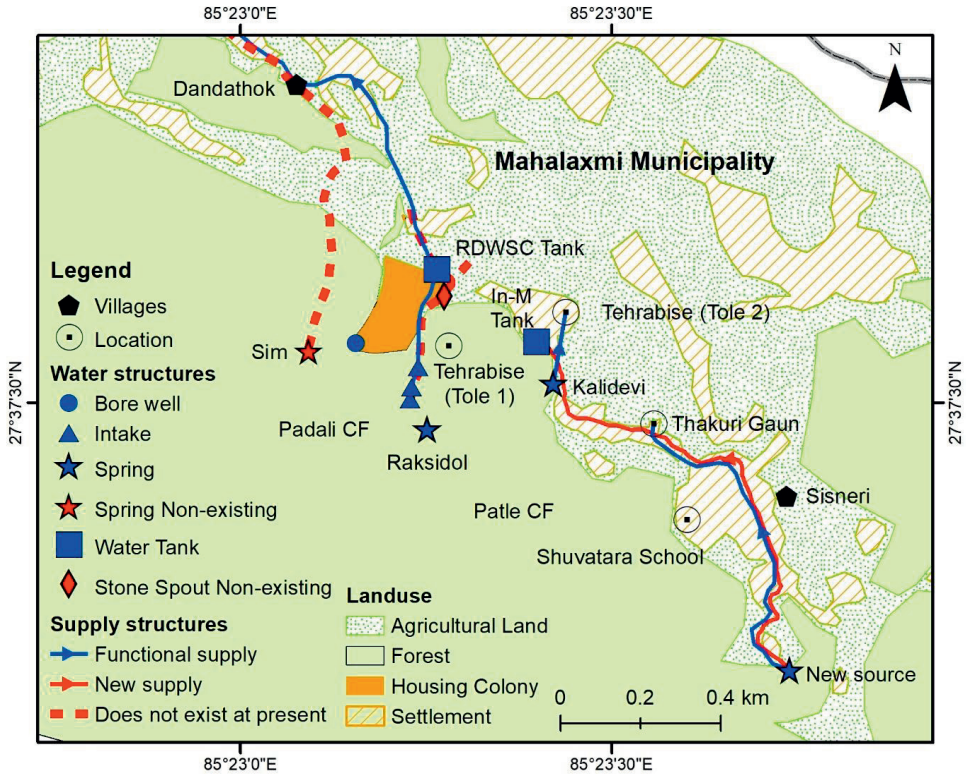


Figure 4.2. Overview of the changing water sources and supply schemes in Dandathok and Tehrabise (Credit: Dibesh Shrestha).

4.5 Discussion

Lamatar, like many other peri-urban settlements in Kathmandu Valley (and elsewhere), is yet to be linked to formal water supply services in the valley. These peri-urban spaces are in a complex situation of being administratively urban and yet reliant on a mix of rural local governance and self-mobilized institutional mechanisms. The examples discussed above show how caste defines water norms, decision-making processes and governance in Lamatar. The intersection of caste-based exclusion and hydro-social processes is evident in how the various claims, contestations and eventually requests by the Dalit residents in Tehrabise to reverse the appropriation of “their” water is continually ignored and overlooked. While it is clear that economic ability helps significantly in offsetting water insecurity in situations of competition and conflict, it is social and political connections and the ability to mobilize these that define

secure access and rights to water in situations of competing claims. As we have shown, the Dalit residents of Lamatar could not unite and organize to oppose against the water appropriations, which made it even easier for the higher castes to ignore the claims and requests made by the former. This shows that situations of conflict can strengthen the privileges of some, at the expense of the rights of others. The relative lack of agency of the Dalit residents in exercising their prior use water rights, challenge and contest new exclusion from water, and explore new strategies, mechanisms and interventions is an outcome of the historically intertwined injustices of caste and class. It is important to recognize that water use, access and control are part of an ongoing, inherently contested, political process (Swyngedouw, 2009). Far too often, water policy solutions —such as new technologies, governance and management— overlook the political nature of exclusion, its embeddedness in history, and its persistence and reiteration across institutional scales.

The fact that Dalits, despite being historically settled residents, found little to no support or solidarity from the higher-caste community in these competitions for water security illustrates that caste-based discrimination remains rigid, even in a rapidly changing peri-urban society. Regardless of the fact that the Tehrabise Dalits are (rhetorical) representatives of the community forest management committee, they were an excluded minority. Clearly then, as we saw in Lamatar, official policies of representative governance and for social inclusion hardly define everyday “relational-dialectical” relations around water (Linton and Budds, 2014). Dalits continue to be physically, socially and politically isolated from the “community” and governance structures in this urbanizing settlement. Thus, as Khanal et al., (2012: 155) observed, the “adverse effect [of caste] [...] continuess to be observable [...] in the lives of Dalits”. Indeed, the structural, internal disadvantages (Sen, 2000) —the historical social, economic and political disadvantages that caste endows on the Dalits— stand firmly in the way of Dalits being able to reclaim their rightful place as equal citizens in Nepal’s new inclusive, democracy.

The key issue that emerges from our findings is “the inseparability of the social [and, the political, economic, cultural; A.S.] and the physical in the production of particular hydro-social configurations” (Swyngedouw, 2009: 56). In the case of Lamatar, these factors combine in the (re)making of community as well as in (re)shaping new water institutions. Our findings also show that economic capital can sometimes offset the lack of social capital, to determine both belonging and access to supposedly common resources. The wealthier residents of Lamatar as well as the housing developer could ignore messy processes of negotiation and

simply secure water access by investing in groundwater extraction. The power of capital is also evident in the ability of a single, wealthy, higher-caste new migrant in Tehrabise to access and appropriate the water source that was said to be allocated to Tehrabise Dalits. Analysis of the water-society dynamics in this urbanizing settlement shows that it is possible to “buy” oneself a place in the community and its institutions, as well as secure (buy) water in contested situations and contexts. We thus stress here that “[Water] is not merely a resource to be managed, nor just a product to be valued and consumed, but [...] actively shapes new geographies” (Bear and Bull, 2011: 2261, in Linton and Budds, 2014: 174).

Wesselink et al., (2017: 6) argue that “research on power relations in human-water or social-nature systems” is far more complex than just “the sequence of the terms ‘hydro’ and ‘socio’ and the presence or absence of a hyphen (in between the two terms)” (2). We have shown here that unpacking context-specific processes and mechanisms of water governance requires analyzing the web of socio-cultural, economic and political processes and relationships that determines “bundles of rights” and “bundles of powers” (Ribot and Peluso, 2003). In other words, in understanding the complexities of entrenched, multi-faceted experiences of caste-based exclusion for the Dalits, we were able to get fascinating insights on the “complexity and diversity of hydrosocial practices and relations” (Linton and Budds, 2014: 174) and “the problem of intersectional marginalization” (Bownas and Bishokarma, 2018: 14) experienced by Dalits in the peri-urban contexts with increasing competition for water.

As we saw in Lamatar, although Dalits have become relatively better able to voice their water rights, their weak economic position remains a major constraint in materializing their rights and contesting exclusion and water insecurity. Yet, we wonder if financial capital would also buy inclusion for the Dalits. In India, a Dalit entrepreneur claims that “capital is the best way to fight caste” (Kamble, undated)⁵⁵ and yet he, too, acknowledges that economic empowerment will not completely erase deep-rooted prejudices. Moreover, with persisting traditionally imposed socio-economic and political disadvantages while the characteristics of exclusion might evolve, for the historically marginalized Dalits exclusion is likely to perpetuate in new social, political and economic systems and processes.

⁵⁵<https://indianexpress.com/article/india/capital-can-break-caste-system-market-and-money-will-defeat-anti-capital-marx-and-manu-milind-kamble-5379652/>



Figure 4.3. A view of Tehrabise village (within orange dotted line) and the housing colony in Lamatar (Source: author).

4.6 Conclusion

In Lamatar, the reshaping of place from rural to peri-urban has been particularly burdensome for the Dalits of Tehrabise. Although the nature of water-related exclusion has changed, exclusion itself remains a constant, showing that, spatially and temporally, water cannot be dissociated from the wider socio-political context in which the resource is used, governed, claimed and contested. The analytical framework that guided this research overlaid social exclusion with hydro-social interrelations. In conclusion, we argue that, in order to fully map the flows of water and understand what they mean socially, it is important to not only see water as a socially and politically mediated resource, but equally to understand the complexities of the historical dimensions of power and divide. A complete picture of hydro-social interrelations in situations where water access for daily household needs is unmet, as in Tehrabise, can only

be fully grasped through the “view from below” (Maathai, 1995), in this article from the perspective of the socio-culturally marginalized Dalit population.

Our findings are relevant for ongoing attempts to reframe water governance and water policy in Nepal. Firstly, recent studies on water in Nepal argue that community-centered approaches are more likely to amicably resolve water-related conflicts, improve water management and ensure a water-secure future (Biggs et al., 2013: 392). This is pointed out in the context of changes in governing systems, legal arrangements, bureaucratic reorientations and institutional restructuring (Upreti, 2007; Biggs et al., 2013). While we do agree that local communities should participate in water governance, our findings point to the need for a more nuanced understanding of what constitutes a “community”. Given the entanglements of class and caste in Lamatar, our findings pose serious questions on what makes for a local community, and who is excluded or included in positions and processes of community-based resource governance and management.

Secondly, our findings show that it is not possible to transform deep-rooted practices and experiences of exclusion by formal, legal-bureaucratic tinkering of change, such as declaring caste-disparities illegal or announcing and putting in place affirmative policies of representation at various institutional levels. Thus, while the official intentions and related policy measures to include Dalits are an important first step (Purkoti et al., 2009), a “thicket of informal behaviors and deep-seated norms and values and networks [...] stand between formal policy statement[s] and [...] actual implementation” (Bennett, 2005: 2). More is needed than just affirmative action in policies and institutions to transform entrenched inequalities and injustices. Concurring with Upreti’s (2007) analysis, we find that, in Nepal, water resources management and governance policies and strategies show a lack of attention to systemic social, historical, cultural and economic entanglements. We would emphasize, as Bennett (2005: 42) mentions, that progressive reform policies and formal institutions crafted at high government level must have roots on the ground, especially at the district level and below. It is in the local context that formal institutions “interact with the dense network of informal systems of behavior and values [...] the influence of these informal institutions can be especially strong in changing patterns of exclusion based on social identity”. In peri-urban spaces, a lot is changing: institutions, actors, networks, social and political connections, economic contexts and realities and yet certain injustices appear difficult to reverse. This necessitates a more critical look at understanding existing and newly emerging dimensions of injustices and how these hit some more than others.

In sum, although caste-based discrimination has been formally abolished and the inclusion of Dalits into social, political, and institutional spheres identified as political priority, their position has not significantly changed in Nepal. Exclusion continues for Dalits in multiple new ways, including in relation to water. In the upheaval of urbanization in Nepal, it is easy to disregard exclusion as “inevitable” and “normal”. This is precisely why delicate nuances of exclusion remain poorly understood and researched. We emphasize the need to critically analyze evolving constellations of actors, agencies, and institutions, and the processes and mechanisms of inclusion and exclusion in peri-urban spaces, to discover in such fluid spaces the potential for transforming and reversing deep-rooted historical inequalities and injustices.



Concrete rings for digging dugwells (above) and a dugwell (below) (Photo source: author).

Chapter 5

Socio-environmental dynamics and emerging groundwater dependencies in peri-urban Kathmandu Valley, Nepal

Abstract

This article discusses the growing use of, and dependence on, groundwater in the rapidly evolving peri-urban spaces of Kathmandu Valley in Nepal. Groundwater is an increasingly important source of water supply in Kathmandu Valley, one of the fastest-growing South-Asian urban agglomerations. Groundwater use continues to increase, despite growing protests and worries about its consequences. A groundwater policy approved in 2012 was partly the outcome of an institutional restructuring of water management in Kathmandu Valley. Our findings show that this policy lacks attention to peri-urban dynamics of change and growth, and does little to address the unplanned and unregulated groundwater use in peri-urban locations in the valley, which urbanizes at a faster rate than the main city. Our findings also show that the polarized views and local conflicts around groundwater exploitation are the outcome of multiple entanglements: sectoral divides and overlapping responsibilities in water institutions, governance and management; social and economic transformations in peri-urban spaces; the invisibility of groundwater; and ambiguity in the hydrological dynamics of conjunctive water use. While we see no easy solutions to these problems, the policy-relevant recommendations we derive from our analysis of the drivers and the dynamics of using, governing and managing groundwater draw attention to the complex on-the-ground realities that need to be better understood for addressing macro-micro gaps in (ground)water management.

Keywords: groundwater, institutions, peri-urbanization, policy, Kathmandu Valley, Nepal

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5.1 Introduction

Groundwater is an important source of water globally, increasingly relied upon for multiple water needs, as surface water supplies diminish or become polluted (Jones, 2011; FAO, 2016). The global groundwater extraction rate has almost tripled between 1960 and 2010, and continued to increase between 1 and 2% annually (van der Gun, 2012). Unprecedented pressures on the resource have often resulted in reduced quantity and deteriorated quality of groundwater, coupled with secondary impacts like land subsidence, damage to vegetation, and depletion of surface water hydraulically connected to the exploited aquifers (Jones, 2011; FAO, 2016). Conjunctive use – simultaneous use of surface water and groundwater sources – can, without supporting hydrological and technical know-how, result in competition and conflicts, which are intensified by weak socioeconomic, legal, institutional and political conditions (Howard, 2013; van Steenberg et al., 2015a; Kurki and Katko, 2015).

The need to manage groundwater sustainably and to understand the dynamics of integrated water resources management is recognized worldwide (Shah et al., 2003; Jones, 2011; van der Gun, 2012). Groundwater policies and regulatory frameworks to control exploitation have been formulated worldwide (Foster et al., 2011). However, the invisibility and variability of groundwater, exacerbated by highly variable precipitation, hydrogeological conditions and climatic uncertainties (Mukherjee et al., 2015), create a significant challenge in putting into practice policy initiatives, even when formal institutions for groundwater development and regulation have been established (Mukherji and Shah, 2005; van Steenberg et al., 2015a; Howard, 2013). These challenges are compounded by socio-natural processes and inter-relationships, including the diversity of actors, interests, incentives, rights, practices and constraints. Clearly, there is a strong case for localizing groundwater development, management and governance (FAO, 2016).

The important question is: how can the technical and managerial capacity of local institutional actors be developed as socio-economic and political factors vary widely? And how can regulatory instruments and institutional arrangements be made to work in situations where water governance is far from predictably organized? Solutions that have worked in one place are not necessarily a viable option for other places. Van Steenberg et al., (2015b) show that the ban on groundwater use in Baluchistan Province in Pakistan to address depletion has triggered an informal groundwater market rather than bringing about intended managerial improvements. Shah (2009) argues that groundwater exploitation in South Asia has occurred in a chaotic, unregulated manner by myriads of small-scale informal water users. He adds that

formal authorities lack political support, institutional capacity and interest in fighting groundwater over-exploitation and degradation, and labels the situation as “anarchy”.

In South Asia, industrial, drinking and domestic water uses are rapidly restricting the highest user of groundwater, irrigation, which accounts for over 85% of total groundwater extraction in the region (FAO, 2013, cited in Mukherjee et al., 2015). In the absence of sufficiently strong public policies, control and regulation, groundwater exploitation has grown far beyond sustainable use (Shah et al., 2003; Shah, 2009). The problems are particularly acute in peri-urban spaces. On the one hand, peri-urbanization adds to water-users and uses as agricultural land is rapidly converted to non-agricultural uses and agricultural water is redirected and appropriated by competing claimants. On the other hand, most South Asian cities rely on groundwater extracted from peri-urban spaces (e.g. Ruet et al., 2007; Janakarajan, 2008; Shrestha, 2011). Groundwater extraction frequently happens in a haphazard and unregulated manner (Ruet et al., 2007; Janakarajan, 2008; Howard, 2013). Furthermore, uncontrolled urban activities degrade groundwater quality, as has been noted in peri-urban spaces (Karpouzoglou et al., 2018). Such dynamics, involving multiple actors and institutions, make peri-urban water security complex and uncertain (Narain and Prakash, 2016; Shrestha et al., 2018). As our case studies will show, water management challenges in peri-urban contexts are aggravated by the erosion of pre-existing water management institutions and the emergence of new institutional arrangements, which are not (fully) in place or dysfunctional. This creates socio-institutional voids, multiplicity and complexity in these rural-urban interface locations (see van Steenberg et al., 2015b).

In this article, we argue the need to contextualize groundwater use, management and governance, recognizing specific socio-ecological nuances. However, location-specific and locally agreed rules and practices may not always bring the envisaged improvement in groundwater governance, for lack of, for example, local-level awareness, interest and leadership. Understanding local realities and integrating scientific, socioeconomic and policy aspects are thus crucial for any groundwater management initiative (Reddy et al., 2014; FAO, 2016). In the face of these challenges, devising, implementing and sustaining “collective” groundwater management is certainly complex, but as Kulkarni et al. (2015) note, not necessarily “utopia”. Several studies on groundwater governance emphasize the need to engage with local actors and understand local processes, political capacities and interests, and accordingly to innovate and mobilize political and institutional actions for feasible and effective

contributions towards sustainable groundwater management (van Steenberg, 2006; van Steenberg et al., 2015a; FAO, 2016).

This paper illustrates the changing nature of groundwater use in two peri-urban villages in one of the fastest urbanizing South Asian urban agglomerations: Kathmandu⁵⁶ Valley in Nepal (Muzzini and Gabriela, 2013), where groundwater use is rapidly increasing (Shrestha et al., 2012). Although the government has formulated a groundwater policy for Kathmandu Valley, extraction continues against the policy directive. In fast-growing peri-urban spaces, the demand for water puts a stress not just on groundwater and its users, but on various water sources, users and those making efforts for water management. In situations of high need and demand, groundwater use has become both a “solution” and a “problem” for water management. The groundwater policy aims to restrict the use of shallow groundwater for domestic uses. The groundwater licensing guidelines categorize⁵⁷ deep groundwater uses, which it aims to formalize and regulate. However, changing land and water uses and challenges of managing water for multiple water needs and demands of the growing peri-urban population in the valley have received little attention. Addressing this policy gap, we use two case studies to illustrate the macro-micro gaps in groundwater management.

Following this introduction, we present the focus and methods of our research presented in this article. Next, we briefly summarize the socio-ecological and institutional context of groundwater management in Kathmandu Valley. We then elaborate on the cases, showing trends in groundwater use, related conflicts and management efforts and challenges experienced by water users, community-level service providers, resource managers and government authorities responsible for water management. This is followed by a discussion on how socio-environmental and institutional changes influence water securities, thereby shaping groundwater use, management, and related conflicts in the peri-urban context. We conclude that groundwater management is a complexly entangled socio-environmental issue that requires looking beyond reforms in water-related formal institutions, to consider both formal and informal practices and institutions around changing land and water uses.

⁵⁶ The capital of Nepal, Kathmandu, is located in Kathmandu District of Kathmandu Valley.

⁵⁷ Categories are: (i) personal, (ii) industrial, (iii) commercial (iv) communal (v) others.

5.2 Research questions, methodology and case selection

In this article, we answer the following questions: (1) what changes are driving groundwater exploitation in peri-urban Kathmandu Valley? (2) how and why do different water users frame groundwater exploitation either as “solution” or as “problem”? (3) how are peri-urban water management challenges dealt with socially, politically and institutionally, or are decisions evaded, resulting in mounting conflicts? Both locations that were selected as cases for this article have an increasing groundwater dependency. Dadhikot, the first site, has been undergoing rapid urbanization. Surface water was historically earmarked for irrigation, and stone spouts and traditional shallow wells (kuwa) for drinking water needs. In view of the few sources, managing drinking water was particularly difficult in Dadhikot. In the second site, Lamatar, urbanization has been more gradual. Although multiple spring water sources made Lamatar a water-rich village, water sources are declining and demands increasing with urbanization. Together, these sites provide an in-depth insight into the socio-environmental changes in peri-urban context and how these shape – and are shaped by – groundwater extraction, and related conflicts and management challenges.

Field research was carried out by the first author between 2015 and 2018. The research was designed as an ethnographic case study (LeCompte and Schensul, 2010), using qualitative research methods. Case studies are most appropriate for developing concrete, practical, contextualized knowledge (Yin, 2003) pertaining to specific issues. Data were gathered by mapping and following the various actors and their linkages to changing water and land use practices and analyzing how these changes relate to groundwater exploitation and management in Kathmandu Valley. Methods included literature review, study of policy documents, informal conversations, open and semi-structured in-depth interviews with actors and key informants and focus group discussions. Informal interaction during field visits to water-related infrastructure (intakes, wells, filter-systems, distribution tanks, etc) and observation of water-related activities (maintenance of an irrigation canal or drinking water supply systems; complaints at the water supply offices, meetings, etc) were crucial for understanding the complex peri-urban groundwater dynamics. In Dadhikot, 23 informal talks and interviews, 23 open and semi-structured interviews, and three focus group discussions were held with irrigators, male and female residents, in-migrants, farmers’ group leaders, representatives from community-based organizations, water suppliers, managers, entrepreneurs, teachers, local politicians and other relevant informants. In Lamatar, 32 informal talks and interviews and 17 open and semi-structured interviews were held with similar persons. In addition, informal talks

and interviews were held with 42 government officials, three officials from NGOs and one INGO working on changing land and water uses and water quantity and quality issues in Kathmandu Valley. Participation of the first author in several annual national groundwater symposiums has increased our understanding of the severity of groundwater exploitation, particularly in Kathmandu Valley.

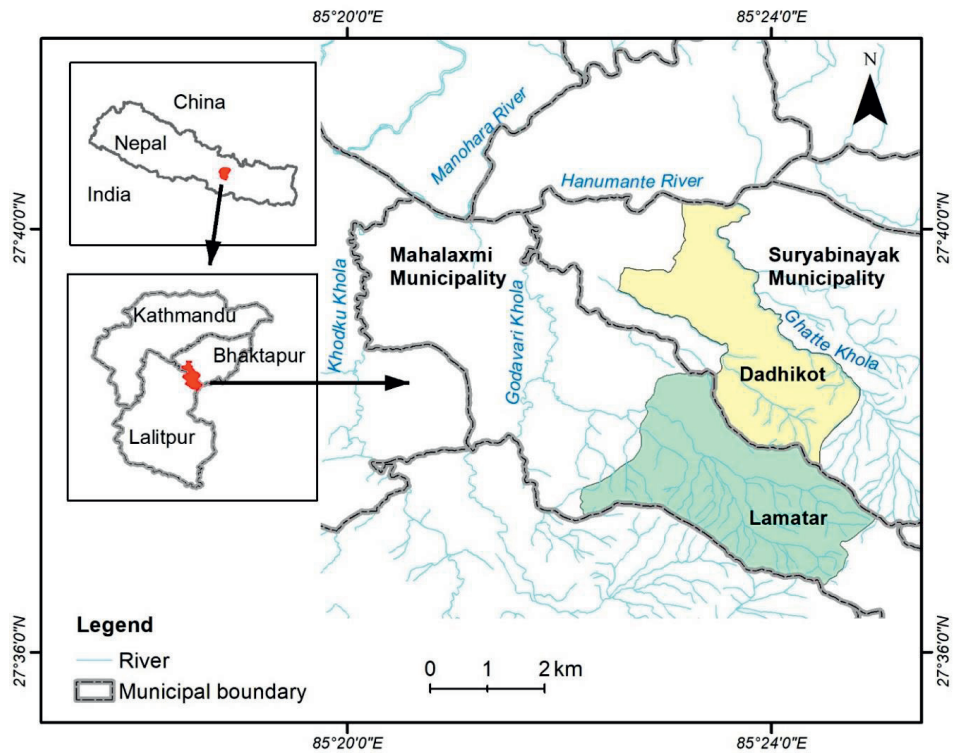


Figure 5.1. Location of study sites in Kathmandu Valley (Credit: Dibesh Shrestha).

5.3 Groundwater use, impacts and governance in Kathmandu Valley: a brief review of the context

The population of Kathmandu Valley is growing about 4.3% annually, with an increase by over 499% between 1955 and 2008 (Bhattarai and Conway, 2010). Kathmandu Valley is located in central Nepal. It has a sub-tropical climate with over 1,500 millimetres average annual rainfall, 80% of which occurs during the monsoon period (UN-Habitat, 2015).⁵⁸ Between 2001 and

⁵⁸ From June through September.

2011, the population of Kathmandu Valley has increased from 1.6 million to over 2.5 million (CBS, 2001; 2012a). The built-up area increased from 2.94% in 1967 (Thapa and Murayama, 2009) to 24.7% in 2011 (JICA, 2012). Water demand has reached 377 MLD,⁵⁹ while supply is 120 MLD (wet season) and 73 MLD (dry season) (KUKL, 2017). Water sources in Kathmandu Valley include both groundwater and surface sources. With the increasing pressure on surface water, groundwater use is also increasing (Pandey et al., 2012; Shrestha et al., 2012; Shrestha et al., 2017).

Administratively, Kathmandu Valley encloses three districts: Kathmandu, Lalitpur, and Bhaktapur. Together, these cover an area of 899 km², whereas the area of the valley as a whole is 665 km² (Shukla et al., 2010). The groundwater basin in the valley has an area of 327 km² (Shrestha et al., 2017). It is considered a closed and isolated groundwater basin, with irregular and discontinuous aquifers (Shrestha, 2012a). From a hydrogeological perspective, there are two major aquifers: shallow and deep, both within the consolidated sediments of Kathmandu Valley. These two vertical layers are separated by an impermeable clay layer that acts as a barrier for direct recharge of the deep aquifer layer (Pandey and Kazama, 2012; Pradhanang et al., 2012). The estimated thickness of the shallow aquifer varies from 0 to 85 m, that of the clay layer varies from less than 10 to more than 200 m, and that of the deep aquifer from 25 to 285 m (Pandey and Kazama, 2011). The traditional sources of groundwater, such as stone spouts and dugwells, are based on shallow aquifers. These water sources were recharged via ponds and canals, traditionally used for irrigation and other sociocultural activities (UN-Habitat, 2007).

A piped water distribution system for the ruling elites was established in 1891, while water supply to the general public started in the late 1920s (Dongol et al., 2012). This modern water supply system has gradually replaced traditional supply and recharge systems. The rapid urban growth in the valley since the 1970s has increased water demands for the growing population and expanding industrial activities. This has led to increasing exploitation of the available water resources, groundwater being withdrawn by means of shallow and deep tube wells. Mechanized groundwater extraction started in the early 1970s. Extraction from deep aquifers increased mainly after the Nepal Water Supply Corporation (NWSC), the formal water supply utility, introduced groundwater as a major component of its supply system since the mid-1980s (Pandey and Kazama, 2011). Degradation of surface and shallow groundwater quality has

⁵⁹ Million liters per day.

boosted extraction of deep groundwater as an alternative, safe, and reliable source (Chapagain et al., 2010; Pandey et al., 2012; Shrestha et al., 2016). Over the decades, urban expansion, increasing gaps between water demand and supply, and ineffective rules and regulations have resulted in unregulated use of groundwater for community, public, private and commercial purposes (Cresswell et al., 2001; IDC, 2009; Dongol et al., 2012; Pandey and Kazama, 2014). In our cases, we show how unregulated use has continued even after the formulation of regulatory mechanisms.⁶⁰ Total groundwater extraction was less than 0.04 million m³/year in the early 1970s, but went up to 12.2 million m³/year in the late 1980s, and over 25.5 million m³/year by 2009 (Pandey et al., 2012). Groundwater extraction in Kathmandu Valley exceeds recharge since the mid-1980s, and the gap is widening (Shrestha et al., 2012; Pandey et al., 2012). In 2001, the extraction rate was 20 times as high as the recharge rate. At the 2001 rate, the groundwater reserve will be used up within 100 years (Cresswell et al., 2001). A study of groundwater balance in Kathmandu Valley has shown a deficit of 29.52 million m³ (Chhinnamasta Consultancy, 2014). Studies have reported a drastic decline of the groundwater level in the deep aquifers, ranging from 1 to 4 m per year since 1984. Decline up to 80 m has been observed in NWSC well fields (ibid). However, there are discrepancies in such estimates, due to the complexity of geological formations and lack of adequate and reliable datasets (Pradhanang et al., 2012).

Since the early 1960s, studies have been undertaken to understand the geological formations, groundwater environment, recharge and hydrogeology of Kathmandu Valley. JICA (1990) has divided the groundwater basin in the valley into three districts: the northern, central and southern groundwater districts. The first is composed of permeable sediments, while the others have a low permeability (JICA, 1990 in Shrestha et al., 2012). Depletion of the groundwater level has been reported from the northern and central groundwater districts (Shrestha, 2012a; Pandey and Kazama, 2014). Although groundwater extraction started relatively late in the southern groundwater district, it has grown rapidly and is likely to increase tremendously (IDC, 2009). In addition, the high rate of urbanization has tremendously increased the impervious surface, thereby radically reducing groundwater recharge (IDC, 2009; Shrestha et al., 2012).

Studies have shown that groundwater in the valley is already over-exploited. Its decreasing quantity and degrading quality are leading to serious problems (Cresswell et al., 2001; Pandey

⁶⁰ The guidelines for licensing the extraction and use of groundwater specify the need for a permit, except for domestic uses of shallow groundwater. It also specifies how to obtain a license and the volume that can be extracted in different areas of the valley (KVWSMB, 2015).

et al., 2012; Pandey and Kazama, 2014). The Government of Nepal (GoN), owner of water resources, has made a number of formal institutional attempts at the development and conservation of groundwater since the late 1960s. The Groundwater Resources Development Board (GWRDB) was established in 1976 under the Ministry of Water Resources (now: Ministry of Energy, Water Resources and Irrigation), for the enhancement of groundwater study and resource management. However, its effectiveness was limited to groundwater development for irrigation in the southern plains (Pandey and Kazama, 2014).⁶¹ Moreover, groundwater extraction rights and ownership issues have never been taken seriously (Shrestha et al., 2012), making groundwater a near-“open access” resource (Pandey and Kazama, 2014). In 2006, the government established the Kathmandu Valley Water Supply Management Board (KVWSMB), aiming to improve drinking water supply services in the valley and replacing NWSC for water supply there. KVWSMB handed over its responsibility for water supply to Kathmandu Upatyaka Khanepani Limited (KUKL)⁶² under a 30-year lease. KUKL services are largely limited to the urban areas of the valley. The District Water Supply and Sanitation Division (DWSSD), under the Department of Water Supply and Sewerage (DWSS),⁶³ supplies water in peri-urban Kathmandu Valley. Interviews with DWSSD officials revealed that these services are increasingly shifting to groundwater, to avoid use of increasingly polluted surface sources and conflicts with prior rights-holders, and meet rapidly increasing water demands. DWSSD⁶⁴ supplies financial and technical supports through community-managed drinking water supply projects, completion of which is a major basis on which performances of DWSSD and its officials are evaluated, both officially and socially. Hence, it is under growing pressure to extract (ground)water. Additionally, other governmental and non-governmental organizations are working to deliver drinking, domestic and irrigation⁶⁵ services in the peri-urban spaces, also increasingly based on groundwater.

On the other hand, KVWSMB has the sole authority for groundwater regulation and management in the entire valley (Dhakal, 2012). In December 2009, the Supreme Court of

⁶¹ This region is called Terai.

⁶² A public company registered under the Nepal Government’s Company Act 2006 and operating under the Public Private Partnership modality.

⁶³ DWSS is the lead agency for the drinking water supply and sanitation sector of Nepal (Rural Water Supply and Sanitation Sector Policy, 2004). www.dwss.gov.np/?lang=en

⁶⁴ DWSSD supports water infrastructure, while the community is responsible for managing the land needed for such infrastructure.

⁶⁵ During our fieldwork, we found GWRDB has started supporting formally registered farmer groups in Kathmandu Valley to drill and use deep groundwater for irrigation. Governmental organizations and NGOs also support well construction for irrigation to economically empower women.

Nepal issued an order to follow the provisions of the Water Resources Act (1992), enforce a licensing system, and control the illegal exploitation of groundwater. This was in response to a writ filed by Pro Public⁶⁶, a forum for protection of the public interest, in June 2003, to issue an order for regulating groundwater use in the valley. Following the order, the KVWSMB recruited a consulting company to prepare a draft groundwater management and regulation policy for the valley (Pandey et al., 2012; Pandey and Kazama, 2014). KVWSMB finalized the draft policy and submitted it to the line ministry in December 2010. The involvement of national and international organizations in studying groundwater issues in Kathmandu Valley, as well as compiling and analyzing the scattered information, has increased the number of studies and publications on groundwater-related issues (e.g. Shrestha et al., 2012; Pandey and Kazama, 2014). Such initiatives have stimulated debates about rainwater harvesting⁶⁷, recharge and groundwater management. Under the influence of growing concerns about groundwater degradation and its potential consequences, the Groundwater Policy for Kathmandu Valley was approved by the cabinet in June 2012. However, its implementation has remained weak and largely limited to issuing licenses and legalizing deep groundwater extractors. KVWSMB estimated there are around 1,000 deep tube wells, only 414 of which are licensed (interview, 03-02-2016). Due to unclear roles and responsibilities for groundwater regulation and management, this has remained “nobody’s responsibility” (Pandey et al., 2012). In addition, a lack of scientific knowledge on groundwater has adversely affected its development, management and protection (Dhakal, 2012).

The Melamchi Water supply Project (MWSP) is underway since the 1990s to augment water supply in Kathmandu Valley (Domènech et al., 2013). 510 MLD of water are expected into the valley from external sources in three phases, each adding 170 MLD to the supply system. The first phase is expected to get completed soon and to improve water supply, thereby decreasing groundwater extraction (Shrestha, 2012b). However, this supply is limited to urban areas (Domènech et al., 2013; GoN, 2016)⁶⁸, while groundwater extraction is also increasing for the growing peri-urban population. In this context, it is relevant to understand how urbanization shapes peri-urban hydro-social dynamics in relation to groundwater, and the existing institutional mechanisms for groundwater management. In the next section, we discuss two cases of contestations and conflicts between surface water and groundwater uses and users in

⁶⁶ See <http://propublic.org>

⁶⁷ GoN prepared Rooftop Rainwater Harvesting Guidelines in 2009.

⁶⁸ Interview, Official, Ministry of Water Supply and Sanitation, 26-09-2016.

two peri-urban locations. We note how increasing urbanization has resulted in a prioritization of institutional support and investments for groundwater extraction for drinking and domestic supplies over irrigation needs and demands. In part, this happens because irrigation and agriculture are on the decline, while urbanization and in-migration cause a growing demand for drinking and domestic water. Nonetheless, these developments pitch different groups of peri-urban communities against one another, leading to an increase of conflicts about water security.

5.4 Socio-environmental dynamics and groundwater dependencies in peri-urban Kathmandu Valley

5.4.1 Dadhikot

Dadhikot VDC⁶⁹, spread over 6.27 km² is a rapidly evolving peri-urban settlement, located around 12 kilometres east of Kathmandu (figure 5.1). With restructuring of the local government units in 2017, Dadhikot belongs to the new Suryabinayak⁷⁰ Municipality. The annual population growth rate in Dadhikot increased from 1.17 (1981-1991) to 6.05% (2011). While the population increased by over 60%, the number of houses increased by almost a hundredfold between 2001 and 2010 (CBS, 2001; 2012a). The built-up area has increased by over 250% between 1992 and 2010, and is expected to grow by about 110% between 2010 and 2030 (Sada et al., 2016). Nonetheless, agriculture is still a major livelihood for many inhabitants (see figure 5.2). Agriculture depends on traditional surface irrigation sources from the Mahadev / Ghatte Khola, a stream in Dadhikot VDC. Mahadev Khola Rajkulo (royal canal) is the largest canal irrigation system in Dadhikot (figure 5.4). The permanent intake (weir and sluice gate, located in Ward 4) of this historical irrigation canal was constructed in 1956 and served approximately 450 hectares (ha) of land (DIO, 1996). After road improvements in the 1980s, the farmers of Dadhikot started growing vegetables, and Dadhikot became a major vegetable producing area for Kathmandu Valley (Bhaktapur DDC, 2002).

⁶⁹ Village Development Committee; this used to be the smallest local government unit in Nepal. Each VDC was administratively divided into 9 wards.

⁷⁰ Dadhikot and three other VDCs were merged to form Anantalingeswor Municipality in 2014, which was merged into the Suryabinayak Municipality in 2017.

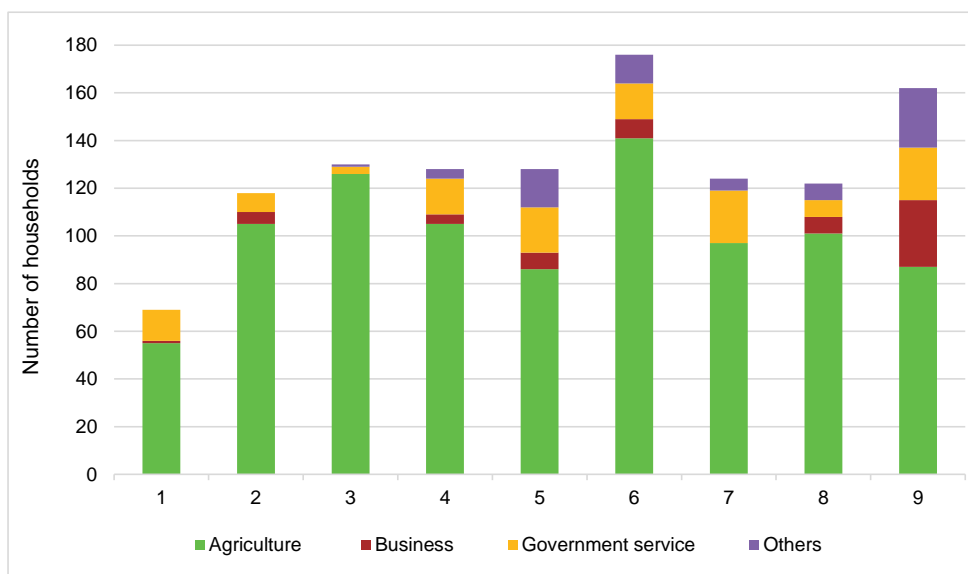


Figure 5.2. Number of households according to major occupations in different wards of Dadhikot (Adapted from: VDC Profile, 2006).

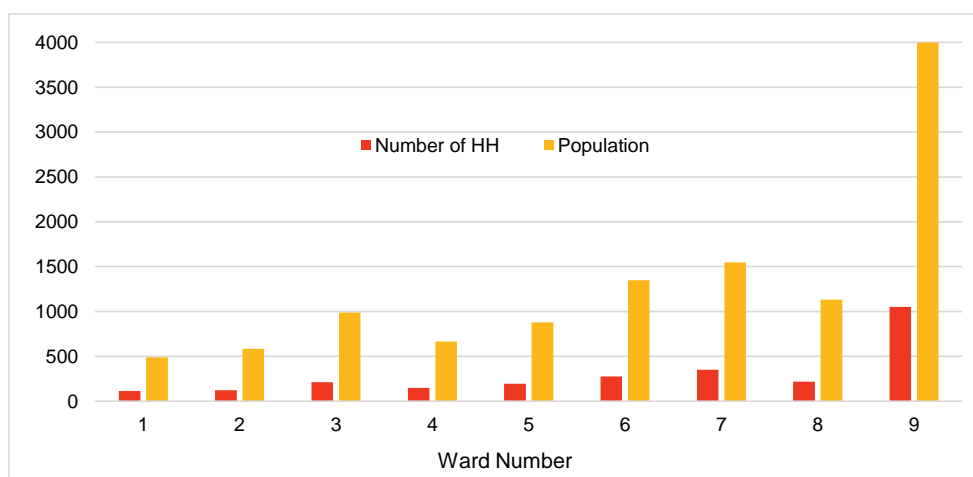


Figure 5.3. Population and number of households in different wards of Dadhikot (Adapted from: CBS, 2012b).

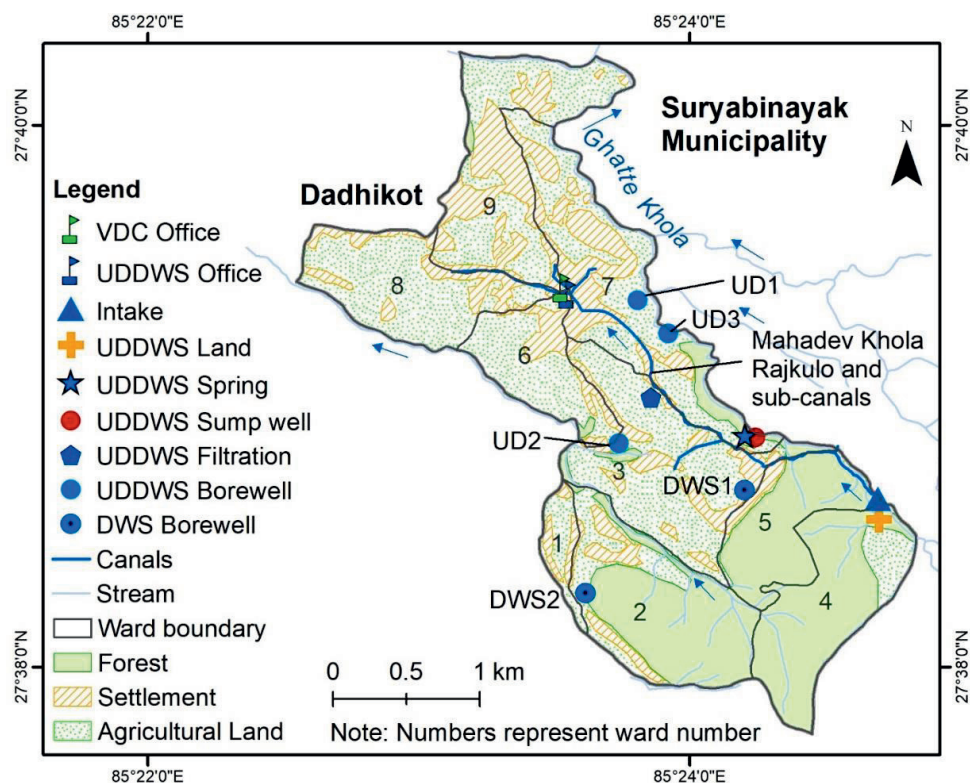


Figure 5.4. Uttisghari/Brihat Dadhikot Drinking Water and Sanitation and Mahadev Khola Rajkulo in Dadhikot (Credit: Dibesh Shrestha).

Note: DWS refers to other drinking water supply systems in Dadhikot. Blue arrows show the direction of river and canal flow.

During the Maoist insurgency (1996-2006), Dadhikot changed rather quickly, becoming a peri-urban patchwork of agricultural fields, multi-storey buildings, and more diverse economic activities. Land transactions and buildings have been on the rise since then. Many new migrant farmers are leasing in land for commercial farming, while Dadhikot landowners rent out agricultural land to brick factories that cater for the building boom in Kathmandu Valley. These changes deeply affect water availability and quality, especially with the conversion of arable land into housing plots and the growing demand for domestic water. In the sections below, we discuss the development and functions of Uttisghari, the largest drinking water supply system in Dadhikot, which started in 1995. It supplies water to wards 3, 6, 7, 8 and 9, which include around 76% of the total population (figures 5.3 and 5.4).

Eroding and emerging water management institutions

The historic Mahadev Khola Rajkulo originates in the hills in the south-eastern part of the Dadhikot VDC, sloping down to the flatter north regions of the VDC. This irrigation system is believed to have been developed around the 1670s (Adhikari, 2012). As in other areas in Nepal, this scheme, initially run by villagers, was managed by the irrigation department of the government until the 1980s, and then returned to a formally established water users' association (WUA) in the early 1990s. The WUA in Dadhikot had been formed to access institutional support for system rehabilitation after canal damage by a landslide. However, it did not remain active very long, due to dissatisfaction among committee members with lack of transparency about rehabilitation expenses and their affiliations to different political parties. Nevertheless, this project introduced a tendency to look for governmental support for canal maintenance.

Although the rehabilitation improved irrigation services, covering drinking water needs from a few traditional sources remained a daily hardship in Dadhikot. A government-managed inter-VDC system supplying tap water to Dadhikot was started in the early-1980s but, with poor management and maintenance, it became almost dysfunctional by 1985. Aiming to reduce this daily hardship, the then elected local representatives initiated a drinking water supply system, named Uttisghari Drinking Water Supply, in the mid-1990s. This system, based on a local spring source, started regular services via public taps since 1999-2000, with funding and technical support from the DWSSD. In the early 2000s, the committee was formally registered at the District Water Resource Committee (DWRC) as Uttisghari Dadhikot Drinking Water and Sanitation Consumers' Committee (UDDWSCC). With formal registration, UDDWSCC gained a permit to use the water sources of five wards of Dadhikot for its service area. Currently, there are six such community-managed drinking water supply systems in Dadhikot, two of which (including UDDWSCC) are formally registered. Both started supply from local spring sources, but with increasing water demand have added deep borewells, funded by the DWSSD. Another community-managed system⁷¹ in Dadhikot has also sunk a borewell, and is getting formally registered.

As population and water demand continued increasing, UDDWSCC, in consultation with DWSSD, shifted to private (paid) tap water supply. Officially, such an approach to pipe and provide individual (paid for) household connections was considered to be efficient and

⁷¹ For drinking water supply in Wards 1 and 2.

sustainable. Supported by DWSSD, the UDDWSCC tapped an additional spring, sank a well⁷² close to the bank of the Mahadev stream, and started 250 private taps. Over the years, the UDDWSCC committee established itself as an institutionally and financially secure water committee. In 2004, it was identified as the second-best functioning community-managed drinking water initiative in the country. This merit and its improving socio-political links have helped UDDWSCC in accessing regular financial and technical support from the government. In 2007, UDDWSCC bought a plot of land, added a deep borewell⁷³ with support from DWSSD, and expanded its services. However, water quality of the borewell dropped within a few years, showing a high sediment load. Aiming to resolve the problem, the committee purchased land and, supported by DWSSD, it added a water treatment plant, but water quality of the borewell continued degrading. Additionally, the yield of its spring water sources and the water level in the well also declined, leading to increasing consumer complaints. While sources were declining, applications for new tap connections increased; by 2013, the committee supplied around 1,500 taps (UDDWSCC, 2013). There were some 600 additional applications for new connections, adding pressure to arrange for additional water sources. In 2015, UDDWSCC was dissolved, registering itself as Dadhikot *Brihat* (extensive) Drinking Water and Sanitation Consumers' Committee (DBDWSCC). This change was in part a strategy to continue accessing funding from the government for expanding and improving its services, demands for which further increased after transformation of Dadhikot from a rural to an urban administrative unit in 2014.

Groundwater exploitation, water (in)security issues and related conflicts

Following the restructuring, in 2016 DBDWSCC bought one more plot of land and added a new deep borewell⁷⁴ with the support of DWSSD, and added over 700 new taps. Nonetheless, after failure of the first deep borewell, the committee did not prefer a deep borewell for expanding its water supply services. In 2014, the Uttisghari committee had tried making a well in Ward 4 of Dadhikot, upstream to the intake of Mahadev Stream Irrigation Canal (figure 5.4).⁷⁵ However, this was strongly resisted by farmers, especially those from the upper reach of

⁷² Officials from DWSSD explained the well is based on groundwater and seepage water from the stream (interview, 25-02-2016).

⁷³ Depth 72 m, located in ward 7 (of the VDC).

⁷⁴ Depth 179 m, located in ward 3.

⁷⁵ Drinking water is supplied by a different community-managed water supply system.

the canal system.⁷⁶ Cultivating paddy, wheat, potatoes and commercial vegetables, they feared that well construction at the intake would reduce water availability for irrigation. The farmers had also opposed the UDDWSCC in 2006. Then, the committee, in coordination with the local government, had tried making a well at the irrigation intake. A farmer recalled: “in 2006, the UDDWSCC tried digging a well at the intake (of the irrigation canal) to take water for their water supply. This would stop all irrigation services for us. So we protested. I coordinated the informal struggle committee. [...] Over 400 people protested at the VDC office. Our slogan was: ‘we do not need drinking water, irrigation is a prerequisite for us’. Almost each household sells cucumbers and pumpkins, with a value of at least NPR⁷⁷ 50,000 per year. If we lose this water, we will lose our livelihood source” (interview, Dadhikot, 03-08-2016).

These farmers complained that this plan was an indirect attempt to reallocate stream water for drinking water supply, while ignoring their livelihoods. After their protests, the UDDWSCC had sunk its first deep borewell. While in 2006 UDDWSCC had tried making a dugwell on public land, by 2014, it had bought a plot of land upstream to the canal intake and reattempted to make a well on it. This again led to overt farmer resistance and added water management challenges for the committee. The chairperson of the DBDWSCC: “we started by tapping surface water sources. As this was inadequate to meet the demands, we started groundwater extraction. The problem is that water from our first borewell is turbid [...] so our consumers regularly complain about our services. [...] Furthermore, demands for water and new connections are rapidly increasing with in-migration. These [...] have been a challenge for us. We applied for additional budget and have been following up regularly since two years. Finally, this new project under the DBDWS has been approved. It is crucial for our drinking water supply but we could not initiate it [...] due to the conflict between drinking water and irrigation interest groups” (interview, 08-06-2015).

After this resistance, DBDWSCC had the second (deep) borewell drilled and started water supply from this second borewell in 2016.⁷⁸ However, within a few months the yield of this second borewell also declined. With declining spring water sources, opposition from rights-holding farmers and need of an additional source to continue supply, DBDWSCC has recently added a third borewell on public land, approved by the newly elected local representative for

⁷⁶ Drinking water in these areas (Wards 4, 5, figure 5.4) is supplied by another community-managed drinking water supply system.

⁷⁷ 1 USD = NPR 103.7 (2-03-2018).

⁷⁸ The hydro-geological survey for the borewell was done prior to the 2015 earthquakes, which, according to DBDWSCC, may have impacted the aquifer.

management of drinking water services and with assurance of technical and financial support from DWSSD.⁷⁹ While DBDWSCC is struggling to supply water to its current users, the rising number of applicants for tap connections is increasing the pressure for accessing additional (ground)water sources.

Unlike the socio-economically and institutionally secure DBDWSCC, irrigation infrastructure in Dadhikot lacks a formally registered management institution, and also monitoring and maintenance. Over the years, canal irrigation has become limited to the upper reach, while downstream farmers only have canal water during the monsoon. This unreliability of canal irrigation has made farmers less concerned for the canal. Hence many farmers switch to the groundwater alternative. A farmer, also local government staff, said: “in the past, we would take our agro-tools and clean the canal as needed.[...] Nowadays canal irrigation is limited to the monsoon. No one bothers about the canal unless they are funded for maintaining it. [...] Those who can afford it have made private wells for irrigating. Although well-water is not sufficient, its use as an alternative for canal water is increasing. [...] Irrigation is also affected by borewell construction and tapping of spring water sources for drinking water supply, so the amount of water flowing into the stream will obviously decrease. [...] It is not possible to keep people from using sources for drinking water supply. The situation is very complicated” (interview, 26-06-2015).

Over the years, the water supply from community-managed drinking water systems in Dadhikot has been decreasing, while service charges are increasing, making groundwater the most reliable and economically viable source of water.⁸⁰ An unpublished survey conducted in 2012 (by the Nepal Engineering College) showed that 27% of the households in Dadhikot have private wells. Field observations showed that the number of wells is rapidly increasing, while traditional recharge ponds in Dadhikot have vanished. A non-governmental initiative to restore traditional ponds was started in a community forest in 2013, but as funding decreased, the project was discontinued.

⁷⁹ Depth 185 m, located in ward 7.

⁸⁰ Until 2007, UDDWSC charged NPR 100 as the monthly minimal tariff per tap for 10,000 liters of water, which was reduced to 8,000 liters in 2011. Since 2012 the minimal tariff is NPR 140 for 8,000 liters of water.

5.4.2 Lamatar

Lamatar VDC⁸¹, some 16 km southeast of Kathmandu and covering 13.65 km², is part of Mahalaxmi Municipality (figure 5.1). With an annual population growth of 0.8%, this formerly rural village, where the conversion of agricultural land into residential plots started in the 1990s is gradually urbanizing. Currently, only half of the population practices agriculture as the main occupation, with inhabitants increasingly occupied in governmental and non-governmental services, small businesses, wage labor, construction and other work (figure 5.5).

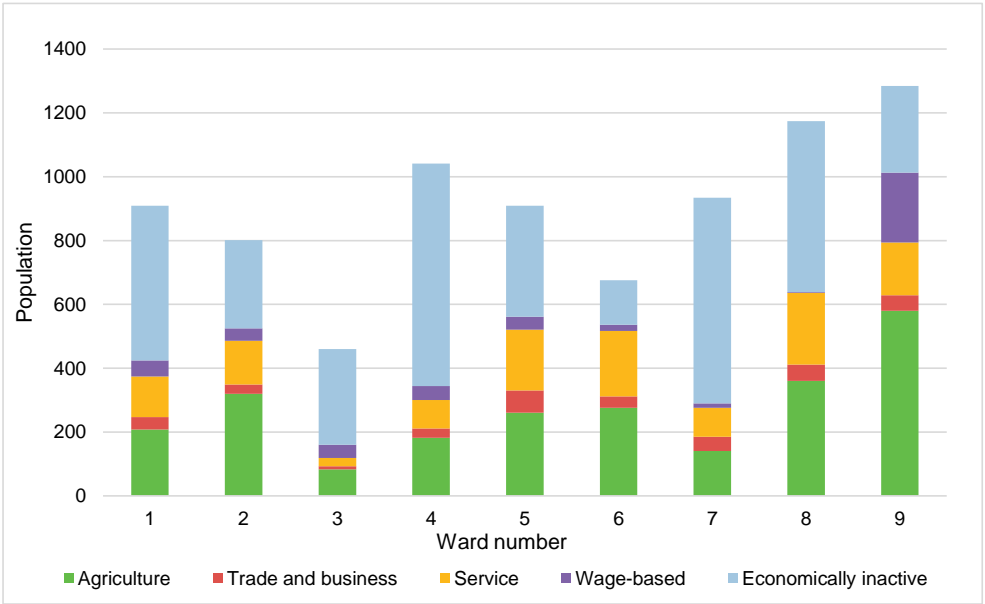


Figure 5.5. Population according to occupation in different wards of Lamatar
(Adapted from: VDC Profile, 2013).

Peri-urban dynamics, strategies and insecurities concerning groundwater

Lamatar’s hilly topography is covered with forests, managed by 11 community forest user groups.⁸² Over 50 springs and streams originate in these forests, feeding into stone spouts, wells and canals (VDC Profile, 2013). These traditional sources for drinking, domestic and irrigation uses continue to be of major importance for daily water needs. Government-managed drinking

⁸¹ Lamatar VDC was clubbed with four other VDCs to form Mahalaxmi Municipality in 2014.
⁸² These groups are from the wards 1, 3, 5, 6, 7, and 9, that include the community forests.

water supply started in the early 1980s, using water from a spring in a neighboring VDC to provide five different VDCs, including Lamatar. This started piped water supply via public taps in Lamatar. Tapping of springs in Lamatar for various community-managed piped water supply systems started in the 1990s. Most of these were supported by non-governmental organizations promoting safe water supply and sanitation, a sector highly prioritized by the government. One of them is the Shasambhu-Thulaghar Drinking Water Supply and Sanitation Consumers' Committee (STDWSSCC). Unlike most other such committees, it supplies water via private taps, and is trying to improve and expand its services by extracting groundwater through a deep borewell. Below, we discuss how this attempt to extract groundwater resulted in disputes between the residents, who are divided on the issue: some see groundwater extraction as a problem, others as a solution to their water insecurity.

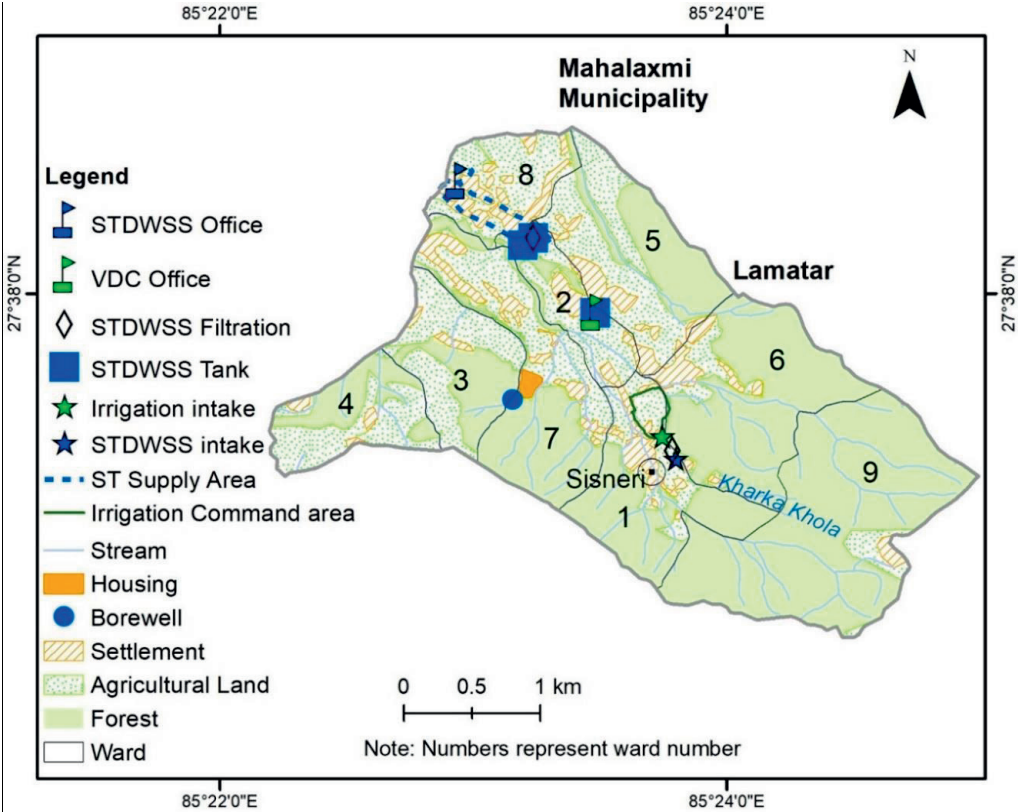


Figure 5.6. Shasambhu-Thulaghar Drinking Water Supply and Sanitation and Kharka Khola Irrigation in Lamatar (Credit: Dibesh Shrestha).

STDWSSCC supplies water to part of Lamatar's Ward 8, a more rapidly urbanizing settlement with an increase in non-agricultural livelihoods (see figures 5.5 and 5.6).⁸³ Like most other community-managed committees in Lamatar, STDWSSCC is not formally registered. It started in 2005 by negotiating rights to use Kharka Khola, a seasonal stream in the community forest in Sisneri, a village in Ward 1 of the VDC (figure 5.6). A verbal agreement was made that, while STDWSSCC has a use right, farmers in Sisneri as prior users get priority and can divert water from the intake of STDWSS for irrigation during cropping seasons. Having obtained the use right from the Sisneri villagers, STDWSSCC mobilized its social connections with governmental and non-governmental organizations and successfully arranged financial and technical support. In the following years, through similar support it improved its intake and added a filtration system for water supply. A member of both STDWSSCC and the above-mentioned inter-VDC water supply management committee stated as follows: "people used to drink stream water and water from traditional wells. This settlement was small, with sufficient water for all. After the government had started public taps in the early 1980s, people started using tap water for drinking, but water demands continued increasing. We started the Sashambhu-Thulaghar drinking water supply to meet growing demands for piped tap water. Although called a drinking water supply scheme (committee) to obtain support, water was actually used for domestic needs (washing, cleaning, etc) except drinking. Gradually, as the public tap supply continued decreasing and water demands increasing, we added a filter to make it potable" (interview, 09-06-2017).

The fact that STDWSSCC obtained approval and funding for the scheme without formal registration, illustrates its social and professional connections. STDWSSCC started with 40 private taps and free water for two users who provided land for the system's tanks. Currently (2017), it supplies 109 taps while demands for new connections are increasing. However, flow in the Kharka Khola has been declining. Water scarcity peaks during the dry seasons, when discharge is low while the farmers in Sisneri, who are upstream and prior users of the stream, start irrigating their crops. In the face of declining water supply, many households in the Sashambhu-Thulaghar settlement have dug private wells and use shallow groundwater.⁸⁴ The quality, however, is poor, making the settlement dependent on STDWSS despite the decreasing of the source and supply of its water. The earthquake in 2015 further reduced water flows in

⁸³ Note: Ward 8 does not have a community forest and its population is not involved in such a group.

⁸⁴ STDWSSCC started with NPR 75 as monthly tariff, with no restriction on the volume of water used. Currently the minimal monthly tariff is NPR 150 for 8,000 liters.

Kharka Khola. This led to the decision by the STDWSSCC to bore a deep borewell and access groundwater to improve and extend service. A member explained: “there is huge demand for new tap connections and we are in the process of drilling a deep borewell for our scheme. After this we will start supplying new taps” (interview, 04-02-2017, office of STDWSSCC). Arranging for new water sources puts additional pressures on the committee to arrange the needed investments; a STDWSSCC member explained: “drilling a deep borewell requires huge investment. [...] We cannot afford this on our own and will have to request finance from organizations supporting drinking water services”.

In 2017, STDWSSCC tried to get registered at the District Water Resource Committee as a formal drinking water user committee, to gain the formal rights to the water source (Kharka Khola) and to access more funding for such initiatives. The committee publicly announced its decision to register and expand services through sinking of the borewell. However, drilling a deep borewell became a major factor of conflict. The Sisneri villagers were unwilling to agree because of the potential impacts on the availability of, and access to, water. While they had agreed to let STDWSSCC access the spring source, this new appropriation of water was not acceptable to them. They complained that registration without consulting them is a strategy of STDWSSCC to avoid prior water users and their claims, illicitly capture the water source, and drill a deep borewell by mobilizing their social connections. Therefore, the villagers submitted a petition against STDWSSC at the District Water Resource Committee.

A villager from Sisneri stated: “if this water is given, there will not be enough for irrigation and drinking [...]. If they try to take water from here, we will brutally cut their pipes. If there is not enough for us, how can we give water to outsiders!” He added: “deep boring takes water from everywhere, withdrawing water from adjoining sources. This will lead to the drying-up of our sources. STDWSSCC never consulted our political leaders or water users. We wonder how its decision came about! Our argument is that people have to be involved in conserving the forest to get water. We, villagers from Sisneri, have been protecting our forest. By doing so, we are also protecting our water sources. Now outsiders come and try to sink a borewell. Will we let them do so? STDWSSCC strategically posted a public notice giving us a limited time to organize and take action against their decision. They wanted to avoid us, the local people. We have already submitted a petition against them” (interview, Sisneri, 07-02-2017).

Groundwater exploitation: problem or solution

Sisneri farmers grow paddy, wheat and commercial vegetables, which they irrigate by making a temporary dam at the Kharka Khola. The farmers, particularly those with lands located downstream of the intake of STDWSS, have long been unhappy with this sharing of Kharka Khola. The irrigation intake lies downstream of the intake of STDWSS supply (figure 5.6). The farmers complain that, despite agreed priority of their water rights over STDWSS supply, this has not been practically possible because of the concrete intake for drinking water supply. A farmer: “STDWSSCC had told us that we can open their intake and take water if needed. But how should we open and close their concrete intake? That is not possible in practice” (interview, Sisneri, 19-07-2017).

Such contestations around water use were key factors in the local elections in May 2017. Following the elections, ward-level meetings were conducted to discuss these issues. The chairperson of the community forest in Sisneri, also a former elected local representative from Sisneri, elaborated: “we agreed to registration of the water sources but we will not let a deep borewell be drilled [...] as this will damage our water sources. In our case all water sources are in the forest, so the forest committee is protecting them. But, as water flows down, it is crucial to make dams [...] to conserve water sources. [...] The current practice is that downhill villagers only use water flowing down, but nobody is concerned about preserving those sources. After the earthquake, water sources have further declined. STDWSSCC intends to get registered, drill a borewell and manage water only for their supply area. That will not work. The forest committee had let STDWSSCC use the water source as they are also villagers of our VDC, but our villagers here complain that we did not monitor their activities and let them take the source” (interview, Lamatar, 14-06-2017).

On the other hand, STDWSSCC, having invested in developing its water supply system Kharka Khola for a larger group, argues that deep borewells are the only solution to the growing demand: “if there was water, investing in surface sources would have been useful. But now there is no water except in the peak monsoon, while water demands continue to increase. New houses are coming up and they demand tap connections. The only solution is a deep borewell. Everyone, including people in Sisneri, has realized that in the future we will have to use groundwater sources. We do not have a big stream source. [...] (Deep) borewells are being made everywhere (in Kathmandu Valley). In the neighboring VDCs, there was no need to get approval, nor did they publish any public notice, they are simply drilling more borewells. The housing colony made a borewell, and who dared to oppose? But when the general public tries

to get a borewell, then the people oppose. A resident in our settlement had tried to get a borewell drilled for his private use, but villagers opposed it. Without knowing the facts, people argue water sources will dry due to deep borewells. In this region, everywhere there is plotting. The roads are being widened. Settlement will continue increasing. Water scarcity will definitely increase. There is no option except going for deep borewells (Office Operator, STDWSS, 9-06-2017).

While the political (ward-level) decision was to prioritize surface water development, the villagers are deeply divided in their opinion on this issue. In 2017, another group of villagers (mainly from Ward 7 of the VDC) submitted a petition at the ward office requesting action against the deep borewell sunk in 2016 in the commercial housing project in Lamatar. The protesting villagers argue that this drilling resulted in the complete drying up of a spring located uphill. Its flow had been declining over the years, and further declined after the earthquake, to run completely dry by late 2016. The commercial housing had not obtained a KVWSMB license, nor conducted a public hearing or obtained approval from the ward office, while all are required for licensing. Nonetheless, the ward secretary for Lamatar argued that the housing project had fulfilled all formal requirements for its construction. Moreover, neither the ward secretary nor other members of the ward-level committee were clear about the recently formulated formal requirements for drilling a deep borewell, and they assumed that the commercial housing owner had a license. As there were no complaints, the ward office did not inquire and interfere in the water arrangements. The villagers explain that the political and economic power of the commercial housing developers enabled them to ignore formal requirements of approval, while this power reach compelled villagers to refrain from protesting until local representatives were elected in 2017.

Despite the protests and concerns over groundwater use, the campaigning strategy in the local elections of propagators of “one-house-one-tap” provision helped the election of pro-groundwater ward committee members. During this time (also the fieldwork period) there were five applications for permits to bore deep borewells (for water supply in different parts of Mahalaxmi Municipality). Nonetheless, continued protests against groundwater development have resulted in the decision to engage technical experts for a detailed study on the possible impacts of conjunctive water use. It was decided that priority should be to develop springsheds and surface water streams. The ward chairperson clarified the position as follows: “drinking water was one of my priorities in [...] the local election. [...] The settlement is expanding. Considering the increasing water needs, our springs and streams are not going to be sufficient.

People from Sisneri argue that making dams in gullies to collect and recharge rainwater will make our springs sustainable and sufficient for water supply. But with expanding settlement we have no option but making a deep borewell. The district drinking water division will soon be conducting a study to explore the possible ways to manage the water supply [...] We will, of course, not be ignoring the need of upstream villagers to have reliable irrigation water. [...] (interview, ward office, 24-08-2017).

As these debates continue, it is likely that groundwater extraction in Lamatar will continue. The ward chairperson clarified that, though the ward-office was trying to notify the commercial housing developers to obtain a license, there was no plan to penalize or refrain from groundwater extraction; thus, local opposition was largely ignored. Meanwhile, the community forest in Sisneri, partly supported by the District Forest Office, has started making water capture and recharge ponds to increase sustainable availability of water. Nonetheless, attention is needed to ensure that such activities will not be short-lived or turn into a mere argument legitimizing groundwater exploitation.



Figure 5.7. Water filtration system; new deep borewell of UDDWSSC / DBDWSSC (above), well and the deep borewell of the housing colony (below) (Source: author).

5.5 Discussion: (peri-)urbanization and groundwater exploitation

The findings presented in this article draw from the investigation of the socio-environmental and institutional dynamics in relation to groundwater use in two peri-urban locations in Kathmandu Valley, Dadhikot and Lamatar. We have shown that the use of, and dependence on, groundwater are increasing, despite growing protests and societal divisions concerning its consequences. From the cases we identify five complex interlinked factors and processes that have triggered increasing groundwater exploitation: (i) uncontrolled urban expansion and subsequently increasing water demands; (ii) poor management and the resulting decline of traditional water sources; (iii) increasing surface water insecurities and related conflicts with prior rights-holders; (iv) lack of coordination between different actors using and governing water (and land), and poor implementation of groundwater policy; (v) limited knowledge on the local hydro-geological complexities and how they are related to the wider socio-political and institutional environment.

With ongoing in-migration and land conversion, drinking (and domestic) water demands are increasing in peri-urban Kathmandu Valley, as illustrated by the Dadhikot and Lamatar cases. In both areas, many water sources traditionally used for irrigation have been reallocated to meet growing drinking water demands. With changing land and water use and management practices, many traditional sources of water have declined, degraded or dried up. As these socio-environmental changes have boosted competition for water, groundwater has emerged as the alternative water source. In addition to the shallow wells used at household level, groundwater extraction from deep aquifers by new and deeper wells has emerged and is still expanding. An example is the Uttisghari/Brihat community-managed water supply in Dadhikot, discussed above. Although urbanization in Lamatar has been relatively slow and population growth relatively low, these are occurring here as well. While use of groundwater from deep aquifers is still new in Lamatar, extraction of shallow groundwater for household uses is common.

Groundwater extraction in Kathmandu Valley ever more exceeds its recharge, with negative consequences like drying traditional water sources, decreasing yield of wells, and declining groundwater levels (Shrestha et al., 2012; Pandey et al., 2012). The threat of disturbances to the local hydro-geology and potential loss of water access and rights, thereby exacerbating water insecurities, united the prior rights-holders to contest groundwater exploitation. On the other hand, decline of traditional water sources, growing opposition from prior rights-holders, and increasing water demands have stimulated drinking water suppliers to take recourse to groundwater, which is perceived to be a reliable water source free from prior rights issues. Thus,

they use various strategies to strengthen and legitimize their rights to groundwater exploitation: for example, purchasing land at the irrigation intake, coordinating with local and central government, restructuring of UDDWSCC and making borewells in the wards served by them in Dadhikot, attempts to formalize STDWSSCC, and coordination with the elected government in Lamatar.

The 1992 Water Resources Act (WRA) of Nepal provides water use rights, while it vests ownership of water resources in the state. WRA has set the priority order for different water uses, drinking water having first and irrigation second priority. Although drinking water supply has received much national⁸⁵ (and international⁸⁶) attention, peri-urban Kathmandu Valley (like elsewhere; see Janakarajan, 2008; Narain and Singh, 2017) continues to be largely excluded from services of the official provider KUKL. As elaborated in the case studies, peri-urban spaces depend on community-managed drinking water services, priority for which has grown in local development projects facilitated by governmental and non-governmental agencies.⁸⁷ The Groundwater Policy of 2012 has also encouraged such community-managed drinking water supply initiatives. The policy reserves shallow groundwater for domestic water uses, and requires a permit from KVWSMB for any deep aquifer use, including community water supply schemes. Accordingly, the borewells made for the community-managed water supply systems in peri-urban spaces of the valley, developed with support of DWSSD, should have been registered, received a permit and regulated under KVWSMB. However, none of these systems in Dadhikot have such a permit.

Such increasing use of groundwater without obtaining a permit, as required by the groundwater management policy (also for community-managed supplies), shows weak implementation of this policy. Furthermore, these community-managed drinking water supplies are financially and technically supported by DWSSD, a government body, whose responsibilities overlap with KVWSMB, the formal authority for regulation and management of groundwater use in the entire valley. These overlapping institutional arrangements, together with growing pressure to

⁸⁵ The Government of Nepal has the national target of “universal access to safe drinking water and sanitation for all”. As per the census data 2011, 85% of the households have access to water supply and 61% of households have sanitation (CBS, 2014).

⁸⁶ Goal 7 of the Millennium Development Goals (MDGs): “to halve by 2015 the population without sustainable access to safe drinking water and basic sanitation”. Goal 6 of the 2030 Sustainable Development Goals (SDGs): “by 2030, achieve universal and equitable access to safe and affordable drinking water for all” (WHO and UNICEF, 2017: 7).

⁸⁷ The Water Supply Sector Policy of 1998 made water supply projects semi-autonomous and curtailed the government’s role to being a facilitator (Aryal, 2011; Freeman et al., 2014).

mobilize new water sources for the rapidly increasing population and to avoid contestations around declining surface water sources have led to the emergence of water-mining practices that transgress the groundwater management policy. These socio-environmental and institutional dynamics illustrate poor coordination, not only between these government agencies responsible for drinking water supply in the valley, but also between and among different bodies responsible for planned land and water management.

Lack of compliance with the existing groundwater management policy in case of community-managed drinking water supply systems is often justified by the need to provide basic water services for “the community”. However, less attention is paid to how the sectoral focus on drinking-water supply augmentation is promoting in-migration into peri-urban spaces. Availability of drinking water services is a major factor in decision-making on migration into any area. Further, we noticed land-brokers often present the example of expansion of drinking water supply systems as an evidence of reliability of drinking water services, and thus attract in-migrants seeking to buy land and settle in these urbanizing areas. These socioeconomic dynamics, in turn, stimulate urban expansion, thereby rapidly increasing water demand and management challenges for the “community” water service providers, as seen in Dadhikot where annual population growth rate increased from 1.17% (1981-1991) to 2.5% (1991-2001) and to over 6% by 2011. In these urbanizing areas, what is still referred to as “community” actually is an increasingly diverse and dynamic society consisting of various population groups with varying backgrounds, livelihoods, identities, needs and interests, characteristic of peri-urban landscapes more generally (Narain and Prakash, 2016).

In Lamatar, STDWSSCC applied for formal registration, to qualify for the formal support on which it depended for accessing groundwater. Opposition to its registration resulted in uncertainty about groundwater access of this supply system, and thus also of water access for those who depended on its services. On the other hand, the housing colony could afford the cost of extraction, and extracted deep groundwater without a license; the petition against this was ignored. In Kathmandu Valley, poor implementation of the groundwater policy has helped powerful actors to evade the regulatory mechanisms in exploiting groundwater for their commercial interests (Shrestha et al., 2018a). This exploitation often takes place without a license from KVWSMB, as illustrated by the limited number of licensed deep borewells noted by KVWSMB and from the example of unrestrained use of groundwater in construction of the commercial housing in Lamatar. In Lamatar, water originates in the community forests. Sisneri villagers manage the forest in Ward 1 and hence claim for their rights to water originating from

their forest. However, not all wards have community forests (see footnote 83), and populations of the wards without forests are not involved in such initiatives. Thus, such informal ways of governing water lack participation of the wider community, including that of the elected local government. The latter has the right to decide on use and reallocation of resources and is in favor of groundwater use for addressing growing water needs and demands. In addition to these institutional issues, economic and political advantages enabled the housing developers to ignore the community and its petition.

In contrast, local opposition against groundwater exploitation has added challenges in managing basic water needs for the peri-urban population that depends on community water services, as experienced by the Shashambhu-Thulaghar DWSS. Nonetheless, despite resistance and growing awareness of the dark sides of groundwater exploitation, with the diverse and growing urbanization-driven needs and interests in water (and land) uses, peri-urban groundwater exploitation is likely to continue increasing. This trend is reaffirmed by the increasingly strong social, institutional and political priority-setting for deep borewells to improve drinking water services. Drilling of deep borewells is viewed with much antagonism by farmers concerned with their irrigation-based livelihoods. However, the number of such farmers is decreasing with the declining irrigation services and increasing urbanization. Furthermore, there is little control over the increasing numbers of shallow wells, which are also used by farmers and widely regarded as the best alternative to the unreliable stream-fed canal irrigation systems. However, the groundwater management policy and guidelines are silent about the growing use of groundwater in irrigation. This silence shows that the focus is on drinking water, which is understandable with the responsibilities given to KVWSMB. However, this again raises questions on the effectiveness of groundwater policy in addressing the complex realities of groundwater uses, particularly in the peri-urban spaces of Kathmandu Valley.

As discussed, the hydro-geologically diverse Kathmandu Valley is broadly divided into three districts. In addition to categorizing the type of groundwater uses, the guideline for licensing groundwater extraction and use (see KVWSMB, 2015) aims at imposing volumetric restrictions on groundwater extraction and has identified safe, semi-critical and critical areas for groundwater exploitation from deep aquifers. However, little is known about the local hydro-geology and its relation to changing land and water uses and management practices. For instance, the borewells for the DBDWSS system were drilled under technical support from DWSSD, following hydro-geological surveys that confirmed their feasibility. However, the

borewells failed to provide the expected water services, which resulted in the need for additional borewells for DBDWSS. It also led to an increase in private household wells, to deal with the poor water quantity and quality services of DBDWSS. Such failure of borewells and subsequent increases in groundwater extraction illustrate the socio-environmental nature of groundwater management issues. In addition, these examples highlight existing knowledge gaps on hydro-geological complexities and related socio-institutional processes that justify and compel continued extraction of a resource that has already been pointed as over-exploited. Better understanding of these socio-natural and institutional processes is crucial with ongoing urbanization and growing dependence on groundwater exploitation.

The groundwater policy has promoted groundwater recharge in the valley. Although the shallow aquifer is characterized by a high recharge rate, the high rate of urbanization has increased impervious surface and radically reduced groundwater recharge (IDC, 2009; Shrestha et al., 2012). The potential for recharge into the deep aquifer is already low because of the widespread impervious clay layer in Kathmandu Valley (Pathak et al., 2009; Pandey and Kazama, 2012), but further decreases with urbanization. The project piloted to artificially recharge the deep aquifer was not only costly and technically complicated, but the results of this scheme were not encouraging either (Dixit and Upadhyaya, 2005). Opportunities for using groundwater in Kathmandu Valley depend heavily on the ability to regulate land use and prevent pollution in key recharge areas (Shrestha et al., 2012; Pant, 2011; Pathak et al., 2011). Considering that the priority of the GoN in recent times has invariably been urban development (MoUD, 2016) with urban expansion in Kathmandu Valley, “the hub of Nepal’s urbanization” (MoUD, 2017), these processes are likely to continue in the future. Consequently, the potential area of open spaces for groundwater recharge can be expected to get converted into built-up areas (Thapa and Murayama, 2012).⁸⁸ In this context, despite the initiatives to improve urban water supply services and the formulation of groundwater policy guidelines, groundwater governance in Kathmandu Valley is likely to remain a major challenge.

⁸⁸ The Kathmandu Valley Development Authority (KVDA), the urban planning authority for Kathmandu Valley, aims to develop infrastructure to accommodate a population of 10 million in the valley (interview, KVDA, 21-11-016; see also Abhiyan National Daily, 07-11-2016).

5.6 Conclusion

We have shown how the use of, and dependency on, groundwater for multiple uses are increasing in Kathmandu Valley, despite the existence of the groundwater policy to regulate and control it. In a context of declining traditional water sources, an ever-increasing population, and growing water needs for multiple uses, pressures on water and competition for access are increasing throughout the valley. Although users experience a considerable decline in the quality and quantity of groundwater, it is increasingly seen as the only “solution” to deal with growing water demands and conflicts about water access, rights, and insecurity. The peri-urban population is divided in its concerns about the impacts of groundwater exploitation on water (in)security. In this context, contestations and divisions concerning groundwater exploitation and its consequences are growing: inequalities and water insecurities create a potential for water-related conflicts to escalate (Janakarajan, 2008; Howard, 2013; Narain, 2014; 2016; Shrestha et al., 2018).

Under the current institutional conditions and groundwater use practices, groundwater is largely an “open-access” resource (Pandey and Kazama, 2014), at least for those who can mobilize the required capital, social relations and technology to get access. Under the current conditions, groundwater exploitation can be expected to continue increasing, with or without formal recognition, regulation and licenses. In line with the government’s priority for urbanization as “the best way to sustainable development” (MoUD, 2016: 3), Kathmandu Valley has been made a rural area-free municipal zone.⁸⁹ However, as our case studies in Dadhikot and Lamatar, located in two of the newly declared municipalities, show these areas lack basic water services while water demand is increasing. With the focus of municipalities on promoting non-agricultural economic activities for “development”, water demand is likely to increase even faster, adding dual pressure on groundwater: increasing exploitation under conditions of a shrinking recharge area. In the meantime peri-urban spaces, despite their rapidly growing populations, remain excluded from surface water-based urban water service improvement initiatives.

⁸⁹ Between mid-2014 and 2017, the number of municipalities has increased from five to 18 in Kathmandu Valley and from 58 to 293 in Nepal. The municipal declaration, as in the past, involved the clubbing of VDCs, rural administrative units, – without considering the minimum criterion for designation of an administrative unit as urban center – as proposed in the national urban policy (MoUD, 2015).

These are not “natural” processes nor mere issues of scarcity or “anarchy” (Shah, 2009). Within the many pressures and constraints discussed, choices are made that benefit certain actors and types of groundwater exploitation at the expense of others. A growing body of literature highlights the complex inter-linkages between water, power, politics and governance and stresses that these socio-environmental processes produce uneven outcomes for various (groups of) people over space and time (Budds and Hinojosa, 2012; Mehta et al., 2012). Considering the socio-natural properties of water, it is important to acknowledge that groundwater cannot be isolated from other socio-natural processes (FAO, 2016). Studies have stressed that top-down institutional attempts at enforcement of rules for groundwater use that were formulated outside specific water use contexts can turn ineffective (Shah et al., 2003; Shah, 2009) and even counterproductive (van Steenberg et al., 2015b). Managing groundwater use, therefore, calls for understanding local hydro-geological complexities and their linkages to the wider socio-political and institutional environments that determine changing land and water uses.

It has been suggested that conjunctive use of groundwater and surface water could deal with the severe groundwater management and water provision problems experienced in areas like Kathmandu Valley (Howard, 2013; Dixit and Upadhyaya, 2005). As such, efforts to revive and conserve traditional (surface) water sources can contribute to a reduction of pressure on groundwater. Nonetheless, attention is needed that such initiatives are socially and institutionally sustained and not mobilized to justify even more intensive groundwater exploitation. Moreover, rather than merely focusing on more groundwater exploitation, governing bodies will have to set, and act upon, clear and coordinated long-term priorities to regulate uncontrolled urban expansion and improve the current quantity and quality conditions of surface water bodies, as a necessary condition for improving (ground)water management.



A sand mine in Jhaukhel (Source: author)



A water source in Lamatar (VDC) that has dried after the earthquake in 2015
(Source: author).

Chapter 6

Which community, whose resilience? Critical reflections on community resilience in peri-urban Kathmandu Valley

Abstract

Development policy and practice is replete with assumptions that local “communities” have both the willingness and capability to adapt to socio-environmental changes and become “resilient” to multiple old and new challenges. This paper analyzes socio-environmental change processes in a dynamic peri-urban context in the Kathmandu Valley of Nepal, and argues that unequal power relations between diverse actors and their differing interests refute popularly promoted notions of “collective action” and “community resilience”. Residents of peri-urban communities are diverse, have varying abilities and interests, and use different strategies and actions in response to complex socio-environmental changes. These differences reduce insecurities for some while reproducing inequalities. These interrelations at the local level are driven by wider socio-economic, political, and institutional processes that transcend community boundaries, interests, and benefits. In the face of these complexities, “community resilience” is an unviable externally defined and engineered goal, often at odds with the power discrepancies and heterogeneity found within actual communities. These findings suggest a need to pay attention to the social, economic, and political dynamics of socio-environmental changes that simultaneously shape local communities and their members’ abilities to respond to changes at various scales.

Keywords: community resilience; collective; interests; peri-urbanization; Kathmandu Valley

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6.1 Introduction

“Resilience” is an increasingly popular concept in science and policy domains relating to contemporary global environmental discourse (Walker et al., 2006; Levine et al., 2012; Cutter, 2016; Walch, 2018). In the global environmental policy arena, ideas about resilience have been mainly though not exclusively drawn from the field of ecology (Brown, 2014). Over the years, the term has been used in different disciplines to express different meanings (Brand and Jax, 2007; Brown, 2014). Notwithstanding its popularity, the concept is also widely contested. For authors critically appraising the concept, “resilience” has evolved from a descriptive ecological concept to a vague connotation that, however defined, it is desirable and good (Olsson et al., 2015; Robinson and Carson, 2016). This is reflected in the growing interest in development policy, research, and practice to build and strengthen the resilience of local communities (MacKinnon and Derickson, 2012; Bene et al., 2014; Walch, 2018). Some proponents claim that the concept provides a framework that can be used across the natural and social sciences (Folke, 2006; Wilson, 2012; Berkes and Ross, 2013). However, social scientists are especially concerned that the use of the concept to understand social change is problematic, especially because proponents pay little attention to issues of agency, conflict, inequality, and power that shape and reshape social processes and co-determine their outcomes (Cote and Nightingale, 2012; Brown, 2014; Olsson et al., 2015; Cutter, 2016; Walch, 2018). Moreover, most resilience literature is conceptual and lacks robust case studies that prove or test the concept (Bahadur et al., 2010: 19).

Despite these critiques, the use of the term has expanded to the now popular term “community resilience” (Cretney, 2014; Brown, 2014; Wilson, 2012; MacKinnon and Derickson, 2012; Robinson and Carson, 2016; Patel et al., 2017). Like resilience, this new term “remains an amorphous concept that is understood and applied differently by different research groups” (Patel et al., 2017: 1). Others argue that the term implies a static and homogenous conceptualization of “community” that fails to acknowledge the differences and dynamics inherent in any community (MacKinnon and Derickson, 2012; George and Stark, 2016). Furthermore, the multiple meanings and framings of “community” makes use of “community resilience” even more questionable (Norris et al., 2008: 128).

In Nepal, a focus on resilience is prominent in policies, particularly in relation to climate change and urbanization. The recently approved National Urban Development Strategy aims for “building community resilience” and making “physically, socially, economically, environmentally and culturally safe and resilient urban areas” (MoUD, 2017). This focus on

promoting and enhancing urban resilience is also found in the draft of a long-term strategic development master plan for the Kathmandu Valley (KVDA, 2015). While resilience is increasingly stressed in Nepal's national policies, resilience *to what* (one should be resilient) remains broad and *how* (to be resilient) remain vague. Taking note of this paradox, in this paper, I explore the extent to which “community” and “resilience” are relevant to understanding socio-environmental changes in two peri-urban locations in the Kathmandu Valley, Jhaukhel and Lamatar.

Peri-urban spaces are complex transition zones that are often undergoing rapid socio-environmental, demographic, and other changes under the influence of urbanization and the resulting flow of commodities, capital, resources, and people (Allen, 2003; Thapa et al., 2010; Narain and Singh, 2017). Because of the dynamics of peri-urban spaces, it is difficult to establish coherent institutional arrangements that can deal with change processes (Allen, 2003). Socio-environmental complexities and institutional ambiguities in peri-urban spaces make it particularly interesting to analyze how resource uses and allocations, social compositions, identities, and interests change in the process of “becoming urban” (Friedmann, 2016). Studies of changing peri-urban land and water use have shown that diversifying livelihoods in these spaces results in growing water demands, increased competition, and contestation (Narain and Prakash, 2016; Shrestha et al., 2018a). In this dynamic peri-urban context, experiences of water insecurity vary, as they are shaped by different forms of access to technology, social connections, power, as well as the capacity to invest in new systems and technologies (Shrestha et al., 2018a; Roth et al., 2018). It is precisely such diversity that begs critical attention to notions of “community resilience”.

In Nepal, urbanization “as the best way to sustainable development” (MoUD, 2016), with an emphasis on “building community resilience”, has been a recent government priority. However, my research findings suggest divisions and differences between and within peri-urban communities and their experiences of water insecurity.⁹⁰

In what follows, I first review the concept of community resilience and identify major claims about its usefulness as well as points of criticism. Next, I briefly present my research questions and methodology and introduce the study locations. This is followed by a presentation of the two case studies, which show that people's interests, abilities, strategies, and actions in dealing

⁹⁰ When I use the concept of “community,” I do so in the more neutral sense of “settlement” rather than with the idealizing assumptions I critique in this article.

with complex socio-environmental changes determine water security for some and insecurity for others. I then analyze how what happens on the ground is linked with wider socio-economic, political, and institutional processes. In conclusion, I argue that understanding and addressing socio-environmental changes, particularly in fluid peri-urban spaces, requires a more nuanced analysis of power, politics, and heterogeneity in communities, as well as the scalar nature of change processes.

6.2 Resilience and community resilience: a critical review

During the late 1960s and early 1970s, “resilience” was used in ecology debates about how ecosystems respond to disturbances (Folke, 2006; Wilson, 2012). Defined as “the time required for a system to return to an equilibrium state after disturbance”, resilience carried an assumption of the existence of a single equilibrium state. Hence, this approach is termed “engineering resilience” (Gunderson, 2000). Holling (1973) emphasized the existence of multiple stable states of ecosystems, which allow for the reorganization of a system in the face of disturbance and change. He defined ecological resilience as, “the magnitude of disturbance that a system can absorb before it changes stable states” (Gunderson, 2000: 427; Cretney, 2014: 628). Beginning in the 1980s, the use of the concept spread to other disciplines (Brown, 2014). Interest further increased in the 1990s, when the Resilience Alliance was created to identify possible connections between Holling’s work on ecological modelling and the social sciences (Cote and Nightingale, 2012). The resulting approach argued that, as social-ecological systems are intimately linked complex and evolving integrated systems, resilience can be employed as a framework for understanding the complex connections between environment and society. This resulted in the introduction of the concept of social-ecological system (SES) (Adger, 2000; Walker et al., 2002; Anderies et al., 2006). This also marked the beginning of the notion of resilience as a “boundary object” between the natural and social sciences (Brand and Jax, 2007; Olsson et al., 2015).

Investigations of whether resilience could be applied to understand human action under the umbrella of “social-ecological resilience” began in the early 2000s (Wilson, 2012). Since then, the concept has been frequently redefined and its meaning expanded, becoming a collection of ideas about how to interpret complex socio-ecological systems (Anderies et al., 2006; Brand and Jax, 2007; Brown, 2014). Such resilience thinking emphasizes building and enhancing the capabilities of people and communities to deal with and respond to socio-environmental

changes, including natural disasters (Manyena et al., 2011; Walch, 2018). The United Nations International Strategy for Disaster Reduction defines resilience as “the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate to, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” (UNISDR, 2009: 24). Resilience thinking has further broadened from an initial focus on returning to normal following a disruption, or “bouncing back,” to include betterment, or “bouncing forward” (Manyena et al., 2011; Tanner et al., 2017).

Notwithstanding its growing popularity, the term’s usefulness to interpret social-ecological dynamics or guide interventions in a society is still widely critiqued. The concept emphasizes the ability to absorb change and the capacity for reorganization or adaptation in the face of disruption. However, what resilience is, who defines it and for what purpose, whether it is an appropriate characteristic to measure, and if so, how to do so, all remain vague (Cretney, 2014: 629; Tanner et al., 2017). While resilience, with its vague, flexible meaning and openness to multiple interpretations as a “boundary object” facilitates research across disciplines and communication between research and policy, this comes at the expense of the concept’s clarity (Brand and Jax, 2007). Furthermore, although the multiple interpretations and positive outlook of the concept for society-environment relations appeal to actors with different interests, the messiness and ambiguities in its use add to analytical problems (Brown, 2014; Boas and Rothe, 2016; Cutter, 2016). This analytical inconsistency continues to be a major challenge to operationalization and application of the concept in practice (Cote and Nightingale, 2012; Brown, 2014; Olsson et al., 2015).

Applying an ecological systems framework in social dynamics does not answer normative questions crucial to social change and the institutional processes and practices that mediate socio-environmental relations in any context. Who decides what resilience is and how it is identified? Who or what should be made resilient to what, for whom, and for what purpose? (Leach, 2008; Cutter, 2016; Meerow and Newell, 2016). The extension of the resilience approach from ecological systems to social, economic, and social-ecological systems approaches has lacked such critical questioning (Leach, 2008; Cote and Nightingale, 2012; Brown, 2014). Moreover, given the complex interplay of social and environmental dynamics, assuming these are similar is problematic (Cote and Nightingale, 2012; Cretney, 2014; Olsson et al., 2015). These weaknesses have meant both social-ecological system (SES) and resilience of limited utility for the analysis of social, political, and cultural dynamics deeply embedded in

a society (Brown, 2014; Cretney, 2014; Olsson et al., 2015). This lack of attention to the role of agency, power, inequality, and politics presumes equality among individuals and communities in coping with challenges. It also turns resilience into a status quo concept that privileges dominant groups and reinforces entrenched inequalities (Cote and Nightingale, 2012; Cretney, 2014).

The concept of “community resilience” is supposed to provide an important conceptual framework for understanding how communities respond and adapt to environmental and societal changes. It is based on the assumption that communities can actively engage in collective action and mobilize their shared resources (economic, social, cultural, human, political, natural, and material) to build the necessary capacity to thrive in an environment characterized by change, uncertainty, unpredictability, and surprise (Magis, 2010; Berkes and Ross, 2013). Moreover, “community” has often been conceptualized as a small and clearly bounded geographic unit or a homogeneous social structure, assumptions that neglect the diverse and conflicting interests of resource users. Critical scholars have stressed the multiple interests of actors and their different abilities to influence decision-making processes, along with the roles of internal and external socio-economic and political institutions (Agrawal and Gibson, 1999; Defilippis et al., 2006; Stone and Nyaupane, 2014). Community-focused programs and studies, however, often lack detailed analyses of the power dynamics inside a community. This overlooks political and practical realities and their impacts on social interactions, decision-making processes, and resource management outcomes (Bulley, 2013; Robinson and Carson, 2016). With such a narrow focus, the concept not only repeats the weaknesses of earlier resilience approaches but can also perpetuate, create, and legitimize unequal social relations (MacKinnon and Derickson, 2012; Brown, 2014; Cutter, 2016; Roth et al., 2018).

There is growing awareness that what is often seen as the resilience of a community depends on internal conditions such as equitable access to resources, the composition of members, the quality of social interactions, cross-scale linkages to external stressors, and the ability of local institutions to adapt to changes (Magis, 2010; Matarrita-Cascante and Trejos, 2013; Berkes and Ross, 2013). But empirical studies of these issues are still scarce and the evidence too thin to provide appropriate analyses of agency, governance, and power issues (Bahadur et al., 2010; Davidson, 2013; Bene et al., 2014; George and Stark, 2016). Failure to recognize such underlying issues undermines the relevance of a community resilience approach to social-environmental relations and as a policy tool (Cote and Nightingale, 2012; Olsson et al., 2015;

Roth et al., 2018). Hence understanding community characteristics and the socio-economic, political, and institutional processes that shape vulnerabilities and insecurities is crucial to understanding community resilience.

Furthermore, organizing abilities vary within and between communities, and communities that are resilient in one context might not be in another (Berkes and Ross, 2013; Robinson and Carson, 2016). Nor does the presence of resilient individuals guarantee a resilient community (Norris et al., 2008). The situation is further complicated by the fact that subjective interpretations of resilience and contextual complexities are interlinked with power differences and other inequalities within and beyond communities (Wilson, 2010; Davidson, 2013; Walch, 2018). As such, resilience for some may lead to a loss of it for others. Moreover, adapting to change is a dynamic process, in which a community and its capacity are also in a constant state of flux. This tension between “resilient” static outcomes and dynamic processes challenges the relevance of resilience itself (Cutter, 2016). When faced with ongoing socio-environmental changes and changing community values, institutions, and goals, what appears to be community resilience may only be a reflection of the “normative and moral goals” for development that happen to be in vogue at a particular time (Wilson, 2010: 376). This deterministic and linear focus on identifying sources of disturbances and devising strategies for their treatment may result in the reproduction of the analytical weaknesses of the resilience concept and to business as usual approaches if (community) resilience is “built” and “strengthened” in development or climate adaptation projects (Levine et al., 2012; Bene et al., 2014; Roth et al., 2018).

In what follows, I focus on three assumptions related to community resilience. First, the belief that “community” is a unit of collective action with shared common interests, social values, and norms, in which adversity equally impacts all community members; second, the assumption that all members of a community are willing and capable of undertaking collective action for a common goal, which is to overcome adversities; third, a faith that through collective action a community is capable of achieving a desired positive outcome for the community as a whole. To do so, I present the real-life experiences of socio-environmental changes, responses, and reorganizational efforts in a peri-urban setting and reflect on the concept of community resilience, taking the above three fundamental assumptions as my entry point. Based on my findings, I argue that, because changes manifested at the community level are shaped by wider socioeconomic, political, and institutional issues, local specificities as well as scalar complexities must be taken into account, though, as I have outlined above, why, how, and for whom “resilience” is sought are other matters.

6.3 Research questions, context, and methodology

This paper is based on ethnographic research I carried out between 2015 and 2018. I focused on the diverse experiences of changing water insecurities and how people respond to these. In addition to in-depth, open, and semi-structured interviews, I received useful information during informal talks and conversational interviews.⁹¹ In Jhaukhel, I conducted forty-two conversational interviews, thirty-four open and semi-structured interviews, and three focus group discussions. In Lamatar, I conducted thirty-two conversational interviews and twenty-four open and semi-structured interviews. Informal talks during field visits to water-related infrastructure (such as intakes, traditional water sources, depleted water sources, and newly drilled wells) and observation of water-related activities (such as fetching water from water vendors, irrigation from brick factory borewells, depleted sand mines, water tankers and tractors, people fetching water by motorcycle and from household wells, and well drilling) were crucial for helping me understand the diverse experiences of people and their responses to socio-environmental changes. My informants included farmers, environmental activists, teachers, representatives of community-based organizations, elected local representatives, brick factory owners, water vendors, sand miners, domestic migrants, people leasing their land, and construction workers. In addition, I conducted semi-structured and conversational interviews with twenty-two government officials and four officials from NGOs.

At the first site, Jhaukhel, the depletion of traditional water sources and the lowering of groundwater levels have increased water insecurities, but organizing the community to manage water resources has been increasingly difficult. The commercial exploitation of land and water has continued, despite efforts by some residents to control these. Lamatar, my second site, illustrates how collective efforts to adapt to urbanization-induced socio-environmental changes have been complicated by the impact of the 2015 Nepal earthquake on water resources. Together, these sites provide important insights about community dynamics and how interests, abilities, and responses within rapidly urbanizing communities influence collective action and blur assumed beneficial outcomes.

⁹¹ All conversations were in Nepali.

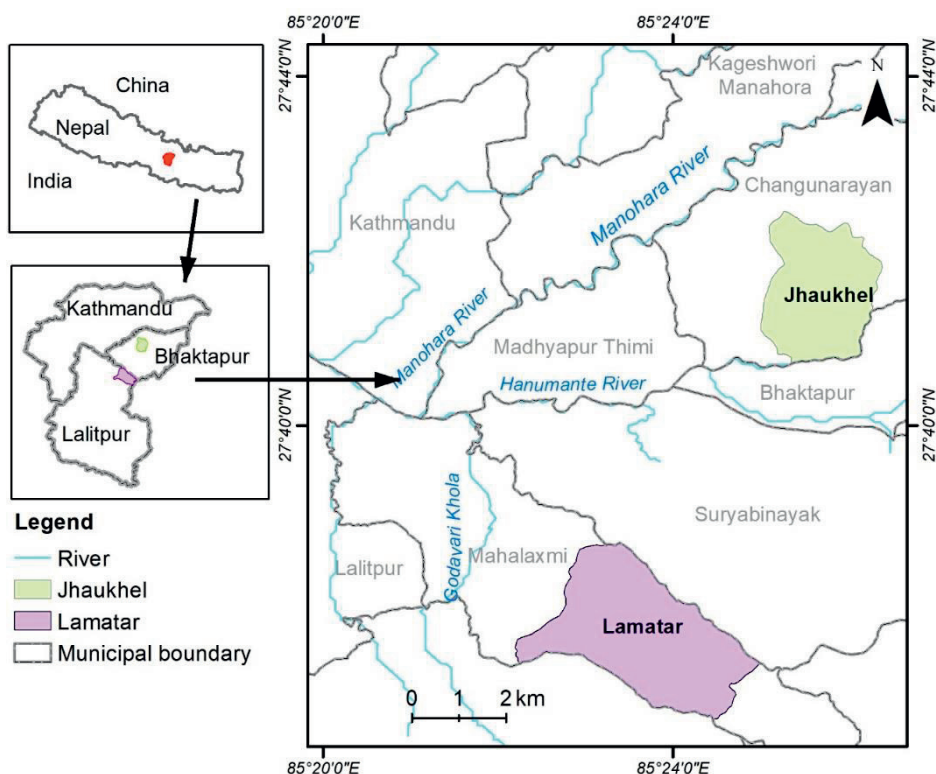


Figure 6.1. Location of study sites in Kathmandu Valley (Credit: Dibesh Shrestha).

6.4 Jhaukhel: community and community resilience in a resource exploitative environment

Jhaukhel⁹² (VDC) covers an area of 5.41 km² and belongs to Changunarayan Municipality (figure 6.1). Between 2001 and 2011 its population increased from 6,678 to 7,721 (CBS, 2001; 2012). Although livelihoods are diversifying, about sixty percent of its population is involved in agriculture (VDC Profile, 2013). Groundwater is the main source of water. Shallow wells, stone spouts, and ponds are traditional water sources, made and managed collectively, often on private land that owners provide as a religious deed.⁹³ Groundwater extraction for agriculture is steadily increasing, and also is the main water source for brick factories and the local

⁹² In 2014, Jhaukhel VDC was linked with three other VDCs to form Changunarayan Municipality. When local government units were restructured in 2017, another municipality was merged with this municipality.

⁹³ See Pradhan (undated) for water-related socio-cultural values and practices in Kathmandu Valley.

commercial urban water supply. The commercial mining of sand started in Jhaukhel in the late 1970s. Mining of terrace sand intensified after the district government prohibited sand mining without a permit in 1993, in response to growing public demands.⁹⁴ However, sand mining continued, largely uncontrolled. A woman from a settlement near a sand mine explained: “the landowners did not consult us before leasing out their lands. Sand was mined on all sides of our house, even from underground. Large volumes of water were flowing out from the sand. The location of our house was converted into a cliff. [...] We complained at the district office and tried to halt the sand mining several times. People from the district office came for monitoring, but ignored our complaints. They said sand mining could continue” (interview, 23-12-2015).

The construction of brick factories in Jhaukhel in the 1990s resulted in more intensive land and water uses in this formerly agricultural area. The leasing out of fields to brick factories largely replaced the cultivation of wheat. Brick-making requires both soil from fields and groundwater. As migration into the area grew starting in the mid-1990s, additional agricultural fields and sand-mined land were converted into residential plots. By the early 2000s, Jhaukhel had changed from a rain-dependent agricultural village into a peri-urban space that included twenty-four brick factories, most of which were unregistered.

In 1997, a group of Jhaukhel residents formed a committee and submitted petitions to several of government bodies requesting state regulation of these brick factories. The brick factories, however, continued operating as usual. In 2002, the committee organized an awareness campaign to urge people not to lease out their land to brick factories. On the campaign day, the brick factory owners intervened and the campaign turned violent, with some residents injured. In 2007, Nepal’s Supreme Court issued an order prohibiting the operation of brick factories using traditional technology or without state registration. This institutional intervention was in response to a petition filed by Pro-Public, a forum that worked to protect the public interest against brick factories in Kathmandu Valley. Following this, unregistered brick factories gradually moved out of Jhaukhel. Nonetheless, brick factories registered at the Department of Cottage and Small Industries (DCSI) are still operating in the community.⁹⁵ However, their experience of violence during the 2002 protests made Jhaukhel residents exercising self-

⁹⁴ Government of Nepal had prohibited riverbed sand mining in 1991 A.D. after haphazard mining of the riverbed sand resulted into collapse of the bridge connecting two main cities of the valley (see Sayami and Tamrakar, 2007).

⁹⁵ Twelve brick factories are registered with the DCSI by January 2016.

restraint in opposing this resource exploitation. This conflict avoidance again favored commercial extraction of groundwater for urban supply.

A commercial urban water supply in Jhaukhel became operational in the early 2000s, after which the number of water bottling factories rapidly increased. Nine registered commercial water suppliers are operating in Jhaukhel.⁹⁶ Although registered as water-bottling factories, most of these also supply tanker water. Additionally, unregistered vendors sell unprocessed “raw water” to commercial tanker and tractor operators, which mostly serve urban areas. The commercialization of water has led to a rapid decline in the groundwater level, and many traditional water sources have dried up. In 2009, Jhaukhel residents demonstrated at the village government office, demanding controls on water sales. A public notice declared water tanker operations illegal, yet water vending continued. In 2012, residents blocked the main road to pressure the village and district governments to control water vending. Yet in the years since the number of vendors has increased.

A teacher, who is also a local politician, argued in an interview that the village government had tried to regulate water sales, explaining that, “we consulted legal documents. But there isn’t any rule to regulate this [...] Unless there are clear rules and regulating bodies, the local government alone cannot regulate exploitation” (FGD, 31-08-2016). In 2012, the government approved a groundwater use policy for the Kathmandu Valley. However, implementation has remained weak and groundwater exploitation has continued. Commercial extraction of these resources are the main sources of the local government revenue, in part because this is a main revenue source for the local government. Residents complain about the hidden nexus between commercial resource extractors, government authorities, and corrupt politicians. As the teacher-cum-politician explained: “regulating exploitation of resources [...] was a campaigning strategy during the election [...] but it was clear that politicians are sponsored by the exploiters [...] New vendors and a water factory have started after the declaration of the municipality. The new water factory belongs to the relatives of the newly elected ward chairperson [...] There was a meeting after the election, but neither the brick factories nor water issues were raised” (interview, 29-06-2017).

⁹⁶ Fourteen are registered, according to DCSI records, so more are likely to come.

6.4.1 Evolving interests, water sources and eroding “community”

Lakhaju, a small settlement in Jhaukhel, has about 25 households with close kinship connections. In the past, residents depended on a shallow well (kuwa) and a spring source located on the field of one farmer. Lakhaju was connected to Jhaukhel by a road in the mid-1980s. Following this, having seen other landowners selling sand from their fields, Lakhaju residents started doing the same. In the early 1990s, they constructed a water tank, with financial support from the village government. This tank was used as a domestic water source and for irrigation. In the early 2000s, a Lakhaju resident, a former ward chairperson, leased water from his land to a brick factory and also began to make bricks, as he described in an interview: “earlier there was only sand in our settlement. It was undeveloped. Although paddy and wheat were cultivated, wheat production was very low. Brick factories would lease land in winter and more could be earned than with wheat cultivation. Expecting that the coming of brick factories might bring development, I brought in a brick factory. Sand mine contractors came on their own” (interview, 24-05-2016).

For their daily water needs, Jhaukhel residents either dig deeper wells or depend on water vendors who lease land and drill deeper wells. In Lakhaju, some households dug their own wells, but because of the poor quality of well water they continued depending on their traditional water sources. Some residents also leased out their land, including land with traditional water sources, to sand mine contractors. Soon, the expanding sand mining industry had demolished their traditional water sources. After Lakhaju residents demanded compensation from a brick factory and a sand mine contractor, two wells were dug. However, one did not yield water, while the water quality of the other was poor.⁹⁷ According to a female resident: “water from the kuwa was good. But now we are using water from the dugwell. The water appears clean immediately after we fetch it, but turns yellow after some time. It has a high iron content. We filter the water and use it for drinking. Additionally, dugwells get obstructed due to silt, which has to be scraped out” (informal group discussion, 26-04-2016).

As the quantity and quality of water from dugwells was poor, some households also invested in borewells, but the water quality was also poor.⁹⁸ In 2013, a Lakhaju resident leased some land to a water bottling factory, which subsequently drilled a 100 meter deep well. This land is

⁹⁷ Water quality analysis done in 2018 showed iron concentration and turbidity in the well water exceeded National Drinking Water Quality Standard (NDWQS).

⁹⁸ Water quality analysis in 2018 showed iron concentration exceeded NDWQS and ammonia concentration was very high in the borewell water.

located close to Nabala, a water rich area close to Lakhaju.⁹⁹ This was not the first case of a Lakhaju resident leasing land for wells. The former ward chairperson has also leased his well for commercial water supply. A resident explained: “our leader is selling water, first to a brick factory and now to a water factory. If he had not sold water, one water factory would have been closed. Following him, my brother also leased his land to a water factory. Now there are two factories nearby, and many more along the main road. Factories have generators, and extract water twenty-four hours each day. Fearing that our relatives would get angry, none of us opposed. Now all of our dugwells have dried and we are struggling to get drinking water” (interview, 26-04-2016).

These developments have made water management increasingly difficult, as some residents have increased their incomes at the expense of growing water insecurity for others. Thus, the leasing out of land to commercial exploiters is creating and sharpening divisions in the community. According to the former ward chairperson of Lakhaju: “our traditional water sources were adequate for domestic needs. I made efforts to arrange finances from the village government and even contributed cash to construct the tank, but no one consulted me in demolishing it. The traditional sources were damaged for sand, clearly, for money. What is the use of complaining about water now? [...] I had a borewell installed for irrigation in the 1980s, which I rented out to the water bottling factory. They [his neighbors] accuse me of selling water now, but, if they have the chance they will do the same” (interview, 24-5-2016).

These changes in a small and relatively homogenous settlement show how uncontrolled exploitation of resources is encouraging community members to gain immediate individual benefits from exploitative activities, even if these go against long-term communal benefits. While such socio-environmental changes are eroding the socio-cultural values associated with water and community, a loss of such values favor commercial exploiters to lease land and continue operating.

6.4.2 Collective action in the context of rapid socio-environmental changes

In 2009, Nepal’s government announced a project to improve the drinking water supply in Jhaukhel. This project included a deep borewell, a storage tank, and pipes for initiating household taps in wards seven and eight, where water shortages are largely concentrated. The

⁹⁹ Nabala used to be swamp but has dried up over the last decades.

community was to be responsible for providing the land needed for a well and a tank, so a community-level management committee was formed. As the water level had considerably declined in Jhaukhel, the committee decided to make the borewell in Nabala. The committee identified an appropriate site for the well, but the owner of this land refused to give this land to the project for free, as its commercial value had increased.

The next option was finding a place in Lakhaju, as explained by the former ward-level chairperson from Lakhaju: “I was willing to donate a plot of my land for this drinking water project. After monitoring the field, the officials were positive that this would yield good water. But residents here opposed, arguing that extraction of water from a deep borewell would result in drying up our household water sources. They also accused me of intending to increase the value of my remaining land here, as the road would have been black-topped [...] but they would also have benefited from that” (interview, 24-05-2016).

While some residents opposed this community project, others have leased their land for personal gain. These diverse responses of community members show how community, interests, and benefits are influenced by wider socio-economic, political, and institutional processes. Moreover, varying interpretations of problems and diverse responses contradict assumed contributions and compromises for collective action, making it more difficult to define both the “community” and what is desired by the community, even within such an apparently homogeneous (and relatively small) social group.

After Lakhaju residents protested the plan to use the former ward chair’s land, the drinking water management committee explored options, but could not find anyone willing to contribute land. In 2012, some members of the committee decided to jointly provide land, after which a deep borewell was drilled and a storage tank constructed. As this site is situated on a hillock, at the edge of which sand was mined, the infrastructure could not be constructed towards the edge. The vice-chairperson of the management committee, who gave the land, explained: “it was said that the tank would be constructed at the edge and each of us would give some land to arrange the total land needed. The committee members who proposed this joint contribution are my relatives. I agreed and became involved in the committee. Later they said that it was not possible to construct the overhead tank at the edge. The tank now occupies much more land than estimated before. In addition, the shadow of this overhead tank falls on my adjoining land, so even these lands will not get sold [...] although the agreement was that we would contribute land jointly, after the construction no one has shown any concern to compensate me for my land” (interview, 10-03-2016).

As of 2018, the landowners involved in this project were yet to execute the agreement regarding joint contribution of land, and land had not been transferred to the project. Furthermore, with the committee members having personal priorities, they could hardly give time to this communal project. This delay has favored commercial water suppliers, who had feared the possible adverse impact of the project on their commercial wells and interests.

6.5 Lamatar: urbanization, the April 2015 earthquake and re-organizing for collective action

Lamatar (VDC), covering 13.65 km², belongs to Mahalaxmi Municipality (figure 6.1).¹⁰⁰ It lies about sixteen kilometers southeast of Kathmandu and has a population of 8,188. Urbanization in Lamatar has been gradual, with an annual population growth rate of 0.8 per cent (CBS, 2001; 2012). Nonetheless, conversion of agricultural land into residential plots, which started in the 1990s, has increased in recent years. Lamatar still has community forests, but also has a private housing colony. Spring sources originating in these forests feed into traditional water sources like stone spouts, still the main water source. Tapping of springs for various local community-managed piped water supply systems in Lamatar started in the 1990s.

The Raksidol Drinking Water Supply and Sanitation (RDWSS), which is the only formally registered community-managed water supply system in Lamatar, was established in the late 1990s. This community-managed system was initiated with the technical and financial support of an NGO, the Friends Service Council and uses as a source a local spring water named Raksidol. An elderly resident donated land for infrastructure and community members contributed labor and some of the financing. Upon completion, this system served approximately 210 households with twenty-six public taps. Residents willingly provided small plots for these public taps. The project benefited all residents, who previously had depended on distant traditional water sources.

In 2008, RDWSS was repaired with support from another NGO, Share and Care. After this maintenance, the Raksidol Drinking Water Supply and Sanitation Management Committee (RDWSSC) was reformed and started collecting an annual service fee from the member households.¹⁰¹ The chairperson of the RDWSSC explained what happened: “the engineer had told us that the lifetime of our tank is only ten years, but it was already over ten years. I stressed

¹⁰⁰ Lamatar VDC was clubbed with four other VDCs to form Mahalaxmi Municipality in 2014.

¹⁰¹ Nepalese Rupee. 1 USD = NPR 116.9 (24-10-2018).

that our tank could break any time and clarified to people that in that case it would not be easy to get immediate support, so that our water supply could get obstructed. If we have some money in our account, seeking support will be easier. So we started collecting an annual service charge of NPR 300 per household. We appointed a resident for the daily operation of the system. As NPR 300 seemed insufficient, we started collecting NPR 500 from 2013. From people who moved into our settlement, we also collect a NPR 5,000 membership fee. We use the collected money for operation and maintenance. We have saved about NPR 250,000 in our account. Our plan is to mobilize this money if there is any organization willing to support us” (interview, 05-04-2016).

Over the years, RDWSS added six additional public taps, making a total of thirty-two public taps serving over 250 households. This example illustrates how the existence of a reliable water supply managed by an active management committee helped strengthen the social bonds between the water users and the management committee. Mobilizing its socio-political connections and exercising its rights as a formally registered water users committee, RDWSSC maintained control over the spring, although Dalit residents of Lamatar also claimed use rights to the spring.

In the 2000s, conversion of agricultural land into residential plots spread in the village. In 2013, construction of a housing colony, advertised as “Green Valley Homes” began. This housing colony occupies an area of approximately 2.4 hectares. The land on which it was built had been local farmland on which owners grew rice, wheat, and maize. According to local residents, a real estate developer bought this land from villagers who were in need of money or were trying to end an existing dual landownership status. For instance, an elderly woman sold 13 ropanies to the developer because she did not want to give this land to her stepsons. By selling her land, she was able to give money directly to her daughters. Another resident who sold land to the real estate developer explained why: “I had two ropanies of land there. My land was under dual ownership, and I was the tiller. The landowner was old, and it was unlikely that his son, who would inherit, would let me continue as a tiller. The proposal for selling the land came as an opportunity to get rid of this uncertainty. So we sold the land”. According to local sources, it took the developer five years to buy the land he needed. His initial plan was to construct 104 houses. By the time of my fieldwork in 2016, approximately sixty houses had been completed, with plot sizes ranging from 1,026.75 to 2,000 square feet. The price of these 2.5 story houses began at NPR 6.5 million, increasing in proportion to plot size. According to local people, economically and politically powerful people are involved in the housing project, reportedly

including the owner of a large supermarket (Bhatbhateni), a relative of a former prime minister, and a former prime minister. Because the developer obtained the necessary construction permits, the village ward office assumed he had also obtained a permit for a deep borewell (which turned out to not be the case). As of spring 2019, the project counted eighty-one houses, all of which have been sold. Residents include government officials, business managers, and affluent retirees. Some of these houses are second homes.

Collective efforts, driven by the need for better water access, enabled RDWSSC to establish its control of the Raksidol source, both over the socio-culturally underprivileged Dalit residents and the economically and politically powerful housing developers. With these experiences of successful system operation, expanding socio-political connections, and a reliable water source, RDWSSC planned to shift from a public tap-based system to private tap system, and started seeking organizational support for its initiative.

6.5.1 Disturbances, re-organization and unequal adaptive abilities

In 2015, the housing developers of the Green Valley housing colony proposed RDWSC that they share water from Raksidol. A member of RDWSC recalled: “the housing developers called us at the water source, together with several engineers. It was before the earthquake. They proposed: ‘we will make a dam at the source and at the bottom install a pipe for your water supply. Only when your tanks are filled and you have enough water, we will access spring water to supply our housing’. I replied that we could decide only after discussion. They agreed. After consulting other members and users, we agreed to the proposal. After the earthquake on April 25 the spring yield had further increased. However, the spring discharge drastically declined after the May 12, 2015 earthquake. After that all plans and proposals were in vain” (interview, 18-01-2016).

RDWSSC decided that filtering water from a local stream was the best alternative and connected with an organization willing to provide support. This NGO agreed to help with infrastructure construction, but the committee had to provide the necessary land. RDWSSC identified a small plot of land appropriate for constructing the tank. However, as in Jhaukhel, the landowner refused to provide this plot for free, and the committee could not afford his asking price. Thus, on the one hand RDWSSC had to cancel its plans for an alternative water source, despite its efforts to mobilize community resources, overcome adversities, and provide community-wide benefits. On the other hand, the housing developer dug his own wells. As the

housing project had used water from Raksidol in the past, a RDWSSC member asked the developer for support. The RDWSSC member recalled: “we said ‘you used our water to construct these houses, now what will you do for us?’ He answered: ‘we will dig another well for our housing colony. Our residents will not be residing there regularly so we will not need much water. We will give you water from one of our wells’ (interview, 18-01-2016).

However, this sharing of water between these socio-economically and politically unequal actors never materialized. Instead, the housing developers strategically avoided interacting with RDWSSC members. After a few months, he drilled a deep borewell for Green Valley without any interaction with local residents, RDWSSC members, or the local government, and without obtaining the required license.

This deep borewell increased dangers to traditional community water sources. However, considering the political and economic power of the developers of the housing colony, people did not oppose this. The chairperson of RDWSSC explained, “rather than opposing the housing developers, we might benefit from negotiating with them for access to water. There is no use quarrelling with them, they are powerful”. Negotiations between RDWSSC and the housing developers about access to water from the housing project wells never happened. Instead, the formerly well-functioning community-managed institution weakened due to the decline of its water source, changing interests of the community members, and the strategies of the housing developers. Support by the members started crumbling, as recalled by the chairperson of RDWSSC: “prior to the earthquake, our system was well-functioning. All members used to pay the service charge. As the source declined after the earthquake, our service has considerably dropped. Many have not paid the service charge yet, and it seems they will not do so in the future” (interview, 05-04-2016).

6.5.2 Community challenges and responses

Having seen how the housing project easily arranged a deep borewell, RDWSSC decided to drill its own well and reorganize itself. However, financing was a major constraint, as explained by a member: “we sought support from both governmental and non-governmental organizations, but did not succeed. KVWSMB¹⁰² does not support such activities. They told us

¹⁰² Licenses for deep groundwater use in Kathmandu Valley have to be obtained from the Kathmandu Valley Water Supply Management Board (KVWSMB), which is formally responsible for water supply

we have to pay it NPR 20,000 as a deposit, and the same amount annually for a license for drilling a deep borewell. According to KVWSMB, the housing developers have no license for their borewell. It is clear the housing developers used their political power. But from us KVWSMB demands a license! Above all, getting a deep borewell sunk costs about two million NPR, how to arrange that big amount? Our settlements are diverse, including Dalit residents. Some households from this group cannot contribute financially, while other households are financially better off and can contribute. But they ask why some of their group do not need to contribute, while others have to. It is difficult to work collectively” (interview, 28-06-2017).

Nonetheless, with most households financially able to contribute, RDWSSC planned to drill a deep borewell financed by collective contributions, according to the chairperson: “we had consulted a company to make a deep borewell [...] which would cost about NPR two million. After a few months, during the local election, the company proposed to drill the borewell for NPR 1.35 million. As this was much cheaper, we expected that community people would agree to this proposal. It would cost around NPR 5,000 per household [...] the company person had guaranteed that the borewell would yield water and that we could pay in installments. We were excited about it. After the election we organized a meeting. As the Communist Party, the political party we supported was elected, while the Nepali Congress, supported by our water users in the uphill settlement lost, they had grievances against us. During the meeting [...] some of these people teased us, saying that the elected government would make the borewell and that collective contributions for the borewell were not needed. Others clapped and supported them. These reactions shocked me. It is not only me who needs water, why should I bother about it! Some even asked why the committee was needed and made offensive remarks. I could not sleep that night. I have been working for this organization for about twenty years. I had resigned twice earlier but it was not approved, so I continued. The same would have been the case if I resigned in a group meeting. So the next day I wrote a resignation letter and posted it publicly” (interview, 28-06-2017).

The above examples show that socio-environmental changes are not just the result of a single and sudden external disturbance, but are complex and continuous processes involving social, political, institutional, economic, and emotional aspects, too broad to be covered and conveyed by a linear, ecology-based approach. Lessons from past experiences and collectively managed community resources motivate community members to reorganize and seek options to

services in the valley, and authorized for groundwater management and issuing licenses for deep groundwater use.

collectively deal with these changes. However, as community values and interests changed, the community-managed institution that had functioned well for about two decades struggled. People started seeking solutions at the household level, as explained by the chairperson of RDWSSC: “people have motorcycles now, which make it possible to fetch drinking water from more distant traditional water sources. All houses have bought 500 or 1,000 liter tanks for storing water. Water lifting pumps can be bought for about NPR 5,000. Almost all households have bought such pumps and water-storage tanks for storing water. They lift stream water and use it for non-drinking needs. Many households have also dugwells. People have arranged alternative means and are not interested in collective efforts, which demand both much time and effort” (interview, 28-06-2017).

While the community-based institution had to forego drilling a deep borewell, the private housing developer used this alternative, despite local protests. A group of villagers submitted a petition at the ward office, requesting action against the deep borewell in the housing colony. The villagers claimed that the deep borewell had drained a spring located uphill of the housing. However, the elected ward chairperson clarified: “local residents have filed a written complaint requesting to close the borewell in the housing colony. But people have started residing in the housing colony. It is our responsibility to provide the public with water services [...] so, regardless of the volume of water extracted or [the fact] it has been drilled without a permit, the borewell should not be closed” (interview, 24-08-2017).

The response of the local government, despite its rights and responsibilities to regulate the use of local resources, favored the economically and politically powerful housing colony and its relatively wealthy residents¹⁰³, while local concerns and complaints were ignored.

¹⁰³ The price of houses in the housing colony of Lamatar started from NPR 6.5 million, far beyond the means of local residents.

and who loses from the processes described above. However, ineffective state regulation has clearly contributed to increased resource exploitation, sharpened conflicting interests, and hampered collective action on water issues.

The importance of social, economic and political differences and dynamics is also notable in Lamatar, where the need to improve access to water from a distant water source was an important factor in bonding together different social groups to contribute to and operate the Raksidol drinking water supply system. However, efforts to reorganize the community for water security as the source declined after the 2015 earthquake failed. These outcomes are related to increased urbanization and improved access to technology such as water pumps, storage tanks, and household wells. These technologies mean that many community members no longer depend on the Raksidol drinking water system. In addition, urbanization has greatly increased the market price of land in the Kathmandu Valley (see also Shrestha, 2011; Shah, 2013). In the two cases I have described, community members have sought to gain immediate individual benefits from urbanization, at the expense of socio-cultural values associated with water and wider community benefits. Thus the second assumption of community resilience (that community residents will automatically have the willingness and capability to undertake collective action for a common goal and successfully overcome adversities) fails to recognize the real-life complexities of socio-environmental change in a peri-urban context. My findings show that experiences of successful collective action encourage community members to mobilize resources and reorganize community-managed institutions in a changing context as was the case in Lamatar. However, this is not sufficient, as community composition, social values, interests, and a willingness to participate in collective action are continuously changing under the influence of wider socio-economic, political, and institutional changes in the process of becoming urban. This is particularly so in peri-urban contexts because of rapid socio-environmental changes and the regulatory institutions and arrangements that have a role in such changes. In these urbanizing areas, the “community” includes residents with diverse backgrounds, livelihoods, identities, needs, and interests (Narain and Prakash, 2016). Rapidly changing resource uses and users, their values increasingly driven by short-term personal interests, make the task of “building community resilience” in peri-urban spaces more challenging than in rural or urban areas.

As seen in Jhaukhel and Lamatar, new actors, particularly those better positioned economically and politically, often disregard existing community-managed institutions and ignore the socio-environmental concerns of local residents. The housing developer in Lamatar maintained a

good relation with Raksidol DWSSC, but refused to share the water it had accessed without a permit. Similarly, in Jhaukhel, socio-economically powerful actors could afford the increased costs of groundwater extraction while ignoring local resistance, co-opting local residents, and taking advantage of weak regulations (see also Shrestha et al., 2018a). It could even be argued that in both cases these powerful actors demonstrated “resilience”, although whether these are examples of “resilience-to-be-supported” or “resilience-to-be-fought” is debatable (Levine et al., 2012: 2). Moreover, as seen in these two examples, whose perspective gets privileged and who gets ignored in the use and governance of public resources such as water are clearly political issues. Rather than focusing only on outcomes, scholars must analyze how such resilience is achieved, whose resilience is involved, and why others may be unable to become resilient. It is often claimed that the resilience approach is capable of integrating these social dynamics, but attention to these issues is still largely lacking in both the literature and resilience-based policies (Leach, 2008; Cote and Nightingale, 2012; Cutter, 2016; Meerow and Newell, 2016).

Furthermore, the notion of collective action and the assumed benefits to the community as a whole are problematic, when confronted with real-life experiences of socio-environmental changes and responses to these. In such a dynamic context, characterized by conflicting interests and inequalities, assuming that the “community” can overcome socio-environmental challenges through collective action and achieve a “commonly desired state”, the third basic assumption of the community resilience concept over-simplifies the complex, connected, multi-actor, multi-level, and multi-dimensional characteristics of such issues. Thus, “community” as a site of presumed unproblematic solidarity and equality, and therefore the most appropriate unit to create or enhance resilience, is rightly criticized.

The cases discussed in this article are, of course, context-specific, but that goes for “resilience” as well; resilience can only be researched, discussed, understood, and turned into policies and action in specific contexts. I do not deny the potential value of the resilience concept, nor the existence of community-based institutions and practices that may be beneficial to resident (for example, see Narain and Singh, 2017). But generalization is difficult, particularly in a peri-urban context (Friedmann, 2016; Webster, 2011). My findings show a need for a more critical and contextual understanding of how unequal access to resources and unequal abilities to deal with socio-environmental changes are shaped by wider social, economic, institutional, and political processes. Such an understanding is an entry point for exploring intervention options that address existing and emerging inequalities.

6.7 Conclusion

I have described the processes of socio-environmental change in two urbanizing villages in the Kathmandu Valley, Jhaukhel and Lamatar, with a focus on residents' diverse experiences of changing water security and their responses. These sites illustrate three key points. First, a "community" consists of diverse actors, interests, and institutions which have varying degrees of power, influence, and abilities to deal with socio-environmental processes; second, opportunities for individuals to benefit from urbanization are growing, adding to social divisions and eroding collective concerns; and finally, strategies and activities to deal with socio-environmental changes are not clear-cut and collective, as is often assumed in community resilience thinking. These processes are fuzzy, diverse, and complex, are often driven by short-term benefits and unequal power relationships, and reduce insecurities for some while adding to the insecurities of others.

In a situation with weak governance of land and water resources that formerly bonded and mutually benefited different social groups, these resources are increasingly appropriated by powerful groups, producing new divisions and insecurities, and reinforcing inequalities within communities. These changes at the community level are inter-linked with wider socio-economic, political, and institutional processes that blur and transcend community boundaries, interests, and benefits. While my findings are context-specific, such conflicting interests among and within local communities are common, particularly in fluid and rapidly changing peri-urban contexts (see Randhawa and Marshall, 2014; Roth et al., 2018). Socio-environmental changes are caused by and demand responses from multiple levels. However, a community's adaptation and resilience to complex changes that are often beyond their control are unlikely to bring the benefits that are often assumed in approaches based on the community resilience concept. The current focus in development on "community resilience" ignores these realities and seems based on an externally defined universalistic approach. Such a decontextualized approach is too vague to understand and address processes of socio-environmental change. What is needed is a more thorough and contextualized analysis of power, politics, and heterogeneity among and within local communities, and their linkages to wider socio-environmental changes and political-institutional processes that simultaneously shape communities, their abilities, and their responses.

If the aim of community resilience approaches is to establish or strengthen equitable social relations, abilities, and outcomes across temporal and spatial scales, this has to start by acknowledging and addressing existing issues of uneven access to power and resources and

how these impact social relations, cross-scale interactions, and actions (Matin et al., 2018). This requires critical attention to the nuanced dynamics of changing resource use, users, and diverse experiences of insecurities, and revisiting and improving the governance, institutional mechanisms, and practices that shape and reshape individual and collective abilities and activities, especially in socially and institutionally diverse and dynamic peri-urban spaces. A serious appreciation of peri-urban changes is badly needed, not only to prevent “community resilience” approaches from being applied to such dynamic spaces in a blueprinted way, but also to open up space for alternative approaches, especially in the policy world.



Brick factories and a dry stone spout in peri-urban Kathmandu Valley (Source: author).

Chapter 7

Discussion and conclusion

7.1 Introduction

Over the past decades, Kathmandu Valley has undergone an unprecedented urban expansion and growth in its population. This process of urbanization in the valley has brought in new water uses and users, and new ways of governing land and water, related to new development agendas and policy priorities. While population and water demand are increasing, there is a shortage of water supply services that are, moreover, increasingly dependent on peri-urban water sources. Furthermore, the peri-urban population is diversifying while its water needs are growing. At the same time, urban-oriented uses of peri-urban water and land are increasingly prioritized. These changes are deeply influencing the conditions of land and water access, rights, and water security in the valley that were, until some decades ago, relatively stable and ordered.

Changes in water security in peri-urban spaces are complex and often gradual, involving a multitude of actors struggling every day to get, maintain and legitimize access to and claims over water. These socio-political processes are intensifying the exploitation of both surface and groundwater sources, with uneven consequences for various actors in terms of their water access, water rights and water security (Shrestha et al., 2018a; 2018b). An important objective of this study was to fill the research gaps pertaining to increasing peri-urban water insecurity and the dynamics of underlying water-related conflicts and cooperation, as these have received little attention in academic and policy-oriented studies.

The main research question for this study is:

How does urbanization in peri-urban Kathmandu Valley, in a context of climate change and post-earthquake developments, bring about changes in water access, rights, water security, exclusion and water-related conflicts and cooperation for various actors, and how do they experience, frame and deal with these?

The analytical focus is on the “peri-urban” as a space characterized by changing linkages between co-existing natural and human, agricultural and non-agricultural processes, activities and related institutions. This focus has oriented my approach to answer this question. In exploring and unfolding the underlying processes of peri-urbanization and how these (re)shape

actors' diverse experiences as well as interpretations of changing water (in)securities and responses to these, the following four sub-questions were addressed:

1. *What are the major urbanization and climate change-driven changes in the use and governance of water resources in peri-urban Kathmandu Valley?*
2. *How do various water users, policy-making institutions and other relevant actors experience and frame these water-related changes, and how do they deal with them?*
3. *In what ways do changing water use, rights and access (re)produce or reduce water (in)securities, social differentiation and exclusion?*
4. *How do the experiences of changing water (in)securities and responses to deal with these relate to the concept of "community resilience"?*

Rapidly changing land and water use in urbanization process are having differential impacts for a socio-economically diverse peri-urban population (Butterworth et al., 2007; Simon, 2008; for South Asia see Narain and Prakash, 2016; Narain, 2009a; 2009b; 2014). This study has gone further in this effort to better understand peri-urban issues by more specifically focusing on the ways in which these processes of peri-urbanization and their impacts on water security are experienced and responded to by various actors and how these co-produce both new forms of access and exclusion, and water-related conflict and cooperation. Further, I tried to unpack the socio-institutional and political dynamics underlying these urbanization-driven changes. Focusing on changing water access, rights, water security and related conflicts, I reflected on how the diverse experiences and responses of various actors relate to (the concept of) "community resilience".

In researching these, I took a multi-sited ethnographic case study approach. Given the diverse and dynamic characteristics of the peri-urban, this approach was well-suited for an in-depth understanding of the experiences of changing of water security in peri-urban Kathmandu Valley, which was the aim of this research. The use of various cases of research locations with different hydro-social characteristics allowed me to construct a full and coherent picture of changing water securities in their many dimensions, and thus to provide a context-specific and practical understanding of the complexities, nuances and ambiguities of the real-life situations, without simplifying such realities (see also Flyvbjerg, 2006: 238). Through the "thick" narratives based on the multiple experiences of situated actors, these in-depth case studies helped me to explore the deeper causes behind problems of changing water security, and its mechanisms and consequences, "from both an understanding-oriented and an action-oriented perspective" (ibid: 229). This approach allowed me to critically analyze the evolving

constellations of actors, agencies, institutions, and processes and mechanisms of changing water use, access, rights, and security, and the dynamics of conflicts and cooperation.

My research followed the changing flows of water, and investigated the cases by using various qualitative research methods, often also based on a more quantitative picture of water-related processes and conditions derived from existing literature, policy documents and other sources, such as for groundwater. The field research and analysis of the findings were guided by insights from the political ecology of water, a methodological focus on actors and their agency, a legal anthropological approach to water rights, and access theory, together with critical approaches to water security, social exclusion, resource-related conflicts and (community) resilience. All of these turned out to be essential for gaining a better understanding of the intricate processes and relationships around water that were the topic of my research.

Because of the complexity of the cases and the multiple inter-linkages between issues (and limited word counts allowed per paper) it was, however, often challenging to decide what to include and where to end in reporting the cases. In some cases, given the wide diversity of actors, I had to limit the case description so as to make it understandable for readers unfamiliar with the specific local contexts. For example, I clubbed the wide diversity of farmers (landowners, land-renters, commercial vegetable farmers, wheat farmers, ancestral farmers etc.) together in reporting the case of farmers using wastewater in Dadhikot, as long as this did not influence the quality and outcome of the analysis. As Stake (1994: 240) has pointed out, during research “more will be pursued than was volunteered, often less will be reported than was learned”. Thus I have tried to analyze the cases in depth, in such a way that the reader can relate to the issues discussed and appreciate their complexity without getting lost in too much of locally specific information.

In this final chapter, which combines discussion and conclusion, I first summarize the main messages from the research chapters. Second, reflecting on the findings of the preceding chapters, I show how they answer the research question set out in this thesis. This is followed by a conclusion based on my understanding of the processes and mechanisms of (peri-) urbanization and their implications for peri-urban water security.

7.2 Overview of the research chapters

In chapters 3 to 6 of this thesis, I presented the findings from my field research in three peri-urban villages in Kathmandu Valley: Dadhikot, Jhaukhel and Lamatar. In chapter 3 I showed that water access in peri-urban Kathmandu Valley is increasingly shaped by access to technology (pumps, pipes etc.), socio-political connections (arranging lands for new wells, maintaining good relations with those having wells, with governmental and other authorities etc.) and capital (the capacity to invest in these). While flexible and temporary means of access to water are on the increase, claims based on existing “traditional” water rights in the surface canal systems are under pressure. In seeking ways to gain and maintain water access, large sections of the peri-urban population are increasingly dependent on those who commercially exploit peri-urban water. While this may be a temporary solution to people’s water access problems, it also reproduces and legitimizes the continuation of exactly those forms of exploitation that threaten long-term availability of water. These dynamics are creating inequalities and divisions between claimants. This, however, seldom leads to open expressions of conflict. The avoidance of conflict, driven by the need to maintain water access and by dependence on those who control it, the fear of worsening existing social relationships, awareness of power inequalities, and the continued existence of local norms, plays an important roles in preventing escalation of water-related conflicts, or rather postponing them.

In chapter 4 I showed how socio-cultural exclusion interacts with socio-economic (in)ability to access, claim and organize for water. Both factors increasingly determine peri-urban water security for various categories of water users in the context of increasing competition over water. The Government of Nepal formally abolished caste-based discrimination many years ago. Inclusion of the Dalits, the group that is socio-culturally discriminated as “untouchables”, has been a key focus in Nepal’s development policies and in the reform of its political structure. Nonetheless, historical exclusion by caste continues to adversely affect the current socio-economic and political abilities of the Dalits to access, claim, and organize for water. Rather, increasing competition for scarce water in peri-urban spaces is reproducing existing forms of caste-based exclusion and even creates new forms of such exclusion.

In chapter 5 I discussed the intensification of groundwater exploitation in Kathmandu Valley. This is happening in an area where a groundwater governing body has been formed, a groundwater policy has been formulated, and protests by the local population about the impacts of groundwater exploitation on their water security are increasing. The ongoing trend of growing dependency on groundwater in peri-urban Kathmandu Valley shows that, with

uncontrolled and uncoordinated changes in land and water use, formulation of this policy can barely bring the intended changes in groundwater use, management and governance. Given the complexities of socio-environmental issues around groundwater, these issues need critical analysis of the interlinked problems and options for more coordinated action in exploring and introducing solutions.

In chapter 6 I analyzed responses to deal with the socio-environmental changes in Kathmandu Valley and how these relate to “community resilience”. In this dynamic peri-urban context, even more than elsewhere, “community” consists of diverse actors with varying origins and socio-cultural and institutional backgrounds, interests, power, influence, and abilities to deal with socio-environmental processes. Furthermore, those responses that seem positive and resilience-enhancing for some can (re)produce inequalities, insecurities and vulnerabilities for others. These changes at the community level are inter-linked with wider socio-economic, political, and institutional processes that blur and transcend community boundaries, interests, and benefits. On the basis of these findings, I argued that the current focus on “community resilience”, widely promoted in development policies and academic studies to address socio-environmental problems and create benefits for communities, is too vague to understand and address the real-life complexities that shape and are shaped by socio-environmental changes. I have stressed that establishing or strengthening equitable social relations, abilities, and outcomes across temporal and spatial scales, as aimed at in community resilience approaches, demands the critical analysis of power, politics, and heterogeneity among and within local communities, and of their linkages with wider socio-environmental changes and political-institutional processes. It also requires critically revisiting and improving the governance, institutional mechanisms, and practices that shape and reshape communities, their abilities to deal with adversity, and their responses.

7.3. Main findings and insights

7.3.1 Urbanization, climate change and changing water security: flows of change

Urban expansion by appropriating land and water resources from the periphery is a defining characteristic of urbanization in South Asia (Marshall and Dolley, 2018; Narain and Prakash, 2016; Narain, 2009a; 2009b). As illustrated in the earlier chapters, Kathmandu Valley, where Kathmandu, the capital of Nepal is located, is among the fastest-growing urban agglomerations

in South-Asia. Urbanization in Kathmandu Valley is characterized by the fast conversion of agricultural land into non-agricultural uses. This results in the emergence of peri-urban spaces, characterized by a co-existence of agricultural and non-agricultural land and water uses, economic activities and livelihood practices. Such a process of urban expansion has tremendously increased water needs and demands in the valley over the past decades, while the public water supply services have lagged behind and remain largely insufficient (KUKL, 2017).

The growing water demand-supply gap has led to an increasing dependence on peri-urban water. Similar to peri-urban settings of other rapidly growing cities in South Asia (e.g. Ruet et al., 2007; Janakarajan, 2009), large-scale extraction of (ground)water to cater for urban water needs is also increasing in peri-urban Kathmandu Valley (Shrestha, 2011). Jhaukhel is one of such villages, where urbanization has triggered commercial exploitation of groundwater and related resources (chapters 3 and 6). In Jhaukhel, groundwater emerged as a new source. However, increasing exploitation of land and water for urban demands (water, vegetables, bricks, sand) has accelerated the drying up of water sources, even excluding rights-holders from their access to water. Meanwhile large-scale resource extractors manage to access land and water by rights-based and other means, adding to the inequalities and water insecurities of a large part of the peri-urban population (chapters 3 and 6). However, except for some temporary halting of operations, no major action has been taken to control this. Commercial users have continued large-scale groundwater extraction for commercial uses by investing in access to (often leasing) land, sinking deeper wells, water pumping (diesel and electric pumps, generators) and filtration technologies. They also supply water to local people, mainly as a strategy to avoid complaints and resistance, and secure continued access.

While the population is growing, livelihoods are diversifying and competition for water is increasing, peri-urban Kathmandu Valley remains largely excluded from the services of KUKL, the formal public water supply authority for the valley. Community-managed drinking water supply committees have emerged and expanded here for drinking and domestic water supply services. Managing water for such systems, however, often involves reallocation of water sources, which increases water insecurity of prior water users (chapters 3, 4, 5). Furthermore, with uncontrolled urban expansion, water demand continues to increase rapidly, triggering large-scale groundwater extraction for commercial supply, as seen in Jhaukhel, and competing with prior rights-holders, as seen in Dadhikot and Lamatar.

The Water Resources Act (1992) has prioritized drinking and domestic water uses over others, including irrigation. On the other hand, Nepal's irrigation policy (2013) explicitly recognizes

prior irrigation water rights to water sources traditionally used for irrigation.¹⁰⁴ As discussed in chapters 3 and 5, farmers in Kathmandu Valley contested the appropriation of irrigation sources to which they claimed prior rights. Water access is increasingly difficult for these prior rights-holders, as competition for water is growing and traditional water sources have degraded. Furthermore, irrigation-related infrastructures as well as the property rights and obligations historically associated with the irrigation canals have largely eroded, as “development” in Kathmandu Valley is dominated by pro-urbanization policies and practices (see MoUD, 2016; KVDA, 2015; chapters 3, 4, 5 and 6).¹⁰⁵

While the traditional surface water sources have declined, those available are reallocated to, and appropriated by, more powerful water users (chapters 3 and 4). In such a context, wastewater and groundwater have become increasingly important alternatives in dealing with increasing water scarcity and insecurity. Wastewater provides relief against increasing water scarcity (see also Quarta et al., 2018), but causes damages as well, and is therefore less preferred, as among farmers in peri-urban spaces of other cities (see Mishra and Narain, 2018 for wastewater-related conflicts and cooperation). On the other hand, the stock of groundwater is rapidly declining, both in quantity and quality (Shrestha et al., 2012; chapter 5). As seen in Jhaukhel, with the increasing cost of access to groundwater the dependency on those exploiting the resources, legally or illegally, is also increasing.

Similar processes are going on in other locations. In Lamatar, for instance, a housing colony project of economically and politically powerful people continued using groundwater without following the formal procedures needed for groundwater exploitation, and disregarding the local concerns and opposition against groundwater exploitation. In contrast, local opposition against groundwater exploitation has added challenges in managing basic water needs for the peri-urban population that depends on community water services, as experienced in Lamatar and Dadhikot. Despite resistance and growing awareness of the dark sides of groundwater exploitation, with ongoing urbanization, peri-urban groundwater exploitation is likely to continue increasing. This trend is reaffirmed by the growing social, institutional and political preference for deep borewells to improve drinking water services (chapters 5 and 6).

¹⁰⁴ <http://www.moewri.gov.np/images/category/Irrigation-Policy-2070.pdf>

¹⁰⁵ Expansion of roads and the Transportation Masterplan are the focus of newly declared municipalities. About 60% of the total investment required to meet the urban infrastructure deficit is earmarked for upgrading and extension of roads (MoUD, 2017).

As discussed, urbanization in Kathmandu proper has been a major driver in changing the use of, and rights and access to, land and water. Studies have noted that the changing climate, with its impacts on precipitation, temperature, and water availability, further exacerbates these processes (Sada et al., 2016; Shrestha et al., 2014).¹⁰⁶ Given the inequalities in socio-environmental benefits and burdens from uncontrolled exploitation of water and related resources, water-related conflicts are likely to increase as well.

7.3.2 Experiencing and acting upon changing water securities: dynamics of conflict and cooperation

As discussed in chapter 2, earlier studies suggested that intense resource use and increasing scarcity of resources lead to conflicts, particularly violent conflicts (e.g., Homer-Dixon, 1999). Studies on water-related conflicts in South Asia have, however, shown that the degree of scarcity is not an exclusive driver and predictor of cooperation and conflict (Mehta et al., 2007). Such more critical studies have stressed the need for attention to unequal power relations, access to resources, governance arrangements, and political discourses, and how these justify exploitation and exclusion (Janakarajan, 2009; van Steenberg et al., 2014b; Narain, 2016; Narain and Singh, 2017).

My findings from peri-urban Kathmandu Valley show that increasing competition for water and growing water insecurity cause water-related contestations and conflicts. However, a linear approach identifying scarcity as the cause of conflict is inadequate for understanding the dynamics of water-related conflicts and cooperation. Increasing water scarcity, for example, has increased water-related conflicts among ancestral farmers in Chakhuphant (Dadhikot) and distorted their traditional water rights and allocation practices. Nevertheless, these farmers collectively contested the in-migrants when “*their*” irrigation canal was damaged due to the laying of sewer pipes by the latter (chapter 3). Such complex dynamics of conflict and cooperation are also seen in Lamatar and Jhaukhel. In Lamatar, for instance, water insecurity promoted cooperation among the higher-caste water users and enabled them to access, but also control, the water source, and restrict water access for the prior water users, the Dalits of Tehrabise (chapter 4). As the water source declined and alternative means (pumping stream

¹⁰⁶ Average annual temperature in Kathmandu Valley is increasing (0.033°C/year) (UN-Habitat, 2015) while no clear long-term rainfall trend was found in Kathmandu Valley (see Sada et al., 2016; UN-Habitat, 2015).

water, groundwater) became accessible, the same community-managed organization faced contrasting and conflicting responses from the water users that it had served for about two decades (chapter 6). In Jhaukhel, water dependency compels those who do not own a well to avoid conflicts with well-owners. This has benefited large-scale resource extractors, who ignore opposition and continue exploiting land and water. Experience of violent confrontation, the social networks of kinship, neighborhood, awareness of unequal power relations and dependency explain people's restraint in openly contesting and opposing growing commercial extraction practices (chapters 3 and 6). On the other hand, not claiming water rights and thus preventing confrontations with prior rights-holders suffering from increasing competition for water is also a strategy. New water users, such as in-migrants, brick factory owners, and new commercial farmers often use this strategy to perpetuate their access to water while avoiding conflicts with users with prior rights (chapter 3).

Peri-urbanization has changed social structures, and created divisions and disparities between and among different water user groups in the valley. Despite rapidly increasing water-related conflicts and contestations, conflict avoidance and co-option to create apparent mutual benefits are still common among the diverse water users who try to maintain their water access, but also among the government authorities responsible for water management (chapters 1 and 2). Such conflict avoidance and apparent cooperation, however, also seem to promote neglect of urgent peri-urban water issues, and to favor ongoing uncontrolled exploitation of peri-urban resources. These hydro-social changes have improved water security for some but increased water insecurity for others, and perpetuated exclusion, inequities, and inequalities. Given these complex interactions around water-related conflicts and cooperation, the assumption of a conflict-cooperation dichotomy is too simple. Conflict and cooperation can be better understood if they are thought of jointly in terms of social and political interaction rather than as mutually exclusive (see also Bavinck et al., 2014; Zeitoun and Mirumachi, 2008; Zeitoun, 2007).

7.3.3 Changes in water rights, access and security: from fixed rights to seeking opportunities

As urban expansion is transforming peri-urban land and water use, the growing urban economy has provided alternative livelihood opportunities, but also changed values, interests and socio-political positions of various actors. In these processes of peri-urbanization, many prior rights-holders have, however, lost access to water. Many of them are compelled to use wastewater to

continue their agriculture-based livelihoods and poor quality groundwater for their daily needs (chapters 3 and 6). There is some continuity of customary water rights-based practices: farmers in Dadhikot continue canal irrigation on the basis of *their* customary rights; rights as local residents provide residents of Jhaukhel an important basis for accessing water from commercial water users; prior users in Lamatar resisted re-appropriation of their water source. However, with declining water sources, a diversity of actors, changing water needs and new socio-technological options for accessing water on an ad-hoc and highly individualized basis, negotiations about water rights are increasingly complex.

As discussed in chapter 4, claiming and particularly establishing water rights is especially difficult for socio-culturally excluded groups. While diverse social groups mobilize socio-political connections and innovate institutional ways to claim and access contested water sources, prior use water rights and water insecurities of the traditionally marginalized Dalits get repeatedly ignored. The new forms of exclusion of Dalits that have emerged in peri-urban water governance practices increase their water insecurity and deepen inequalities. Such continued exclusion weakens their efforts to contest the deep-rooted inequalities and injustices, even though addressing marginalization and exclusion “is the precise aim of [ongoing; A.S.] state restructuring” in Nepal (WB, 2018: 9).

My findings show, as Ribot and Peluso (2003) have theorized, that access is not always rights-based, nor do rights always ensure access. Moreover, rights-based or traditional water use practices have gradually, yet increasingly, become subordinate to state-prioritized urban-biased water uses, mainly by socio-economically and politically powerful water users. Given the power of those who exploit peri-urban resources and the indifference of governing bodies to such activities, there is a growing individual interest in gaining immediate benefits from the exploitation of peri-urban resources, even at the cost of the water security and resilience of the community (chapter 6).

The WRA (1992) promotes “beneficial uses” of water, within the available means and resources, without causing damage to others. Water access, control and water security of inhabitants of peri-urban Kathmandu Valley, as in peri-urban spaces of other rapidly urbanizing cities (Narain, 2014; Mehta and Karpouzoglou, 2015; Karpouzoglou et al., 2018), are increasingly dependent on socio-economic position, political connections and abilities to mobilize these. Access to the socio-technical means and resources to access water are, however, largely unequal. These inequalities in socio-environmental benefits and burdens from uncontrolled exploitation of water and related resources are growing, due to poor governance

with weak control over changing land and water use, and no active intervention against (over)exploitation of such resources.

7.3.4 Water (in-)security in a peri-urban context: rethinking “problems”, “solutions” and “community resilience”

In addition to causing a decrease of agricultural land, urbanization in Kathmandu Valley has led to significant deterioration of surface water sources, while water demand has continued increasing. Groundwater use, which increased as an alternative to deal with declining surface water sources, increasing water demands and prior rights-related conflicts, has become an increasingly important “solution” to the peri-urban water insecurity. Accessing groundwater, however, is increasingly difficult as the groundwater is degrading, both in quantity and quality (Shrestha et al., 2012; chapters 3, 5, 6). A groundwater governing body was formed in 2006 and a groundwater policy has been formulated to regulate groundwater use in the valley.

However, as noted in other South Asian countries (Shah, 2009), groundwater use remains largely unregulated in the valley. Moreover, the existing groundwater policy lacks attention to peri-urban change and growth, and does little to address the increasing groundwater use in peri-urban locations in the valley (chapters 3 and 5). Such weak resource governance mechanisms have benefited socio-economically and politically powerful actors (such as water vendors, water bottling factories, brick factories, the housing colony, etc.), who are increasingly attracted to peri-urban Kathmandu Valley to exploit peri-urban resources (such as water, sand, soil, land for speculation) for their commercial interests. While the socioeconomically and politically powerful actors exploit peri-urban resources, existing community-managed institutions and socio-environmental concerns of peri-urban residents are neglected. Uncontrolled exploitation and growing inequalities continue to exacerbate water insecurity of the majority of the peri-urban population, which is in contradiction with the national policy aim of ensuring access to water for all. Given the underlying socio-political and economic power differences, and the indifference of governing bodies, inequalities in water access, rights and security, and related conflicts are growing in peri-urban Kathmandu Valley but are so far rarely openly manifested. Nonetheless, increasing resource exploitation and social inequalities behind apparent cooperation are likely to add fuel to the hidden social tensions and contestations.

Despite its differential impacts and darker sides, as discussed earlier, urbanization is taken for granted as if it were a “natural” process; stimulating it has even become a policy priority

supported by a growing public preference.¹⁰⁷ In this context, water demand in Kathmandu Valley will continue to increase. The Melamchi water transfer project (see chapter 1) is often framed as *the* solution to the growing water shortage in Kathmandu Valley. While these claims have been endlessly repeated, despite several decades of ongoing problems with this “solution”, the existing water problems and alternative options to improve water management and governance have been largely neglected (Rest, 2018: 15; Domènech, 2013). Studies have, however, noted that water supply-augmentation projects that largely depend on external water sources and foreign investments are neither neutral nor a sustainable solution for rapidly and haphazardly urbanizing areas (Domènech, 2013; Rest, 2018; see Celio et al., 2010; Díaz-Caravantes and Wilder, 2014). Moreover, as discussed in chapter 6, socio-environmental changes like changing water security cannot be isolated from socio-economic, political and institutional processes and resulting differences in the ability to mobilize socio-economic and political-institutional means and resources to deal with these.

In the current national context of prioritization of urbanization and on-going efforts to formulate a national water policy¹⁰⁸, it is important to acknowledge that competition for water in peri-urban spaces is likely to increase with urbanization and the expected adverse impacts of climate change (WECS, 2011; UN-Habitat, 2015). Addressing climate change has been a major agenda in the formulation of new policies and strategies for Nepal, such as urban, irrigation, agriculture and safe drinking water supply and sanitation policies. Through its National Adaptation Programme of Action (NAPA), The Climate Change Policy of 2011 has prioritized community-based adaptation through integrated management of agricultural, water and forest-based resources, to minimize the adverse impacts of climate change. However, as discussed above, the rapidly changing land and water use practices and the needs and interests of peri-urban communities are changing largely in contradiction with such formal community-based integrated management approaches. Moreover, studies have argued that Nepal’s climate change adaptation policies neglect the existing social and political contexts and run the risk of reproducing the kind of business-as-usual development that is currently reinforcing rather than reducing vulnerability (Nagoda, 2015; Ojha et al., 2016).

While the real-life issues of changing resource use, users, their interests and unequal abilities to deal with socio-environmental changes remain neglected, the aim of building community

¹⁰⁷ “Now, urbanization is recognized as the best way to sustainable development. Priority of any Nepal Governments in recent times has invariably been urban development” (MoUD, 2016: 3).

¹⁰⁸ <https://thehimalayantimes.com/business/government-mulls-integrated-water-policy/>

resilience that is increasingly prominent in policies, particularly in relation to climate change and urbanization (e.g. MoUD, 2017; KVDA, 2015), seems an uncritical replication of an externally defined universalistic approach. My findings show that enhancing the abilities to deal with complex socio-environmental issues, such as changing peri-urban water security, demands a more critical and contextual understanding of how unequal access to resources and unequal abilities to deal with socio-environmental changes are shaped by wider social, economic, institutional, and political processes. The existence and importance of such inter-linkages between environmental changes and responses to them throw serious doubt on current uncritical approaches to community resilience that assume that communities are homogenous entities and that people can have the ability to deal with adversities beyond their influence and control. Such an understanding is an entry point for exploring intervention options that focus on existing and emerging inequalities in peri-urbanization, starting from an exploration of what makes communities vulnerable and water-insecure in the first place.

7.4 Concluding remarks: water security in a rapidly urbanizing context

In the context of rapid urbanization, delineation of a fixed rural-urban boundary has no practical relevance and is even problematic. Academic studies have increasingly attempted to overcome the urban-rural dichotomy and acknowledged the peri-urban as processes of intensifying urban-rural linkages, making it distinct from specific urban and rural areas (Leaf, 2011; Narain and Prakash, 2016; Narain and Singh, 2017; Dupont, 2007; Allen, 2003; Iaquina and Drescher, 2000). However, generalization about peri-urban processes and issues involved is difficult, and there is no agreement on solutions to specifically peri-urban problems or on approaches needed to promote more sustainable peri-urbanization (Friedmann, 2016; Webster, 2011). Nevertheless, ignoring these spaces of encounter, conflict, and socio-environmental transformation in the course of “becoming urban” can be problematic. Paying attention to these issues can help in exploring and recognizing alternative planning and management pathways, and in providing specific entry points for realistic intervention strategies (Randhawa and Marshall, 2014; Marshall and Dolley, 2018).

My findings show, however, that the peri-urban dynamics in Kathmandu Valley remain largely neglected in policies that take for granted and even promote urbanization and prioritize catering for growing urban needs. Such negligence of peri-urban issues has paved the way for overexploitation of peri-urban resources and growing inequalities, while it has increased the

potential for water-related conflicts. My findings also suggest that these processes are often too complex and too difficult to always identify clear-cut winners and losers. For prior rights-holders, for instance, materializing water rights and accessing water are increasingly difficult. At the same time, however, urbanization has also provided them with new economic opportunities like commercial vegetable farming (chapter 3) —which, in turn, contributes to water insecurity— and labor opportunities in new construction sites in the valley and abroad (chapter 4). Nonetheless, it is clear that, for socio-economically less powerful actors, the burden may far exceed the benefits, especially in terms of long-term water insecurity.

Understanding these changes in peri-urban water security would start from an appreciation that water security is a contextual, relational and socio-political issue. Hence critical attention is needed to the socio-economic, political and institutional processes underlying the increasingly urban-oriented flows of resources, how these produce conflicts and cooperation, and perpetuate insecurities and inequalities. This requires looking beyond reforms in water-related institutions and considering both the diverse practices and associated unequal power relations that influence and legitimize changes in land and water uses, allocation and control. Thus, it is important that the various water users and governing bodies, at all levels, seriously acknowledge such inter-linkages. This can be a starting point for overcoming and transforming the prevailing sectorial working practices of the policy world (see Suhardiman et al., 2015; 2018). In addition, it can help setting, and acting upon, clear and coordinated long-term priorities to regulate uncontrolled urban expansion and improve the current quantity and quality conditions of both surface water and groundwater.

The current political and administrative changes, involving the devolution of power from a Kathmandu-centric bureaucracy to the provincial and local governments, is providing an important opportunity for better addressing the prevailing socio-political issues involved and for undertaking contextualized development activities. Important issues should not be avoided, including how to discourage rural-urban migration, a major driver of peri-urbanization in Kathmandu Valley and other rapidly urbanizing cities of Nepal, by creating new and brighter futures for the rural population. As discussed in this thesis, addressing water insecurity demands continuous coordination and commitment of diverse actors, and the challenge involved in this cannot be underestimated. Furthermore, in the current political and policy context, urbanization is inevitable and with the dynamic nature of the peri-urban, unprecedented challenges are likely. Nevertheless, committed and accountable governing bodies can play an important role in largely preventing these urbanization-driven changes from being haphazard and inequitable.

An urgent need is revisiting and revising land and water governance mechanisms and enforcing these with strong rules and regulations, providing incentives for complying with these and penalties for violation.

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Summary

This study examines the processes and mechanisms of (peri-)urbanization and their implications for water security in peri-urban Kathmandu Valley of Nepal. Kathmandu Valley, where Kathmandu, the capital of Nepal is located, is among the fastest-growing urban agglomerations in South-Asia. Urbanization in Kathmandu Valley is characterized by the fast conversion of agricultural land into non-agricultural uses. This results in the emergence of peri-urban spaces, characterized by a co-existence of agricultural and non-agricultural land and water uses, economic activities and livelihood practices. The process of urban expansion into peri-urban Kathmandu Valley has accelerated after the devastating earthquake in 2015. Many people need to rebuild their houses, and often the only means to arrange the needed finances is selling land.

Rapid urbanization in the valley has brought in new water uses and users, and new ways of governing land and water, related to new development agendas and policy priorities. While population and water demand are increasing, there is a shortage of water supply services and increasing is the dependency on peri-urban spaces, particularly for water appropriated for urban-oriented uses and users. Additionally, the peri-urban population is diversifying while its water needs are growing. These socio-political processes are intensifying the exploitation of both surface and groundwater sources, with uneven consequences for various actors in terms of their water access, water rights and water security and increasing potential for water-related conflicts. However, these issues of increasing peri-urban water insecurity, how diverse actors in the peri-urban context experience and deal with changes in water access, rights and water security, and how these changes affect social relations and the “resilience” of communities in the increasingly diverse and dynamic peri-urban spaces have received little attention, both in academic and policy-oriented studies.

Taking the peri-urban as processes of intensifying urban-rural linkages, this thesis analyzes the processes of peri-urbanization and their impacts on water access, rights, and water security as experienced and responded to by various actors, and how these co-produce both new forms of access and exclusion, and water-related conflicts and cooperation. Focusing on changing water access, rights, water security and related conflicts, it also unpacks the socio-institutional and political dynamics underlying these urbanization-driven changes. It further reflects on how the diverse experiences and responses of various actors relate to (the concept of) “community

resilience”. The thesis is based on field research in three peri-urban locations in Kathmandu Valley: Dadhikot Village Development Committee (VDC), Jhaukhel VDC and Lamatar VDC.

Chapter 1 discusses different approaches to understand and analyze the “peri-urban” and the growing acknowledgement of the peri-urban as a process of intensifying rural-urban linkages. It also provides an overview of peri-urbanization in Kathmandu Valley, how changing land and water uses in the context of weak water governance in Nepal have resulted in rising competition for peri-urban water, and how these are increasing peri-urban water insecurity and related conflicts in Kathmandu Valley.

The main research question for this study is:

How does urbanization in peri-urban Kathmandu Valley, in a context of climate change and post-earthquake developments, bring about changes in water access, rights, water security, exclusion and water-related conflicts and cooperation for various actors, and how do they experience, frame and deal with these?

Engaging with this main question, four research chapters (3-6) explore the processes and mechanisms of changing peri-urban water security, the diverse ways these changes are experienced, interpreted and dealt with by various actors, and how these co-produce conflicts and cooperation, and perpetuate insecurities, exclusion and inequalities. Addressing the existing research gap in understanding the processes underlying the peri-urban water-society dynamics, their impacts on different social actors, actors’ abilities and activities to deal with these and the implications on water-related conflicts and cooperation, this study contributes to a better understanding of processes of peri-urbanization, their implications for changing water access, rights, security, related conflicts and cooperation and what these processes of socio-environmental changes and responses to these mean for “community resilience”.

Chapter 2 presents the theoretical framework and methodology on which the research and the thesis are based. The field research and analysis of the findings are guided by insights from the political ecology of water, a methodological focus on actors and their agency, a legal anthropological approach to water rights, and access theory, together with critical approaches to water security, social exclusion, resource-related conflicts and (community) resilience. This thesis acknowledges that hydro-social processes are never socially and ecologically neutral and that conflicts are part and parcel of these processes, which tend to create winners and losers. However, in the specific context of peri-urban spaces, with their changing social composition and increasing interests on the part of a variety of actors in gaining immediate benefits from

urbanization, it is not always clear who the winners and losers of these urbanization-induced changes in water (and land) uses are. Nonetheless, these processes differentially change access and water rights for various actors, improving water security for some while increasing water insecurity for others, who often are traditional water rights-holders, particularly those socio-economically marginalized. In researching these processes and experiences of changing of peri-urban water security, this thesis takes a multi-sited ethnographic case study approach. Given the diverse and dynamic characteristics of the peri-urban, a multi-sited case study-based research approach helps to contextualize the key dimensions of water-related changes and provide a full and coherent picture of changing water securities and their implications for water security and related conflicts and cooperation.

Chapter 3 shows how different water users experience the changing land and water uses in the peri-urbanization process. In presenting their diverse experiences, it focuses on land and water-related changes over the past several decades, and their implications for changing water access, rights, security, and related conflicts and cooperation. This chapter shows that water access in peri-urban Kathmandu Valley is increasingly shaped by access to technology (pumps, pipes etc.), socio-political connections (arranging lands for new wells, maintaining good relations with those having wells, with governmental and other authorities etc.) and capital (the capacity to invest in these). While flexible and temporary means of access to water are on the increase, claims based on existing “traditional” water rights in the surface canal systems are under pressure. In seeking ways to gain and maintain water access, large sections of the peri-urban population are increasingly dependent on those who commercially exploit peri-urban water. Although this provides a temporary solution to people’s water access problems, it also reproduces and legitimizes the continuation of exactly those forms of exploitation that threaten long-term availability of water. These dynamics are creating inequalities and divisions between claimants. This, however, seldom leads to open expressions of conflict. The avoidance of conflict, driven by the need to maintain water access and by dependence on those who control it, the fear of worsening existing social relationships, awareness of power inequalities, and the continued existence of local norms play an important roles in preventing escalation of water-related conflicts, or rather postponing them.

Chapter 4 describes how increasing competition for scarce water in peri-urban areas is reproducing existing forms of caste-based exclusion, and even creating new forms of such exclusion. Using the concept of social exclusion, the researchers analyze how historically deep-rooted socio-cultural practices of caste-based discrimination experienced by the historically

marginalized *Dalits* (traditionally considered an “untouchable” caste-groups), especially in relation to water, are persisting, reproducing exclusion and water insecurities in the process of peri-urbanization. This chapter shows that socio-cultural exclusion interacts with the socio-economic (in-)abilities to access, claim and organize for water, which increasingly determine peri-urban water security in the context of increasing competition over water. While the characteristics of exclusion have changed, exclusion persists for the Dalits and is entrenched in evolving peri-urban water governance processes and institutions.

Chapter 5 elucidates how urbanization is causing an increasing use of, and dependency on, groundwater in peri-urban Kathmandu Valley, despite the fact that water governance mechanisms to regulate groundwater exploitation have been formulated and protests and worries about its consequences are increasing. In discussing these socio-environmental and institutional dynamics, the researchers analyze the experiences, framings, interests, strategies and practices and the changing priorities of local institutions, groundwater users and policy makers and their interrelations with the unregulated exploitation of groundwater, which has been declared an over-exploited resource in Kathmandu Valley a long time ago. The ongoing trend of growing dependency on groundwater in peri-urban Kathmandu Valley shows that, with uncontrolled and uncoordinated changes in land and water uses, formulation of this policy can barely bring the intended changes in groundwater use, management and governance. Given the complexities of socio-environmental issues around groundwater, these issues need critical analysis of the interlinked problems and options for more coordinated action in exploring and introducing solutions.

Chapter 6 analyzes the responses to deal with the socio-environmental changes in Kathmandu Valley and how these relate to “community resilience”. “Community resilience” is increasingly used as a concept, as a means to address socio-environmental problems and promote benefits for the community, as well as an ideal final goal of adaptation processes. Using cases from two peri-urban locations in Kathmandu Valley, this chapter demonstrates that peri-urban populations are very diverse and have varying abilities, interests, powers, strategies and actions to adapt to complex socio-environmental changes. These differences reduce insecurities for some, while (re)producing inequalities and insecurities for others. These changes at the community level are inter-linked with wider socio-economic, political, and institutional processes that blur and transcend community boundaries, interests, and benefits. On the basis of these findings, the researcher stresses that establishing or strengthening equitable social relations, abilities, and outcomes across temporal and spatial scales, as aimed at in community

resilience approaches, demands the critical analysis of power, politics, and heterogeneity among and within local communities, and of their linkages with wider socio-environmental changes and political-institutional processes. It also requires critically revisiting and improving the governance, institutional mechanisms, and practices that shape and reshape communities, their abilities to deal with adversity, and their responses. Hence, the current focus on “community resilience”, widely promoted in development policies and academic studies to address socio-environmental problems and create benefits for communities, is too vague to understand and address the real-life complexities that shape and are shaped by socio-environmental changes. Intra-community diversities and multi-scalar processes of socio-environmental change need much more critical consideration than they tend to get in such community resilience approaches. This is particularly so in the face of the rapid urbanization and increasingly differential impacts for different social groups in peri-urban communities.

The study shows that “development” in Kathmandu Valley is dominated by pro-urbanization policies and practices and that peri-urban dynamics remain largely neglected in policies that take for granted and even promote urbanization and prioritize catering for growing urban needs. Such negligence of peri-urban issues has paved the way for overexploitation of peri-urban resources and for growing inequalities, and increased the potential for water-related conflicts. These processes are often too complex to always identify clear-cut winners and losers. Nonetheless, it is clear that, for socio-economically less powerful actors, the burden may far exceed the benefits, especially in terms of long-term water insecurity.

Understanding these changes in peri-urban water security would start from an appreciation that water security is a contextual, relational and socio-political issue. Hence critical attention is needed to the socio-economic, political and institutional processes underlying the increasingly urban-oriented flows of resources, how these produce conflicts and cooperation, and perpetuate insecurities and inequalities. This requires looking beyond reforms in water-related institutions and considering both the diverse practices and associated unequal power relations that influence and legitimize changes in land and water uses, allocation and control. Thus, it is important that the various water users and governing bodies, at all levels, seriously acknowledge such inter-linkages. This can be a starting point for overcoming and transforming the prevailing sectorial working practices of the policy world (see Suhardiman et al., 2015; 2018). In addition, it can help setting, and acting upon, clear and coordinated long-term priorities to regulate uncontrolled urban expansion and improve the current quantity and quality conditions of both surface water and groundwater.

The current political and administrative changes, involving the devolution of power from a Kathmandu-centric bureaucracy to the provincial and local governments, is providing an important opportunity for better addressing the prevailing socio-political issues involved and for undertaking contextualized development activities. Important issues should not be avoided, including how to discourage rural-urban migration, a major driver of peri-urbanization in Kathmandu Valley and other rapidly urbanizing cities of Nepal, by creating new and brighter futures for the rural population. As discussed in this thesis, addressing water insecurity demands continuous coordination and commitment of diverse actors, and the challenges involved in this cannot be underestimated. Furthermore, in the current political and policy context, urbanization is inevitable, and with the dynamic nature of the peri-urban, unprecedented challenges are likely. Nevertheless, committed and accountable governing bodies can play an important role in largely preventing these urbanization-driven changes from being haphazard and inequitable. An urgent need is revisiting and revising land and water governance mechanisms and enforcing these with strong rules and regulations, providing incentives for complying with these and penalties for violation.

About the author

Anushiya Shrestha was born in Lalitpur, Nepal. She obtained her Bachelor's and Master's degree in Environmental Science from Tribhuvan University in 2006 and 2010 respectively. Her MSc thesis on socio-economic and environmental benefits of biogas in rural Nepal was funded by the Center of Research for Environment, Energy and Water, a growing research organization based in Nepal. From mid-2010 to 2013 she worked as a Research Assistant at Nepal Engineering College (*nec*) in Kathmandu, Nepal in a project entitled "Water Security in Peri-urban South Asia. Adapting to Climate Change and Urbanization". This action research project was financially supported by the International Development Research Centre, and involved research in four cities of three countries: Kathmandu in Nepal, Gurugram and Hyderabad in India, and Khulna in Bangladesh. During her engagement in this project, she was involved in undertaking field research, management and analysis of both qualitative and quantitative data, preparing reports and writing scientific articles, and maintaining continuous communication with relevant actors. In 2014, she continued as a Research Assistant at *nec* under the NWO- and DFID-funded research project "Climate Policy, Conflicts, and Cooperation in Peri-urban South Asia. Towards Resilient and Water Secure Communities". In the same year, under a high competition she was selected for a sandwich PhD scholarship under this project. From October 2014 to 2019 she worked on this PhD project at the Sociology of Development and Change group of Wageningen University. In addition to fieldwork and writing for her PhD thesis, she was also engaged in MSc thesis supervision during this period.

Anushiya Shrestha

Wageningen School of Social Sciences (WASS)

Completed Training and Supervision Plan



Wageningen School
of Social Sciences

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
Integrated Water Management, ESS33806	WUR	2014	6
Governance theories and governance frameworks	WASS	2014	1
WASS PhD Proposal	WASS	2015	6
CERES basic training	CERES	2015	6
<i>'Peri-urban Water Security and Climate Change: Exploring Conflict and Cooperation'</i>	Annual Project Workshop, Hyderabad, India	2015	1
<i>'Peri-urban Water Issues in Kathmandu Valley'</i>	Peri-urban Water Security Consultation Workshops, Nepal (at the research location and for the policy makers)	2016	1
<i>'Transforming conflict into cooperation for climate change interventions: Insights and recommendations'</i>	CCMCC Workshop (Nepal): Transforming conflict into cooperation for climate change interventions, NWO.	2017	1
B) General research related competences			
Information Literacy including EndNote Introduction	WUR Library	2014	0.6
WASS Introduction course	WASS	2015	1
Systematic approaches to reviewing literature	WGS	2015	4
<i>'Urbanization, regulated groundwater management, and the changes and challenges to peri-urban water security in the context of changing climate and post-earthquake Kathmandu Valley'</i>	7 th National Groundwater Symposium, Nepal	2016	1
<i>'Groundwater policy and groundwater dependencies: Some reflections on the evolving socio-environmental dynamics in peri-urban Kathmandu Valley'</i>	Conference on local water management: Challenges and opportunities in an era of change and uncertainty, Nepal.	2018	1
<i>'Changing access to peri-urban surface and groundwater sources in Kathmandu Valley, Nepal'</i>	Exploring Urbanization: Events, Resources, Risks, and Movements, Wageningen	2018	1

C) Career related competences/personal development

Scientific Writing	WGS	2015	1.8
Prepared Climate change training manual and provided two day training for students and teachers of Grade 7,8,9 in Dolakha district of Nepal.	Jalshrot Vikas Sanstha, the GWP Nepal Secretariat in Nepal http://www.jvs-nwp.org.np/	2016	2
Competing claims on Land, Water and other (Agricultural) Resources	CDI, WUR	2017	3
Supervision MSc thesis	WUR	2015-2016	1
Co-supervision MSc thesis	Nepal Engineering College	2015-2019	1

Total			39.4
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*One credit according to ECTS is on average equivalent to 28 hours of study load

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