Understanding Water Conflict

A Study of Conflict among Farmers and between Farmers and Companies in the Godavari Watershed, Kathmandu Valley, Nepal

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Master thesis Law and Governance Group submitted in partial fulfillment of the degree of Master of Science in International Development Studies at Wageningen University and Research Centre, the Netherlands.

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Preface and Acknowledgements

I have been attracted to natural resources management since my first master degree on Rural Development at Tribhuvan University in Nepal. Therefore, I decided to perform further research on the topic of rural drinking water in the Nepali hills for that master thesis. However, before this, I built up technical expertise regarding micro-hydro power in Nepal. Furthermore, during my working relationship with the Rural Village Water Resources Management Project (RVWRMP), functioning as a monitoring and evaluation officer, I was intrigued with water resource management and local level conflicts, arising while sharing water for drinking, irrigation and hydropower. For this MSc, before, I was thinking to carry out research related to conflict in the Melamchi inter-basin water transfer project that is going to transfer 170 MLD water from Indrawati basin to Bagmati basin of Nepal. That highly conflict affected project is financially supported by the Asian Development Bank (ADB). While staying a long time in Kathmandu valley, I personally also had faced a lot of problems involving water shortage.

In the meantime, I came across Mr. Bidur Ghimire and Mr. Ram Chandra Bastakoti, post doctor fellow of AIT Thailand. Mr. Ghimire, who is also from the Godavari watershed area, suggested me to carry out research in water conflict and management between farmers and industries in the Godavari watershed area. The Godavari watershed area, as a peri-urban area, has been experiencing a rapid urbanization; hence it is facing a lot of problems due to the unmanaged urbanization and in-migration. Companies are transferring water away from local agriculture and drinking water and then selling it to Kathmandu city in the form of bottled water and tanker water, creating water shortage for drinking and irrigation. They are further benefiting from the current unclear and transitional political stage with a weak governance structure. After the suggestion of Mr. Ghimire, I came to know that not a single scholar and organization has carried out research on this theme at a scientific level, so far. Suddenly, I was intrigued by this topic and got my idea to go with this topic.

During my research work, I have found very few studies carried out on local conflict caused by rural-urban water transfer. It may also be because the institutionalization of the water sector has been left untouched in Nepal since a long time. The nation's focus has been on political reform since many years. Therefore, my main interest lies in discovering the issues and consequences of conflicts in rural development in this specific area. In addition to this, being a student of development policy with courses aligned towards water, it pushed me to think of combining my thesis with the Irrigation and Water Engineering Group (IWE). The socio-technical approach and interdisciplinary orientation of IWE group are the determinants for choosing IWE.

I appreciate my supervisors Mr. Dik Roth from my mother chair group, Law and Governance (Law) and Mr. Bert Bruins from Irrigation and Water Engineering Group (IWE) for their acceptance to supervise me. Also, as a student of development studies, legal anthropological perspective is completely new discourse for me. I got a lot of theoretical and methodological insights while working with both of my supervisors. Moreover, I have been in close contact with Mr. Roth in many courses and assignments. Due to the different backgrounds of my supervisors, I got a lot of vital, constructive and cross cutting insightful comments since the beginning of the proposal preparation process to the writing of the thesis report. Their comments and suggestions helped me to analyze the water conflict scientifically. Without their support, this thesis would not have come to this stage. Hence, my sincere gratitude goes to both of my supervisors. I also extend my thanks to Mr. Janwillem Liebrand, a PhD

researcher of Wageningen University for his advice and suggestions during my field work. Also, during my internship in India with SOPPECOM, I got a lot of practical insights on local water conflicts which are useful for this thesis, hence my sincere thanks goes to Mr. K. J. Joy.

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Mr. Bhola Nath Dhakal, lecturer of Bhaktapur Campus, Nepal for providing maps and geographical information of the Godavari watershed area. My colleagues Mr. Harmen Mijnen and Mr. Gerald Atampugre for editing English language of the thesis. I have dedicated this thesis to my family; my wife Shanta, daughter Jagriti and son Aabiskar. My wife for her inspiration for this MSc study, taking care of our kids, bearing responsibilities and sacrifice during my absence. Similarly, my children for their sacrifice during my two year's absence from them. In addition, I am thankful to Mr. Prakash Pandey and Ms. Bhagawati Pandey, my brother-in-law and sister-in-law respectively for their informative support during my write up period.

Abstract

Water conflict between farmers and companies has profound influence on the livelihood and social harmony of the people of the Godavari watershed. Use of water is contested because of growing pressures on water use. This study explores the current water sharing (allocation) rules, regulations, practices and strategies of farmers and companies, to secure and defend their water rights in the Godavari watershed area of Kathmandu valley. Growing population and expansion of economic activities escalate pressure on water resources in the valley in an overall context of plural water rights and unstable political conditions. The main objective of the study is to find out the issues and nature of water conflict among farmers as well as between farmers and companies (brick, bottled water and water tanker). Results show that companies are forcibly transferring water away from agriculture, creating or increasing water shortage for irrigation and local drinking water supply.

The study further analyzes and discusses the conflicting views on the bundles of water rights, power relationships among water users and how these lead to the conflict. Central to the conflict is the difference between state laws and customary laws based on the prior appropriation and prioritization of water use. The study concludes that water conflict in the study area (among farmers and between farmers and companies) is latent, intermittent and sporadic, increases during the dry season and plummets down afterwards. The intensity of the conflict also varies among different water users. It is high between farmers and brick industries because besides causing water shortage, the brick industries are also polluting villages. Furthermore, conflict is gradually gaining local peoples' participation. The VDCs attempted many negotiations to manage the conflict. However, it could be successfully negotiated at the VDC level with the help of the elected VDC body, once elections have taken place.

Keywords: *water conflict, water rights, farmers, companies, state law, customary law, prior appropriation.*

Abbreviations and Acronyms

AAP	Aquatic Animals Protection Act
ADB	Asian Development Bank
AIT	Asian Institute of Technology
BS	Bikram Sambat
BTK	Bull's Trench Kiln
CBO	Community Building Organization
CBS	Central Bureau of Statistics
CDO	Chief District Officer
CFUG	Community Forest Users Group
CMS Nepal	Consolidated Management Services Nepal (P.) Ltd.
CSIDC	Cottage and Small Industries Development Committee
DAO	District Administration Office
DDC	District Development Committee
DFTQC	Department of Food Technology and Quality Control
DoI	Department of Irrigation
DWRDC	District Water Resource Development Committee
ED	Executive Director
EIA	Environmental Impact Assessment
FCBTK	Fixed Chimney Bull's Trench Kiln
FMIS	Farmer Managed Irrigation System
GDP	Gross Domestic Products
GRDB	Groundwater Resources Development Board
HDPE	High Density Polyethylene
HR/M&E	Human Resource/ Monitoring and Evaluation
IDI	In-depth Interview
IEE	Initial Environmental Examination

IFPRI	International Food Policy Research Institute
ISET-N	Institute for Social and Environmental Transition-Nepal
IWE	Irrigation and Water Engineering Group
KUKL	Kathmandu Upatyaka Khanepani Limited
KVWSMB	Kathmandu Valley Water Supply Management Board
LSGA	Local Self Government Act, 1999
Maoist	Unified Communist Party of Nepal (Maoist)
Masl	Meter above sea level
MCBTK	Moving Chimney Bull's Trench Kiln
MLD	Ministry of Local Development / Million litres per day
MoI	Ministry of Irrigation
MoPPW	Ministry of Physical Planning and Works
NC	Nepali Congress
NCCR	National Centre of Competence in Research
NGO	Non-governmental Organization
NPR	Nepali Rupees
NTFP	Non Timber Forest Products
NUFFIC	Netherlands Organization for International Cooperation in Higher Education
NWCF	Nepal Water Conservation Foundation
NWSC	Nepal Water Supply Corporation
O & M	Operation and Maintenance
OCR	Office of the Company Registrar
RO	Reverse Osmosis
RPP	Rastriya Prajatantra Party
RVWRMP	Rural Village Water Resources Management Project
SOPPECOM	Society for Promoting Participative Ecosystem Management

SS	Stainless Steel
TDS	Total Dissolved Solids
UML	Communist Party of Nepal (Unified Marxist Leninist)
UNESCO	United Nations Educational, Scientific and Cultural Organization
USC	Under School Children
UV	Ultra Violet
VDC	Village Development Committee
VSBK	Vertical Shaft Brick Kiln
WHO	World Health Organization
WRA	Water Resources Act, 1992
WSSB	Water Supply and Sewerage Board
WSSC	Water Supply and Sewerage Corporation
WSTFC	Water Supply Tariff Fixation Commission
WUA	Water Users Association

Glossary

Aarthik Sahayog	Financial help.
Abhisap	Misfortune.
Ahir	Buffalo herds.
Alopalo system	Rotational basis.
Ama Samuha	A group of mothers. This is an informal institution.
Anugyan patra	Water quality license issued by the DFTQC which is a complementary license to register a bottled water company in the office of the company registrar or in the CSIDC.
Bhatta	Brick kiln.
Bhed	The principle of dividing.
Bikase mal	Chemical fertilizer.
Bikram Sambat (B.S.)	The name of the Nepali calendar. Normally, the *Bikram Sambat* is 56 years 08 month and 14 days ahead of the Gregorian calendar (Anno Domini).
Bir Dhara System	The tap water system constructed during the *Rana* Prime Minister Bir Shamser.
Chanda	Voluntary financial help. Sometimes it is in the form of extortion.
Dama	The process of using money.
Danda	The principle of punishment.
Dhalpa	Caretaker of irrigation canal.
Gaunle Kanun	Same as customary law, devised by local people themselves many years ago.
Ghat	A Nepali word to denote a designated burning place for dead human bodies according to the Hindu religion. In the Hindu religion, such *ghats* should be made at the bank of the river (normally at the bank of a big river). If there is no big river, the *ghat* should at least be made at the bank of a small river where there is a water flow. After the death of a human being, people bring dead body to the *ghat* and carry out the Hindu rituals. In the Hindu tradition, a dead body is burnt and the final remains of the body (burnt ash) is left sailing on the river as in the beliefs the dead person goes to the heaven through the river flow.

Gopal	Cowherds
Heralu	A person who takes care for and manages irrigation systems.
Kakakul	A name of a bird which lives in water scarce areas. In Nepal, the word *kakakul* is used to denote an extremely water scarce area.
Kanth	The local word in Kathmandu valley to denote periphery areas of the cities of the valley.
Karyabidhi Digdarshan	Rules and regulations made by the industry department of the government of Nepal, for the operation and regulation of cottage and small industries. The rule was promulgated in 2065 B.S. (2008 A.D.).
Kharbari	A non-irrigated land plot, normally covered by grass. In general, the *kharbari* is not useful for cultivation. Normally, it is barren land but small trees are planted there for fodder and animal feeding.
Khola	A river/rivulet/stream
Khutta Tanne Prabirti	Typical Nepali slang language: When someone earns money or makes progress then his or her relatives or neighbours try to damage his reputation or try to damage his progress, conspiring covertly.
Kulo bhattinu	Destruction of irrigation canal.
Kund	A kind of holy lake or pond.
Pipal Chautari	A resting/gathering place made under the *pipal* tree (sacred fig).
Sahayek Sachib	The assistant secretary. In this thesis, it denotes the assistant secretary of the VDC.
Sama	The process of pacifying.
Samyantra	A committee composed of the representation from all political parties active in the VDC to allocate budget and to run the VDC. It is formed because of the lack of elected members in the VDC.
Sarzamin muchulka	A detailed description of physical and social matters, written down and signed by all concerned. The paper should be drafted in the field in front of all parties involved. Upon acceptance, it is signed in the presence of all concerned.
Syaula	Brushwood
Tole	cluster settlements of a village

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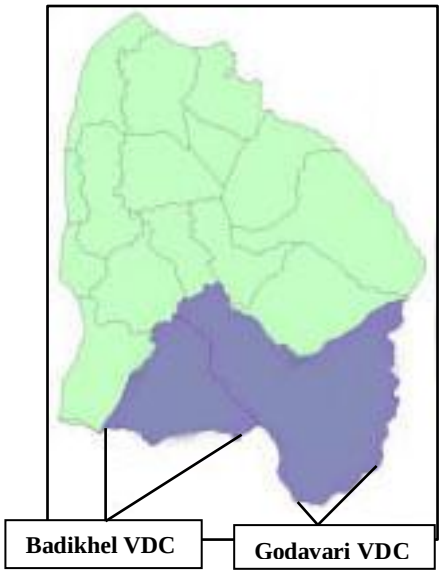


Godavari Watershed

Badikhel VDC

Godavari VDC

Lalitpur district

Chapter-One

Introduction

This introduction chapter mainly discusses the context of the research. It starts with the background information of the research. It then analyses some water related old and new laws of Nepal and the contradictory issues on them. It further discusses the past and current issues of management and development of water resources in the Kathmandu valley. It explores the intrinsic relationship of water with land in Nepali and the global context. Likewise, problem statement, significance of the study and organization of the study are also discussed in this chapter.

1.1 The Research Context

Water is a dynamic and politically contested resource (Wester et al., 2003). It is a crucial resource for human beings for many reasons. Water is used in agricultural production, drinking, transportation, ritual purposes, sanitation, energy and industrial use. It is a scarce resource, so it is contested. Gleick (2007:1) argues this scarcity: "more than a billion people lack access to safe drinking water. Two and a half billion people live without access to adequate sanitation systems necessary to reduce exposure to water-related diseases." Similarly, UNESCO states: "the main problem of water crisis is basically a crisis of water governance" (UNESCO, 2006:1 cited in Castro, 2007). So, both governance and scarcity can be held accountable for a water crisis; the extent to which each factor is accountable may however vary. Considering the social and economic value and the strategic position of water for the livelihood of the people, scarcity of water will lead to competing claims on water. Water scarcity is therefore becoming a new source of conflict in many parts of the world.

It is hard to define property rights of water without taking land property rights into account. Defining property rights of water is more complicated than defining property rights of land. Land is a prestigious resource in Nepal as anywhere else. People's social identity and dignity are defined by the quantity of land that they possess. Land entitlement often also defines water rights, especially in irrigation. As water has an economic and a social value, there are multiple claims on it; thereby, it is contested. As a result there are conflicts over land and water use and water sources such as rivers, wells, spring sources, tanks etc. Water has been used by humans since time immemorial for agricultural, cultural, religious and domestic purposes. In the Nepalese context, water has a religious value too. In Hinduism and other religions, water of big rivers and lakes is deemed to be something holy. People worship the water in big Rivers and lakes like *Kaligandaki (Muktinath)*, *Ridi*, *Gosainkunda* (lake) and *Mansarobar* (lake) in Nepal as well as many other rivers and lakes globally.

In Nepal, in the past, water was regulated mostly by customary and local law. Nowadays, the government of Nepal has been implementing numerous water laws for the management of water but still, customary law is a crucial regulatory mechanism in water control and governance. Law can be taken as a social construction of society (Schauer, 2005) which is embedded over many years. Therefore, laws are changing and merging in the course of time.

According to the Water Resources Act (WRA), 1992, the ownership of all Nepalese land and water is vested in the state. There are primarily two self-contradictory acts in Nepal that

mention water rights. These are the *Muluki Ain*[1], 1854 (the first national code) and the WRA, 1992. The *Muluki Ain* established the prior appropriation right in water by regarding the customary law whereas the WRA, 1992 prioritized the use of water by putting drinking water and domestic use in the first priority without regarding prior appropriation which is also called first investor's as well as customary rights. In case of land, citizens can use land by obtaining land entitlements from the state subject to regular payment of tax. Regarding water, it is not the same as land. The Water Resources Act of 1992 has categorized and regulated the different orders of water use, as mentioned in annex I. Private water rights in Nepal generally come from land rights whereas water rights are generally kept by the water users associations (WUAs). The WUAs are a legal entity once they have been registered and obtain a legal status from the District Water Resources Development Committee (DWRDC) chaired by the Chief District Officer (CDO).

In Nepal, political and economic powers have been key factors in altering previous and ancestral water rights of local *raithane* farmers. For example: i. Some politicians of newly emerged powerful political parties establish water businesses in peri-urban areas and transfer water forcibly to their business. This water was previously used by farmers for irrigation and drinking purposes. ii. Some rich businessmen use money and their political connection with powerful politicians to divert water to their businesses which was previously used by farmers for irrigation and drinking purposes. Before, Nepali farmers were regulating water using mainly customary law. They were applying first investor's (prior appropriation) rights while using water in drinking, domestic uses and irrigation. These two contradictory water laws (the *Muluki Ain* and WRA, 1992) may have contributed to bring different water users into conflict. These laws give Nepali people room to make claims on water according to their own normative interpretation. On the other hand, these acts are contributing to people losing their claims on water.

Nowadays, urbanization is rapidly increasing in Kathmandu valley[2] . The main cause of rapid and unmanaged urbanization is migration of people from outside the valley. It is said that rapid in-migration took place especially during the internal conflict (civil war) from 1996 to 2006. Population increased from 1.1 million in 1991 to 1.6 million in 2001 in Kathmandu valley (IFPRI, 2005). Indirectly, rapid population growth is causing water shortage because there is a need of bricks to build houses. While at the same time, drinking water through water tanker companies and bottled water companies is needed to fill the water supply gap in Kathmandu valley. Increase in thefts, sanitation problems and pollution in water streams are some of the problems caused by the unmanaged rapid in-migration. Due to the urbanization of Kathmandu city, there has been a rapid construction of buildings. Bricks are necessary to

[1] "The *Mulki Ain* is a "public act" which formalizes different practices and norms on sharing resources (natural resources and other resources) in the country. The *Muluki Ain* of 1854, the first legal code introduced and practices in Nepal, combined ancient Hindu sanctions and customary laws and fundamentals of common laws and was also then modeled on the British and Indian codes. This act codified rules of behaviour that had evolved over the centuries in Nepal, particularly among the dominant communities residing in the Kathmandu valley at that time such as *Newars*, *Ranas*, upper class *chetris* and *Thakuri* and *Bahun*. In terms of irrigation cost sharing, the amendment of *Muluki Ain* in 1952 stated "tenants could be evicted from the land if they fail to contribute labor for repair of canals." This was again amended in 1963 stipulating that registered tenants cannot be evicted from the land even for their failure to contribute labor for repair and maintenance of irrigation systems." (Khanal and K.C., 1997 cited in Khadka, 1997:7).

[2] Kathmandu is the capital of Nepal. It consists of the Kathmandu, Lalitpur and Bhaktapur districts. Thus, the word 'Valley' and or 'Kathmandu Valley' represents all three districts of 'Kathmandu Valley.' Among these districts, there are six municipalities: Kathmandu metropolitan city, Kirtipur municipality, Lalitpur sub-metropolitan city, Bhaktapur municipality, Madhyapur-Thimi municipality and Shankharpura municipality (newly designated).

make buildings and brick industries are water intensive industries as they need water to convert soil into mud. There are no viable alternatives for bricks, apart from cement tile for constructing buildings in Nepal.

Similarly, the bottled water and tanker companies extract huge quantities of water to sell in the city areas. As there is a shortage of water in the city area, these bottled and water tanker companies are transferring rural water to the city. It is a kind of 'rural urban water transfer.' This research mainly explores the competing views on water rights and the resulting conflicts among irrigating farmers as well as between farmers and various companies i.e. brick factories, bottled water companies and water tanker companies, established in the Badikhel and Godavari VDC[3]s under the Godavari watershed.

1.2 Analysis of Water Related Laws of Nepal

In the early history of Nepal, the country was ruled by *Gopal* (cowherds) and *Ahir* (buffalo herds) dynasties but detailed legal information is not available. After that many small principalities - *baisi and chaubisi rajya,* were ruled by *Kirat, Lichhavi* and *Malla* dynasties. (Khadka, 1997). After the unification of those small principalities by late king Prithvi Narayan Shah in the 18th century, the country was ruled by the Shah Dynasty until 2008.

The first law of modern Nepal was promulgated in 1854, popularly known as the '*Muluki Ain*' (The national code). Until now, the code has an influence in the Nepali legal system. Before the *Muluki Ain,* the legal system was run by different religious scriptures. (ibid.). The *Muluki Ain,* being the first code of the country was a product of peoples' behavior, culture and beliefs. That law was the starting point of 'rule of law' in the history of Nepal. The history of water related laws of Nepal as mentioned by Khadka (1997) is placed in annex IV. The table in the annex IV shows different water related legal systems during the rule of different dynasties of Nepal. The legal system for water after that period is explained in the following sub sections. However, the analysis of Nepal's contradictory laws on water is discussed from the next paragraph onwards.

The Muluki Ain, 1854 (national code) was the first concerted effort in the history of Nepal made by the state to govern and regulate societal systems and resource management. The latter version of this code adapted by amendment in 1952 and 1963 dealt mainly with water rights. The 1963 version of the national code dealt with the issues of water allocation among different cultivators, new canal construction and maintenance. The *Ain* applied the right of first investor on water appropriation. It linked water rights with land rights, in such a way that any other investments after the first investments made in water diversion, were deemed a violation of water rights. This may causes water scarcity for the first (downstream) irrigation land holders. However, the *Muluki Ain* does not clearly mention whether priority should be given to riparian rights or prior appropriation rights when distributing water among users. Some other acts promulgated by the government on water rights and management of water resource are: Aquatic Animals Protection Act, 1960; The Canal Act, 1961; Electricity and Related Water Resources Act, 1967; Water Resources Act, 1992; Hydropower Development Policy, 1992; Irrigation Policy, 2003. By promulgating these acts, the state has almost completely regulated the rights over water resources. These acts also restrict local user's customary rights over water. The 1967 act made clear that individual and private water rights are secondary to the rights of the state. (Pant et al., 2008).

[3] Village Development Committee. It is a bottom level government institution of Nepal.

The Aquatic Animals Protection Act (AAP), 1960 states that the term water includes lake, water reserve, water fall, water course, river, stream, pond canal etc. and their sources. The term aquatic animal is defined as all animals living in the water. The act has made a provision so that the owner of the water can kill or catch aquatic animals as he[4] likes without using poisonous substance. [Section 2 (a) and (b) and section 31 of AAP]. The 'private water' has been defined as lakes, ponds and watersheds to the extent that the owner pays land revenue of the land to the government. [Section 2 (gha) of AAP]. Hence, the concept of 'private water' and its use has been accepted by AAP, 1960 but has not been regarded by WRA, 1992. Moreover, the WRA, 1992 has made rules that can impose restrictions on the use of private water that contradict the provisions made under AAP, 1960. (Khadka, 1997).

Khadka (1997) argues further that the *Muluki Ain* has obscured the legal rights of water, as it is difficult to understand as it was written more than a hundred years ago. It also contains some contradictions. For example, the upper riparian have prior right of water use to irrigate their land. This poses the question what happens when the upper riparian convert their *bari* (unleveled cultivated land use to grow crops other than rice) into *khet* (rice field) reducing the quantity of water to the lower riparian. It is difficult to answer such a question. Furthermore, the WRA, 1992 has overridden the *Muluki Ain* because the *Muluki Ain* is a general law of the nation whereas the WRA, 1992 is a specific law. Thus, while the *Muluki Ain* has recognized the prior appropriation and customary water use rights, the WRA does not do so explicitly. For example, in many places in the country, there are water user associations (WUAs) which are generally not registered as legal institutions. They have however constructed irrigation canals and are charging irrigation fees from the beneficiaries. The customary practices by the WUAs cannot be taken as legal unless they get a license under WRA [section (8) 3]. (ibid.).

The WRA has nationalized all the water resources of the country. It also fixed a priority order for the uses of water. Drinking water is a top priority [WRA 1992, section 7 (1)]. What happens if someone or a group that has built an irrigation canal and has been using the water of the canal since a long time without getting a license, but now someone comes to claim the water for drinking purposes? What kind of laws apply to such a situation? Is it the customary law under the *Muluki Ain*, as they built the irrigation canal a long time ago, or the right of a person who would like to use the water for drinking purposes under the WRA? This is a complex condition. Legally, if the case goes to court, experts will certainly argue the WRA applies in this case because the *Muluki Ain* is a general law of the nation and it cannot prevail over the specific law. This illustrates the contradiction that someone gets water rights under the *Muluki Ain* but loses them under the WRA. (ibid.).

Furthermore, the priority of water use under the WRA, 1992 does not explain whether the first priority use needs to be fulfilled completely before a lower priority use of the water is allowed. For example, drinking water and domestic use is the first priority in the WRA, 1992, whereas irrigation use is in the second priority. It is not explained whether the irrigation water use is only allowed after fulfilling the drinking water demands completely or whether both can go together proportionately considering the first right of drinking? Yet, all the water related laws and bylaws after 1992 are based on the WRA, 1992 which to some extent contradicts the *Muluki Ain*. Because of this, the interpretation of the laws can differ from place to place and court to court.

[4] It denotes both he and she (male and female).

1.3 Water Resources Development and Management in the Kathmandu Valley

Water was one of the most important and valuable resources during the *Lichchhavi* (464–782 A.D.) and *Malla* periods (782-1768 A.D.) of Nepal. *Dhunge dharas*, earthen canals and point sources were the main water supply sources during the medieval period (750-1750 A.D.). These sources still are important sources of water in the Kathmandu valley. During that period, irrigation canals were constructed and managed locally in the Kathmandu valley for agricultural use. The major uses of water were irrigation, drinking and domestic use. There were numerous informal local institutions in the Kathmandu valley for the management of water resources.

During the *Rana* Regime (1846–1951 A.D.), local institutions had a problem because *Ranas* started grabbing water and land according to their own vested interests. During Bir Shamsher's regime, the water sources of Shivapuri hill were tapped and supplied by a pipeline especially to the Prime Minister's quarters and for the ruling elites of that time. However, after the overthrowing of the *Rana* regime in 1951, there was an increased development of many piped water systems in the Kathmandu valley, as the population increased rapidly. After the *Rana* regime, the Kathmandu valley became one of the most lucrative destinations for the citizens of other parts of the country. Increment in population and industry created scarcity of water for drinking, domestic use and irrigation in the valley. Gradually, irrigation canals were also developed to cultivate cereal and cash crops in the valley. Before 1950, the rivers of Kathmandu were used only to irrigate agricultural land. People used to divert water making temporary weirs of *syaula* (brushwood). Mostly the canals were of the earthen type. The irrigation canals were mainly managed by the local people themselves. The irrigation department also organized maintenance of canals by hiring *dhalpas* (caretakers). (Dixit, 1997).

Drinking was also one of the most significant uses of water in Kathmandu valley in the past. As said, the piped drinking water system was introduced in Kathmandu valley in the early 1880s, after the construction of the *Bir Dhara* system. The system tapped water from the *Bishnumati* River in the Shivapuri hill. Later, in the 1930s, the *Tri-Bhim Dhara* system was built. Water from the hydropower plant's tailrace was also tapped to transmit water to Kathmandu city for drinking purposes. The two tributaries *Nagmati* and *Syalmati* of Bagmati River were also used to divert water to the piped system. In the meantime, there was a rapid increase of population and urbanization in Kathmandu valley that created a water shortage. However, at that time, not all the available water sources were fully utilized and the population, compared to today, was much smaller. Due to leakage and transmission losses, only 40-60% of the transmitted water reached the consumer's houses. Later, in 1974, the World Bank supported the improvement and expansion of the drinking water networks of Kathmandu valley. With the support of the World Bank, groundwater exploitation was started in the 1980s. Between 1980 and 1990, private pumps were installed extensively in Kathmandu valley by hotels, factories and international organizations to receive running water. In 1995, NWSC (Nepal Water Supply Corporation) also started to exploit groundwater in Kathmandu valley, especially during the dry season. Despite the above mentioned efforts to manage water in Kathmandu valley, the drinking water service has always had a deficiency both in terms of quantity and quality. (ibid.). Supply is sporadic and moreover there are periods of many days with no water supply in houses at all. Over the years, there have been many institutions involved in the management of water in Kathmandu valley. Figure 1.1 demonstrates the history of water management in the Kathmandu valley.

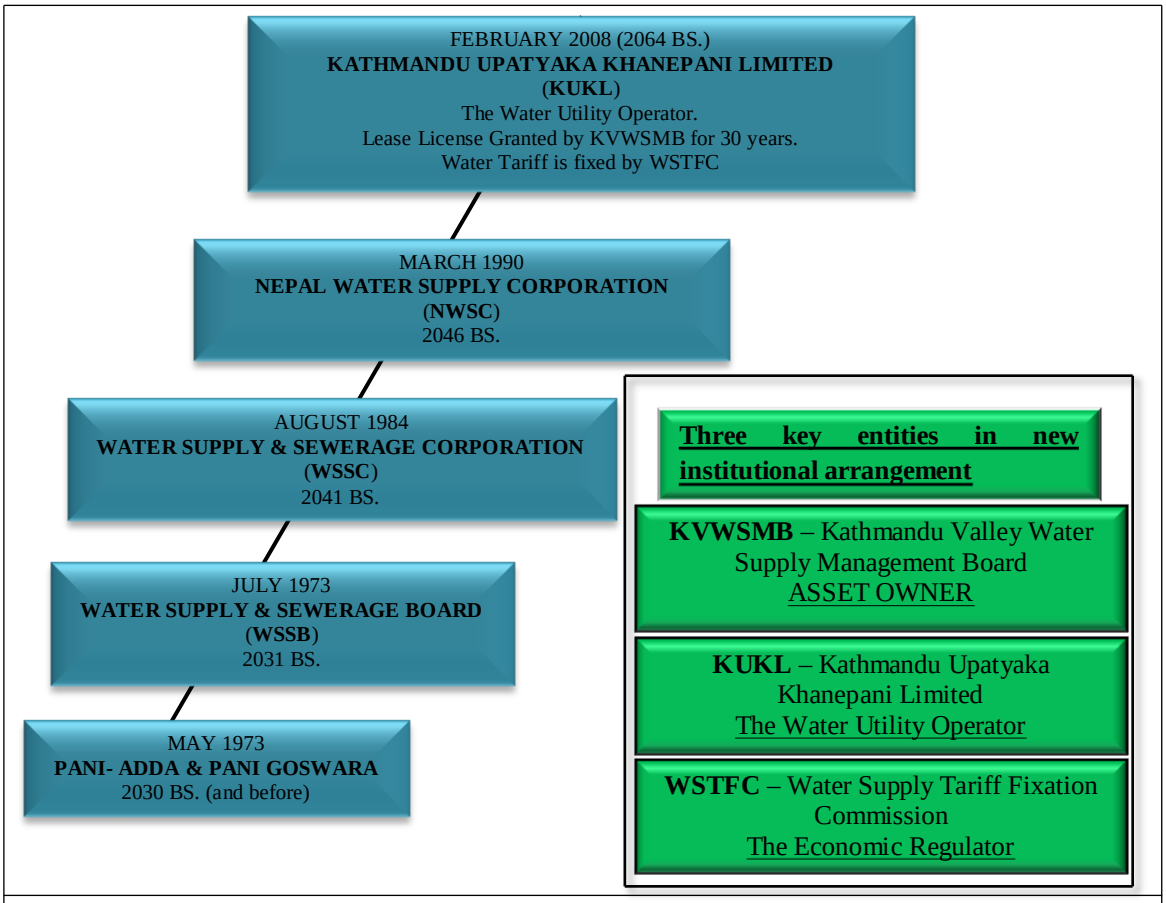


Fig. 1.1 Organization responsible for water and sanitation services in urban areas of Kathmandu valley at different periods of time & present institutional arrangements (Source: KUKL at Glance: Third Anniversary Report, 2010).

Figure 1.1 shows the formal institutions involved for the management of drinking water in Kathmandu valley since 1973. The current water management entities are also depicted in the

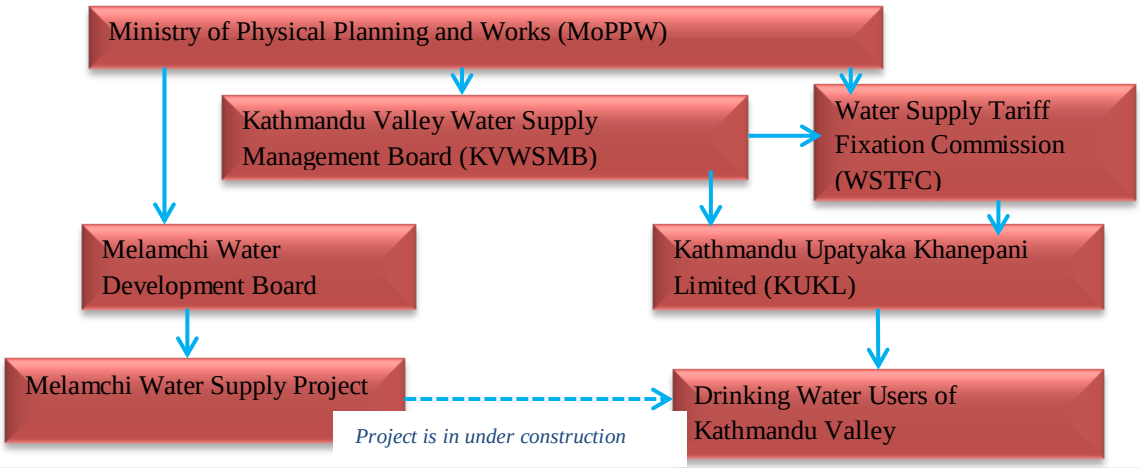


Fig. 1.2 Overview of Kathmandu valley water management (Source: Adapted from: Drinking Water Management in Newa State, available at: http://www.ccd.org.np/new/trans/policy_Drinking_Water.pdf

figure. These three entities shown are KVWSMB, KUKL and WSTFC. Similarly, the overview of current water management in Kathmandu valley is mentioned in Figure 1.2.

As shown in figures 1.1 and 1.2, since 2008, KUKL has been the utility operator for drinking water in the Kathmandu valley. The KUKL leased the operation from KVWSMB for 30 years. The WSTFC is responsible for the economic reviewing of the tariff system. The NWSC (Nepal Water Supply Corporation) is not responsible for the drinking water management in city areas of Kathmandu valley. However, it is responsible for the provision of drinking water to the cities outside Kathmandu valley. Currently, KUKL is supplying much less water due to the current scarcity. According to the KUKL's annual report for 2010, water demand in Kathmandu valley is 320 MLD (million liters per day) while the supply is only 120 MLD in the dry season excluding losses. The ADB supported Melamchi Project is currently under construction. This project is going to supply 170 MLD of water to the Kathmandu valley from the Melamchi River in Sindhupalchok district.

The larger population, increased economic activities and modern lifestyles exert significant pressures on water demand. The current water management system of Kathmandu valley is both insufficient and inefficient due to the old pipe line system. Many of the distribution lines were laid during the *Rana* regime. Leakage also is one of the most important causes of the water shortage. Furthermore, in Kathmandu valley there are currently three tiers of water supply systems (Moench, 2001). The traditional *dhunge dharas*, the KUKL supplied piped water (municipal connection) and the tanker truck supplied water. Policy makers and planners hope that after the completion of the Melamchi project, there will be sufficient water for the next 40 years. However, the completion of the project is uncertain due to the inter-basin water conflict between the people living in the Indrawati basin and the project management (the ADB and the government of Nepal).

1.4 Intrinsic Inter-relation of Water with Land

Meinzen-Dick and Nkonya (2005) argue that much attention in water rights reforms have been focusing to look at water rights separately from land. However, Hodgson (2004) argues that, from the point of view of the European statutory laws, water rights are subsidiary to land rights. In Asia and Africa, it is very hard to separate water rights from land because water rights are intrinsically linked with land rights (Meinzen-Dick and Nkonya, 2005).

Land and water are the most important resources not only in Nepal, but everywhere in the world. These two are also amongst the most contested resources often causing conflicts within a society. Both in rural and urban areas, land symbolize dignity and power in the societies of Nepal. Moreover, there have been lots of violent conflicts over it in the past. Land reform is one of the important and buzzing phrases in Nepal among political parties. The political parties have always advocated a 'scientific land reform' but they failed do so in practice until now. Scientific land reform has only been on their political agenda during elections. In Nepal, in many cases, water rights come with land rights. Irrigation rights (water rights) come with the land entitlement in a particular place. Similarly, groundwater rights also come with the landownership. By constitution, the ownership of all natural resources inside the territory of the country including land and water are vested in the state. Use rights of land are obtained after regularly paying land tax. For drinking, small irrigation and domestic use, groundwater rights can be obtained for free with the land entitlement. However, there is a licensing provision for commercial purpose.

The *Muluki Ain* of 1854 established the prior appropriation right of water which is attached with land. Groundwater is mostly used for irrigation purposes, especially in the Terai[5] region of Nepal. Furthermore, in the Terai region, groundwater is the source of both drinking and irrigation. Normally, no license is needed for irrigation from groundwater in the Terai. A license from the concerned authority is needed for commercial purposes using a large quantity of groundwater extraction.

The Groundwater Resources Development Board (GRDB) under the Ministry of Irrigation (MoI) is responsible for groundwater development, management and regulation in the country. The Kathmandu Valley Water Supply Management Board (KVWSMB) is responsible for the regulation of groundwater in the Kathmandu valley. It has been drafting groundwater extraction policy for the Kathmandu valley. Since February 2011, KUKL has restricted commercial groundwater extraction in the Kathmandu valley and made it subject to licensing. People's wellbeing, social reputation and power are associated with land possession in Nepal. In summary, both surface water and groundwater have high economic value and they both are intrinsically inter-related with land which is the symbol of power and dignity. Due to the high economic value of land and water, there are competing claims among different users of land and water, because they have an intrinsic relationship with the livelihood of people. Land and water should therefore be viewed not as separate but as inter-related.

1.5 Problem Statement

In the past, farmers used water solely for household and agricultural purposes. Farmers were managing water on their own premises although they had some problems and disputes on water allocation in irrigation and drinking. Over the course of time, the study area (Godavari watershed) developed and the population grew rapidly. For constructing houses, people in the city need bricks, while bottled water companies and tankers are necessary to supply drinking water to the water scarce parts of the city. Though drinking water provision for city dwellers can be taken as a responsibility of the government, this has not been the case in the Kathmandu valley. The Kathmandu Upatyaka Khanepani Limited (KUKL is a para-statal organization that has been supplying drinking water to Kathmandu valley. Currently, NWSC is responsible for the supply of drinking water outside the Kathmandu valley. During the dry season, city dwellers have to depend on water from tankers, as regular supply cannot fulfill the water demand of households and industries. Water tanker and bottled water companies are becoming profitable and lucrative businesses in Kathmandu.

Yet, there are no clearly defined laws to regulate water supply tankers in Kathmandu. However, bottled water companies are partly regulated by the Department of Food Technology and Quality Control (DFTQC). Although bottled water companies have certain obligations set out by the government of Nepal through the DFTQC, they are not meeting these quality requirements. The water sources (rivers, rivulets, kholas and springs) of Badikhel VDC are partly serving as sources to fulfill the water demand of the core area of Kathmandu through both bottled water and water tanker companies. However, tankers also

[5] "The Terai region refers to the southern lowlands of Nepal. They are also a part of the eastern Indo-Gangetic plains. Inside Nepal, all area in the south with an elevation of 30-300 meters is referred to as the Terai. This is the most fertile part of the country and occupies only 17 percent of the total area of the country. The rest of the country is made up of hills (higher than 300-3000 meters) and mountains (all area above 3000 meters)." (Gautam, 2006: 27).

supply water to Kathmandu valley from other places like *Matatirtha*, *Taudaha*, *Manamaiju* and *Jorpati*.

Political changes and political fuzziness played a catalytic role in drawing farmers into conflict. In the study area, industries are heavily transferring water from agriculture, drinking and domestic to industrial and commercial use. The governance structure is weak in the peri-urban areas that are gradually becoming cosmopolitan areas. The VDC and other institutions under the government have weak administrative power during this politically unclear period. Different conflicting interests exist to encroach and grab the resources of the peri-urban areas. The brick industries, water tanker and bottled water companies have a close relationship with politicians through bribes and financial support during election. Because of this, the industries can use water resources of the area for their vested interest. Moreover, the industries use the influence of politicians to get access to water resources regardless of the effects of farmers.

Brick industries are also creating problems affecting the agricultural sector and human health. In the dry season, farmers and industries have disputes on the sharing of water. Due to the conflicts amongst farmers themselves, they have been unable to act against companies collectively. Different political ideologies have also divided them in many competing groups. This kind of conflict has a deep influence in village development and social harmony. Therefore, it is necessary to assess the nature, magnitude and dynamics of water conflict among different water user groups in the study area. Moreover, this study is necessary in order to learn and understand the nature of water conflict among farmers themselves as well as between farmers and companies and to find out the future way forward towards a resolution of current conflict in the study area. In a nutshell, the main problem for this research comes with the scarcity, allocation and control of limited water sources created by companies which are transferring water from irrigation and drinking to industrial and commercial uses.

The brick industries transfer water from agricultural to industrial use. They extract water heavily to make raw bricks. Similarly, the water tanker and bottled water companies transfer rural water from agriculture to industrial and commercial use. Those industries selling of water to Kathmandu valley cause shortage of water for agriculture and domestic use in the study area. As water is important for all the users (farmers and industries) because of its economic value, farmers and companies compete with each other to withdraw and use it for their own purposes. Hence, this problem has drawn farmers and companies into conflict. The nature, process, transformation and dimensions of conflict as well as actors involved in them is to be rightly understood because of its deep influence on the overall development process of the study area in the long run.

1.6 Significance of the Study

Rural-urban water transfer is a kind of interaction between rural and urban area. Rural areas have more natural endowments than urban areas. In the peri-urban area, these natural endowments are depleted day by day due to the over exploitation. The study area is a mixture of rural and urban. In the cosmopolitan society, social ties are weak among different groups of people while it is strong among similar groups of people. For example, social ties and social capital is weak between farmers and businessmen, between farmers and government staffs as well as between *raithane* and new immigrants. In contrast, it is strong among similar groups of people like among farmers themselves. The cosmopolitan area can be inferred to have a low level of social ties and social capital in comparison with a homogeneous

settlement. Similarly, a low level of social capital brings with it a lack of trust among citizens which may bring them into conflict even on small issues. Similar situation prevails in the study area.

The Godavari watershed lies in the outskirts of Kathmandu valley. As said earlier, in-migration is rapidly growing there. Water is a valuable resource to any settlement and is used for many purposes. Uses of water in the study area are drinking, irrigation, sanitation and domestic use, cereal crop and vegetable farming and fishing. Water has an (economic) value. Hence, by nature, its rights are always contested if they are not properly identified. There are many conflicting interests related to the different water uses.

In-depth study of the management of water resources has not been done in the study area so far. Water tanker and bottled water companies are the means of rural urban water transfer that also transfer water away from agriculture. The Government of Nepal has not promulgated a regulation policy for those companies yet. Regarding water access, control and ownership, there are conflicts among farmers as well as between farmers and companies. On the other hand, brick industries are producing pollution and creating landslides and food insufficiency problems by baking the top soil of the land. Local farmers seemed to have low awareness of the implications of using the fertile top soil of agricultural land for their yields in the long run.

As the study area is rapidly urbanizing, I decided to study problems caused by the unmanaged and rapid in-migration and increased establishment of industries like brick, bottled water and water tanker. To study the problems caused by migration, water shortage, water security, governance, pollution, soil degradation and conflicts in water control and allocation; the Godavari watershed area is more suitable than other rural areas. Because, here it is also possible to study the changing water control situation during a political transition period and the void of elected local government. There has not been an elected governing body at the local level since a long time. The study area, which is close to Kathmandu city, also has a reasonably good transport facility.

Numerous studies were carried out by many organizations in trans-boundary water conflicts and water rights issues. However, very little literature is available on local conflicts among farmers and between farmers and companies that emerge due to rural-urban water transfer. Nevertheless, there are some studies about water tanker but I have not seen any single combined study related to water rights, conflicts among farmers and conflicts between farmers and industries (brick industries, bottled water companies and water tanker companies). The lack of prior research was an important part of the reason for my interest in this topic. This study can be a tool to understand the characteristics of conflict among companies and farmers.

Furthermore, from an academic perspective, this study may create new knowledge on the nature of water conflict. This study will further provide insights on how the water users (irrigating farmers, water tanker companies, bottled water companies and brick industries) were managing water resources, how these water users are managing water resources now and what the stakes of farmers and industries are regarding water. This study will also provide new scientific insights on local water conflict. Further, understanding the nature of conflict may be helpful to formulate a conflict resolution and transformation plan in a specific context. Considering those issues discussed above, this study is significant; hence I chose this topic and site for my thesis. I did this also assuming it will add some value in science. Finally, it will be beneficial for the local people and concerned authorities to understand the nature of the conflict and to be able to formulate a conflict resolution plan.

1.7 Organization of the Study

1.7.1 Study Procedure

These are the steps taken for this study:

Desk study

- Literature survey

Proposal development and presentation

- Proposal development.
- Proposal presentation.

Fieldwork in Nepal

- Primary data collection at research site.
- Consultation with experts and related government, private and international organizations.

Research report writing and presentation in colloquium

- Research report writing.
- Final results presentation in colloquium.
- Thesis defence.

1.7.2 Organization of the Research Report

This introduction chapter discussed the introductory issues and context of this research. The next chapter discusses the concepts and theories used in this research to analyze water conflict in the study area. It further discusses the research methods applied in this research. Chapter three describes the physical features of the Godavari watershed area. It also illustrates the socio-geographical features of the study area. Chapter four explores the water tanker companies established in the study area. It illustrates the overview, main filling stations, impacts of water tanker companies and issues of conflicts. This chapter involves with the general overview of water tanker companies and the results of the empirical study. Similarly, chapter five discusses the bottled water companies followed by the brick industries discussed in chapter six. These three chapters (4, 5 and 6) further discuss how the industries create irrigation water shortage for farmers as well as main issues of conflict. Furthermore, chapter seven combines and analyses the previous three empirical chapters e.g. chapters four, five and six. It analyses water conflict of the study area on a micro level. Discussion and conclusions of the study are presented in chapter eight.

Chapter-Two

Concepts, Theories and Research Methodologies

This chapter discusses the conceptual framework and the research methods of this study. Three concepts - water rights, legal pluralism and water conflict, are discussed to identify the nature and dynamics of water conflict among farmers and between farmers and companies in the study area. This chapter further explains the structure of the thesis. Objectives and research questions derived from the above mentioned concepts and theories are also discussed. Research methods such as sampling procedures, the way of collecting data and its analysis are also explained in this chapter. Main limitations of the study are also illustrated in this chapter.

2.1 Concepts and Theories

Three concepts and theories have been used for this research i.e. water rights, legal pluralism and water conflicts. These theories are the basis of this study to understand the nature and dynamics of water conflict among different water users in the study area. Scientific notions of these concepts and relevancy for this study are discussed in detail. Conflicting views on water rights among different water users and existence of plural legal system in the study area are also analyzed carefully. The sub-sections below discuss these concepts and theories.

2.1.1 Water Rights

Water rights are often obtained through land rights in many countries in Asia and Africa. Water rights are defined as authorized demands to use (part of) a flow of water, that authorization includes some privileges, obligations, restrictions and sanctions. (Beccar et al., 2002). The liquid nature of water makes it more difficult to define rights over water than land. Meinzen-Dick and Pradhan (2005) state that the term "water rights" does not only denote a single right, it should be understood as "bundles of rights" that includes several types and levels of rights. These bundles of rights are often grouped in two broad categories: use rights and decision making rights (F. von Benda-Beckmann et al., 1997; Schlager and Ostrom 1992). The bundles of rights according to Schlager and Ostrom (1992) are: i. access: the right to enter a defined property with excludable right as well. ii. withdrawal: the right to obtain the products of resources. iii. management: the right to regulate internal use patterns and transform the resource by making improvements. iv. exclusion: the right to determine who will have an access right and how that right may be transferred. v. alienation: the right to sell or lease either or both of the above collective choice rights. According to the authors, the first two rights: access and withdrawal come under the category of 'use rights' and the latter three rights: management, exclusion and alienation come under 'decision making rights.' Furthermore, Adhikari and Pradhan (2000) state that decision making rights affect other rights in bundles of water rights. Changes in management, exclusion and alienation may cause changes in access and withdrawal rights of water.

Law is a social construction and subject to change (Schauer, 2005). Different legal frameworks and rights are prevalent in society e.g. state law, customary law, local law and project law (Meinzen-Dick and Pradhan, 2002). Customary water rights originate from the customary law. There is also the notion of prior appropriation of water rights and riparian rights. Prior appropriation means that those users who invested for water first and started using water, have the first use right. Riparian rights, in contrast, advocate rights of the people who are living in a riparian area of water sources like rivers and lakes. The notion of riparian

rights does not clearly say that whether prior appropriation exists in riparian rights. Furthermore, Onyango et al., (2007) argue that customary law may be very strong and state law virtually irrelevant in a remote community with little in-migration and low influence of government agencies. However, in a cosmopolitan community with high in-migration rates like in an urban or peri-urban community, customary law may be much weaker than the state law.

Meinzen-Dick and Pradhan (2005) state that the availability of water in sources changes year to year and even season to season. In the places where there is an abundant availability of water, water transfer and withdrawal of water may not be a careful focus of water users. In contrast, withdrawal of water is a careful focus of users where there is a scarcity of water. Careful watch of water extraction happens during dry season. Further, the authors state that stronger water rights will apply during scarcity, whereas weaker rights may be denied. The weaker rights may represent the marginal and less powerful water users e.g. farmers if compared to the rich industrialists. It creates competition over water use claiming different types of water rights that subsequently creates conflict among water users.

In this study, water rights claims of farmers based on the prior appropriation rights (customary and local rights) and rights claims of companies based on the state law is important. Companies like water tanker companies, bottled water companies and brick industries are new users of water in the study area. They also use water from the same sources which farmers have been using since a long time. Moreover, the study of "bundles of water rights" of both the companies and the farmers is important for this study. Issues on how companies get access and withdrawal rights, how they are managing and excluding water rights and how they are making their claim legitimate are important for this study. Also, different views and claims over water, based on state and the customary law, are significant. Therefore, water right is a crucial concept for this study.

2.1.2 Legal Pluralism

Legal pluralism can be understood as: 'different legal mechanisms applicable to identical situations' (Vanderlinden, 1972:20 cited in Bavinck, 1998). 'The coexistence and interaction of multiple legal orders within a social setting or domain of social life is called legal pluralism' (Meinzen-Dick and Pradhan, 2001:11). These definitions say that legal pluralism is a state where more than one legal systems or laws exist in the same socio-political situation. Existence of legal pluralism may 'accept and regard' all of existing laws like state law, customary law, local law and project law. There is sometimes an overlapping of these laws. People can shop different existing forums to use these laws. Whereas, in a condition of legal pluralism, different forums also lure people and the people shop their platforms for legal purposes. The condition of such a situation of legal pluralism has been named as "forum shopping and shopping forums" by K. von Benda-Beckmann (1981).

Furthermore, Meinzen-Dick and Pradhan (2005) state that it is necessary to look for new approaches of legal pluralism, not only looking at the government laws and administrative process of government to understand both the mechanisms of water transfer and the range of water rights held by different stakeholders. The legal pluralism concept accepts that there may be overlapping legal frameworks, including state and customary law as well as religious and project law, which creates a local law as a mixture of customary, religious and project laws. Moreover, water rights are not a unitary item, but can include diverse bundles of rights including use rights, decision making rights and income earning rights. The nature of the bundles and the types of law applicable may differ, depending on both the source of the water

and the types of law. A plural legal system sometime maintains peace and harmony in society. In contrast, sometimes, it deters rights, peace and harmony. An example can be taken from Kathmandu valley, where house lord's customary law prevents house renters to take water from tap and well, causing water insecurity for the renters. (Ooijevaar, 2002). Normally, in Kathmandu, during water scarce time, house lords do not share and provide water to the renters.

Law is a dynamic and changing phenomenon. Some laws emerge in the course of time, prevail for some time and then collapse. Similarly, in the course of time, it can also revive again due to the changed socio-political situation. Spiertz (2000) urges that the conceptual framework of legal pluralism is indispensable, that local customary law and community based organization's water law for water management should be considered significant and should get more attention or even be re-introduced. In his article, he argues that legal pluralism describes many situations in the life of farmers, water users, heads of the village, bureaucrats and officials who can use more than one normative store to legitimize their decisions and behaviours.

Pluralities of rights of legal, customary or conventional notions are used to make claims where there is an ambiguity of rights which overlaps the system of legitimacy. Within this plurality in legal systems and competing claims, some actors may be able to increase their own benefits to maintain their own access or gain control over other's access by choosing the forums in which to claim their rights and from which they seek to have these rights enforced. (Benda-Beckmann, 1981; Lund 1994:14 cited in Ribot and Peluso, 2003). Meinzen-Dick and Pradhan (2005) further argue that the co-occurrence of plural laws does not mean all laws are equally significant and influential. In some cases, state law is more powerful and used by state officials in assigning water for agricultural and non-agricultural uses. State law can also be used by powerful outsiders to claim resources that are not accepted as legitimate at a local level. The promulgation of state law is not necessarily accepted by all, nor can it always be implemented.

Study of existence of plural legal system and forum shopping and shopping forums are important for this study. Different competing claims on water, based on different legal orders, are the focus of this study. It is important to understand water conflict within the periphery of legal pluralism and subsequent differences in claims of water rights by farmers and companies.

2.1.3 Water Conflict

The word 'conflict' holds a negative connotation. It is frequently thought of as the opposite of peace and cooperation and is most commonly linked with violence or the threat of violence. Nevertheless, conflict should also be seen as a potential energy of positive social change (Warner and Jones, 1998). The authors further state that the introduction of new technologies, commercialization of resources, growing consumerism, privatization of public services, newly changing government policies and decline of agricultural trade exert pressures on individuals and community groups towards change. The conflicts that arise from these many issues cannot be avoided or suppressed. It also implies that changes caused by the effects of globalization may contribute to create conflict.

Water is a valuable resource, so when it is scarce, there is a competing claim which raises conflict among its users. However, competing claims are less or zero in the place where there is an abundant water resource. The authors also discussed the issues of conflict in natural

resources. They mentioned two factors of contributing forces of conflict. The first one is the increasing developmental pressure that can twist the access of natural resources, increase the existing level of competition and focus natural resource degradation in one area. The second one is the deeper-seated latent conflict. These include (inherited) differences in legal definitions of resource ownership, vested interest of regional and local elites supporting commercial use and longstanding cultural, class and ethnic differences. That latent conflict has a high potential for real conflict because it can wake up at any time by external processes.

Similarly, Kriesberg (2007:2) explains social conflict as: 'a social conflict exists when two or more persons or groups manifest the belief that they have incompatible objectives.' The author's definition says that one person's use of resources may turns incompatible to others. For example, one person's use of something excludes other's use. Likewise, Walker and Daniels (1997) state that conflict is an active stage of disagreement between people having opposing opinions, principles and practices manifested in different forms (grievance, conflict and dispute).

Furthermore, Upreti (2001) states that water conflict is a normal phenomenon if the same source is used for more than one purpose in the absence of a clear water rights provision. The frequency and intensity of such a conflict is high during the water shortage period in the dry season. In addition, inequitable and unreliable water distribution and excessive use of water in the head-end portion limits the supply (of time and quantity) in the tail-end portion and often cause frequent conflict related to irrigation systems. He further argues that the magnitude of conflict grows as the gap between demand and supply of water increases. Unequal water distribution is generally linked with an inadequate monitoring that allows greater access to head-end farmers. He concludes that this is one of the major determinants of conflict among farmers concerning irrigation and drinking water.

Water conflict also emerges if there are differences between the priority of water use and the prior appropriation based on the state law and customary law. State law not necessarily regards customary law of remote villages where there is less influence of the state. Such conflicting claim brings different water users into conflict. Similarly, plural legal system may become a source of water conflict in many places. New water transfer mechanisms to supply drinking water to city areas by transferring water out from agriculture is becoming a source of conflict. Agriculture is a backbone of many villages, hence the farmers do not easily compromise on water going out from their agriculture. In many place of the world, especially during the dry season, there is a severe conflict between water transferring agencies and farmers who have been using water of the same source for irrigation and drinking for a long time.

In this study, water conflict among farmers and between farmers and companies is studied. Regarding conflict between farmers and companies, different claims over water rights based on the state and the customary law are vital to understand the nature and dynamics of water conflicts in the study area.

2.2 Objectives of the Research

The main objective of this research is 'to identify the nature of water conflict among water users (farmers and companies), their strategy to claim and defend water rights and impacts exerted by the companies (water tanker companies, bottled water companies and brick industries) in the Godavari watershed area (Badikhel and Godavari VDC).'

2.3 Research Questions

2.3.1 Main Research Question

The main research question of this study is:

- How are farmers and companies of Godavari watershed involved in water conflict, how do they claim, defend and strategize their water rights and how do the impacts exerted by the companies and plural legal systems bring the water users into conflict?

2.3.2 Sub Research Questions

Sub-questions of this research are:

- How are farmers and companies utilizing water and how do they apply strategies to secure water rights?
- What are the legal bases and how are they claimed by farmers and companies to securitize their water use?
- How is the nature of water conflict understood in the study area?
- How do the impacts of companies contribute to affect water conflict?

2.4 Research Methodology

2.4.1 Overall Approach

The overall approach of the research is based on the "actor oriented approach." (Long, 2001). The socio-legal process of the entire group of actors in this research is analyzed. The research is descriptive, exploratory and analytical. Furthermore, it is both qualitative and quantitative.

2.4.2 Unit of Analysis

Discussing the 'Unit of Analysis' is one of the most significant matters of any research. That could be a group of people, individuals, artifacts (books, photos and newspapers), geographical units (town, census tract and state) and social interactions (dynamic relations, divorces and arrest). It is of key importance in concept development, empirically measuring or observing concepts and in data analysis (Neuman, 2006 cited in Ghimire, 2008). Researchers fit a concept to the specific type of unit which they wish to analyze. In this study, the units of analysis are farmers (old '*raithane*' and new), brick industries, bottled water companies, water supplying tankers, users of tanker water (sprayed in many places of the Kathmandu valley), non-users of tanker water and other influential actors of different places. Politicians and officials (both government and non-government) are taken as influential actors. These all are the direct and indirect actors of this research. However, not necessarily all these actors are involved (directly and indirectly) in the conflict. The research is therefore concentrated on the units of analysis and their socio-legal processes. The same units of analysis discussed above are also considered as different sources of data collection.

2.4.3 Definition of Boundaries

Primarily, the area of the field study is the Godavari watershed area extended only in Badikhel and Godavari VDCs of Lalitpur district. However, there are many other VDCs that fall under the Godavari watershed (see map 3.1). Besides this, patches of Kathmandu

metropolis and Lalitpur sub-metropolis are also the study area as tankers and bottled water companies supply water to those areas. Networks of actors such as politicians, experts, associations and officials are important actors. Hence, the boundary has not been limited to the territories of the Badikhel and Godavari VDCs only.

2.5 Methods of Data Collection

In this research, both primary and secondary data have been collected from various sources. Face to face open interviews on the life-long history of farmers were conducted to gain insights in the actual social process, water governance, water rights and water allocation (previous and current). The key informant interviews were conducted with water rights professionals and researchers (both Nepali and foreign). Such professionals are the researchers of universities and research institutions, government staffs of water related offices, staffs of courts and local level organizations. Similarly, both participant and non-participant observation of activities of the villagers, farmers, industries, water tankers and tanker water users were carried out. Participant observation was done by participating in joint meetings of industry owners, farmers and VDCs. Following the tankers in an unobtrusive way was also a kind of non-participant observation of tanker water selling activities. This included observing how they approach consumers of tanker water, what are the perceptions of users about tanker water, what is the price and quality of water, whether the users use tanker water to drink or for other purposes etc.

Furthermore, city dwellers who buy tanker water were openly interviewed to get insights on perception, rate, availability and quality of tanker water. Checklists for open interviews and semi-structured survey questionnaires were used to collect primary data from local residents of both VDCs. The semi-structured survey questionnaires have been used to get local information about the study area mostly like economic status of respondents, education, literacy, demography, climate and vegetation, occupation, landholdings and livelihood strategies. Besides semi-structured interviews, completely open discussion methods of interviews were carried out by the researcher himself. Similarly, secondary data were collected from government departments, DDC[6], VDCs, I/NGOs, newspapers, court decisions etc. Narratives of people were documented as the storylines and analyzed to relate the concepts and theories.

2.6 Sample Selection

During actual sampling work, local villagers' help was taken. The ex-VDC chairmen and some MSc students helped to carry out sampling work. While sampling, both probability and non-probability sampling methods were used. This research has 4 different sampled actors e.g. irrigating famers, water tanker companies, bottled water companies and brick industries (*bhattas*[7]). Hence, the research population and sample size is differed accordingly. A total of 10 bottled water and two brick industries have been established in Badikhel VDC. One tanker company was in operation in Badikhel VDC before 6 months from the field work which was shut down due to the local conflict. Therefore, I took another water tanker company of Godavari VDC for this research. Both the Badikhel and Godavari VDC fall under the same Godavari watershed with similar ethnic composition and other features. Interviews were held with both of the water tanker companies.

[6] District Development Committee – is the district level local body as per the interim constitution of Nepal.
[7] Nepali name to denote Brick Kiln.

In total, two brick industries were established in Badikhel VDC. Both were in operation during my fieldwork time. Both of the brick industries were interviewed. In Badikhel VDC, altogether 10 bottled water companies were installed and in operation. They supply water in

Table 2.1 Sampling method

S.N.	Description	Research Population (N)	Sample size (n)	Percentage of N	Location/address	Sampling method	Remarks
1	Farmers/local residents	722	75	10	Badikhel VDC (9 wards)	Cluster random and purposive	15 in depth interviews
2	Brick Factories	2	2	100		-	
3	Tanker water companies	2	2	100	Each from Badikhel and Godavari VDC	-	
4	Bottled water companies	10	6	60	Badikhel VDC	Simple random	
5	Farmers/local residents	300	20	7	Godavari VDC (wards 2 & 3)	Cluster random and purposive	5 in depth interviews
6	Tanker water users	NA	30	NA	From various places in Kathmandu city	Snowball	water scarce areas
7	Tanker water non-users		10			Snowball	

both 20 liter jars and 1 liter bottles. Since these companies are concentrated in one locality, within a kilometer distance from the source, these companies were selected by simple random sampling method. The population size of the bottled water companies is 10 (*N*) whereas the sample size (*n*) is 6. That means 60% of sample size was taken from the bottled water companies.

The total household number of Badikhel VDC is 722 (Badikhel VDC profile, 2010) and Godavari VDC has a total household number of 1200 (Godavari VDC Profile, 2010). The research population (N) of the local residents of Badikhel VDC is 722. About 10% sample size (n) i.e. 75 household numbers were taken from local residents from all 9 wards of the Badikhel VDC. Among them, 15 in-depth interviews (IDI[8]s) were taken. However, in Godavari VDC, only 20 households (10 from each ward) from ward number 2 and 3 were taken as a sample for this research. Among them, 5 in-depth interviews (IDIs) were taken. The reason for this is that the water tanker company was established at ward number 2 and the source was located at ward number 3 of the Godavari VDC. These households were sampled to know about the source related rights, governance and conflict situation due to the water tanker company. The individual respondents from these wards were selected by both cluster random sampling and purposive sampling. Wards of the VDC were taken as clusters. The sampled local residents are composed of irrigating farmers and local residents.

Users and non-users of tanker water have also been selected as a sample from many places of the Kathmandu valley. The majority of the selection was done in severe water shortage areas through a snowball sampling method. It was very hard to figure out the population depending on tanker water in Kathmandu valley hence; only 30 users of tanker water were selected as sample. Likewise, 10 non-users of tanker water were selected as a sample. Snowball (non-

[8] First of all, short open interview with the entire sampled households were taken and then in-depth interviews (detail life long history) were taken with the limited (informative) respondents to know the issues in detail.

probability) sampling method was used to select professionals, officials and researchers involved in water sector in Nepal. Open discussion types of interviews were done with them. To sum up, a total of 135 households, 2 brick industries, 6 bottled water companies and 2 water tanker companies (the closed and running) were taken as a sample and thus interviewed.

2.7 Data Analysis

Data collected through the semi-structured questionnaires have been tabulated in MS Excel and MS Word and analyzed in an interpretive way. Open types of interviews have been documented also in MS Word and MS Excel. Furthermore, content analysis method was used to analyze interview discussions. In the process of content analysis, coding of concepts and memoing were used. The primary data collected were both qualitative and quantitative. Secondary information obtained from various means were analyzed to relate to the established concepts for this research and also to triangulate with primary data.

2.8 Limitations of the Study

This research is MSc thesis work of a student of International Development Studies of Wageningen University mainly for academic purpose based on the information from a field survey (primary data). Both the primary and secondary data may suffer from certain limitations. Budget, time, manpower, theoretical and methodological limitations during research prevail for the thesis work carried out by a student, while other limitations are as follows:

- The study has dealt only with water conflict taking samples of water tanker supplying water in the Kathmandu valley, bottled water companies, brick industries and irrigating farmers. Although, the boundary of the study has extended to many places of Kathmandu valley, the primary data collection was restricted only to Badikhel and Godavari VDCs of Lalitpur district. Moreover, Godavari VDC was taken only to study water tanker related issues. The current political situation of Nepal to also be considered when generalizing the results.

- The method of data collection was an open interview. However, semi-structured survey questionnaires have also been used. In both of the methods (open interview and semi-structured survey questionnaire), the researcher had to depend on the conversation with the respondents. However, while studying conflict related matters, it is very difficult to obtain the real situation from the respondents. That was also evident in my internship research on water conflict in India.

- This study is fully dependent on the field survey and observations of the researcher during December 2010 to February 2011 (3 month). It took a bit of more time to complete this thesis due to a loss of field data.

Chapter–Three

Description of the Godavari Watershed Area

This chapter briefly discusses the features of the Godavari watershed in general and the study area in particular. The location of the Godavari watershed as well as Badikhel and Godavari VDC of Lalitpur district is also discussed in this chapter. This chapter further illustrates the topographic maps of the Godavari watershed. The chapter discusses local features of Badikhel VDC in depth because the focus of the field work was in that VDC. However, part of the Godavari VDC is also a study area. Nevertheless, detailed features of Godavari VDC have not been included. The study area in this study denotes both of the VDCs in general but Badikhel VDC in a particular. The chapter further illustrates the climate and vegetation of the study area. Demographic features of the study area, educational and literacy status, occupation structure, average landholdings and livelihood strategies of the watershed area are also discussed in this chapter. The chapter ends with discussing irrigation management practices in the watershed area.

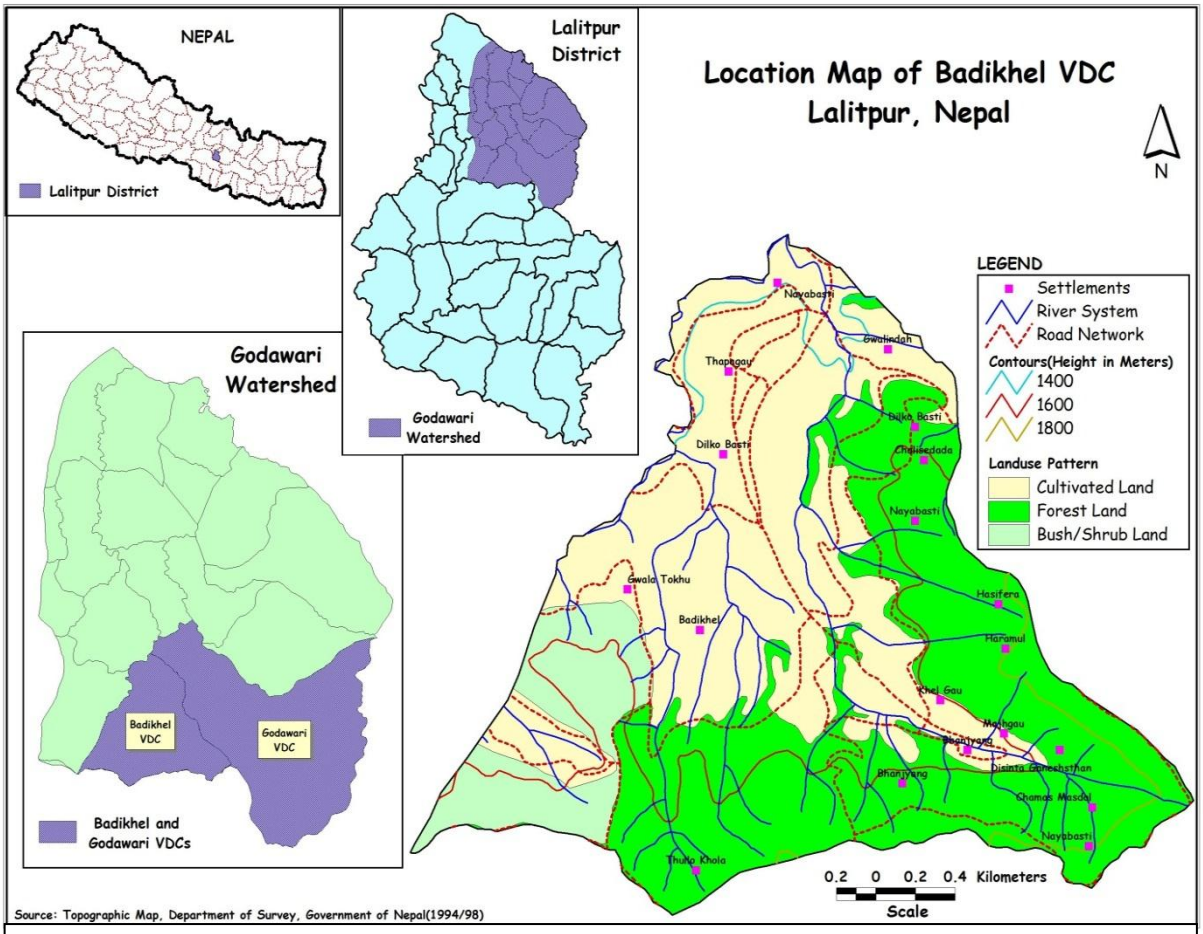
3.1 General Description of the Godavari Watershed

The Godavari watershed area extends over more than 10 VDCs of the Lalitpur district of Kathmandu valley. The terrain consists of mid hills and altitude ranges from 1400 to 2600 masl[9]. This is a highly vegetative area. It is a source of water for many downstream VDCs and partially for cities of the Lalitpur district. The watershed area has many rivers such as Godavari khola, Kodku khola and Thulo khola, as well as spring resources like Godavari *kund*, *Gwalindaha mul* and *Khasimara mul*. Due to its abundance in vegetation and greenery, the International Centre for Integrated Mountain Development (ICIMOD[10]) regional office has established a demonstration site for nature conservation and rural and alternative technologies in this area. Also, due to the ICIMOD, this watershed area is famous in the Hindu Kush-Himalayan region.

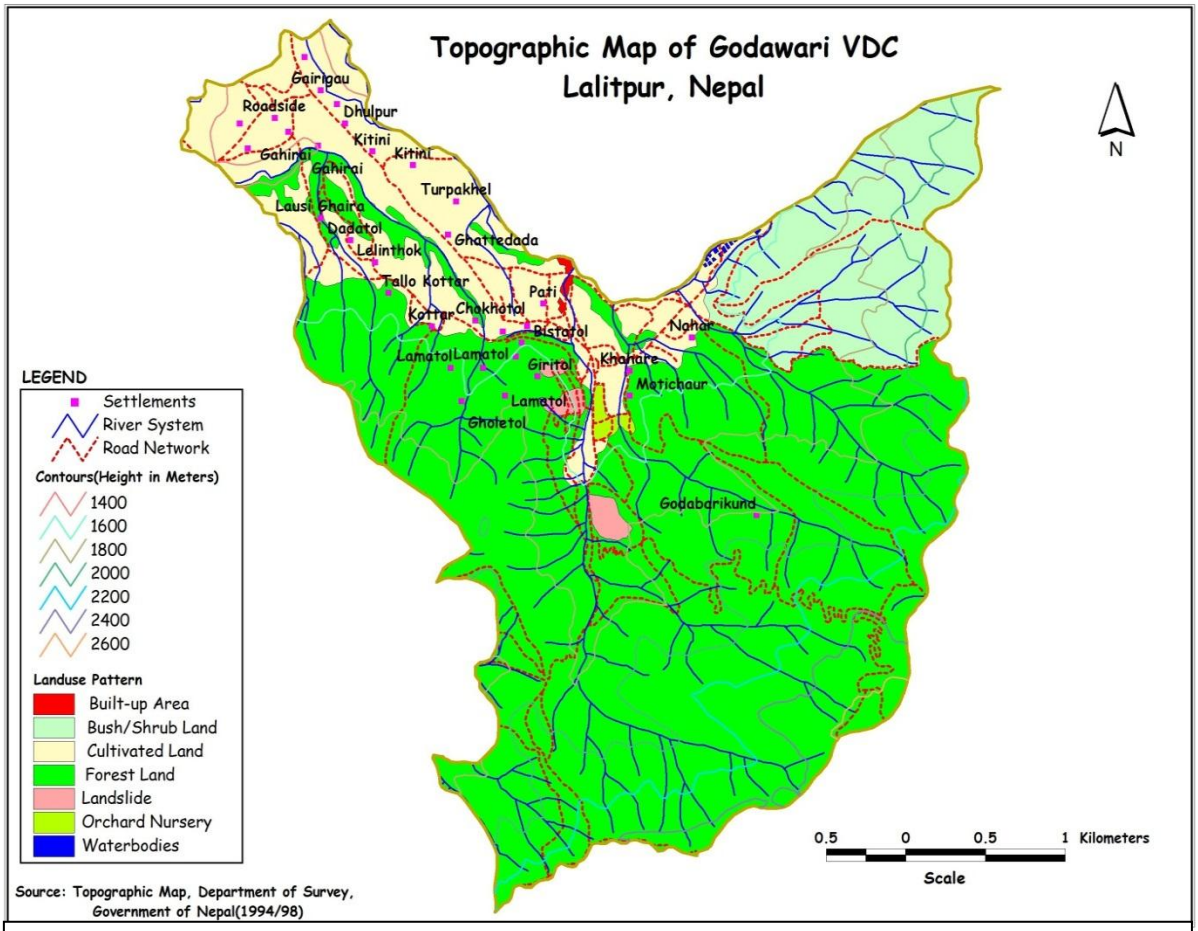
The watershed is located about 12 km southeast from the Lalitpur district headquarters. It falls administratively under the central development region, Bagmati zone and Lalitpur district. Most parts of the area have all weather motor-able roads and good public transportation facilities. Likewise, many places of the watershed are connected by the blacktopped road from Kathmandu metropolis. The watershed area extends from 27° 33.6' north to 27° 36.6' north (latitude) and 85° 20.4' east to 85° 24.6' east (longitude). Although there are many VDCs under the Godavari watershed, only Badikhel and Godavari VDCs were studied in detail for this study. Moreover, the major study was conducted in the Badikhel VDC. Below maps 3.1 and 3.2 illustrate the study area under Godavari watershed.

[9] Meter above sea level

[10] The ICIMOD is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush-Himalayas. The Hindu Kush-Himalayan countries are Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan.



Map 3.1 Location and topographic map of Badikhel VDC and Godavari watershed



Map 3.2 Topographic map of Godavari VDC

The watershed area was not a focus of immigrants before 10 years ago. During the 12 years of conflict, this area became popular due to its natural beauty and resources. The area is a resource depository for many downstream VDCs. The Godavari and Kodku khola have been providing irrigation and drinking water to many VDCs for a long time. However, the watershed area is in a vulnerable condition of encroachment due to the saturation of open lands in Kathmandu city. Hence, it is gradually converting from peri-urban into a cosmopolitan environment.

The study area (Badikhel and Godavari VDC) is reachable by one hour bus travel from Kathmandu metropolitan city. The site is a peri-urban area whereas most parts of the VDCs are still rural in nature. Major ethnic communities are Bramhan, Chhetri, Pahari, Newar and Tamang. Existing water sources in the Badikhel VDC are *Kodku khola*[11], *Gwalindaha mul*, *Khasimara mul*, *Harra mul*, *Sirupatya mul*, *Damile khola*, *Chandole mul* and *Thulo khola*. Godavari VDC has Godavari khola, Godavari kund and a lot of small spring sources. Two brick factories and 10 bottled water companies are established in the Badikhel VDC. One tanker company was also in operation in Badikhel but due to the conflict with local people, it has not restarted operation after its previous closure. The existing uses of water are drinking and household use by the local residents of the watershed and industrial and commercial use by the brick industries and bottled water companies. Local people were attempting to start

[11] River/rivulet/stream.

water tankers in Badikhel VDC but at the time of field work, it was not yet started. Therefore, a part of Godavari VDC was also taken as a study site only for the issues of water tanker.

The Badikhel VDC is slowly becoming a part of the city though it is still a peri-urban area. Land transaction (buying and selling) for homestead purpose is saturated in the city core area, hence has been concentrating in this area. Moreover, the peri-urban area is the main land transaction point in Kathmandu valley because of the available facilities of drinking water. Primary occupation of the residents of the Badikhel is agriculture. However, residents also engage in other secondary and tertiary occupations. The chosen site for the study is located close to the city in Kathmandu metropolis. In the local dialect, the periphery of the city area (mostly peri-urban) is called 'Kanth.' Both city and the village characteristics are present there. Moreover, the VDC has a hybrid nature.

Previously, the residents of the Badikhel were homogenous e.g. *raithane*[12] farmers. The ethnic composition of such a *raithane* is diverse consisting of *Pahari*, *Bramhan*, *Chherti*, *Newar* and *Tamang*. Nowadays, the VDC is a kind of cosmopolitan area. People migrated from different places of the country live there. Furthermore, some employment opportunities are also generated by the brick industries and the bottled water companies. As the brick industry is labor intensive, it needs large numbers of labor. The resulting employment opportunity is also a luring factor, causing rapid in-migration not only in Badikhel VDC but also elsewhere in the Kathmandu valley.

3.2 Climate and Vegetation

The study area has a temperate climate most of the time of the year. Maximum temperature in summer goes up to 23.6° Celsius whereas the minimum temperature in winter goes down to 10.7° Celsius. The area has an average annual rainfall of 1232.6 mm. More than 80% of rain comes during the monsoon between June to September. (Lalitpur DDC, 2004). Due to its peri-urban nature, this VDC is famous for greenery and fresh vegetables. Furthermore, the area is highly vegetated. Due to the high level of vegetation, the area has lots of permanent water sources. Main sources of water of the VDC for drinking and irrigation are *Chandole mul*, *Gwalindaha mul*, *Harra mul* and *Sirupate mul*. Though the *Khasimara mul* is located at the Chapagaon VDC, it has always been used by the residents of Badikhel VDC for drinking and domestic use.

Main trees found in the area are *Chilaune* (Schima wallichii), *Katus* (Castanopsis indica), *Kafal* (Myrica esculenta), *Uttis* (Alnus nepalensis) and *Sallo* (Pinus roxburghi)[13]. This area is also popular for NTFPs (non-timber forest products). Out of the total area of Badikhel VDC, about 35% of land is agricultural land suitable for crop production, 44.04% is productive forest and 0.75% is marginal land followed by 0.83% of grazing land. Main forests are under the community forest user group-CFUG (Ghimire, 2008). Furthermore, main fruits grown in the study area are orange, pear, peach and plum. Similarly, major agricultural productions are paddy, maize, wheat, mustard, potato, cabbage, cauliflower and fava bean (*Bakulla*[14]).

[12] The residents of the particular place since their birth. Moreover, *Raithane* denotes those families who have been living to the particular place continually since many generations following the occupations mostly same as their father and forefather.

[13] Names in parentheses are scientific name.

[14] Nepali name for fava bean.

3.3 Statistical Facts of the Study Area

3.3.1 Demographic Features of the Badikhel VDC

According to the recent village profile of Badikhel VDC, total population of the VDC is 3528 with total of 722 households (Badikhel VDC profile, 2010). The VDC is divided in nine wards. The table below depicts the present ward-wise population composition of the VDC.

Table 3.1 Ward-wise population distribution of Badikhel VDC

Ward No.	Total Household Number	Total Population	Number of Female	Number of Male	Family size
1	91	446	230	216	4.9
2	87	459	235	224	5.28
3	66	327	164	163	4.95
4	84	406	203	203	4.83
5	100	452	211	241	4.52
6	62	310	151	159	5.00
7	112	586	284	302	5.23
8	64	242	117	125	3.78
9	56	300	150	150	5.36
Total	**722**	**3528**	**1745**	**1783**	**4.89**

Source: Badikhel VDC Profile, 2010.

The table shows the average family size of the VDC is 4.89 which is less than the national average of 6. In contrast, from the field survey (in sampled houses), the family size is found to be 6.27 which is a bit higher than the national average. Total households of the country are 4,253,220 whereas total population according to the Central Bureau of Statistics (CBS), 2001 is 23,151,423. The average national family size then comes to be 6. The population composed of 50.05% female and 49.95% male. In the field survey, the male to female ratio is 1:1.33 which is higher than the national average of 1:1.002. Total population in the sampled 75 households is 470 (202 male and 268 female).

3.3.2 Education Status

Although the VDC is close to the capital of Nepal, the literacy rate as mentioned in the latest village profile and the result of field survey is less than the national average of 54.1%[15]. Furthermore, the average literacy rate as mentioned in the village profile is 47.17% whereas the average literacy rate obtained from the sampled household is

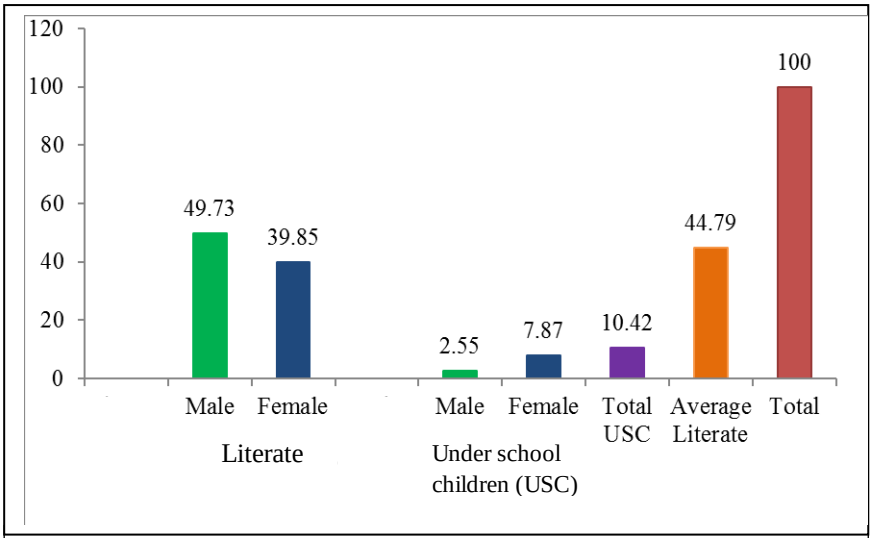


Fig. 3.1 Literacy status of Badikhel VDC

[15] Statistical Year Book of Nepal 2009, Central Bureau of Statistics, Kathmandu Nepal.

44.79%. However, this is calculated excluding the under school aged children. The *Pahari*[16] communities of the village have a lower literacy rate though the situation as observed is improving gradually.

3.3.3 Occupation Structure

Badikhel is a small rural village situated close to the Kathmandu metropolis. More than 82 percent of the villagers are farmer, so agriculture can be taken as the backbone of the VDC. The primary occupation of most of the residents is agriculture. Along with agriculture, they also have secondary and tertiary occupations. Females are mostly confined to the inner household activities whereas some are involved in service and business. The figure describes the occupation structure of Badikhel VDC.

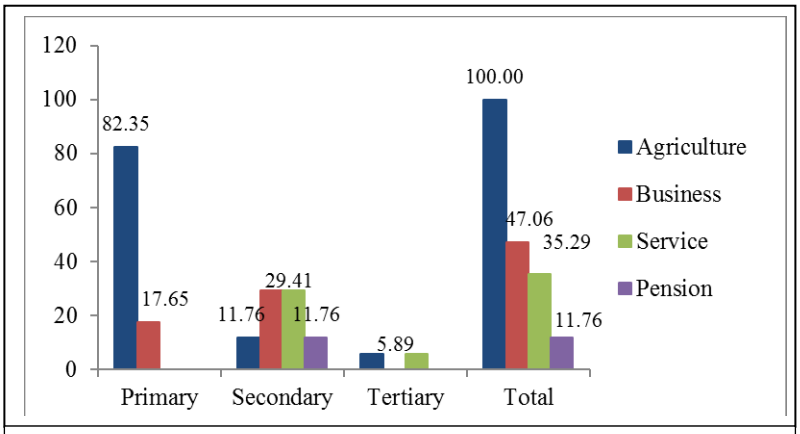


Fig. 3.2 Occupation structure of Badikhel VDC

Agriculture is the primary occupation of more than 82% population of Badikhel VDC. Less than 12% only have agriculture as a secondary occupation whereas less than 6% have agriculture as a tertiary occupation. Nepal is an agriculture based country and the national percentage of people depending on agriculture is more than 80%. Also more than 40% of the country's GDP comes from the agricultural sector. However, agriculture is still of the subsistence type. As secondary and tertiary occupation, people are involved in small business, industrial work, wage labor, foreign jobs, especially in the Gulf countries and governmental jobs. Very few local residents are involved in brick, bottled water and water tanker business.

3.3.4 Average Landholdings

The average landholding size in Nepal is 0.8 hectares, which varies according to the ecological region. The highest landholdings is in the terai region (0.94 hectares) whereas the smallest is in the middle hills (0.66 hectares) followed by 0.73 hectares in the mountains (CSRC, 2009). Lalitpur district lies in the middle hills. According to the latest VDC profile of Badikhel VDC, a total of 12 families are landless. In this VDC, 9.7% have landholdings less than 1 ropani[17], 61.63% have land holdings of 1 to 5 ropani and 13.3% population have landholdings of 6 to 10 ropani followed by 5.96% having above 11 ropani. (Badikhel VDC profile, 2010). This VDC is rich in water resources in comparison to other VDCs of the district. The landholding consists of irrigated and non-irrigated land as well as *kharbari* and private forest land.

[16] An indigenous tribe residing in the Badikhel VDC.

[17] Ropani is the unit of land measurement in Nepali Hill. The breakdown of land unit measurement in hill and mountain of Nepal is *Dam*, *paisa*, *ana* and *ropani*. In terai area, the prevailing unit is *Dhur*, *Kaththa* and *Bigha*. 20 ropani = 1 hectare and 13 ropani equals to one Bigha. 1 ropani = 508.72 m^2 and 1 kathha = 338.63m^2. For detail land measurement in Nepal please visit: http://www.nepalhomepage.com/converter/#1 and http://en.wikipedia.org/wiki/Bigha.

3.3.5 Livelihood Strategy

The concept of sustainable livelihood was first used as a development concept by Chambers and Conway in 1990s. Chambers and Conway, 1992 defines: "Sustainable livelihood can cope with and recover from stress and shocks, maintain or enhances its capabilities and assets and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.' (Chambers and Conway, 1991:6).

The main livelihood of the VDC is agricultural production. People produce cereal crops like rice, wheat, maize, barley and millet and vegetables like potatos, cauliflower, fava bean, cabbage, spinach etc. Most of the farmers are doing agricultural works for their subsistence. Involvement in commercial vegetable farming is very low. Poultry farming, fish farming and cash crop farming are emerging as small businesses, introduced mostly by the in-migrants. Kathmandu city is close to the study area and has a high demand for fresh vegetables, fruits, chicken and fish. The main markets for products from the VDC are the many cities of the Kathmandu valley. However, the most important markets of the VDC are Lagankhel and Patan of Lalitpur district.

Bamboo crafting is one of the popular occupations in *Pahari* communities of the VDC. Almost 90% *Pahari* communities are involved in bamboo crafting. They make various bamboo products and sell them in Lagankhel and Patan. Furthermore, the intermediary businessmen sell the production of Badikhel to other big cities of Nepal like Narayanghat, Butwal, Pokhara, Birgunj and Biratnagar. Although there are some growing water businesses in the VDC, the main livelihood strategy of the people of many communities is based on agriculture and small bamboo crafting.

3.4 Irrigation and Drinking Water Management Practices in the Study Area

Badikhel VDC lies in the middle hills with abundant water sources. The VDC has 17,824 ropani (891.2 hectare) of land area. Out of the total area, only 35% is cultivable, 44.04% of land is covered by forest, 10.15% of land is unproductive followed by 10.81% of land remaining barren (Badikhel VDC Profile, 2010). Although Badikhel is a water resource abundant VDC, out of the productive cultivable land, irrigation has reached only to 40.32% of land. The remaining 59.68% of land has no irrigation facility thus farmers are depending on rain.

Main sources of water in the VDC are *Chandole mul*, *Harra mul*, *Gwalindaha mul*, *Thulo khola*, *Kodku khola and Sirupate mul*. Khasimara mul has been used for drinking water and irrigation in Badikhel VDC for a long time although it is located in Chapagaon VDC (adjacent VDC). Due to the heavy forest coverage in the VDC, there are numerous tiny water sources too. Kodku khola is flowing through the heart of the VDC towards Kathmandu city. Thulo khola is a tributary of Kodku khola while Kodku is a tributary of Karmanasha khola. Kodku khola meets Karmanasha khola in Harisiddhi VDC. Though the VDC has good vegetation, residents believe that *Sallo* (pinus roxburghi) forest situated on the ridge of the hills of the VDC helps to dry out the water sources. Further, the farmers argue that *Sallo* tree sucks water whereas *Chilaune* (schima wallichi), *Kafal* (myrica esculenta) and *Kapur* (dryobalanops spp.) contribute to emerge water. Whatever the farmer's belief, they are observing a diminishing water quantity in many sources. The claim of local residents regarding sources drying out might not only be generalized because there might be other

causes like global warming. The existing water management practices of Badikhel VDC are discussed below.

Five main irrigation canal systems are operational in Badikhel VDC. All these irrigation systems are the FMIS (Farmer Managed Irrigation System) under water users associations (WUAs). These irrigation canal systems are the *Durga* small irrigation system, *Manjh kulo, Harramul sinchai kulo, sirupate sinchai kulo* and *Ghatte kulo*.

Table 3.2 List of irrigation canals in Badikhel VDC

SN.	Name of Irrigation Canal	Source/intake at	Command area
1	Durga Irrigation canal	Chapagaon ward no. 8	Ward no. 2.
2	Majh Kulo	Chapagaon	Ward no. 2 and others.
3	Harra Mul irrigation canal	Harramul Badikhel 4	Ward no. 3 and others.
4	Sirupate irrigation canal	Badikhel VDC ward no 4	Ward no. 1, 2 and 3 Badikhel VDC.
5	Ghatte kulo	Badikhel VDC ward no. 9, Gwalindaha mul	Downstream areas of Badikhel VDC ward no. 1.

Source: Badikhel VDC, 2010.

These irrigation canals serve water all year round. There are irrigated cultivated lands along both banks of the Kodku khola and the Thulo khola. These cultivated lands are the food depository of the Badikhel. Local farmers manage these irrigation canals and have their own water allocation system. Farmers have been applying the '*alopalo system'*[18] of water sharing mechanism devised by them, many years ago. Moreover, the '*alopalo system*' of water sharing is socio-culturally constructed. In the '*alopalo system*,' each farmer gets a chance to irrigate their land on a rotational basis.

Before talking about the water sharing system, it would be better to know how the system in Badikhel has been working for a long time. Each farmer who has land to irrigate should register their command area in the local irrigation water users association (WUA). Not all the WUAs are registered in the district water resource development committee (DWRDC). Operation and maintenance of the main canal is the responsibility of concerned WUA whereas the maintenance of the branch canals is the responsibility of the individual irrigators who are irrigating land from the particular branch canal. This means that if there are many branch canals, the O&M (operation and maintenance) responsibility is shared over different groups of irrigation water users. The proportion of water allocation for each farmer is decided according to the land size of the farmer. The levy money is also decided according to the size of the land of each farmer. That means the size of the command area determines the turn and duration of the water in the field.

Those farmers whose land is located close to the head-end (intake/weir) of the canal would get water first followed by the farmers at the tail-end. Farmers have developed a system which allocates water principally in an equitable manner to each and every farmer. The WUAs also have some '*heralu*' to take care for and manage water allocation. Mostly, the water sharing issues do not directly go to the WUA executive committee unless there is conflict among farmers. The water sharing issue further goes to the WUA through the *heralus*. The WUA tries to solve conflicts in a mutual understanding.

The water conflicts among farmers were observed especially during the dry season when there is a water shortage. The main conflict exists between head-end and tail-end farmers.

[18] Rotational basis.

Sometimes there is no water at the tail-end when head-end farmers take more water than allocated for them. The allocated duration for each farmer is generally monitored by the *heralus*. However, they said that monitoring is always difficult unless all farmers obey to the rules of water allocation. There are irrigation canals mostly on the both banks of the Kodku and Thulo khola. Farmers quarrel over the quantity of water diverted to their side of the canal. In some places, there are disputes between irrigation and drinking water users who are taking water from the same source. Normally, both irrigation and drinking water users are the same, but this is not the case in all places.

Regarding drinking water, there are many drinking water supply projects running from different spring sources available in the Badikhel and Chapagaon VDC. Main drinking water supply schemes are *Khasimara*, *Chandole*, *Harramul*, *Gwalindaha* and *Sirupate*. Although the VDC has abundant water sources, the management of drinking water is poor. According to the latest VDC profile, 665 (92.11%) households out of the total 722 households of the VDC have piped water facilities either through public or private tap. The remaining 52 (7.2%) households use well water. Five (0.69%) households use open water sources from khola, canal and pond. However, the VDC's claims were observed not to be true during the field visit. The villagers have a tap water system but these pipelines are very irregular. Some villages are depending on an open *khola*, canal and pond due to the irregular water flow from the tap.

The scarcity of water is especially rampant during the dry season. According to the villagers, the main problem of water shortage is the management of water not the quantity. Donor agencies built these drinking water supply systems and handed them over to the villagers (users' committee). Most of the drinking water supply systems are irregular in Badikhel due to a shortage of funds for operation and maintenance. In case of O&M of the drinking water supply system, the responsibility of the main line goes to the users committees whereas the responsibility of the distribution lines go to the particular users who use water from these particular branch lines. In some drinking water systems, problems are caused by brick kilns as they dig away land each year, leaving the HDPE pipes exposed on the ground. Then anyone can damage the pipe or take water, causing interruption of the water supply in the destination village. Leakage also causes air blockage in the pipeline system which results irregular water conveyance through pipes. Most of the drinking water supply systems are of an intermittent type. The villagers store water in the reservoir tank and supply timely in the morning and in the evening. Competition on water use causes water management problems. Industries (water tanker, brick and bottled water) are also contributing to the mismanagement and subsequent water scarcity.

Chapter-Four

The Water Tanker Companies

This chapter discusses the water tanker companies supplying water in Kathmandu city from various places. The chapter also explores the background of the emergence of water tanker companies in Kathmandu valley, locations of tanker water filling stations and contribution of water tanker companies. Also, this chapter discusses the details of the water tanker entrepreneurs association, the details of the closed water tanker company of Badikhel VDC, the impacts of tanker companies in the study area and issues of conflict between farmers and water tanker companies. The chapter ends with a conclusion.

4.1 Overview and Emergence of the Water Tanker Companies

There is a scarcity of water in Kathmandu valley not only in the dry but also in the wet season. In Nepal, the dry season normally starts from mid-March and lasts until mid-June, whereas the monsoon starts in July and remains until September. Since 2007, the Kathmandu Upatyaka Khanepani Limited (KUKL), an authorized water utility operator for Kathmandu valley, has been supplying drinking water in the cities of Kathmandu valley. Before this, the Nepal Water Supply Corporation (NWSC) supplied water to these cities. The water supply system in Kathmandu valley consists of three arrangements for provision, namely municipal services, traditional provision and the private water market (Moench, 2001). According to the author, this system denotes; the municipal supply system through Nepal Water Supply Corporation (NWSC), the traditional water facility of *dhunge dharas* and private water market through water tanker companies. Besides water tanker companies, bottled water companies and private water vendors are also supplying water to city dwellers.

Photo 4.1 Water supplying tankers in the Kathmandu valley

Necessity is the mother of invention (anonymous). The emergence of water tanker companies in Kathmandu valley can be taken as an invention for sorting out the water scarcity problems. In response to the huge supply gap, a water market emerged in Kathmandu valley in the 1980s in the shape of water tanker trucks. Since then, sometimes slow and sometimes fast, the water market has been constantly growing with the progressively increasing scarcity of water in the Kathmandu valley (Shrestha and Shukla, 2010). Moench and Janakarajan (2006) argue that the emerging private water market in Kathmandu valley exists to fulfill the gap of services of water supply left by traditional sources and the piped water supply system in Kathmandu valley. In the past, the Nepal Water Supply Corporation (NWSC) was also supplying water for high altitude areas of the city through the use of water tanker trucks. Tanker truck business has been a haphazard one since the beginning but also very crucial for citizens. Since the water tanker companies purchase water in the rural village and sell to the

city, it constitutes a rural-urban water transfer. The water tanker entrepreneurs have had their own formal association since the beginning although many water tanker companies have found to be unregistered to the association. Yet, there is not any form of governmental regulatory mechanism for water tankers operated in Kathmandu valley.

Tankers supply water from many places of the peri-urban areas of Kathmandu valley. Among many places, Godavari is one of the most significant water filling stations. Since the area is highly vegetated and green, the water of Godavari is popular in Kathmandu valley for its taste and quality. Currently, there is one registered water tanker company in Godavari whereas there is numerous household water tanker filling points. It is very difficult to figure out household filling points because they are erratic and informal. Godavari was one of the first water extraction places for water tanker companies in Lalitpur district. There is no historical data on who started the first water tanker company in the Godavari VDC. The existing owner started his water filling station one year ago. In Badikhel VDC, one local entrepreneur started his water tanker business more than two years ago. After 15 months of operation, it was closed due to a local conflict between the owner and local residents.

Quality of the Tanker Water

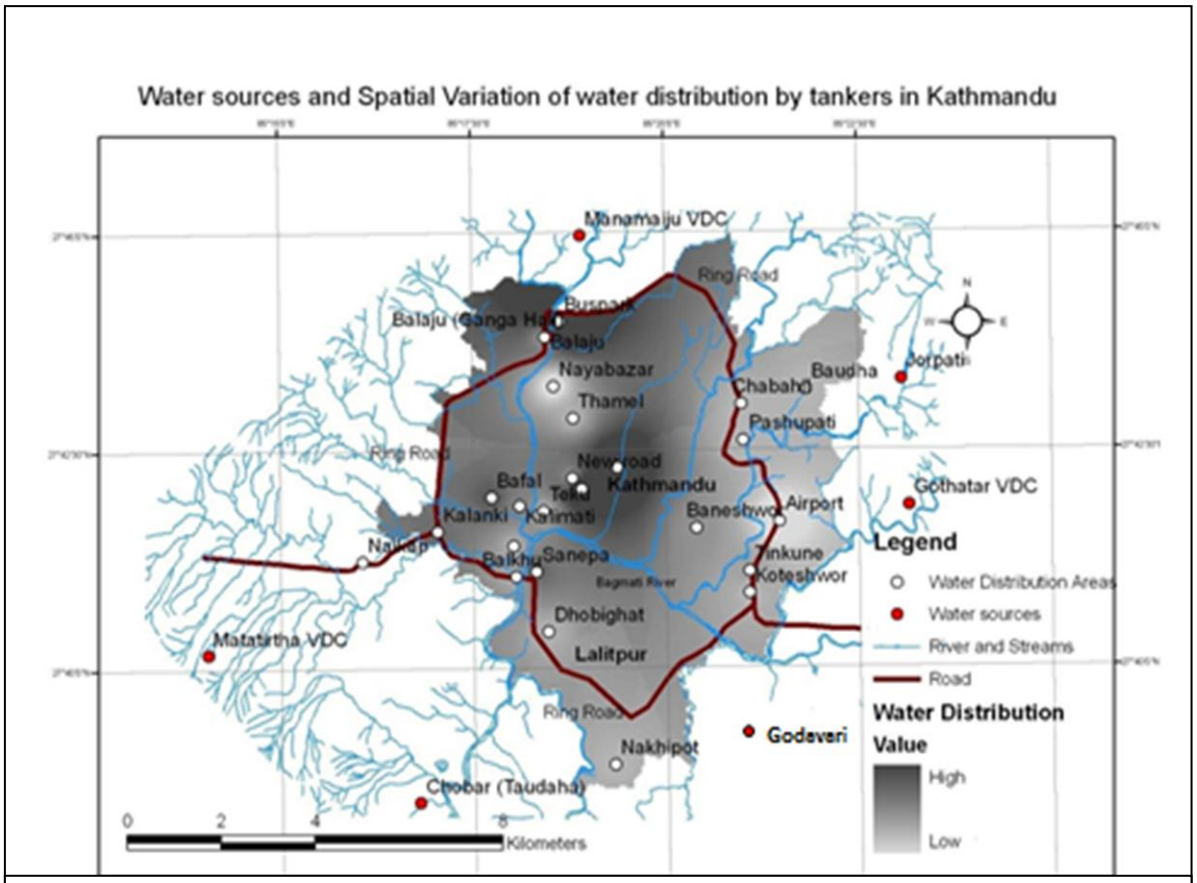
Water tanker companies do not purify water in a good way in order to achieve the permissible water quality required for drinking. Mostly, water tanker companies filter water using sand and a carbon filter and then sell it to the city. Some companies use alum and bleaching powder to avoid germs, which was not a common practice among all water tanker companies. It is very hard to ensure the quality of tanker water. This is especially the case because the focus of water tanker companies is on meeting quantity rather than quality targets. Customers have also observed to be less conscious regarding the quality of tanker water. Interestingly, water tanker companies write 'drinking water' on the body of the tankers. In contrast, some tanker entrepreneurs argue it to be non-drinkable water. During site visits in many filling stations, I observed that some companies used a simple sand filter, but many companies did not have any filtration or purification system at all. The sources of tanker water were also turbid and contaminated even in January.

Many hospitals and hotels use tanker water for non-drinking purpose. Consumers said that they use tanker water for drinking without boiling. Some consumers seemed to be aware of the quality of tanker water and only used it for non-drinking. Those who were aware use jar water for drinking. Water tanker drivers and helpers said tanker water is potable water. Unfortunately, one driver drank tanker water directly in front of me to show the good quality of it. I apologize for that because due to my inquiry that person drank raw water without care. Below sub-sections discuss specific issues of the water tanker companies.

4.2 Major Water Tanker Filling and Distribution Spots in Kathmandu Valley

Matatirtha, Chobhar (Taudaha), Jorpati, Gothatar, Manamaiju, Godavari, Lele, Balaju, Swayambhu and Badikhel are the main water sources of tankers. Matatirtha, Lele, Godavari, Chobhar (Taudaha) and Badikhel are the main spring sources whereas Gothatar, Jorpati, Balaju and Swayambhu are main groundwater sources. Matatirtha VDC sells water to water tanker companies at a nominal price. Private entrepreneurs also have established deep borings to extract groundwater in those locations. From February 2011, such kind of deep boring water extractions became illegal unless they have a license from KUKL. Due to the worsening geological condition of Kathmandu city with heavy groundwater extraction, the KUKL announced strict rules to control and manage it.

Supply of tanker water concentrates on the water scarce locations of Kathmandu valley. These locations are: Sundhara, Bagbazar, Kalimati, Bafal, Teku, Newroad, Patan, Nayabazar,



Map 4.1 Water sources and spatial variation of water distribution by tankers in Kathmandu (Adapted from: Shrestha and Shukla, 2010).

Sanepa, Baneswore, Dhobighat, Koteshwore, Kuleshwore, Airport, Thamel and Maitidevi. These places are the core city areas of Kathmandu where the population is highly concentrated. In those places main consumers of tanker water are middle class residents. Tankers also supply a significant quantity of tanker water to hospitals, hotels, restaurants, schools, contractors, pharmaceutical companies and producers of soft drinks.

4.3 Contribution of the Water Tanker Companies

According to the '*Upatyaka Khanepani Tanker Byabasayi Sangh*' (The Valley Drinking Water Tanker Entrepreneurs Association), there are altogether 450 to 500 tankers supplying water in Kathmandu valley. However, the exact number is not known. Only 315 tankers are registered with the association. These tankers fill water in different locations of the peri-urban areas of Kathmandu valley. Each tanker delivers about 10,000 liters of water per trip. The association estimates, one tanker makes 5 to 7 trips (6 on average) per day in dry season when water scarcity is in the apex and 1 to 3 (2 on average) trips in off-peak season. According to this estimation, total average dry season water delivery comes at 28.5

((10,000*6*475)/1000000) MLD (million liters per day) and 9.5 ((10,000*2*475)/1000000) MLD in off-peak season[19].

The annual report of KUKL 2010 estimates 320 MLD of demand for drinking water in Kathmandu valley whereas the dry season supply is only 120 MLD. Moench (2001) states, during 2000-2001, the loss in distribution of NWSC was about 40 to 60 percent. On the supply side, if we take a 40% loss, the KUKL water supply in the dry season comes to 72 MLD. If we compare this with tanker water supply of 28.5 MLD in dry season, the tankers account to 40% (28.5/72*100) of KUKL water supply. On the demand side, supply of tanker water fulfills 8.9% (28.5/320*100) of the demand of the total estimated demand of 320 MLD in Kathmandu whilst the supply of KUKL fulfills 37.5% (120/320*100) of the demand (without considering 40% system leakage).

During 2000–2001, tanker water supply was estimated to be 19% of the estimated NWSC of 80 MLD minus 60% losses (Moench, 2001). Contribution of tanker water supply progressively increased from 19% in 2000-2001 to 23.75% (28.5/120*100) in 2010. However, if we calculate from current supply of both, the KUKL and tanker companies have fulfilled only 46.4% (37.5+8.9) of demand of water in Kathmandu valley. The 23.75% is calculated as compared to KUKL's 120 MLD supply per day. This estimation and calculation shows the significant contribution by tanker suppliers to fulfill total water demand in the Kathmandu valley. Besides the water tanker, bottled water and private vendors contribute to filling the water supply gap in Kathmandu valley. Reliable data of bottled water companies and private water vendors are not available.

The above contribution is an estimation and calculation based on the data of the association. The contribution of tanker water might also become clearer by considering the narration[20] of a resident of Baneshwore, Kathmandu: "*My name is Pemba Tamang (name changed). I am 45 years old. I am from Sindhupalchok district. I came to Kathmandu five years ago with my family, seeking opportunities. I have been working in one construction company as a skilled labor (mason). We are five members in our family i.e. I, my wife, my mother and two school going kids. We have been residing in Baneshwore height for three years, renting two rooms because I cannot pay much money in rent. Water! Oh, one of the most significant word in my life living in Kathmandu. You get job here easily but water is almost impossible. Taps are very irregular in terms of water flow in pipes. Only once a month, drinking water comes from the tap. In my home area, we have sufficient water but I am compelled to live in this water scarce place (Kakakul) because of job and other amenities of Kathmandu. Quality!!! Oh, it is far away because quantity has not been met yet. You need to boil both tap and tanker water before drinking. This area is at height, so it is very difficult to get municipal tap water. My house lord rarely provides tanker water. Normally, we buy tanker water ourselves at the rate of NPR 1,200 for 6,000 liter. Quality of tanker water is also not good. I am using it for drinking and other purposes. I boil tanker water before drinking. Rate varies during dry season and wet season. Dry season is more difficult than wet season.*

As I have a job in a construction company, I cannot stay on queue at the dhunge dharas for 1 to 2 hours. However, there are no dhunge dharas close to my residence. There is no affordable alternative to replace the tanker water in Kathmandu valley. Jar water is too expensive for us (NPR 60 for 20 liter-NPR 3/liter) as compared to NPR 1,200 for 6,000 liter (NPR 0.20/liter) of tanker water. Due to

[19] These data are calculated in an average to make estimation of the contribution of tankers on water supply in the valley. Therefore, they are not presented in an absolute number. Nevertheless, getting exact data is very difficult. Tanker water supply is an erratic business, hence it is difficult to predict daily selling in exact. Therefore, average selling can only be calculated and estimated.

[20] The narrations mentioned in this thesis are summaries of the individual in-depth interviews. These interviews were translated from Nepali language into English.

the scarcity of water, bathing and washing clothes are irregular in my house. Tanker drivers say tanker water is drinkable but it is not. We are forced to drink tanker water because we do not have alternatives. Due to this, my family faced a lot of disease problems. The KUKL has failed to provide sufficient water for the residents of Kathmandu valley. The Melamchi project is a hope but I heard the project has a lot of problems, hence I have no hope to see the water of Melamchi in my life."

How people are using tanker water and what is the rate?

Problems are the greatest in the high-altitude areas of the city. About 30% of the tanker water users use tanker water for non-drinking purposes like toilet use, dish cleaning and cloth washing. Some 50% reported that they use tanker water for drinking after boiling. About 20% of the users use tanker water for drinking after filtering, but their filters were malfunctioning. Hospitals and construction companies use tanker water for non-drinking purposes but hotels use it for drinking. Some hotels have old dispensers of jar water which they fill with tanker raw water. This may affect the health of city dwellers who use hotels for eating. In reality, tanker water is non-drinkable because it is raw and can only be used for non-drinking purposes.

Users of tanker water say that the rate of water is high during dry season. The rate also varies according to the tanker companies and distance of the user's house from the source of tanker water. Users buy tanker water combining 4 to 5 neighbors because the tanker capacity ranges from 6,000 liter to 12,000 liter. Many houses have a 1,000 to 5,000 liters storage capacity, so the inhabitants cannot buy a full tanker of water alone. The average rate, as many respondents said, is NPR 1,200-NPR 1,500 for 6,000 liter, whereas NPR 1,800-NPR 2,200 for 12,000 liters of tanker water. The lower range and higher range of the above rate represent the rate in wet season and dry season with 10 kilometer radius distance from the source to a user's house. Regarding quality, respondents said that spring water is better than groundwater as groundwater is somehow sticky and thick. They further reported that they have no alternatives for water except tanker water. They have to go to office, so they cannot stay on queue at *dhunge dharas.*

4.4 The Valley Drinking Water Tanker Entrepreneurs' Association

The *Upatyaka Khanepani Tanker Byabasayi Sangh* (The Valley Drinking Water Tanker Entrepreneurs' Association) was informally founded in 1989 in Kathmandu. However, it remained almost completely inactive for ten years not contributing any significant work. The current association was formed and registered in the district administration office of Kathmandu district in 1997 (2054 BS.). The association is registered as a NGO.

Before the association, there were lots of rumors about tanker water. According to the current board member, water tanker entrepreneurs were facing lots of problems from police, local thugs and goons. There was no strong agency to speak on behalf of entrepreneurs during tanker accident related critical problems. Therefore, entrepreneurs had to give money to the police as a bribe in order to settle cases. Previously, the entrepreneurs did not think about the sustainability and longevity of water tanker business in Kathmandu valley. They started tanker businesses to gain profit from it. Once they observed the large profits and worsened condition of water scarcity in Kathmandu city, they upgraded their business, adding more tanker trucks. In the course of time, entrepreneurs gradually realized the need for a separate association to raise a voice on behalf of water tanker entrepreneurs. Actually, the tanker entrepreneurs came from other businesses, so they already had their individual forums to seek help during problems on their business, but their forums did not work well collectively.

There was also unhealthy competition among entrepreneurs, which they later realized as harmful for their business. For the internal regulation of tankers and to show consumers a legitimate organization, entrepreneurs formed an association. The current executive body of the association is the second executive body after its first registration. The first executive committee had nine members whereas the current has seventeen members with some recently added members. The association is active in Kathmandu valley, working with its member entrepreneurs. In contrast, during interviews with some tanker entrepreneurs, they said that they did not know of the existence of any water tanker entrepreneurs association. During interviews with executive committee members, the association was also observed to be full of politicians with different political ideologies which frequently raised internal conflicts. An executive committee member said that there were two ideological groups within the association, which hinder the association's ability to organize meetings and to reach a consensus. Entrepreneurs with different political ideologies all seek their decisive role in the executive committee. There were always disputes within the association while making internal decisions. So, finally, the executive committee decided to add some key and general members in the committee.

Their internal disputes and politics may also be taken to be a reflection of the current vulnerable national political condition of Nepal. There is the emergence of professional organizations of specific groups in the Nepali society led by political parties. For example, farmers and teachers have their own associations. Initially, the association divided seats proportionately according to the power of the political parties that led to the emergence of informal groups within the association, mostly along political lines. There is always conflicting interest in the association due to these informal groups. To reduce the disputes and to work more smoothly, the committee has had to add more members to the executive committee otherwise it may break down forming another parallel organization. Political parties of Nepal are also in a similar condition, breaking down and forming new political parties.

A total of 317 tanker trucks have been registered by the association. Registered tankers get support from the association. In return for this, they have to abide by rules and regulations of the association thereby gaining legitimacy in the eyes of their customers and ensuring support against increased government restrictions. The tanker association provides lobbying, legal and financial support to member companies during conflicts with government or customers. According to the executive committee member of the association, tanker entrepreneurs have to pay NPR 7,000 annually for each tanker truck as levy. The association has a tanker truck workers welfare fund. From the levy amount, NPR 1,000 goes to the welfare account of workers. Workers include drivers, helpers and some other staffs members working with the association.

According to the executive committee member, the focus of the association is water quality and cost. In contrast, the focus of tanker entrepreneurs is quantity of sales. Although the association is a representative of the entrepreneurs, their interests are different. Coordination and consensus on quality and rate of the tanker water are collective efforts of the association. Besides this, the association has to raise its voice on behalf of its drivers and helpers in the event of (fatal) accidents. The association is trying to make uniformity in water prices but as members of the association said, this is not an easy task. Regarding quality of water, the association is working to generate awareness about the quality of water at the source, during transportation and storage in the storage tank of consumer's houses. The KUKL also has water tanker trucks. According to the annual report of KUKL in 2010, it has 17 water tanker

trucks at the moment. An additional 10 tanker trucks may be added in the near future with the financial support of ADB. Furthermore, the main functions of water tankers of KUKL as explained in the annual report are: to provide water to the system in no supply areas - which is a main priority, to provide water in private trips at KUKL rates and to provide water in emergencies (stand by tankers). (KUKL, 2010).

Furthermore, according to the executive committee member, the association is planning to expand itself as a cooperative, integrating drinking water with health services for consumers. However, this depends on the assistance from other donor agencies. Entrepreneurs are planning to establish one separate water treatment plant in the near future. They are also seeking some funds to organize 'water quality, road safety and health impact training' for their workers. Since the association has no big income sources except levies from water tanker entrepreneurs, these plans are highly dependent on the availability of external funding in the future.

Besides, the association delegation frequently visits KVWSMB and KUKL to settle many issues and misunderstandings. However, at the time of the interview, they put in some demands. They argue, as water supply is an urgent and necessary task, their services of tanker water should be included in an 'urgent service category' of the government of Nepal. If it is included in an urgent service category, they could transport water during strikes and road blockades. They also wanted a tax waiver for their tanker trucks from the government (transport department), for a tax they have to pay annually. The association was hopeful to broaden its business in days to come. Members were also happy to serve water in scarce areas. The water tanker business is expected to remain in the market until the completion of the Melamchi project. Hence, before Melamchi, there is no any indication of a reduction of water tanker business.

4.5 The Closed Water Tanker Company of Badikhel VDC

As said earlier, the water tanker business is a lucrative business in Kathmandu Valley. As the scarcity of water in the Kathmandu valley increases, the tanker business increases at almost a same pace. Seeing the prospects of profit in this business, water tanker companies have been growing day by day. There is the emergence of numerous water tanker companies that are taking water from prominent sources like Matatirtha, Chobhar (Taudaha), Jorpati and Manamaiju. At these sources, tanker trucks have to wait a long time to fill water. Due to the problem of long queues in existing sources, some innovative businessmen searched for new locations to fill their water tankers and sell the water to Kathmandu city. An entrepreneur from Badikhel VDC found 'Gwalindaha mul' located at Badikhel, appropriate and profitable. He is originally from the same ward (nine) where the water source is situated. After some time, the source for tanker filling was closed due to a conflict between farmers and owner. The contradictory narrations given by the ex-water tanker entrepreneur (40 years old) and member of Gwalindaha youth club (25 years old) are mentioned below to make water conflict issues clearer.

An ex-water tanker entrepreneur gave the following account of his closed water tanker business of Badikhel: *"Two years ago, I got permission from Badikhel VDC and acceptance from DDC Lalitpur for five years to take water from Gwalindaha mul. I had started a new business of water tanker in Badikhel with my two tanker trucks. According to the agreement with Badikhel VDC, I had to pay NPR 50,000 annually to Badikhel VDC as levy for the extraction of water. None of the villagers had the idea to sell water before me. I also made clothes washing platforms to make clothes washing easier at the requests of women of Gwalindaha. I spent NPR 175,000 to construct clothes*

washing platforms and some structures necessary for filling the water tanker. I spent that amount of money trusting my relatives and seeing the scope of that business. I did not foresee any obstacles from villagers who are also my close relatives. I operated the water tanker business for 15 months. Then after, Gwalindaha club and some villagers objected to my business, referring to many problems. They said that my trucks were damaging the road and caused noise pollution in the village. That was not the case because there were lots of vehicles moving at that time during day and night. They did not object to those other vehicles. This reason was not the true reason for their objection; the main reason was personal enmity and politics.

My relatives did not want to see my progress in making money from my innovative business. My relatives and close brothers made trouble for me. Because of this, I lost the invested money. The VDC has to pay my money because it has been unable to enforce the written agreement made between us. Later on, local villagers of Gwalindaha completely stopped my tankers filling water from Gwalindaha mul. Then I gave up that business because, I was not willing to fight with them. I think it is an example of "khutta tanne prabirti." I could go to court because I have written agreements but I did not do so. Now, I heard that some people who were objecting to my tankers want to buy the tankers to do tanker business from Gwalindaha mul. If so, I would then object them strongly to make impossible for them to start their business."

In contrast, Gwalindaha Youth Club member reacted differently: *"That water tanker businessman is a cunning person. He arranged agreements to extract water from Gwalindaha mul during the tenure of his sister who was a secretary in Badikhel VDC. He did not consult villagers on his water tanker business. We did not know about those agreements with the Badikhel VDC and DDC Lalitpur. Although he is from Gwalindaha, he should have consulted with villagers about his scheme rather than covertly making agreements with VDC and DDC. He used his power to take benefit from common resources of our village. The VDC has been run by the secretary; hence he took benefit from his sister who was a secretary at the VDC. If there was an elected VDC governing body in the VDC, he could not do agreements without consulting villagers. Moreover, his tankers were very frequently causing noise pollution, blowing excessive dust as well as damaging the road. Furthermore, tankers spilled water during their movement, made potholes in the road. We asked him to repair the damaged road but he was reluctant to do so. Therefore, we did object and stopped tankers filling water from the Gwalindaha mul."*

These opposing arguments show something of the conflict on the water tanker business of Badikhel VDC. Yet, the water of *Gwalindaha mul* has been used by bottled water companies in commercial use and farmers and local residents in irrigation and drinking. Furthermore, KUKL has a plan to supply water of Gwalindaha to Patan area. The Gwalindaha Drinking Water Project- a government owned drinking water project has constructed a reservoir tank of 3.2 million liter capacity close to the Gwalindaha source. Likewise, another reservoir is constructed upstream to the source to supply and deliver water to the houses of ward number nine which is located upstream to the Gwalindaha mul. The project will deliver water to the upstream reservoir with the help of a high powered electric pump and will supply the local village through gravity. The project under KUKL will supply water to the Patan area from the lower reservoir.

According to the executive committee member of the Gwalindaha youth club, that project can take water to Patan as long as it does not compromise water for irrigation and drinking in Badikhel. The government project has another problem as well. The main water source of Kodku khola is *Gwalindaha mul,* although it also has another small tributary named Thulo khola which comes from upstream of the *Gwalindaha mul*. In addition, Kodku khola is a source of irrigation for downstream VDCs like Thaiba and Harisidhi, hence there were a lot of disputes and objections against the government drinking water project in Gwalindaha. Also, the club member argues that Gwalindaha club is not hostile to that project as it thinks

waste water should be utilized. The club further said that the residents of downstream VDCs came to Badikhel VDC many times for the objection against the bottled water companies of Badikhel.

4.6 Impacts of the Water Tanker Companies in the Study Area

The water tanker companies are a medium of water transfer from rural areas to urban centers. As said, the water tanker companies emerged in Kathmandu to address the gap of municipal drinking water supply. Furthermore, tanker industries may have large consequences for agriculture (irrigation), drinking, environment and the socio-economy of villages. Users of tanker water are the middle class families of Kathmandu valley, whereas lower class citizens fulfill their water demand through traditional *dhunge dharas*. Although the tanker water of private providers and KUKL was not found drinkable, many private water tanker companies claim it to be potable water.

One registered water tanker company has been established in Taukhel of Godavari VDC. Besides this, there are numerous household tanker and bottled water filling stations in Godavari VDC. Such filling points are causing problems both in the village and in Kathmandu valley due to the poor quality of water. The narration of the assistant secretary of Godavari VDC makes clear the existing water management practices of Godavari VDC: "*In Godavari VDC, many tanker trucks transport water to city without paying tax to the VDC or local institutions like WUAs. Before, tankers used to pay tax happily to the VDC for water filling but due to the current political situation, they have stopped paying tax to the VDC. There is one brewery in Godavari VDC which is also extracting huge amount of water from Godavari kund, has also stopped paying tax to the VDC. Due to the abundant water in our VDC, there is numerous household bottled water filling points. This is because the price of water is very low. The VDC has been running one community drinking water project through the name of 'Godavari drinking water and sanitation users' committee.' Almost all households have a facility of piped drinking water in Godavari VDC. The charge for water per month consumption is NPR 10 up to 10,000 liters and NPR 4,000 for up to 100,000 liters. For the consumption of a quantity above 100,000 liters, the charge is an additional NPR 20 for each 1,000 liters.*

The cost of water consumption in Godavari VDC is the cheapest if compared to municipal water supply costs in the rest of Kathmandu city. Due to the cheapest water charge, numerous domestic bottled water and tanker filling points have emerged and are running without registration or paying tax. Due to the household water filling system, the quality of water of tankers and bottled water through jar and small bottles is poor. These filling points have no any filtration or water treatment mechanisms. The VDC has no any monitoring mechanism to control and regulate them. One water tanker company named 'Amulya drinking water services private limited' is in operation in Taukhel of the VDC. The owner of the tanker company is not paying any tax to the VDC. That tanker company has lots of problems because many downstream VDCs have been using the water of Godavari khola especially for irrigation and drinking. During the dry season, there are numerous complaints against the water tanker company. There is always a queue of tanker trucks from the company to fill water, which reduces the water of the river downstream. This affects Godavari VDC and downstream VDCs like Thaiba, Harisiddhi, Imadol and Bishankhunarayan."

The above narrative also reflects the weak governance of the Godavari VDC. If analyzed critically, the weak governance structure may be due to the absence of elected members in the VDC. Likewise, impacts of the water tanker company become clearer when we look at the discussion of a 60 year old farmer of ward number two of Taukhel of the Godavari VDC: "*My name is Bharat Acharya (name changed). I live in Taukhel of Godavari VDC ward number two. The Amulya drinking water services extracts excessive quantities of water from Godavari khola. The company should pay money to the VDC and the local users committee for the water extraction. Rivers*

are common, hence water should come to irrigation canals first, then to tanker companies for commercial purposes. The excessive extraction of water causes water shortage for downstream farmlands and in the households for drinking. Also, the Godavari khola is a source of irrigation water for downstream VDCs like Thaiba, Harisiddhi, Imadol and Bishankhunarayan; thereby the objections arise not only from Godavari VDC but also from those downstream VDCs. Although the Godavari khola has emerged in Godavari VDC, farmers of downstream have been using water of Godavari khola for a long time.

Local residents are strongly opposed to the plant extension plan of the Amulya drinking water services. Although the owner of the water tanker company is a local resident of Godavari VDC, he cannot use all water of the river for his own profit making business. He should consult the villagers and the water users before making his extension plan. As long as that affects us, he should convince us, otherwise he cannot excessively extract water. But nobody cares for irrigators and local villagers. We have less power than the company. The company uses its power and money to expropriate common natural resources. Also, the VDC cannot control and force the company regarding water extraction from Godavari khola. Severe water shortage happens in the dry season on irrigation and drinking. Before that water company existed, we did not have any shortage of water.

Furthermore, big tanker trucks are not allowed to enter into the core city areas during office hours. Because of this, tankers transport water in the evening and night causing noise pollution. The plying of tankers creates potholes in the road. Moreover, tankers spill water on these potholes which further damages the road. Due to these potholes, vehicles create dust while running on the road, affecting the houses on the road side. Similarly, drivers and helpers take junk foods packed in plastics and throw them onto farmlands and roads close to the filling station which is harmful for agriculture. Furthermore, they urinate openly without any consideration, causing a foul smell near the filling station. Several disputes have arisen between local residents and tanker companies over the noise pollution but the problem has not been solved yet. We are being unable to sleep at night due to the tanker trucks driving on the roads."

The above mentioned narration demonstrates the negative impact of tanker companies. Local residents are strongly opposed to excessive water extraction of the tanker company. In contrast, the owner of the water tanker company in Godavari has very different opinions on these matters, which is discussed below: "*My water company, 'Amulya Drinking Water Services Private Limited' was established in Taukhel on July 2010. It was registered in the office of the company registrar, the Vat office, the DFTQC and the cottage and small industries office. I have got recommendations from Godavari VDC before registering my company on these offices. I have my two water tanker trucks to supply water to Kathmandu city. A total of eight people are working in my water company including drivers, helpers and marketing executives. Besides my two tanker trucks, a lot of other companies' tanker trucks come to take water from my water filling point. I have three rate categories for tanker trucks, they are: NPR 200 for below 5,000 litres of water, NPR 250 up to 7,000 litres and NPR 400 for the range of 7,000 to 12,000 litres.*

I am taking water from Godavari khola. The water extraction point is located at ward number three whereas the filling station is located at ward number two of the Godavari VDC. The electric pump sends raw water from Godavari khola to the filling station through three inch's HDPE pipe. I have constructed seven wells on the river and covered them with concrete rings. Water from all rings finally concentrates on one big well at the centre of other rings. I have not made any water treatment or filtration system in the river. Water filtrates naturally through boulders and sands at the source. I filter water with sand at the filling station. Though there are some settlements above the source, the water of the source remains uncontaminated. After sand filtration, water is directly filled into trucks. Due to the quality of the water of my company, there are long queues of tanker trucks awaiting their turn to take water. (The owner showed a long queue of tanker trucks in front the filling station). *I am doing lab tests of the source water monthly in NAST (Nepalese Academy of Science and Technology) lab. I do not pay money for water extraction to anyone because the water of the khola is a common resource and I am a local resident of this VDC.*

I have some permanent customers like Patan hospital, brewery company of Godavari and B&B hospital. I am supplying water mostly to construction companies, because of my background as civil engineer and contractor. I have no detailed idea where my customer tanker trucks supply water. As far as I know, my tanker trucks are supplying water especially in the cities of the Lalitpur district like Gwarko, Patan, Jawalakhel, Lagankhel and Mangal bazar. I have a personal contact with customers. They often call me and request for tanker water. I tell them the water of tanker truck is raw water which is not drinkable but many customers use it for drinking. Therefore, I mostly supply to hospitals and contractors because they use it for non-drinking purposes. Before, I used to put chlorines and alums to purify water. Later on, I stopped adding them due to the large numbers of complaints from customers about its scent. Furthermore, I am planning to extend my water company, adding some other machines to produce bottled water. Machines are on the way to reach my company. No one has objected to me against the extraction of water from the source. Irrigators have sufficient water for irrigation, even in the dry season. There is no effect from my company's water extraction on drinking water schemes as well.

I have heard of the water tanker entrepreneurs' association but I do not have any affiliation with it. Moreover, I do not think it works in the interest of tanker entrepreneurs. That association might be creating a platform to do politics through it. Therefore, I have no interest in joining it. So far, I have not heard any particular regulating authority for water tanker business in Kathmandu valley. The government of Nepal should regulate and monitor water tanker businesses in Kathmandu valley. Since we are reducing the municipal water supply gap, the government has to give us subsidy for establishing these new and innovative industries."

According to a water tanker company owner of Godavari, his company is supplying 0.25 MLD from his filling stations. The table below depicts the details.

Table 4.1 Dry season water supply details of water tanker company of Godavari

SN	Water supply places	Numbers of tankers per day	Quantity of water supplied (liters)	Rate (NPR)	Income per day (NPR)	Remarks
1	Local brewery	5	50,000	0.1 per liter	5,000	10,000 liter per tanker
2	Many places in city from own tankers	10	100,000	0.15 per liter	15,000	
3	Many places in city from others' tanker	10	100,000	400 per tanker (10,000 liter)	4,000	
	Total per day	25	250,000		24,000	
	Total per month		7,500,000 (7.5 million liter)		720,000	

Source: Water tanker company owner, 2011

The above table shows that, during the dry season, the water tanker company earns NPR 24,000 per day by selling 0.25 MLD of water. The owner says that, the off-season sale is only around 40% of peak season. Hence, in the off-season, the company supplies only 0.10 MLD of water to the city earning NPR 9,600 per day. The figure also shows the large income from water selling. It also tells that, the company extracts and transfers about 7.5 million litres of water per month away from irrigation and drinking in the dry season. I have not taken any detailed data from other filling stations in Kathmandu valley. But from my experience, tankers might extract more water from these filling stations than from the Godavari.

4.7 Issues that Raised Conflict due to the Water Tanker Companies

The water tanker companies are creating conflicts between them and farmers (local residents) in the study area. They are creating water shortage for irrigation and drinking. Because of this,

farmers in the study area are having problems with irrigation and drinking water. From the above narration cases, it can be inferred that, different actors have different opinions about water tankers and their rights to claim water. In particular, main issues of conflict between farmers and tanker operators are following:

- In the dry season, during paddy seed sowing time, there is a water shortage for farmer's land due to the excessive extraction of water by companies. At the same time, tanker and bottled water demand is excessively high in Kathmandu valley. Tanker and bottled water companies earn a lot of money during that time from water sales.
- Tanker companies are creating noise pollution, damaging roads and creating potholes in the roads.
- Water tanker companies are promising farmers for jobs, road repair and other assistance but they are not keeping their promises, even when they are still benefiting from the resources of the VDC.

These negative impacts are the main issues and parameters of water conflict between farmers and water tanker companies. Godavari VDC has a lot of anonymous complaints of local residents against the water tanker company. As the owner is a local resident of Godavari, he is also powerful because of his connections with politicians. Local residents are unable to agitate explicitly against him. They are more implicit in this matter. Godavari VDC has made many failed attempts to start negotiations between farmers and tanker companies. Local residents said that the VDC secretary has no interest in solving this problem. In my observation, an attempt of arbitration from the political level would be effective. The attempt of mere junior government staff would not be sufficient to solve the problem.

4.8 Conclusion

Tanker companies emerged to fill the water supply gap of Kathmandu valley. The chapter reveals that Godavari is one of the tanker water filling points in Kathmandu valley. Tanker water users are middle class citizens of Kathmandu valley. Contribution of tankers in water quantity is significant, whereas the quality of tanker water seems not acceptable for drinking. Unlike other filling stations, Godavari filling station does not pay any tax to the VDC. The narration of the resident of Baneshwore shows that water is scarcer than jobs in Kathmandu. Tanker entrepreneurs association exists in Kathmandu but not all tanker trucks are registered to it. Similarly, tanker water filling stations are transferring millions of liter of water out from irrigation and drinking, causing water shortage for local farmers. Because of this, farmers have to depend on the rain for irrigation. Filling station owners and tanker trucks are earning a lot of money from water businesses in many areas of Kathmandu city including Godavari. The main issue of water conflict between farmers and water tanker company is water shortage caused by the water tanker companies. The VDC has tried to solve the problem of conflict between farmers and water tanker company but failed. An elected VDC body could negotiate the conflict.

Chapter–Five

The Bottled Water Companies

In this chapter the issues concerning the bottled water companies are discussed. It begins with a discussion overview and then explains the emergence of the bottled water companies in the study area. Furthermore, the first sub-section discusses the background and emergence of bottled water in a global and Nepalese context. Another sub-section discusses briefly the technical aspects involved in the bottled water company. It outlines the water purification process used by the bottled water company in general and site specific. The empirical impact issues in the study area are discussed with the help of narrations of the various actors involved in water use. The sub-section on impacts further demonstrates the opinions of farmers, the bottled water company owners and the DFTQC, pertaining towards impacts of the bottled water companies. It also explores the average water extraction levels and earnings of one bottled water company of Badikhel. Similarly, the next sub-section discusses and analyses the main issues of water conflict between farmers and bottled water companies. The final sub- section provides a conclusion.

5.1 Overview and Emergence of the Bottled Water Companies

Water is a special kind of commodity because it is one of the key necessities for human survival. Public struggles over water purity and the costs involved with this go back to the 19th century when British citizens began a long campaign to provide cheap and clean water as a public service. At the time, debates on the notion of water as a human right were constantly emphasized by political campaigners who advanced the role of the government in protecting the rights of consumers in the face of privately owned profit making companies (Trentmann and Taylor, 2006). Bottled water also brings the issue of the government's failure to provide basic public services for its citizens into focus (Clarke, 2004 cited in Wilk, 2006). Still, it is also an interesting matter that European and many North American countries invest trillions of euros and dollars to bring clean, cheap and safe drinking water to their citizen's homes. However, these same people go out and buy bottled drinking water in shops at a price higher than an equivalent amount of beer, soda or even gasoline (Wilk, 2006).

The Kathmandu Upatyaka Khanepani Limited (KUKL) has been unable to supply enough drinking water to fulfill the demand of the city. The bottled water companies are seen as a new and innovative water business in the Kathmandu valley. The city dwellers also perceive bottled water having more quality to drink as well as safer than open water and tap water. Hence, city dwellers prefer to use bottled water. In contrast, the microbiological quality of bottled water is a serious concern among users as it is a seemingly safer alternative to municipal use. (Mavridou, 1992 cited in Bhandari et al., 2009). Probably, the attraction of bottled water (jar and 1 liter bottle) as drinking water came due to its taste, convenience, fashion influence from foreigners, international media, awareness, safety and probable health benefits (Gleick, 2004; WHO, 2006 cited in Bhandari et al., 2009).

There is no reliable historical information of bottled water companies in Kathmandu valley. The bottled water companies emerged and grew due to the scarcity of drinking water in the valley. Furthermore, it is popular for its convenience in handling many religious and other social functions like marriages, parties and seminars. The bottled water companies are established in Kathmandu valley depending on groundwater and spring water sources. In the dry season, citizens also depend on jar water for drinking. Some international NGOs

introduced the 20 liter jar which became fashionable and common in Kathmandu. Later, residents of the Kathmandu valley adapted it as a reliable source of drinking water.

Not only in Kathmandu valley but also in other parts of the country (particularly at water scarce urban areas), the 20 liter jars and 1 liter bottles are popular. Moreover, jar water is becoming a fashion in the offices of Nepal due to its convenience in handling. Because of its popularity, bottled water business is one of the lucrative businesses that can be established with a small investment in Kathmandu city and its peri-urban areas. These companies extract water almost freely from the peri-urban areas and sell to the city areas at a good price. Though, there is no regulation from the government side, the bottled water companies are registered in the Cottage and Small Industries Development Committee (CSIDC) and the Department of Food Technology and Quality Control (DFTQC). Altogether, 48 bottled water companies have taken a license (*anugyan patra*) from DFTQC (Bhandari et al., 2009).

Altogether ten bottled water companies are established in Badikhel. Their production capacity depends on the size of the investment in machinery and equipment. These bottled water companies are registered both as a beverage and as a mineral water company[21]. The bottled water companies, established in Badikhel take water from the *Gwalindaha mul*. Due to its lucrative nature, these bottled water companies are a center of attraction for young businessmen of Badikhel and nearby villages. The progressive expansion of water as a commodity may be a result of the failure of the government fulfilling public demand. It is innovative and lucrative because of the creative skills of entrepreneurs of bottled water (Wilk, 2006).

The bottled water companies of Badikhel are concentrated on the downstream to the *Gwalindaha mul*. Since the Kodku khola flows through the heart of the VDC, it also works as a drain of the VDC. The price of the finished product (jar and one liter bottle) varies corresponding to the cost of installed machines and the quality of water products. Most of the bottled water companies of Badikhel do not have their own laboratory to test water quality. By considering water as an important commodity, the government of Nepal has promulgated a drinking water quality standard. However, the bottled water companies do not follow the quality standards properly. The same quantity of bottled water has a different price in the market depending on its quality. Moreover, every company claims their products to be of higher quality than others. The government of Nepal does not have any strong monitoring mechanism for bottled water companies.

According to the proprietor of one bottled water company, his bottled water company pays NPR 50,000 annually as a tax to Badikhel VDC. In addition to this, it pays an annual sum of NPR 35,000 to the local users committee backed by the *Gwalindaha* youth club, located at ward number nine. Companies pay money to the users committee and local club to gain access and withdrawal right of the water of *Gwalindaha mul*. Moreover, they are purchasing temporary property rights of water, though the property right of *Gwalindaha mul* customarily rests upon a local group. The local group denotes a local users committee and the *Gwalindaha* youth club. These two organizations think that they have an ownership right of the water of *Gwalindaha mul*. They claim ownership because the source is located in their area and they have been maintaining and using the water since their birth. They have an intrinsic relation with the water. Furthermore, they state that water is as the blood of their body because if the water was not there, their existence in the village would have been

[21] In Nepal there are different laws for bottled water companies registered as a 'beverage' or as a 'mineral water company.'

impossible. Mostly, the bottled water companies claim water rights for the access and withdrawal with the mixture of customary and state law. The VDC officials also regard and appreciate claims of local residents' and the existence of customary law.

5.2 Technicalities of the Bottled Water Companies

In general, the bottled water companies are water purifiers. They process raw water extracted from the source that contains particles like sand, rust and other particulate matters. The process and technique of purification may be different according to the size and type of the industry. Figure 5.1 illustrates an example of a common method of the water purification process.

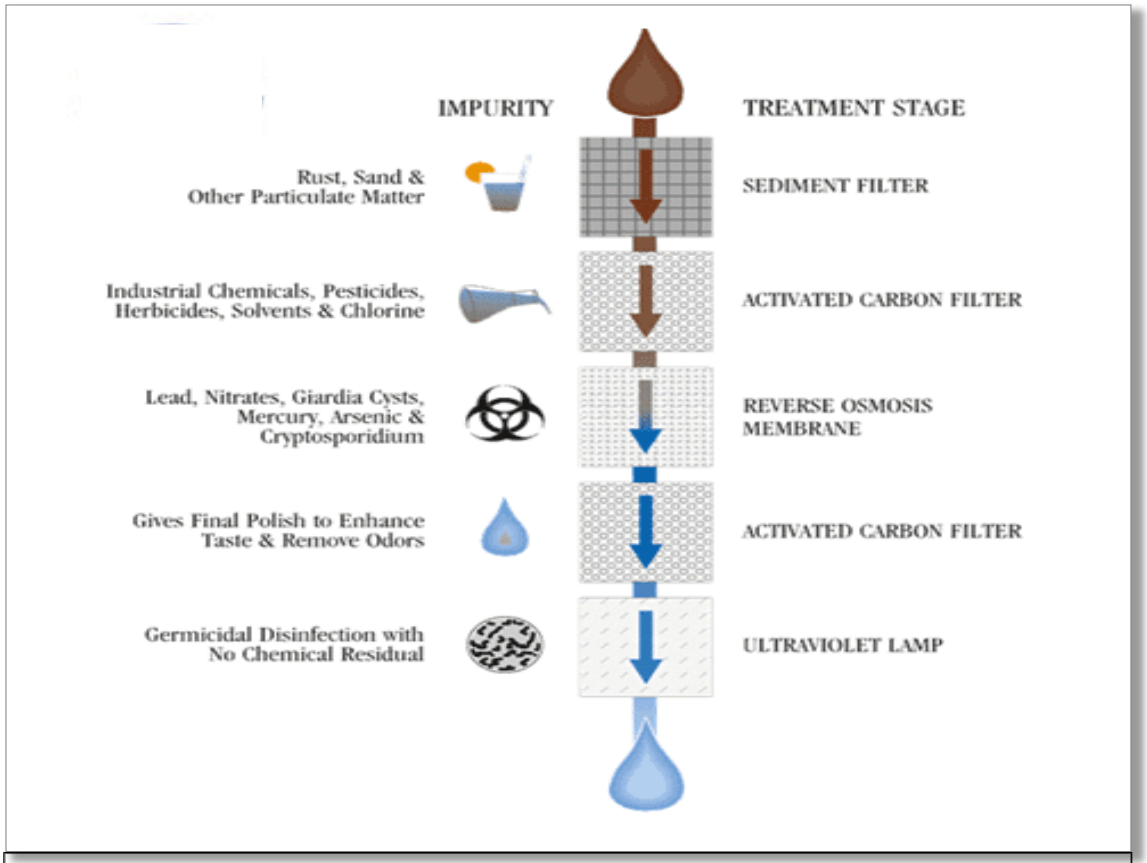


Fig. 5.1 Step wise water purification process in bottled water company. (Adapted from: http://www.aquaperfect.com/technology.asp).

The figure further shows five stages of water treatment and purification system i.e. a sediment filter, activated carbon filter, reverse osmosis membrane, activated carbon filter and ultraviolet lamp. However, not all the bottled water companies follow the above process. Some companies may skip steps to save energy, labor and money.

Ten bottled water companies are producing and selling water in 20 liter jars and 1 liter bottles in Badikhel VDC. The 1 liter bottle is popularly known as '*mineral water*' in Nepal. The 20 liter jar is popular among middle and higher class households residing in water scarce areas. In bottled water companies, water is collected and stored in HDPE tanks. The raw water first goes through a sand filter and then through a carbon filter. After the carbon filter, it goes to a reverse osmosis (popularly known as 'RO') machine. Finally, after these three stages of water

filtration, the filtered water passes through the ultraviolet (UV) light which is the last step in the water purification process. After this, the purified water is stored in a stainless steel (SS) tank from which jars and bottles are filled for sell on the market. There are various types of RO machines on the market. Bottled water factories have installed different types of machines according to their investment capacity. Figure 5.2 demonstrates the bottled water products. Furthermore, according to a technician of one bottled water company of Badikhel, when the water is filtered through the reverse osmosis method, about 50% of the inflow of raw water into the RO is converted into non-drinkable waste water which drains out through the drain pipe. Furthermore, the bottled water companies of Badikhel discharge the waste water directly into Kodku khola which flows towards the downstream VDCs like Thaiba and Harisiddhi.

Fig. 5.2 One liter bottle and 20 liter jar (source: http://www.eco-bottles.co.uk/ and http://www.tradeindia.com/manufacturers/indian manufacturers/bottled-water-dispenser.html).

5.3 Impacts of the Bottled Water Companies

Bottled water companies are transferring water away from agriculture. They are impacting farmers negatively. In particular, they are causing water shortage in irrigation and drinking water supply of villages. Despite this, different water users have different arguments on the impact of these companies. Some arguments are discussed below.

Feelings and experiences of a 50 year old farmer from Badikhel VDC on the impacts of the bottled water companies: *"My name is Hari Prasad Acharya (name changed). I am 50 year old. I live in Gwalindaha of Badikhel VDC ward number nine. My occupation is farming. I have 5 ropanies of cultivated land downstream to the Gwalindaha mul. The source of irrigation of my agricultural land is Kodku khola which emerged from Gwalindaha mul. I have been living here since my birth. Badikhel VDC is rapidly urbanizing since 5 to 7 years ago. Nobody came here to buy land or to do business before 10 years ago. The saturation of land for homestead purpose in Kathmandu and Patan has forced many in-migrants to come to Badikhel. The land in Kathmandu is expensive too. Moreover, there is severe water scarcity in Kathmandu city. Badikhel VDC is environmentally rich, so we have greenery and fresh water. Fulchoki hill is situated on the south of the VDC.*

Nowadays, many outsiders come to our VDC for business. Before, I used to know almost all people of the village. Now, there are many new unknown faces from outside. The Gwalindaha mul is one of the sources of drinking and irrigation water of the VDC. Water of Gwalindaha mul is the best among other water sources like Harra mul, Sirupatya mul and Khasimara mul. The bottled water companies, established in Gwalindaha, extract water from Gwalindaha mul. I do not know the exact number of bottled water companies. We have a lot of cultivated land to irrigate to the downstream of Gwalindaha mul. The bottled water companies extract water through high powered electric pumps. Those bottled water companies pay tax to Badikhel VDC, local users committee of Gwalindaha and Gwalindaha youth club. I do not know the exact amount of money they pay. Also, I have no idea about the spending of that tax money in the VDC. Moreover, I have not heard of any investments for the benefit of the villagers of Gwalindaha. I guess the club and users committee members are misusing money. They misuse money but we face water shortage on our cultivated land. In the dry season, during paddy sowing and transplantation time, there is a water shortage on our land, because at the

same time, there is a high demand for bottled water in Kathmandu city. These companies extract water excessively during that time of year to earn a lot of money. This causes water shortage for agriculture. For seven years, we have been facing problems with water shortage, therefore we have to depend on the erratic monsoon.

We did complain many times to the bottled water companies about the excessive extraction of water during paddy sowing and transplantation but they did not listen to us. Because of this, we also did complain many times to the VDC. The secretary of the VDC tried to settle the problem but failed to do so. These bottled water companies are powerful and have strong political connections. They always refer to their license and formal agreements when they face complaints. Therefore, these companies are violating farmer's right to water for irrigation, drinking and domestic use. Interestingly, they refer to state law, but we have our own law in the village. We call it 'gaunle kanun,' which has been prevailing since the time of our forefathers. There should be water for drinking and irrigation first and for companies later. Furthermore, farmers of Thaiba and Harisiddhi VDCs also complain to the bottled water companies, because Kodku khola is also the source of irrigation for them.

Besides water shortage, these companies are causing social pollution in the village. Staffs of the industries that come from many places of the country cause a lot of sanitation and theft problems in the village. However, on the positive side, these companies are generating employment on a local level. Also, Gwalindaha is becoming the center of the village due to the concentration of the bottled water companies, hotels and shops. The companies are also increasing economic activities in village. In sum, these companies are creating more negative impacts. However, in comparison to the brick industries and water tanker companies, bottled water companies are less harmful for village."

In contrast to the above narration, a bottled water company owner has a different opinion on its impact. The narration makes it clear: *"The last 5 years, I have been operating a bottled water company business in Gwalindaha in a partnership with my colleagues. My company is registered in the cottage and small industry office (CSIDC) and DFTQC. The VDC has recommended to CSIDC and DFTQC to issue license for the operation of my bottled water company in Gwalindaha. My company extracts water from Gwalindaha mul which is situated 300 meter upstream to the factory. I have a license to operate a bottled water company in Badikhel. According to the law, I have a right to use natural resources of this area without harming the local residents who are the prior users. My company has a good water purification machine imported from Taiwan. The production volume depends on the demand of bottled water in the market. The demand of water is high in the dry season and comparatively low in the off-season. The high season of the bottled water market starts in February and ends in October (Falgun to Asoj in B.S.). However, the off-season is between October and January (Kartik to Magh in B.S.). In the dry season, my company sells about 375 to 400 jars of 20 liter and 50 to 60 packs (12 bottles in a pack) of 1 liter bottles per day. The off-season selling is less than half of the high season months.*

My company has its own lab to test water quality containing various parameters like pH[22]*, TDS, total hardness, calcium hardness and bicarbonate. My factory does not have any capacity to test the contamination of hard metals, because this is expensive. My lab staff tests each production batch in the lab. After establishing a good quality of water from the lab test, water is put in jars and small bottles and then send to the market to sell. My company also has monthly records of lab test results. My staff members are perfect in the process of water purification. My company has a sand filter, carbon filter, resin softener, RO machine and UV light as prescribed by the quality standards of the government of Nepal. I do not think other factories have such a complete water purification system. Because of the investment difference in water purification, the price of the bottled water is also different. The rate of my company is: NPR 120 per pack for 1 liter bottle (12 pieces of 1 liter bottle per pack) and NPR 50 per one 20 liter jar. Wholesale and retail prices are also different in my company. Furthermore, while processing, RO machine rejects more than 50% of raw water inflow as*

[22] In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. (http://en.wikipedia.org/wiki/PH).

contaminated water. Because of this, many bottled water companies do not have a RO machine installed. This saves water, time and money. Moreover, some companies have installed RO machines but when purifying, they just skip it. Their RO machine is only to show to consumers and the monitoring team of government (though monitoring in practice is virtually zero). The waste water or drain water released from the RO and other filters are directly discharged into the Kodku khola. That water can be used in animal husbandry, home gardening and washing cloths but cannot be used for drinking. I heard some tankers illegally fill water in the Kodku khola, downstream to my company. Many bottled water companies of Gwalindaha directly discharge effluents water into the Kodku khola contaminating it with soft chemicals.

My company has a good relationship with farmers and local residents of Gwalindaha. My company has generated employment for the local people. Eight local people are working in my company. During the dry season, demand for water is high both in Kathmandu and in the cultivable land (agriculture) of the farmers. Sometimes, farmers complain about water shortage due to the bottled water companies of Gwalindaha. My company does not extract a huge quantity of water that would create water shortage in farmer's irrigation canals. Moreover, bottled water companies and farmers have a mutual understanding in sharing water. Furthermore, each bottled water company pays an annual NPR 50,000 to Badikhel VDC and an additional annual NPR 35,000 to local users committee/Gwalindaha youth club.

My factory has not created any problems because of the water business. Local residents are happy with us. We have increased the mobility of people in this village. Water of Gwalindaha mul is famous in Kathmandu city. Moreover, local people feel proud because of the popularity of water from Badikhel VDC in Kathmandu city. In case of water shortage during paddy sowing and transplantation time, farmers inform us well in advance. My company then does not extract excessive amounts of water during that period. The management of my company understands the problems of farmers. My company does not have any conflicts with farmers regarding water extraction. Furthermore, my company financially supports many local ceremonies like Dashain festival, Tihar and Holy festival. Sometimes local people demanded large financial support from my company, which is beyond my capacity."

Both of these arguments of above are conflicting. Farmers and bottled water company owners have different opinions on claiming water rights. The bottled water company owner argued that his company does not have any conflict with farmers. In contrast, farmers reported conflict with bottled water companies. Regarding impacts, different water users tell conflicting stories.

Although the bottled water companies have a negative impact, farmers reported them as a less harmful industry than brick industries and water tanker companies. Figure 5.3 makes this clear.

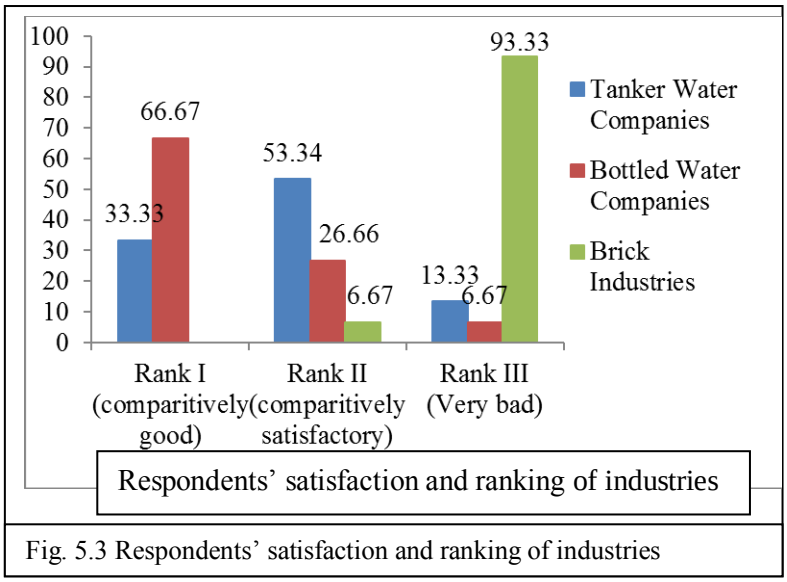


Fig. 5.3 Respondents' satisfaction and ranking of industries

Figure 5.3 shows that more than 66% of respondents rated bottled water companies as 'comparatively good' followed by 33% in favor of water tanker companies. It

can also be inferred that brick industries are the most harmful industries followed by water tanker companies and bottled water companies, which are least harmful.

The table 5.1 shows the dry season water sales and earnings of one bottled water company of Badikhel VDC.

Table 5.1 Dry season water sales and earning details of one bottled water company of Badikhel

SN	Description	Per day sales of jars	Per day sales of 1 liter bottle pack	Quantity of water sales (liters)	Per unit Rate	Per day income (NPR)	Remarks
1	20 liter jar	375[a]	-	7500	50	18,750	[a] & [b] = lower range of sales as the owner said.
2	1 liter bottle	-	50[b]	600	120	6,000	
	Total per day			8,100		24,750	
	Total per month			243,000 (**0.243 million liter**)		742,500	

Source: Bottled water company owner, 2010.

The above table shows the quantity of water sales and earnings of one bottled water company in the dry season. However, the off-season sales decline by more than 50%. It also shows the monthly water transfer of the bottled water company to be 0.243 million liter. The figure also shows a large income for the company from its water sales. I have not taken any detailed data from other bottled water companies located in many other places of Kathmandu valley.

The bottled water companies should submit a water quality test report and scheme of water production to DFTQC. However, they submit the report only for formality because DFTQC does not have any regulation mechanism. Below mentioned narration demonstrates the opinion of DFTQC on regulation and water quality of bottled water: *"The Department of Food Technology and Quality Control (DFTQC) is a government organization established for the management of food quality and technology in Nepal. Our field inspectors collect random samples of food sold in the market and test their quality. Ensuring water quality also falls under our jurisdiction as it relates to food. However, some other particular organizations are responsible for the management and to ensure the water quality. The KVWSMB and KUKL are the responsible organizations to supply water in Kathmandu valley. Furthermore, the DFTQC also has an obligation to observe the quality of water supplied in Kathmandu valley.*

The bottled water companies should get 'anugyan patra' from DFTQC before getting their final certificate of company registration (license). The license is renewable each year. Technical staffs of DFTQC inspect installed equipment for water purification at the company site. The DFTQC has an obligation to monitor water quality of bottled water companies in the factories and in the market. However, it does not have the resources to monitor frequently. The bottled water and water tanker regulation act is in the process of finalization. The draft act has given the responsibility to regulate and control both bottled water and tanker water to KUKL. The DFTQC is unable to ensure the current quality of bottled water supplied by numerous companies because of the lack of resources. The DFTQC has received many complaints from consumers about the poor quality of bottled water. In DFTQC's opinion, the draft act should be finalized soon in order to regulate such critical companies."

The above narration demonstrates that bottled water companies are not following water quality norms set by the government of Nepal. Furthermore, this business has become a mess

due to the lack of a particular organization for its regulation. Hence, the bottled water companies are easily causing water shortage in irrigation and drinking water supply. This has caused severe conflict with farmers in the study area. Besides causing water shortage, these industries are affecting human health by selling low quality of bottled water in the market.

5.4 Issues that Raised Conflict due to the Bottled Water Companies

The main issue of conflict between the bottled water companies and the local residents (farmers) is a shortage of water in irrigation and drinking water caused by bottled water companies. The bottled water companies are a medium of rural-urban water transfer. These companies also transfer water from agriculture to commercial use. More than 82% of residents of Badikhel depend on agriculture. Therefore, agriculture is the backbone of the economy of Badikhel. The narration of the farmer cited above indicates the existence of water scarcity in Badikhel for agriculture during paddy sowing and transplantation. Moreover, in the dry season, bottled water demand is also high in Kathmandu city. When the demand is high, the prices of bottled water are also high during that time. Income and quantity of water supply of one bottled water company is illustrated in above table 5.1. Furthermore, farmers have reported that companies do not obey promises given to local residents during their establishment. They also reported that bottled water companies promised the construction of roads and to provide jobs to locals. Conflict has emerged not only with Badikhel VDC but also from the downstream VDCs like Thaiba and Harisiddhi. It is because the people of those VDCs have been using water from the Kodku khola for irrigation for a long time.

Those negative impacts are the main issues and parameters of water conflict between farmers and bottled water companies. Badikhel VDC has received some anonymous complaints of local residents against bottled water companies. Most of the owners of bottled water companies are big businessmen. Therefore, they also have other businesses. Respondents said that company owners have a good relation with politicians. All this leads to a situation in which local residents have become unable to agitate explicitly against the companies. Badikhel VDC office made many failed attempts to negotiate between farmers and bottled water companies. Local residents said that the VDC secretary is not interested in solving this problem. In my observation, it would be effective if there was an attempt of arbitration from political level. The attempt of mere junior government staff would not be sufficient to solve the problem.

5.5 Conclusion

The bottled water companies emerged in Kathmandu valley to fill the drinking water supply gap. People perceive bottled water as easier to handle than tanker water. Also, the quality of bottled water is better than that of tanker water. The bottled water companies extract water and transport it to cities from villages causing water shortage in irrigation and drinking water supply. Unlike water tanker companies, bottled water companies pay tax to the VDC and a local users committee contributing to the development of the villages. The study on bottled water users shows that its users are middle and upper class citizens of the Kathmandu city. Bottled water is more expensive than tanker water, so lower class citizens cannot afford buying it for drinking. The narrations demonstrate that, in the dry season, water demand is high in Kathmandu city as well as in the agricultural areas. Companies are making a lot of money by selling large quantities of water to cities during the dry season. Results show that one bottled water company, on average, extracts 0.20 million liter of water per month.

Many bottled water companies in the study area do not have a proper water purification system. Government authority also has no proper monitoring and regulation plan for the bottled water company business of Kathmandu valley. Due to the lack of monitoring, numerous unregistered bottled water filling points exist in Badikhel and Godavari VDC. Those filling points do not have a proper water purification system. The poor monitoring on water quality of bottled water might have a serious effect in human health. Despite all this, bottled water companies have some positive impacts as well. They are generating employment on a local level. Similarly, they are also increasing economic activities in the villages. They are also filling the water supply gap in Kathmandu city. Respondents ranked bottled water companies less harmful in comparison to brick industries and water tanker companies. The main issue of conflict between farmers and bottled water companies is water shortage in irrigation and drinking water supply, caused by bottled water companies. Conflict between bottled water companies and farmers is latent and seasonal. It rises during the dry season and plummets down afterwards. The VDC tried to negotiate the conflict but failed. An elected VDC governing body can solve the conflict in a participatory way.

Chapter–Six

The Brick Industries

This chapter discusses the general overview of brick industries. The first sub-section explores the environmental requirements for the brick industries and the brick industry's general features. The second sub-section describes the basic technical features of Nepalese brick kilns. It demonstrates mainly the three types of brick kilns established in the Kathmandu valley. Quantity of water consumption by brick kilns is also discussed in second sub-section. The third sub-section explores and analyses both the positive and negative impacts of brick kilns and the main issues of water conflicts among farmers and between farmers and brick kilns due to the operation of brick kilns in Badikhel VDC. The fourth sub-section discusses the issues of water conflict between farmers and brick industries. The last sub-section concludes this chapter.

6.1 General Overview of the Brick Industries

Brick is a main building material in urban Nepal. It will dominate the future market as long as there are no other economically viable alternatives. This has driven interest for many businessmen to establish brick industries. Altogether, 436 brick kilns are established in Nepal. In the Kathmandu valley, brick industries are concentrated in three districts i.e. Kathmandu, Lalitpur and Bhaktapur. (VSBK, 2009). Clay is a raw material for bricks. A lot of water is needed to convert clay into mud. During the fieldwork, an experiment was carried out to estimate the quantity of water required to make a piece of brick. However, the quantity of water requirement varies according to the size of the brick. The experiment found that 400 litre of water is required to make 1,000 bricks. The experiment was carried out in February 2011 by the researcher with the help of the staff members of the brick factory at the premises of the Kantipur brick factory in Badikhel VDC ward number one. The size of the brick taken for the experiment was: length 9 inch, breadth 4 inch and thickness 2 inch. Hence, the volume of brick comes to 0.042 square feet (72 square inch). According to the above calculation, the actual water quantity required for one brick is 400 millilitres (0.40 litres).

Brick industries are considered a traditional family business in Kathmandu valley. In recent days, a lot of other castes are also getting involved in this business within the Kathmandu valley area as well as other parts of Nepal. According to the rule of the government of Nepal, brick industries should register at the Department of Cottage and Small Scale Industry (DCSSI) in their respective districts. An Initial Environmental Examination (IEE) report is necessary for those brick kilns which produce 1.5 to 5 million pieces of bricks and tiles per annum, whereas Environmental Impact Assessment (EIA) is necessary for kilns producing more than 5 million pieces of bricks per annum. The IEE and EIA are necessary to assess the environmental harm caused by the operation of kilns before their establishment. (ibid.). Each brick factory leases land ranging from 60-140 ropani to make bricks. Normally, the brick factories lease land during December to May. Also, they lease land for 5 to 10 years for the construction of the kiln. In average, each brick factory established in Badikhel leases about 100 ropani of land. The exact data of leased land is not available because it changes frequently.

According to the law, brick industries should be established at least one kilometre away from any settlement or forest. In contrast, both of the brick industries of Badikhel VDC have been established at less than 500 meter distance from settlements. Brick kilns do not run during

monsoon, therefore, brick production is a seasonal industry. It leases the land for half a year and the cost of the lease varies according to the quality of soil and distance from the local market. If the *bhatta* is established in an urban area, the land lease cost would be high as compared to the *bhatta* established in a rural village. According to the owner of the Kantipur brick factory, it pays NPR 5,000 for 1 ropani of land for one season (6 months) whereas another *bhatta* pays only NPR 4,000 for the same area of leased land and duration. Those farmers, who lease their land, cannot cultivate winter crops but they can cultivate paddy during monsoon. Seasonal workers of brick kilns come from other parts of the country whereas the fire-workers[23] come from Bihar state of India. Workers also go back to their village to cultivate paddy during monsoon time. *Bhatta* owners have a special contact with intermediary brokers of Bihar who manage all fire-workers for the brick kilns.

Local residents are facing a lot of pollution problems from the *bhattas*. *Bhattas* are extracting water from the nearest sources. As discussed in previous chapters, farmers have historically been taking water for irrigation and drinking from these same sources. During March to June (dry season), there are disputes between *bhatta* owners and farmers over access and withdrawal of water. The main area of conflict between farmers and brick kilns is the access and quantity of water and land. To obtain the permit from the VDC, these brick industries pay an annual NPR 300,000 plus 10,000 bricks to Badikhel VDC as a tax. The agreement says that each brick factory should pay this amount in taxes. However, at the time of the fieldwork, there was a dispute between a brick factory owner and the VDC regarding payment of tax money. Moreover, the brick factory owner did not want to pay tax money referring the large financial loss in his brick business. The Badikhel VDC denied the claim of the brick factory owner, claiming the brick factory should pay the tax regardless of loss and profit in the business. This example shows one case of unwillingness by a brick industry to pay an agreed amount.

Brick industries excavate the top fertile soil and make bricks, bake them and sell in the market. Next year, the yield might be reduced on that land due to the loss of top fertile soil. Those farmers, who lease their land to the *bhattas*, might not think seriously about the loss in fertility of their land. As reported, they are using chemical fertilizers to increase the yield, but of course, this is not a sustainable practice. Therefore, brick industries can be taken as 'bakeries of the top fertile soil.' Also, every year *bhatta* reduces the height of the land by 3 to 5 feet, causing problems with landslides. Farmers reported that their HDPE pipes of drinking water schemes are in a vulnerable condition as they are exposed on the ground because of the excavations. Furthermore, people can cut and damage those exposed HDPE pipes with a knife or a sickle and can easily take water from that point. If this happens, there might be less or no water for the next settlements. One positive aspect of the *bhattas* is that they create employment; however they create very little at the local level. As described earlier, most labourers are seasonal and come from other parts of the country and India rather from the local area.

6.2 Brief Technical Features of the Brick Industries

Brick making in Nepal is done using a mixture of clay and earth, which is moulded into a definite shape after which the brick is baked at the kiln. Although there are major 5 types of technologies available, the brick making in Nepal is dominated by the Bull's Trench Kiln

[23] Workers involved in baking raw bricks. Their work involves managing the fire to bake raw bricks. In Nepal, mostly, the fire-workers come from Bihar, India.

(BTK), both with moveable and fixed chimneys. However, the most common is the moveable chimneys, which are installed all over Nepal. A study carried out by a Swiss supported VSBK project revealed that 59% of brick kilns are moveable, 35% are fixed followed by 7% are of clamp kilns. The problem associated with the moving chimney is the excessive emission of greenhouse and other polluting gases, negatively impacting people's health (VSBK, 2009).

Traditional clamp kilns are still in operation in some distinct places. These kilns produce a small quantity of bricks to fulfill the demand of villages and small communities. Hence, they are not established for commercial purposes. Both of the brick factories of Badikhel VDC are

Photo 6.1 Moving chimney bull's trench kiln (MCBTK). (Source: VSBK, 2009).

Photo 6.2 Fixed chimney bull's trench kiln (FCBTK). (Source: VSBK, 2009).

fixed chimney type. Furthermore, the government of Nepal has banned the operation of the moveable chimneys in Kathmandu valley since 2003.

Photo 6.3 Vertical shaft brick kiln (VSBK). (Source: VSBK, 2009).

There is also a new technology for brick making named as a VSBK (vertical shaft brick kiln). The VSBK is a project supported by the Swiss government through the development cooperation. It is an energy efficient technology which emits less greenhouse gases compared to the fixed chimneys. However, many entrepreneurs are not willing to convert their kilns into VSBK because it has a lower brick production. Though VSBK is energy efficient, it is not water efficient, because water is necessary only to make bricks. Therefore, the quantity of water consumption remains the same in both of these technologies.

The main fuel of brick industries is coal imported from India. The quality of coal also determines the level of pollution. The fixed chimney bull's trench kiln consumes the highest amount of coal while making bricks. The FCBTK and MCBTK consume nearly the same

amount of coal. The average coal consumption by these kiln types is 14.8 tons to produce 100,000 bricks. In contrast, the traditional clamp type only consumes 2.5 tons of coal to produce the same quantity of bricks. However, the traditional clamp kiln also uses other fuels like fuel wood for brick firing. (VSBK, 2009).

6.3 Impacts of the Brick Industries

Brick industries are water intensive industries as they need water to convert clay into mud to make bricks. The brick kilns of Badikhel VDC divert water from the canals and sources through gravity and electric pumps. The soil of the Badikhel is suitable for agriculture due to the good quality of clay with high water holding capacity and rich humus. These brick industries are established on agricultural land because of many economic reasons like the availability of raw materials and water in the vicinity and proximity to the market.

Traditional farming is not perceived as a profitable occupation. Hence, many farmers of Badikhel want to change their occupation. Also in line with this, they lease their land to brick industries. Those who do not want to lease have problems due to the lack of access to irrigation water. According to the respondents, farmers divide themselves as leased farmers and non-leased farmers. This kind of grouping reduces their social harmony. Because of the lack of unity and understanding among farmers, proper maintenance of the canal is hardly possible, hence the irrigation canals are getting more collapsed day by day. Respondents further reported that there is no guarantee that they can continue long term lease with brick factories. The brick factory owner might move to another location making the previous land barren when he deems the soil of the previous land is no longer suitable for brick making. Moreover, large quantities of *khet*[24] are converted into *bari*[25] due to the lack of irrigation.

Box 6.1 Quantity of water extraction by two brick kilns of Badikhel VDC

The experiment carried out by the researcher shows that 400 liters of water is needed to make 1,000 pieces of bricks of average size. In Badikhel, average brick production per season per brick factory is 15 million bricks. The average figure of brick production was estimated by a brick industry owner after comparing 5 years of actual brick production of his factory. However, it was very difficult for him to figure out the exact quantity of production. If we take this company's average, each brick kiln of Badikhel consumes 6 million liters of water in one season. Hence, the total water extraction and consumption of two brick kilns comes to 12 million liters.

Brick kiln owners and local farmers have different and conflicting opinions on the impacts of the brick industries. A 65 year old farmer of Badikhel explained the impacts of the brick kiln in this way: *"My name is Rudramani Acharya (name changed). I have been living in Badikhel since my birth. My house is located about 400 meter distance from one of the brick kilns. I have given 2 ropanies of land on lease to a brick factory for the last 4 years. Furthermore, I also have additional 5 ropanies of cultivated land. I am getting NPR 5,000 per ropani as a rent for the leased land. I have made a lease agreement of 5 year with the brick industry. According to the agreement, the brick factory can occupy and use my land from December to May to make bricks. In June, the brick factory should leave my land. There are a lot of problems with neighbors during re-demarcation of excavated land. As the land is a valuable resource for us, there is always quarreling among land owners during re-demarcation. I can cultivate paddy on my land during monsoon.*

[24] Irrigated lowland. *Khet* denotes irrigated land where farmers cultivate especially rice which is the major cereal crop of Nepal

[25] Non-irrigated upland. Farmers cultivate crops other than rice on such type of land.

Productivity of leased land is reduced due to the excavation of top soil. The new top soil is less fertile compared to the old one, hence it is difficult to achieve a good paddy yield. We are compelled to use harmful chemical fertilizers (bikase mal) in our cultivated land to get a good yield. Some of my fields lie downstream from the brick kiln. Workers of brick kilns are not from my village. Many of them come from Rolpa, Rukum, Kavre, Sindhuli and Banke districts. They have no care for our irrigation canal when they excavate lands to make bricks, therefore they often damage it. Because of the damaged irrigation canal (kulo bhattinu), there is a shortage of irrigation water for the downstream cultivated land. The brick kilns also contribute to the destruction of many branch canals. Moreover, brick industries extract excessive quantities of water using heavy electric pumps. Due to this, there is a shortage of water for irrigation during the dry season. Wheat cultivation is hardly possible during the winter.

Especially because of the lack of irrigation facilities for the lands downstream of the brick kiln, those who do not want to lease their land are almost compelled to do so. Due to this, I was also compelled to give my land on lease. Villagers are divided as leased and non-leased groups. Brick kiln owners are cunning guys who also use our wives and children in many ways to convince us. I heard that brick kilns also damaged the drinking water supply pipeline of some wards of my VDC. I also heard that consumers of those water supply projects complained about it many times to the brick kiln owner.

Furthermore, brick kilns are sources of pollution. Until 10 years ago, I used to grow vegetables like fava beans, spinach and cauliflower in huge quantities and sell them at Lagankhel. I also have orange and peach trees in my bari but it has been hard to grow them over the last 10 years. Due to the smoke of the bhattas, the production of abundant 'lai kiras' (aphids) on fava bean plant makes its production almost impossible. The market price of fava bean is high during the winter months, so it is one of the most profitable vegetable productions of that time. 'Lai kiras' are the enemy of our vegetables and fruits and they are caused by the smoke of the bhattas. Leaves of vegetables like cauliflower, cabbage, spinach also become black with dust from the smoke of the bhattas. Winter rain is rare in Kathmandu valley, hence such black dust is hard to remove from the leaves of vegetables.

Because of the reasons discussed above, these brick kilns are the 'abhisap' for us. If these bhattas were not established close to my house, I would have grown a lot more vegetables and fruits which I would have sold to Patan and Lagankhel. Due to the high demand of fresh vegetables and fruits in Patan and Lagankhel, the price is also high. Brick kilns are one of the most hazardous industries of Badikhel. Moreover, they use harmful coal as fuel. I saw many villagers suffering from respiratory disease due to the effect of the thick smoke from the bhattas. Our eyes get dry during winter months when brick kilns are in operation. The brick kilns store a lot of chemicals and coals, creating different types of pollution. In particular, frequent plying of trucks from the bhattas produce dust and noise pollution in the village. Due to the noise of moving trucks from the bhattas outside on the road, deep sleeping at night and watching television is difficult.

Furthermore, bhattas are creating social problems as well. Different kinds of people working in the bhattas are also from different parts of the country and India. I heard most of the fire-workers come from Bihar (India) are not well disciplined. They tease our daughters, sisters and wives. Moreover, workers of brick kilns drink alcohol and quarrel with their families causing trouble for local people. Their quarrelling creates a lot of noise, which disturbs us. After the establishment of brick kilns in Badikhel, theft cases have increased especially during the season months of the bhattas.

Owners of brick kilns should have consulted with local residents before their establishment. They should prepare 'sarzamin muchulka' from nearby villagers but none of the villagers have seen it so far. I heard these industries have submitted fake documents to the government authority to get a license. It has also come to my attention that brick kilns pay a huge amount of money to the VDC as tax because they are considered 'polluting industries.' However, I do not know the exact amount. I also have no idea about the spending of the tax money for the benefit of the affected residents of the VDC. I have never seen any investments by the VDC in the affected wards. Moreover, the VDC cannot force brick kiln owners to stop production of bricks because the VDC has already issued

recommendations to operate brick factories. Those farmers who give land on lease also do not have unity among them. Therefore, raising a collective voice and protest against brick industries is a very difficult task for farmers. The brick industry owners, VDC officials and politicians have deceived us, misusing money, damaging the villages' environment, economy, society and people's health. We are really facing severe problems due to the brick factories.

Positive impacts of brick kilns are not significant. However, brick industry owners urge that they are doing a lot for the village, their claims are not true. Nevertheless, they are raising economic activities in the village through their workers. They are also generating employment though is not significant for the local level. However, they help us to repair and construct roads and provide financial support for the school. We can also get a ride from their trucks while going to Kathmandu and coming back from there. In sum, brick industries have badly impacted our village. These brick industries should stop and leave from my village."

In contrast, a brick kiln owner rejected the claims of the farmer: *"I have been operating a fixed chimney type of brick kiln in Badikhel VDC since 7 years ago. I am from outside of this VDC. I am using water for my bhatta from both a spring source and canals. I am paying NPR 300,000 plus 10,000 bricks per year to Badikhel VDC as a tax. In addition to this, I am paying annually NPR 40,000 to the local users committee for the extraction of water. Besides that money, I also have to give a lot of 'chanda' to various groups like schools, clubs and temples. My bhatta is leasing 105 ropanies of land this year to make bricks. However, this varies from year to year. I lease land only during December to May. The rest of the months, my bhatta does not occupy farmer's land. I pay NPR 4,000 per season per one ropani of leased land. I make an agreement with farmers each year for the land to make bricks. The agreement for the lands on the area for chimney and raw brick baking is made for 5 years. There is no guarantee that farmers continue the agreement.*

During one season, my bhatta produces 15 million bricks if it runs in full swing. Nowadays, farmers refuse to give their land on lease which creates problems for me run my bhatta at full capacity. The fire-workers come from Bihar India because Nepalese do not have such technical skills. The rest of the laborers like brick makers and porters come from Dang, Rolpa, Salyan, Kavre, Sindhuli and Banke districts. In monsoon, we leave the farmers' land making it plain and demarcating terraces to enable them to transplant paddy during monsoon.

Regarding water extraction, we have a mutual understanding. My bhatta has no problems on water sharing. In the dry season, especially during paddy sowing time, farmers inform us about their sowing and transplantation schedule and then we do not extract much water on such days. Since my bhatta is paying money to the local users committee, farmers do not complain to me about water shortage. Of course, there may be smoke pollution during the first firing of the kiln. Afterwards, there is no such smoke pollution from my bhatta. My bhatta is established according to the rules and regulations of the government of Nepal. Furthermore, Badikhel VDC has issued a recommendation letter to us for the operation of a bhatta on this location. We are supporting the construction, repair and maintenance of the road. We give discount for local residents if they purchase bricks from us. We are also supporting them in transportation and providing water to their land through our electric pump.

Since we lease the lands of farmer, we have the right to use irrigation water because water rights come from land holdings. Moreover, industries are the backbone of the country, hence local residents should appreciate our industries. We are generating employment for local people and contributing to increase economic activities in the village. We are further contributing to improve the socio-economy of the village. Due to our contribution to Badikhel, VDC officials highly regard us. We are running our business whilst also considering our corporate social responsibility."

It was also observed during the field survey that brick kilns excavate at least 3 feet of land each year. Loss of top soil causes a negative impact on agricultural productivity due to nutrient loss. Many farmers might not know the long term consequences of the loss of top soil on their crop production. Farmers reported that they are compelled to use large quantities

of chemical fertilizers to grow rice and other crops. I have observed that farmers were trying to compensate the loss of productivity through lease money and chemical fertilizer. However, this type of compensation may be unsustainable. Furthermore, increasing height differences caused by excavation may cause problems with landslide. Problems of terrace landslide during monsoon were also reported by farmers during interviews with them.

In addition, there is a serious adverse effect of dust on the winter crops due to the smoke of brick kilns. Winter rain is rare in Badikhel, hence dusts deposits remain on the leaf of the plants for a long time. This causes disturbance in the photosynthesis process, causing leaves to become dry which may affect yields. Fruits grown in a dusty area do not grow into a proper shape and size. Some local residents reported that even after washing vegetables leaves with water, the dust is not removed completely, making it difficult to sell the vegetables in the market.

Brick moulding, drying, transporting through the open field and plying of vehicles along the unpaved earthen roads and along the agricultural land during the dry season generate large amounts of fugitive emissions. Other materials like coal, saw dust and Chinese plums (*Choerospondias axillaris*) are also kept on the open field. The combined effect of both of the stack and fugitive emissions has a serious health effect on workers, owners and local residents. Such kind of environmental problems exist more in a downwind than an upwind area. Smoke always remains trapped due to the umbrella shaped topography of Badikhel. Respondents reported that due to the prolonged presence of smoke and polluted air; mostly older aged local residents are suffering from many respiratory diseases. The problem of drying eyes due to the smoke dust and chemicals is also reported by respondents. To gain more profit, brick kiln owners use low quality coals that produce heavy pollution. Brick kilns are also producing a lot of greenhouse gases contributing to global warming. From the social perspective, brick kilns and other industries introduce negative acculturation into the village. Furthermore, respondents reported that theft cases are increasing, causing worsening condition of security of the village.

Despite the negative impacts of brick industries, respondents also reported some positive impacts and benefits. Brick industries have created employment opportunities, though the amount of employment for local people is negligible. Leasing of land is also an opportunity for local people to earn cash money. Those farmers who want to change their occupation can lease their land and start new occupations. Brick industries can be taken as a techno-social integration of the society. Furthermore, brick industries bring brick making technology to the village. Local people can learn the brick making technology from the brick industries. As a result of this, there were a lot of homemade brick kilns seen in Badikhel, where people make bricks for individual house building purposes. Besides, respondents believe that brick kilns are helping to construct roads for the village. Brick Kilns also need roads to transport bricks and other materials, therefore they construct and maintain earthen roads. Local residents are also benefiting from the same road.

6.4 Issues that Raised Conflict due to the Brick Industries

Social cohesiveness was observed to be low due to the leasing of land to brick industries. Those who do not want to lease their land to brick kilns are compelled to lease due to the lack of irrigation water in downstream areas. This is due to the damage of irrigation canals upstream. The damage of canals causes difficulty in water conveyance to the downstream farmer's land. This issue causes strong conflict among farmers themselves and between farmers and brick industries. There are divisions among farmers between those who give land

on lease and those who do not. Non-leased farmers blame leased farmers as well as brick factory owners for the damages to the irrigation canals. That is one of the big issues of conflict in Badikhel. Another problem caused by brick kilns is difficulty in re-demarcation of farmers' land after excavation by brick industries.

The large quantity of water extraction as demonstrated in the box 6.1 causes water shortage in irrigation which draws farmers and companies into the conflict. In addition, brick kilns extract water forcibly without regarding farmers' requirement. Similarly, pollution from the brick companies (both stack and fugitive) is also one of the conflict raising issues in Badikhel. Vegetables and fruits are affected a lot by the smoke and dust pollution of the brick kilns. Hence, farmers want to close down the brick companies, however they do not have the capacity to fight with the powerful companies.

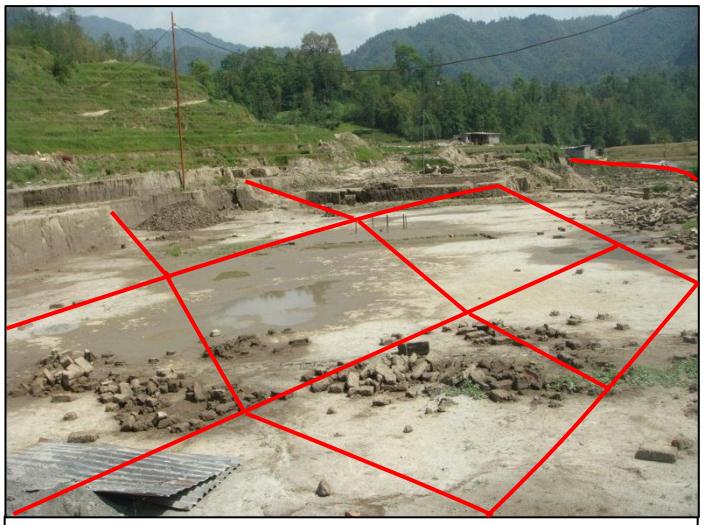


Photo 6.4 Imaginary re-demarcation of land after excavation.

These negative impacts are the main issues and parameters of water conflict between farmers and brick industries. Badikhel VDC has received a lot of anonymous complaints of local residents against the brick industries. Most of the owners of the brick industries are a big businessmen from the Patan area. Therefore, they also have other businesses. Respondents said that industry owners have good relations with politicians. Because of the fear for big businessmen, local residents are unable to agitate explicitly against them. Farmers said that these businessmen can send goons and the police after them if they agitate explicitely.

6.5 Conclusion

Three types of brick industries have established in Kathmandu valley i.e. MCBTK, FCBTK and VSBK. Both brick industries of Badikhel are established at less than 500 meters distance from the settlement and forest. They pay tax to the VDC. Each brick industry on average extracts about 6 million liters of water in one season. According to farmers, brick kilns cause severe water shortage for the irrigation of the VDC, due to the heavy water extraction. Also, farmers are faced with problems of water shortage because of damages to the irrigation canals. Excavation on cultivable land in upstream areas damages the irrigation canal causing difficulty in water conveyance to the downstream lands. Because of this, farmers have to depend on winter rain, which is rare in Badikhel. Cultivation of vegetables and fruits is difficult in winter due to the smoke pollution of the brick kilns.

Agriculture is the backbone of the economy of Badikhel VDC. Hence, the water extraction of brick kilns, causing water shortage, has severe consequences for the development of the VDC. Brick kilns are further contributing to food insecurity in the VDC. Farmers think that they are traditional users of water, hence they claim first right to use the water on their land. Owners of the brick kilns deem that they have a license from the government, so they also have a right to extract water. Owners claim rights over water based on the state law while

farmers claim the same rights by customary law. According to the water use perspective of the WRA, 1992, the priority of industrial use of water is below that of the drinking and irrigation. Therefore, farmers are in a better position to claim the water rights. However, poor unity among farmers themselves contributes to them standing poorly against rich factory owners.

The demonstrated narrations confirm the impacts of brick kilns. Another issue of conflict is re-demarcation of land after the soil excavation by brick kilns. There have been a lot of disputes among farmers in the past due to this. Despite all this, brick kilns also have some positive impacts in Badikhel VDC. Support to construct village roads, increasing economic activities in the village and introduction of new technology to the village are some of the positive things mentioned by respondents. Although farmers have a lot of problems caused by brick kilns, they are not able to strongly agitate against the factories. The conflict increases in the dry season and then suddenly plummets down afterwards. Much of arbitration attempted by the VDC failed to solve the problems. The VDC also has a vested interest not to act against the brick kilns. The stronger interest of the VDC is to receive tax money continually from the kilns. It also has legal difficulties if tries to order a company to be closed down. The problem of conflict could be solved by an elected VDC governing body.

Chapter–Seven

Understanding Water Conflict in the Study Area

This chapter analyses and compiles the previous three empirical chapters: four, five and six. It analyses water conflict issues of water tanker companies, bottled water companies and brick industries as discussed in earlier chapters. This chapter begins with a general overview of the conflict. Narrations of respondents about water shortage are also featured in this chapter. Furthermore, the chapter discusses the issues of water conflict among farmers and between farmers and companies. The present attitude of farmers towards companies and main issues that brought farmers and companies into conflict are also discussed. Similarly, the degree of people's participation in the conflict and the opinions of Badikhel VDC on water conflict as well as VDC's role in managing conflict are discussed in more detail. The nature, dimensions and magnitude of the conflict are further illustrated with the help of some figures. The chapter ends with a conclusion.

7.1 Brief Overview of Water Conflict

The word conflict holds a negative connotation that is perceived as the opposite to peace and cooperation. Usually, this is associated with violence or threat of violence. However, conflict in some cases can be taken as a positive factor which creates a dialogue and motivates people to think about solving their problems. The important issue is to manage conflict rather than suppress or allow it to escalate beyond control (Warner and Jones, 1998). Extensive analysis of conflict on a contextual basis identifies the conflict resolution mechanisms.

Major issues of water conflict emerged from competing claims on water rights and the existence of plural legal systems. Water conflict may be normal and obvious when the same source is used by different and heterogeneous water users like farmers and companies (irrigation, commercial and industrial use). In the study area, severe conflict exists between industries and farmers and amongst farmers themselves on using existing sources of water for irrigation and commercial use. All the actors of the water use (actors of conflict) try to follow their own forums expecting a decision on water rights issues in their own favor. Water selling is considered to be one of the most lucrative and innovative business in the study area. Many locals and outsiders therefore have their eyes on the common type of water resources of the Badikhel VDC. Water transfer from agriculture, drinking and domestic uses to commercial/industrial purposes poses the main problem.

The following sub-sections discuss the specific conflicts among farmers themselves and between farmers and companies. Below mentioned nostalgia of a 58 year old farmer of Badikhel demonstrates the negative impacts of industries and issues giving rise to conflicts: *"My name is Harihar Thapa (name changed). I have lived in this village since my birth. Now I have 10 ropanies of cultivated land in different locations of the VDC. Before, I had 20 ropani of cultivated land. I sold my land for my children's education and for other household expenses. When I was young, this village was an isolated rural village. Now it is famous so, many immigrants want to buy land to settle down here. Kathmandu city has scarcities of many things, so people want to come here. We have water, greenery and organic food here. Fifteen years ago, I used to recognize everyone in the village but nowadays, I recognize only raithane residents. During the past 15 years, this VDC has been changing rapidly. Raithanes sold their land to new immigrants, so this VDC has become a cosmopolitan village. People from different parts of Nepal live in Badikhel.*

We used to drink water from the Chandole mul until some years ago but now the mul is unable to serve us due to the lack of water. We are using the water of Khasimara mul located in Chapagaon VDC. Before, there was sufficient water for irrigation. There were no such water intensive industries in this village 10 years ago. I think brick industries were established 10 years ago in this village. About 5 ropanis of my cultivated land is located to the downstream of a brick factory. I had no problems with irrigation for that land before, but now there is no irrigation canal to irrigate because the irrigation canal was damaged by the brick factory while making bricks. I have to depend on rain for irrigation. Paddy yield of 5 ropani land was about 50 quintal before the industries came, when there was sufficient water. Now it has been reduced to approximately 40 quintal. That 40 quintal of production also depends on the situation of rain during monsoon. Similarly, other yields from the land have also been reduced. Some of my cultivated land is also located downstream of the Gwalindaha mul. There is a similar problem of water shortage on those lands. I have been using chemical fertilizers to increase yield but failed to get the previous quantities of production.

The environment was clean in my village 10 to 15 years ago but now there is smoke pollution during winter because of the brick kilns. Smoke deposition is a major problem because of the low altitude of my village as well as the umbrella type of shape of the topography. Another reason for smoke deposition is the lack of winter rain in Kathmandu valley. I used to sell large quantities of vegetables at the market in Lagankhel but now I have given up commercial vegetable farming. Nowadays, during the season of the brick factory, growing of vegetables commercially is very hard. This is due to the smoke and dust pollution of brick kilns. My days were nice before but now it is very hard to live in this village. Moreover, the security situation has also deteriorated here. Theft problems have also increased. Before, many villagers of my age used to gather at pipal chautari to talk together but now nobody wants to go to the chautari. Social harmony has decreased. Political ideology has also divided people in many groups.

Ten years ago, we had abundant water for irrigation and drinking. There were no significant disputes among farmers in sharing irrigation water. Nowadays, due to the scarcity of water, farmers are always quarrelling over water sharing. Last year one of my neighbors had stolen water from my turn. When I complained, he started scolding me and my family. Since then, we stopped talking to each other. I heard many such types of cases in my village which are a cause of enmity. Fifteen years ago, we did not have such cases. People are becoming very selfish nowadays."

The above narration tells of the overall changes taking place in the village due to the impacts of industries and consequences of water shortage. Farmers come into confrontation with companies due to the water transfer activities of companies. Because of this, conflict exists among farmers themselves and between farmers and companies. Below sub-sections demonstrate the conflict issues.

7.2 Water Conflict among Irrigating Farmers

Farmer managed irrigation systems (FMIS) use some water distribution rules and rotational sharing of water especially in the dry season and peak demand period. Because of this, FMIS have less conflict and they provide more mutual conflict resolution mechanisms than agency managed irrigation systems. As discussed in the earlier chapter, though the irrigation schemes of Badikhel are FMIS type, farmers associated to FMIS also have some conflicts. The main conflict among farmers of Badikhel VDC is between the farmers of head-end sections and tail-end sections in sharing water. The main issues of conflict are the quantity used and the duration of irrigation (time). Conflict among head-end section farmers are not caused by the quantity of water. However, conflict among tail-end farmers is mainly as a result of shortage of water especially during the dry season. Respondents argued that as long as the gap between demand and supply of water increases the magnitude of conflict grows. The tail-end farmers reported that due to the lack of monitoring, head-end section farmers grab more

water than allowed. This leads to the severe consequence of water shortage in the tail-end irrigation section.

Furthermore, the *raithane* farmers claim more water than new immigrant farmers. Also, among head-end farmers, there is an implicit discrimination between new and old farmers while allocating and sharing water for irrigation. However, the rule of WUA does not formally discriminate between new and old farmers. This shows that there is a difference between new and old farmers in claiming bundles of water rights. New immigrants are weaker than *raithanes* in claiming water resources of the VDC. This kind of implicit discrimination also contributes to dividing farmers in groups. This grouping ultimately causes water conflict.

As discussed in the previous chapters, social cohesiveness is observed to be low due to the land leasing practices of farmers. Those who do not want to lease their land forced to lease it anyway, because in the downstream they do not have good access to water. This has happened because upstream farmers have leased their land to brick kilns which damage the canal while making bricks. This makes it difficult for downstream farmers to convey water to their land. That is one of the causes of the conflict among farmers. Another problem caused by brick kilns is difficulty in re-demarcating the land after the excavation by brick industries. As land is a valuable resource and symbol of power and identity; farmers do not want to lose their land. Furthermore, at both the banks of Kodku and Thulo khola, there are irrigated lands which have irrigation canals. Unequal sharing of water drives farmers into conflict. Farmers from both sides claim a large quantity of water for their canal and are thus drawn into severe conflict especially during the dry season. Lack of coordination among different irrigation systems is also evident and reported by farmers. This type of conflict is related to competing claims on access and withdrawal over water.

Another conflict observed and reported by farmers is between drinking and irrigation users. Since the source of water for irrigation and drinking is the same in many wards of the VDC, disputes arise between drinking and irrigation users. During paddy sowing and transplantation, drinking water users reported shortage or no water in their drinking water reservoir tanks due to the transfer of water to cultivated land by farmers of upstream areas. Drinking water users claim their right before irrigation. In case of operation and maintenance of the main and branch canal, there is always conflict over the responsibility and accountability. The water users association has some problems of corruption and also water users associations are passive in their repair and maintenance of the irrigation canals. Farmers who pay levy (annual tax for irrigation water use) argue that they would not pay the levy in the future if the water users association does not perform its repair and maintenance in a good way. Similar problems are reported by drinking water users with the repair and maintenance of hydraulic structures.

Another dispute among farmers is theft of irrigation water at night. Respondents reported that they have a rotational basis of water sharing. Each farmer, as per land plot size, gets a certain duration and quantity of water to irrigate their land. Some farmers reported that the upstream farmers sometimes divert water into their land at night which the allotted farmers might not know. The allotted farmer is surprised when he goes to see the status of irrigation on his land plot in the next morning because he sees complete irrigation of his land has not occurred during the night. It is however hard for him to figure out who actually did divert his turn of water. Lots of disputes thus erupt among framers due to these types of theft. Respondents reported that such conflicts sometimes had turned violent. Respondents reported that initially the conflict starts with water but in the end it gets politicized resulting in worsening social

harmony. Sometimes, neighbours do not talk to each other for a long time due to these kinds of conflict.

As said by Upreti (2007), the political system and sub system of any country shapes policies, strategies, practices, behaviours and actions of citizens and vice versa. Hence, the politics and behaviour of citizens are interrelated and reflect various forms of power relations. The conflict among farmers as discussed in this section can also be viewed like this. The present political system of Nepal contributes to frame the behaviour of citizens whereas the behaviour of people also influences by many policies and strategies of the country. Therefore, both are interrelated with each other. Due to the conflict existing among farmers themselves, they are not in a position to protest collectively against industries. Although, they have options to go to court against the companies, this has not yet happened. In this research area, none of the NGOs are dealing with these cases although there are a lot of active NGOs.

7.3 Water Conflicts between Farmers and Companies

The main causes of conflict between companies and farmers as discussed in earlier chapters is a shortage of water for local residents in irrigation and drinking due to the over extraction of water by companies. Companies are transferring water to city areas creating water scarcity in the villages. Each industry and farmer claims water rights from their own perspective. Companies based their right on the current state law whereas farmers based theirs mostly on customary law. Legal ambiguity, therefore, contributes to raise conflict. Companies are also benefiting from free riding opportunities.

Companies are extracting water forcibly without considering farmers' requirement of water for agriculture and drinking. Similarly, pollution from brick companies (stack and fugitive) is also one of the issues raising conflict in Badikhel VDC. Vegetables and fruits are greatly affected by the smoke and dust pollution of the brick kilns. Therefore, farmers want the brick companies to close down (see figure 7.1) but they lack the capacity to fight with these

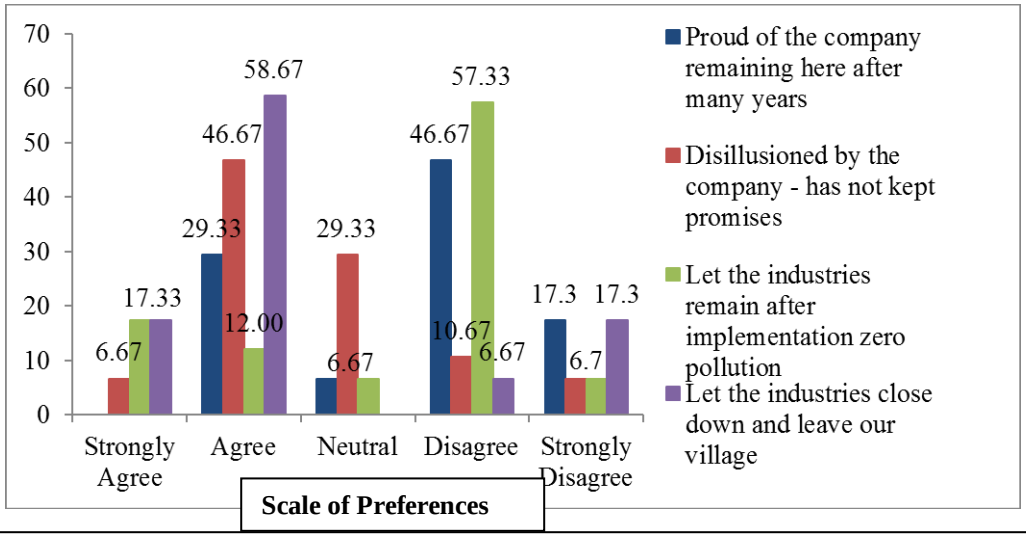


Fig. 7.1 Respondents' present attitude towards companies

powerful companies. Besides these underlying factors of conflict, there are a number of issues that were reported by the respondents and observed by the researcher in the study area:

- Tanker companies are creating noise pollution as well as damaging the road and creating potholes on the road,
- There has been an increment of theft/robbery and sanitation problems created by the workers of the companies,
- Farmers believe that companies are damaging the culture of their society as some company workers drink alcohol and walk along the village using rough and vulgar language,
- Brick companies are contributing to expose drinking water pipes of villages on the ground. Excessive excavation of land to make bricks cause landslide problems on the agricultural land,
- Brick factories are not established according to the criteria of the government of Nepal in terms of distance from settlements, they have submitted fake documents to get a license,
- Gradually, *khets* have been converting to *baris* causing alteration in food production and food security,
- Farmers are compelled to lease their land to brick industries and they are forced to change the cropping pattern due to the lack of water. Farmers have to cultivate crops which consumes less water,
- In the dry season during paddy seed sowing time, there is a shortage of water in farmers' land due to the excessive extraction of water by companies. At that time, tanker and bottled water demand is excessively high in Kathmandu valley. Water tanker and bottled water companies make lots of money during dry season by selling water,
- Factories are promising farmers jobs, roads and other assistance but they are not fulfilling their promises,
- From Kodku and Godavari khola, hundreds of hectares of lands are irrigating, so water selling from upstream was objected by both irrigation and drinking water users of the downstream settlements of Godavari and Badikhel VDC as well as neighboring VDCs like Thaiba and Harisiddhi,
- The excavation of land to make brick causes problems in the re-demarcation of farmers' land. Farmers always quarrel when demarcating their land before cultivating paddy. This raises enmity among farmers in village.

Severe conflicts between industries and farmers can be inferred from the above problems. Respondents reported that conflict was usually non-violent but sometimes it was violent as well. Although, it can be taken as severe, the nature of the conflict is more or less temporary. Farmers raise issues of water shortage during paddy seed sowing and transplantation time but they become passive afterwards. The conflict sometimes is latent and sometimes it is visible. As mentioned by Warner and Jones (1998), latent conflicts regularly lie dormant until 're-awakened' by a particular set of pressures. The pressure in this case is the water shortage and pollution. Furthermore, farmers have become weak in the face of the powerful and rich companies. The participation of people in conflict is high during the dry season while it is reduced afterwards. Hence, it is sporadic. The reason of the sporadic nature of conflict is also that no NGOs are supporting farmers on this issue. If there were some supporting organizations, the conflict would have been strong and thus protested against the companies.

Janakarajan (2008) depicts the conflict case in Palar basin of India with the help of a figure comprised of four blocks. The same figure can be used in the farmer's and company's case here but in a different way. Janakarajan's case was related more to environment but this case is related more to water in particular. Figure 7.2 demonstrates the stages of conflict according

to the participation of people in conflict. The shape of the figure is suggested to be viewed only as a generally convex shape but not as a parabola. Block 1 indicates low level of conflicts and low level of people's participation- the problem is hardly noticeable. Very few black spots are seen. Block 2 indicates medium level of conflict and medium level of people's participation- the problem has surfaced to a noticeable level. Black spots are increasing. Block 3 indicates a very high intensity of conflict- almost a crisis situation where people's participation is high. Black spots have overwhelmed the available white space. When the curve falls down to Block 4, people's participation in the conflict gets steeply reduced because the problem has turned into a catastrophe. People feel helpless and thus withdrawn. The conflict of the study area between farmers and companies is still in the block 2- medium level of conflict with increasing participation of the people. The problem of water shortage may reach the level of block 3 in the near future. In contrast, there needs to be a great effort to create unity among farmers to reach people's participation as in block 3. A higher level of people's participation might be difficult to achieve because of the weak unity among farmers.

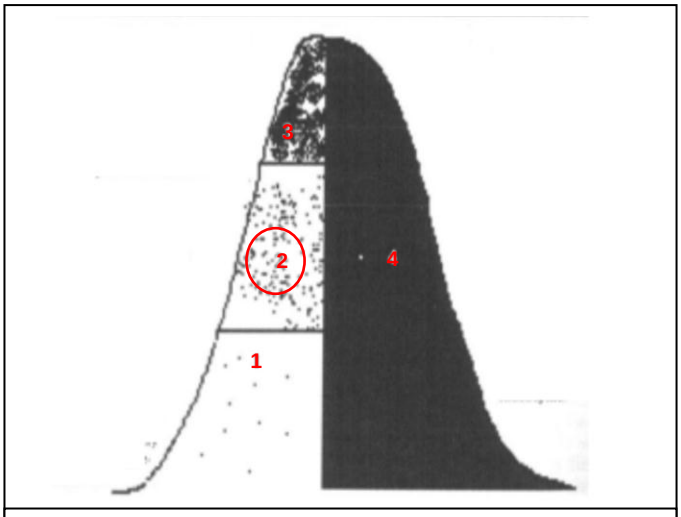


Fig. 7.2 Degree of conflict between farmers and companies (Source: Adapted from Janakarajan, 2008).

The Badikhel VDC office has been negotiating many conflict cases. There were numerous attempts of negotiation for water conflicts in the VDC. For a long time, there has not been an elected body in the local government in Nepal; hence the VDC secretary's negotiation attempts went in vain. Also, in such a liquid political state as that of Nepal, local people do not easily regard government staff as an arbitrator. This is even more so because the VDC secretary is a junior staff and not necessarily from the same VDC. There are allegations that the VDC secretary is not willing to develop the village because he is not from the same village and district. The political mechanism (*samyantra*) composed of the major political parties is formally and informally influencing the governance of the VDC, especially in budget allocation and important political decisions.

Furthermore, the Badikhel VDC secretary has given his opinion on behalf of the VDC about the water conflict issues: *"According to the prevailing state laws, the VDC is the owner of all the resources of its territory including water. Industry should get a recommendation letter from the VDC before registering either to the company registrar or to the cottage and small industry department. Almost all industries operating in Badikhel VDC have got recommendation letters from the VDC according to the prevailing rules and laws of Nepal. In case of brick industry, according the Karyabidhi Digdarshan 2065 (2008), it has to be established one kilometer far from settlements. In reality, these brick industries have established less than 500 meter distance from settlements whereas they have submitted the documents to the VDC according to the rules specified in the karyabidhi digdarshan 2065. Many brick industries have established many years ago, so I have no idea how they submitted these documents. Before, brick industries did not have to submit an IEE report but now this is compulsory in order to establish a new brick industry. These industries have a valid license issued by the government, so I cannot do anything against their registration and license*.

Badikhel VDC has made an agreement that each brick industry has to pay annually NPR 300,000 plus an additional 10,000 bricks to Badikhel VDC in tax whereas bottled water companies have to pay NPR 50,000 per year. One water tanker company was in operation in Badikhel before my tenure but it was closed 6 months ago. I heard the owner had made an agreement with the VDC and DDC but I do not know in detail because that happened before my tenure. There are a lot of complaints about pollution and water extraction of companies in the VDC. Farmers have complained about shortage of water created by water and brick companies. Verbally, people complain a lot but when I ask them to complain in a written form, they hesitate to do so. However, we have received some anonymous written complaints. There has not been an elected body in the VDC for a long time. The political Samyantra governs the VDC while I am a staff of government of Nepal. Since the companies have strong political support, a secretary cannot do anything to these companies. Furthermore, the VDC's work is to coordinate and negotiate both conflicting parties based primarily on state law, with appreciating local and customary laws of the local people. As a government staff, first, I have to go with prevailing state law when giving VDC's formal decision but the VDC always regards customary laws and rights of the local people. The VDC has been negotiating many issues of conflict among local farmers and between farmers and companies regarding water sharing and pollution."

Farmers are trying to create greater participation of people in the conflict with the help of numerous forums like political organizations, local clubs, CBOs, mother groups and civil societies. Industries are using their own forums like concerned associations, influential politicians, government offices and police. The companies are trying to hold their strong position on the governance of water, based on the temporary purchasing of access, control and property rights over water from farmers. Companies generally cite state law by which they are operating their business, whereas local farmers are basing their rights on customary law historically used in the village. The VDC is in a confusing stage in this regard to make a decision, but it formally has to decide on the basis of state law. Clearly, there is an existence of plural legal system.

7.4 Different Dimensions and Dynamics of Water Conflict – The Analysis of Conflict

Water conflict does not emerge in one single dimension. It has different dimensions from which it develops many dynamics. In the study area, there are numerous actors involved in the conflict directly and indirectly. Numerous dimensions of conflict have been observed in the study area. While analyzing conflict, Warner and Jones (1998:09) suggest some activities that include:

- Mapping of the conflicts (their magnitude and connectivity);
- Mapping the geographical distribution of the conflict/s;
- Prioritization of the conflict into 'urgent' and 'significant';
- For the prioritized conflict, identification of the key stakeholder groups and their prospective representatives;
- The motivating objectives and underlying 'needs' and 'fears' of the different stakeholder groups.

Some activities from their framework have also applied here for this research to analyze the conflict. Hence, before discussing the dimensions of water conflict within the study area, it would be better first to map the water conflict. Figure 7.3 maps the nature of water conflict of the study area, which helps us to understand its dimensions.

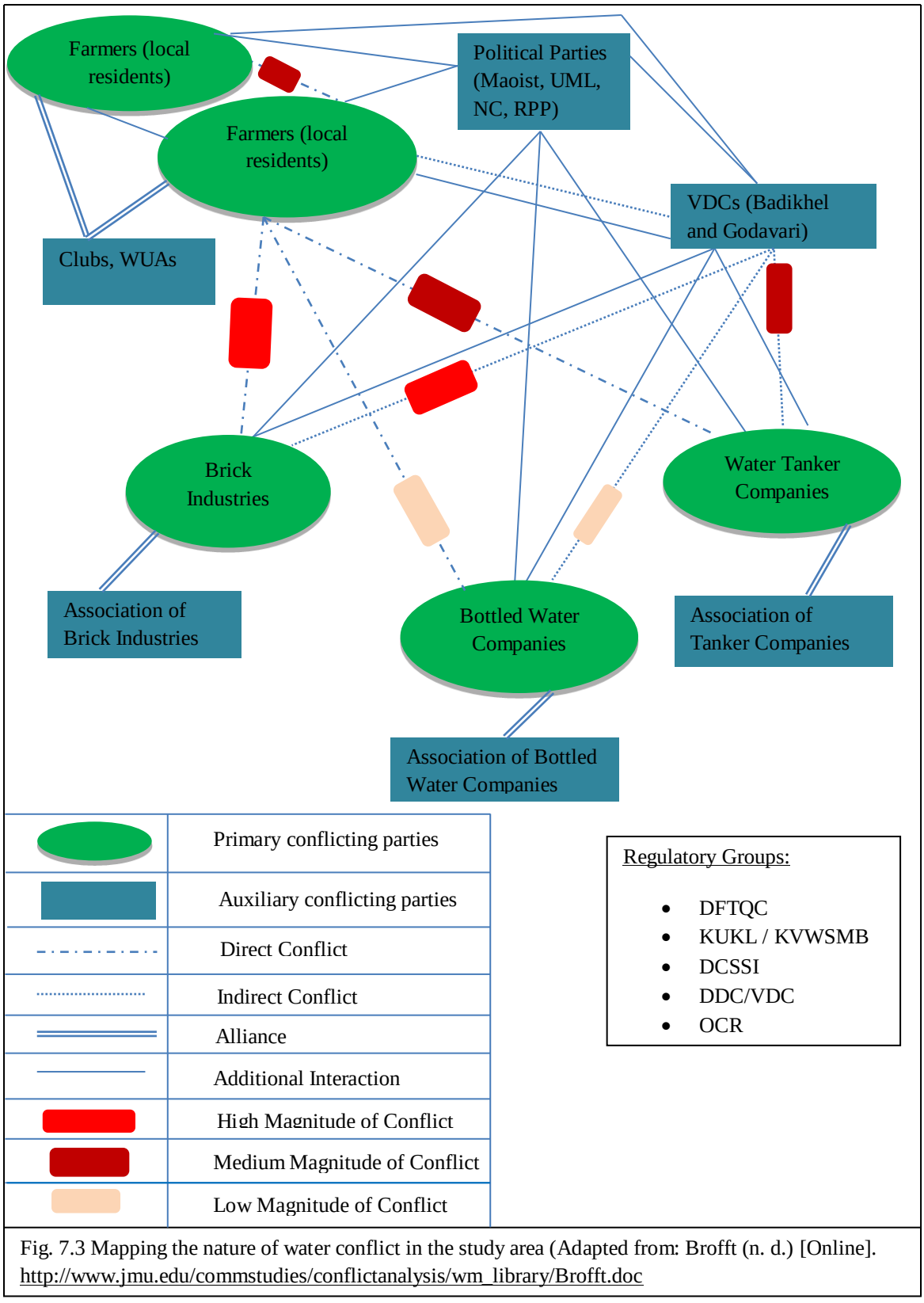


Fig. 7.3 Mapping the nature of water conflict in the study area (Adapted from: Brofft (n. d.) [Online]. http://www.jmu.edu/commstudies/conflictanalysis/wm_library/Brofft.doc

The figure discusses the direct and indirect confronted parties involved in the water conflict. There is a direct confrontation between farmers and companies (brick, bottled and water tanker). The conflicting actors have a direct alliance with their own allies. These actors have an indirect conflict with the VDCs in many matters because the VDC is a responsible

government organization in the village. From recommendation to tax receipt, each time the actors come into conflict indirectly with the VDC. For example, both farmers and companies complain to the VDC when they have a problem. During conflict, farmers and companies do additional communication with VDC and politicians. The figure also depicts the different magnitude of conflict. Dark red indicates high magnitude followed by dim red denoting less magnitude and the faint red, which indicates a low level of conflict. The magnitude is measured with the help of complaints of farmers against companies, observations in the field and responses of respondents and key informants.

The main regulatory bodies involved in water management in the study area are also shown in the figure. They are: the DFTQC, which in principle is responsible for the bottled water companies, the DCSSI, which is responsible for the cottage level industries, registered in it, KUKL and KVWSMB who are responsible for the regulation of municipal drinking water supply in the Kathmandu valley and the DDC and VDC, who are responsible for the development and administration of the district and the VDC respectively. Similarly, the OCR (office of the company registrar) is responsible for issuing registration certificates for companies. Besides, the figure clearly illustrates the conflicting parties and the direction of their conflict.

Figure 7.4 demonstrates the dimensions of water conflict in the study area. These dimensions mentioned in the figure have interaction with each other and are therefore interrelated. Viewing them separately is impossible. The legal dimension has to do with the existence of plural legal system in water rights. State law, customary, local and religious laws are prevalent in the study area.

Both the factories and the government authorities regard state law whereas farmers claim their right through customary and religious laws. Prior appropriation is not regarded by state law but farmers are still claiming it. Hence, the confrontation here stems from ambiguity in the laws. Similarly, conflict has an economic dimension because water possesses economic value e.g. both irrigation and industrial use have the economic value. The environmental and technological dimensions correspond to the pollution from the brick industries. The social dimension has to do with social problems created by industries e.g. increasing theft, acculturation, weakening of social ties and social capital. Among all dimensions, politics always sits on top because it possesses the power to govern and regulate the other dimensions. Moreover, changes in politics may influence changes in other dimensions.

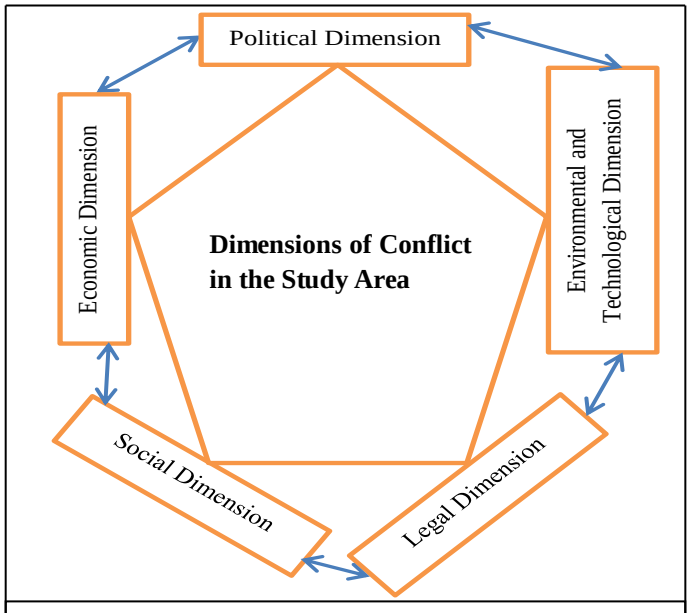


Fig. 7.4 Dimensions of water conflict in the study area.

7.5 Conclusion

It can be concluded from this chapter that water conflict in the study area is understood as an incompatibility of uses of water among users. This means commercial and industrial uses of water of different companies have become incompatible to the local *raithane* farmers' use of water. From the narrations of farmers, it can be inferred that water shortage created by industries cause difficulties for farmers growing crops. Moreover, in the dry season, irrigation has become impossible due to the transfer of water and collapse of irrigation canal caused by companies.

In the study area, water conflict exists among farmers themselves for irrigation and between farmers and companies for irrigation, drinking and commercial and industrial use. Conflict between head-end and tail-end section farmers is significant and strong. As long as the gap between demand and supply of water increases, the magnitude of conflict grows. Furthermore, the conflict between farmers and companies is latent, sporadic and intermittent with high potential. However, people's participation in the water conflict is increasing. It is high in the dry season whereas it plummets down in the wet season. In addition, a high magnitude of conflict exists between farmers and brick factories because they transfer water out from agriculture and drinking, as well as causing pollution in the village. The VDC has been negotiating many conflict issues but failed to solve them. An elected governing body could negotiate and manage water conflicts of the village.

Chapter–Eight

Discussions and Conclusions

This chapter discusses the results, observations and outcomes of the research. It tries to relate the relevant concepts and theories for this research e.g. water rights, legal pluralism and water conflict. It also tries to revisit the research questions to assess whether they have been answered from the study. The chapter discusses these research questions according to the three previously mentioned concepts. Finally, a conclusion is provided at the end of the chapter.

8.1 Discussions

Water Rights

The four sampled actors (3 types of companies and a farmers group) of this research have different meanings, understandings and perceptions in claiming their water rights. It was also found that the methods of rights claiming of farmers faced with other colleague farmers and with companies is different. Farmers claim water rights in bundles, claiming all five types of rights under it. However, the claims over bundles are also different among farmers. The *raithane* farmers claim more rights than the new farmers. The new immigrant farmers also claim water rights in bundles but they cannot claim the same bundles as the *raithane* farmers. For example, those who have stayed or lived in the study area for long time can withdraw more water than the new immigrants. Similarly, the former have more regulatory rights, can exclude others and transfer or lease their rights to others. Prevalence of customary law supports them for prior appropriation rights. Therefore, informally, the new immigrants have less rights than those who have lived there for a long time i.e. *raithane*. However, state law does not discriminate old and new users on water rights. It may be illegal to discriminate in this way, but this kind of discrimination is still prevalent in the study area and commonly accepted by villagers.

Water rights are in a high focus in the study area because of the existence of many different types of water users. Water extraction has become a major focus of users because of shortage of water during the dry season. Before the establishment of water intensive companies like bottled water, brick and water tanker companies; water use was not in a primary concern of the residents, because there was abundant water for them at that time. The withdrawal of water has only become an issue for residents after excessive withdrawals caused a scarcity of water.

The coping strategies of farmers to securitize their water rights are generally based on customary, religious and local law. Local level informal institutions like CBOs, *Aama Samuha*[26], WUAs and clubs are lobbying farmers to help them to securitize their water rights. The irrigation water rights of farmers come from their land rights. However, farmers seem to be weak compared to the companies when claiming their water rights in bundles. This is partly caused by the growing cosmopolitan nature of the area (heterogeneous society). In the study area, there is an apparent prevalence of customary law but in a weak stage. However, from the perspective of prior appropriation (customary rights) and on the basis of priority of

[26] A formation of groups of women. This is an informal institution exists in the VDC.

water use (state law-as per WRA, 1992), farmers' water rights should prevail above of the companies' because commercial use of water comes after drinking and irrigation use.

Religious and customary laws also have given a high priority to drinking use of water. However, the water supplying companies like water tanker and bottled water claim that they are supplying drinking water which is in the first priority order in the WRA, 1992. Nevertheless, this kind of water supply is also a commercial supply which has a direct profit motive. Therefore, it comes after drinking and irrigation as stipulated in the WRA, 1992. Also, tanker water is not necessarily always used only for drinking purposes in Kathmandu valley. By extracting large amounts of water, companies are violating both prior appropriation and riparian rights of the farmers of the study area, causing water shortage for irrigation and drinking of the riparian of the *Kodku khola* and the *Thulo khola*.

The VDC claims its rights because WRA, 1992 vested the ownership of natural resources in the state. The VDC is a representative of the state inside its territory. Formal organizations and acts like LSGA 1999, the court, DDC and DAO are the upper level government bodies that protect the ownership of the natural resources inside the territory of the state. The study also demonstrates that the VDC regards customary rights informally. It always has to make trade-offs between customary and state promulgated laws. However, they are obliged to apply state law in case of a formal decision.

Companies claim their temporary water rights from the registration and renewal of their company with the relevant government agencies. The basis of their right is the license of their company and the related company laws. The Companies argue that "the management of the availability of raw materials and water for the factories is the responsibility of the government because we are paying tax money to the government agencies." Furthermore, the government of Nepal has declared industries as a backbone of the nation, so these companies are in a strategic position to claim the rights on natural resources in the VDC.

The brick industries claim water rights through the land rights which they have leased. They argue that they have leased land from farmers, so as long as they have an agreement with the farmers, they can extract water from the river and other sources. In particular, they claim that they have purchased temporary water rights from the farmers. Besides this, they use money, power and political ideology (*Sama*, *Dama*, *Danda* and *Bhed*)[27] to be able to rule over the natural resources of the VDC. It was also observed that companies have many covert means to expropriate the natural resources of the VDC. For example, companies can covertly use bribes, goons and police as their covert means. The political unclear stage of the country has become a positive catalyst for the companies to expropriate water resources. Also, the study reflects that farmers are unable to unite due to a lack of social capital. Farmers try to raise a collective voice against companies but when problems exist among farmers themselves, disputes can easily separate them.

Furthermore, tanker water users also claim their rights as they think that water is a kind of human rights. However, since water is not regarded as a human right constitutionally in Nepal, citizens cannot claim water as a human right. Citizens who are living in water scarcity areas cannot go to the court against the government for the lack of municipal water supply. In

[27] *Sama* = the process of pacifying; *Daam* = the process of using money; *Danda* = the principle of punishment; *Bhed* = the principle of dividing.

a nutshell, the study shows that different stakeholders have different versions of water rights. This helps to escalate the conflict.

Legal Pluralism

A plural legal system was observed to exist in the study area. The issue is claiming water rights based on state versus customary law and the subsequent withdrawal of water. Farmers and local residents claim water right on the basis of customary and local law. They oppose companies who are transferring water away from irrigation and drinking water supply. The WRA, 1992 has also prioritized drinking and domestic use of water over industrial use. This means water should not be transferred to industrial uses if it causes shortage in the irrigation and drinking water supply. Actually, in the study area, the rights of farmers should outrank those of companies according to both state and customary law. On the other hand, companies have rights based on formal legal aspects (state law) as long as they have a license of the government for the operation of factories.

The prior appropriation rights, which farmers usually claim are not being regarded by WRA, 1992. During negotiations, the VDC is also trying to recognize customary law but it always leans towards state law when it has to give a formal decision. The clear existence of a plural legal system and different understandings and perceptions of rights over water prevents both farmers and companies from enjoying their rights. For example, farmer's customary law prevents companies from extracting large quantities of water from the source. Although, in principle customary law prevents companies from extracting water, this has not happened in practice. Therefore, there are confrontations between companies and farmers. In contrast, state law as used by companies prevents farmers from enjoying their customary rights. Moreover, due to state law, farmers are facing water shortage, because companies are withdrawing water based on it. Hence, in the study area, legal pluralism contributes to escalate conflicts rather than lessening it.

One consequence of legal pluralism is that farmers and companies have different and separate forums. They shop their own forums wisely during conflict, expecting the decision turns out in their favor. Similarly, many forums like political parties, NGOs, CBOs and clubs are also luring the conflicting parties to come to them for the negotiation, convincing them that the decision would turn out favorable for their side. This clearly shows that the consequence of legal pluralism in the form of forum shopping and shopping forums was observed in the study area. These forums are sometimes catalysts to raise conflict and sometimes the other way around. Political parties are especially playing both types of roles. Forum shopping is the main strategy of farmers to securitize their water rights. Farmers do not trust in prescriptive type of decision making institutions (as arbitrator of conflict) like district administration offices, the police and the courts.

Water Conflict

The issue of one user's withdrawal of water becoming incompatible to the withdrawal of other users is a key point in understanding water conflict in the study area. For example, companies' withdrawal of water has become incompatible with the farmers' withdrawal. It creates water shortage, hence conflict emerges and escalates among farmers as well as between farmers and companies. Moreover, different competing views on water rights in both of the groups of water users are the main causes of conflict. These groups of water users are in a competition to withdraw water from the source. Both of the groups do not regard each

other's right. Also, they do not recognize the necessity of water for the other. Companies' use right of water violates and excludes farmers' rights and vice versa.

The conflict is visible during water scarce times e.g. the dry season. This is because, in the study area, in the dry season, there is a high demand of water (mostly drinking and domestic use) in Kathmandu city as well as on farmer's land (for irrigation). Therefore, there is more competition to extract and use water at that time. In contrast, there is less conflict in other seasons when each group of water users get comparatively more water. Hence, the water conflict in the study area can be categorized as 'latent,' 'intermittent' and 'sporadic.'

Upreti (2007) states: water conflict is a normal phenomenon if the same source is used for more than one purpose in the absence of a clear water rights provision. This study found, in the study area, the conflict clearly exists although it is a latent and intermittent because the same source of water is using by farmers and companies in many purposes and there is the ambiguity of law (absence of clear water provision). Farmers mainly use water for irrigation and drinking whereas companies and factories use it for commercial and industrial use. In particular, farmers are using *Gwalindaha mul*, *Thulo khola* and *Kodku khola* on irrigation and drinking water supply whereas companies making commercial (water tanker and bottled water companies) and industrial (brick industries) use of the water. Severe conflict exists during water shortage time among farmers as well as between farmers and companies. The conflict between head-end section and tail-end section farmers is mainly about water quantity and duration (time). The magnitude of conflict grows as the gap between demand and supply of water increases.

There have been a lot of unsuccessful negotiation attempts from VDCs to solve water conflict issues. Due to the lack of a local elected body, those attempts went in vain. Companies are becoming powerful because they are paying money to the VDCs and local clubs. They use their power and money to expropriate water. Due to many negative impacts of brick industries, farmers have ranked them as one of the worst and most polluting industry. Brick industries extract large amounts of water as well as cause heavy smoke pollution in the study area. Social cohesiveness was also observed to be low due to the cultivated land leasing practices of farmers in the study area. Nevertheless, the conflict, as observed in the study area, is gradually gaining people's participation.

8.2 Conclusions

Water conflict in this study is understood as disputes arising among farmers as well as between farmers and companies due to the inequitable sharing of water. The main cause for this is companies' water transfer from agricultural to industrial and commercial use. Moreover, the water conflict is a product of competing views on the bundles of water rights and the prevalence of a plural legal system. Some users' water use has become incompatible to that of other users. The existence of the customary law and state law further contributes to the emergence and escalation of conflict in the study area. The study found that there is severe conflict between different water users (old and new) but the conflict is latent, intermittent and sporadic. Conflict is clearly visible during the dry season while subsides rapidly at the start of the rainy season. The intensity of the conflict varies according to the season. For example, the intensity of conflict among and between the groups of water users is high during the dry season. The magnitude of conflict is especially high between farmers and brick industries because the brick industries extract excessive quantities of water as well as

cause pollution in the village. People's participation in the conflict is increasing as the extent of water scarcity increases.

Furthermore, according to the narrations and observations, it can be inferred that the conflict between the farmers of head-end section and tail-end section is severe. This is again related to the quantity of water. Similarly, terrace re-demarcation after the excavation of the brick industries creates and escalates conflict among farmers. This also deteriorates and diminishes social harmony within the local society. Due to the lack of regulation for small water businesses (bottled water and water tanker companies) in Kathmandu valley, these industries are able to extract excessive quantities of water and then sell to the shortage areas of the city as drinking water without minimum purification. This also may affect the health of the users of bottled and tanker water. It is also found that, in the Godavari watershed, the demand for drinking water is increasing while the demand for irrigation is not increasing at the same pace because the rapid in-migration increases population but reduces irrigated land. Due to the lack of an elected governing body in the VDC, the negotiation and management of water conflict has been very difficult. The current unclear political state of the country also contributes to the emergence and escalation of water conflict (among farmers and between farmers and companies) in the study area.

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Summary

Understanding Water Conflict: A Study of Conflict among Farmers and between Farmers and Companies in the Godavari Watershed, Kathmandu Valley, Nepal

Water conflict between farmers and companies has a profound influence on the socio-economic development of the Godavari watershed of Kathmandu valley. The study area is a peri-urban area which is urbanizing rapidly due to rapid in-migration. Many water related industries are established to fulfill the municipal water supply gap of Kathmandu city. Water shortage in irrigation and drinking water supply has occurred due to the transfer of water by water companies (water tanker and bottled water) as well as water use by brick industries. Since agriculture is the backbone of the economy of the study area, farmers have an intrinsic relation with water. Many problems caused by water and brick industries and the subsequent conflict between farmers and companies have not been addressed by any scientific study so far. This study explores the nature of water conflict among farmers and between farmers and companies in the Godavari watershed area (Badikhel and Godavari VDCs) of Kathmandu valley.

Three main concepts and theories have been used in this research to analyze water right conflict in the study area. These concepts are: water rights, legal pluralism and water conflict. The main objective of this research is to identify the nature of the water conflict among water users (farmers and companies), their strategies to claim and defend water rights and the impacts caused by the companies (water tanker companies, bottled water companies and brick industries) in the Godavari watershed area. The overall approach used in this study is the 'actor oriented approach' developed by Norman Long. Main actors of this research are irrigating farmers, water tanker companies, bottled water companies and brick industries.

Both probability and non-probability sampling methods were used for sampling. A total of 75 farmers, 2 brick industries, 2 water tanker companies (one from Godavari VDC) and 6 bottled water companies have been taken as samples from Badikhel VDC. Similarly, 20 farmers from Godavari VDC were taken as a sample to analyze water tanker company related issues and conflict. Likewise, 30 tanker water users and 10 tanker water non-users were taken as samples from various water scarce city areas of Kathmandu valley. Checklists and semi-structured survey questionnaires have been used to collect filed data. Interpretive analysis method of data analysis was used to analyze both primary and secondary data.

The study area Godavari watershed lies to the southeast from the Kathmandu city. Both of the VDCs sampled for this research are peri-urban in nature. Though the study area has been rapidly urbanizing over the last decade, agriculture still is a main primary occupation of residents. Only 44.79% of literacy rate is found in Badikhel VDC whereas the national average is 54.10%. Irrigation systems in the study areas are of the Farmer Managed Irrigation Systems (FMIS) type. A rotational basis of irrigation water sharing is prevalent in the study area. *Heralus* are taking care of systems as well as management of water allocation to each farmer. Operation and maintenance of the main canal is the responsibility of the water users committee (WUA) whereas the responsibility of the branch canal goes to the farmers who irrigate their land from those particular branch canals. Head-end and tail-end section farmers have conflict in sharing irrigation water.

There is a severe scarcity of water in Kathmandu city. Per day demand of water is 320 MLD whereas dry season supply of KUKL is only 120 MLD. The water tanker companies emerged in Kathmandu valley to fulfill the water supply gap left by the municipal and traditional

supply. Tankers are transporting water from many places of the Kathmandu valley including Godavari. There is one registered water tanker company in Godavari VDC while the water tanker company of Badikhel has had to close due to a conflict with local residents, after 15 months of operation. Water tankers are supplying raw water but branding it as 'drinking water.' This is possible due to the lack of monitoring from the government. Water tanker companies supply 28.5 MLD water per day to Kathmandu city which is a significant contribution. Users of tanker water said that water is scarcer than a job in Kathmandu. About 50% of tanker water users use tanker supplied water in drinking after boiling followed by 30% users use in non-drinking purposes and 20% users use for drinking after filtering only.

Regarding the closed water tanker company of Badikhel, both the owner and local residents have different and conflicting opinions on the reason of its closure. Results show that one water tanker company extracts about 7.5 MLD water per month from the local water sources. Due to the transfer of water away from agriculture, it has a negative impact on agriculture. Main issues of conflict between farmers and water tanker companies are: water shortage created by water tanker companies, noise pollution due to the frequent plying of tanker trucks on the village road and not keeping promises by companies about jobs for local people. The VDCs receive a lot of anonymous complaints of local residents against water tanker companies.

The bottled water companies emerged in Kathmandu valley also to fulfill water supply gap left by municipal and traditional supply. Bottled water has been in fashion in Kathmandu due to its convenience in handling. People also believe that the water inside the bottles and jars has a better quality than tanker supplied and tap water. Bottled water companies of Badikhel pay tax to the VDC and a local club. According to the DFTQC, bottled water sold in Kathmandu is also not safe to drink. Due to the transfer of water, bottled water companies create water shortage for agriculture (irrigation) and drinking water supply. In the dry season, especially during paddy sowing and transplantation time, there are many confrontations between farmers and bottled water companies. Moreover, in the dry season, demand of bottled water is high in Kathmandu city, which drives bottled water company owners to extract large quantities of water from the sources.

Although the DFTQC is responsible for the water quality produced by bottled water companies, there is no monitoring mechanism for such companies. Therefore, ensuring good quality bottled water is difficult. Respondents ranked bottled water companies as less harmful than water tanker companies and brick industries. Results show that one bottled water company, in a month, extracts 0.20 MLD of water from source. Furthermore, as agriculture is a backbone of the study area, farmers do not want to compromise on irrigation water. The conflict between farmers and bottled water companies is most intensive during the dry season (paddy sowing and transplantation time). Moreover, the conflict is latent, sporadic and seasonal with high potential.

Water is necessary to convert clay into mud in the process of making raw bricks. Brick industries lease farmers' land to make raw bricks as well as for the area of the chimney and the raw brick baking place. Result shows that one brick factory, on average, extracts 6 million liters of water in one season (December to May). Respondents claim that brick industries destroy irrigation canals due to the excavation of land for making bricks. Because of this, downstream lands face water shortage problems. Moreover, heavy water use by brick industries contributes to creating water shortage in irrigation and drinking. Problems with re-demarcation of land and smoke pollution are other problems caused by brick industries. Due to the smoke pollution, growing winter vegetables has become almost impossible in the study

area. Land leasing practices also damage social harmony in the village because non-leasing farmers blame leasing farmers for the damaged irrigation canals. There are conflicting views about the negative impacts of brick industries between farmers and brick industry owners. Respondents ranked brick industries as one of the most hazardous industries in the study area because, besides the high quantity of water extraction, they are polluting the villages.

In this study, water conflict is understood as incompatible uses of water among different users. The commercial and industrial uses of water become incompatible for farmers and vice versa. Theft of irrigation water at night is another issue of conflict among farmers themselves. Local people's participation in conflict is increasing. Both VDCs are trying to negotiate and manage conflicts but have failed. Belief in different types of laws like state and customary laws with different forums of actors contributes to escalate conflicts in the study area. Brick industries and farmers have a high magnitude of conflict followed by a medium magnitude conflict with farmers and water tanker companies and a low magnitude for farmers and bottled water companies.

Users of water have different perceptions on water rights derived from state law and customary law. Farmers believe that they have prior appropriation rights of water use which the WRA, 1992, as a state law, does not regard. Farmers' coping strategy is based on the customary rights. The WRA, 1992 categorized uses of water, giving drinking water and domestic use first priority, whereas industrial and commercial use was granted fifth priority. Water rights have not been declared a fundamental right by the current interim constitution of Nepal. The existence of a plural legal system clearly contributes to escalate the conflicts (between farmers and companies). The different forums of actors of the conflict contribute to escalate conflict rather than negotiating and reducing it. The VDCs regard customary laws informally but when making formal decisions, they follow state promulgated laws. This is because the VDC is a government organization. Different conflicting views on water rights and excessive water extraction of companies bring farmers and companies into conflict. Moreover, water shortage created by companies by transferring water away from irrigation and drinking is a main issue of water conflict between farmers and companies.

Annexes

Annex-I: Priority order of water use according to the WRA, 1992

While utilizing water resources, following priority order shall, in general, be followed:

1. Drinking water and domestic uses;
2. Irrigation;
3. Agricultural uses such as animal husbandry and fisheries;
4. Hydroelectricity;
5. Cottage Industry, industrial enterprises and mining uses;
6. Navigation;
7. Recreation uses;
8. Other uses.

Annex-II: List of bottled, brick and water tanker companies in the study area

SN.	Name of Industry	Address/Location	Remarks
A.	**Brick Industries**		
1	Kantipur Brick factory	Badikhel VDC ward no. 1, Thapagaon	
2	Bramha Bishnu Maheshwore Brick Industry	Badikhel VDC ward no. 8, Chamas tole	
B	**Bottled water companies**		
1	Godavari Mineral water	Badikhel VDC ward no. 9, Gwalindaha	
2	Sahara Beverage		
3	Himalayan Beverage		
4	Krishna Mineral water		
5	Glacier Mineral Water		
6	Core Spring Mineral Water		
7	Tripura Beverage	Badikhel VDC ward no. 1, Gwalindaha	
8	Annapurna Mineral Water	Badikhel VDC ward no. 9, Gwalindaha	
9	Fulchoki Mineral Water		
10	Kanchanjungha Mineral Water		
C	**Water Tanker Companies**		
1	Amulya Drinking water Services Private Limited	Godavari VDC ward no. 2, Taukhel	Owner: Mr. Rabin Silwal. Source is located at ward no 3.

Annex-III: List of experts and offices consulted in Kathmandu Nepal during field work

S.N.	Visited/interviewed organizations / experts	Their areas of working	Remarks
1	Badikhel, VDC, Lalitpur	Bottom level government organizations of Nepal	Adjoining and nearby VDCs
2	Godavari, Harisiddhi, Jharuwarasi, Thaiba and Imadol VDCs of Lalitpur		
3	Three ex-VDC chairmen of Badikhel VDC		
4	Industry Department, head office	Industrial policy related – government office	
5	Cottage and Small Industries Development Committee (CSIDC), Lalitpur district branch	Government office responsible for entire management and regulation of small industries	Registration of small industry including brick and bottled water
6	Department of Food Technology and Quality Control (DFTQC)	Food law, food policy management, regulation and scientific study	
7	Kathmandu Valley Water Supply Management Board (KVWSMB)	Overall policy making and management of drinking water and sewerage in Kathmandu valley – government office	
8	Kathmandu Upatyaka Khanepani Limited - KUKL (Kathmandu Valley Drinking Water Limited)	Para-statal organization responsible for the operation and management of overall drinking water supply and sewerage system of municipalities of Kathmandu valley	Established under KVWSMB
9	Nepal Water Conservation Foundation (NWCF)/WaterNepal/ISET-N.	Organization carrying out Research on interdisciplinary water	
10	Vertical Shaft Brick Kiln Project, Lalitpur	A Swiss supported project working in promotion of VSBK and research and development.	
11	Upatyaka Khanaepani Tanker Byabasayi Sangh (Valley Water Tanker Entrepreneurs Association)	Association of taker companies	
12	Pro-Public Kathmandu Nepal (Mr. Prakashmani Sharma - ED)	Advocacy for good governance, human rights, an watch dog of government policies	
13	Nepal Water Partnership (Country representative for Global water partnership - GWP)	Water related research and development in Nepal	
14	Visited libraries of Nepal Engineering college, Social Science Baha and Nepal Water Conservation Foundation		
15	Dr. Bishnu Raj Upreti	Regional Coordinator of NCCR – South Asia	
16	Dr. Rajendra Pradhan	Renowned Anthropologist – who was working in water rights project in Nepal with different universities and organizations of Europe and USA	
17	Dr. Prachanda Pradhan	FMIS trust/ renowned scholar working in research on FMIS	

18	Dipak Gyawali	IDA/renowned scholar working in water/former minister for water resource, Nepal	
19	Ajaya Dixit	ISET-N/renowned scholar working in water	
20	Upendra Gautam	CMS Nepal/ working in irrigation since long time	
21	Professor Ashtosh Shukla	Professor of Nepal Engineering College - nec	
22	Janwillem Leibrand	PhD researcher in Wageningen University	Frequently

Annex-IV: The history of water related laws of Nepal

S. N.	(1) **Ruling Dynasty**	(2) **Duration / Period**	(3) **Prevailing *Dharmasatra*/Law**	(4) **Substantive Law**
1	Kirat Dynasty	Before 464 AD.	"Mundhum" (Chapter on Khasem Kharom Theme, Rules for Administration of Justice)	No specific provision regarding water management found to date.
2	Lichhavi Dynasty	464 – 782 AD.	Lanusmriti, laradasmriti, Yangyaalka Smriti and other religious scriptures	As per customary practices and Dharmasastra
3	Malla Dynasty	782-1768 AD.	As above	Annual repair of canal by its users made mandatory and non-compliance was punishable. Everyone had right to use water irrespective of their caste on turn by turn basis.
4	Shah Dynasty			
a	Legal system before codification of Law	Begins from the reign of Drabya Shah in Gorkha in 1559 to 1854 AD.	As above	• First come first service in drinking water & irrigation. • Petty cases relating to drinking water and irrigation was not heard by state agency or royal courts (Rules 6 & 8 of Ram Shah). • The person who cut trees around drinking water taps was fined NPR 5 (Rule 14)
b.	Legal system since the promulgation of codified law in 1854	1854 – 1963 AD.	As above plus National code of 1854.	• Makers of the canal had first priority to use the water but traditional water sharing pattern was upheld. • Irrigation from top to bottom

				was recognized. • Canals could not allowed to be constructed upstream of existing canals if that lessened water supply to the downstream canals.

Table: continue…

S. N.	Ruling Dynasty	(5) Concerned Authority	(6) Jurisdiction	(7) Remarks
1	Kirat Dynasty	Local Assemblies and Individuals.	Water related conflicts as well as other issues.	
2	Lichhavi Dynasty	• Panchali, Drang, Adhikaran. • Birtawala	• Panchali was village level assembly of five adults like a trial court, all case within their jurisdiction. • Drang was province level or appeal level court and Adhikarn was central level. • Birtawala had authority to hear local level water related cases within their Bitra land area.	• Birtawalas were persons who receive land grants, usually tax free from the state.
3	Malla Dynasty	• Pancha Samuchaya (Assembly of five local people). • Dwares (gateman). • Birtawala (land lord). • Pundits (Priests).	• All village level disputes including water related. • All appointed by king, princes or ministers to hear petty cases including water related issues of their respective areas.	• In 1626 AD. Jitamitri Malla of Bhaktapur issued a royal order to levy for the use of canal water. • Water related disputes were not considered as important disputes of the society.
4	Shah Dynasty			
a	Legal system before codification	Pancha, Dware,		Jurisdiction of state

	of law	Thare, Mukhiya, Birtawala, Choudhary		agencies and their authorities overlapped.
b	Legal system since the promulgation of codified law in 1854 AD.	Court of Bichari (Trial Court)		

Source: Khadka (1997).