Access to and Usage of Clean Water in Peri-Urban Vietnam

A Case Study of Gia Lam District, Hanoi

Thi Huyen Cham Nguyen

Consortium of Development Studies in Southeast Asia (CDSSEA)

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The Consortium of Development Studies in Southeast Asia has drawn on primary postgraduate research undertaken for theses from the master's programs of Asian Institute of Technology's Master of Science in Gender and Development Studies (MGDS), Chiang Mai University's Master of Arts in Social Science (Development Studies) (MASS); and the Chulalongkorn University Master of Arts in International Development Studies (MAIDS). Scholarships for the students of CDSSEA has been generously provided by the International Development Research Centre (IDRC) of Canada. With a diversity of academic approaches (gender studies, political science, social sciences), the individual works of this collection have in common a focus on the increasing interconnection and regionalization of the five mainland Southeast Asian countries (Myanmar, Thailand, Laos, Cambodia and Vietnam), and examine these exchanges and encounters within the context of the Greater Mekong Sub-region (GMS).

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Thi Huyen Cham Nguyen

RCSD
The Regional Center for Social Science and Sustainable Development
Chiang Mai University

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Series Foreword

The Regional Center for Social Science and Sustainable Development (RCSD) at Chiang Mai University has extended its publication program to include Master's dissertations from The Consortium of Development Studies in Southeast Asia (CDSSEA). The CDSSEA series covers mainland Southeast Asia: Myanmar, Thailand, Cambodia, Laos and Vietnam, and regionalization, development encounters and exchanges within the Greater Mekong Sub-region (GMS).

The CDSSEA program brings together resources and expertise from three of Thailand's leading institutions offering Master's degrees in development studies: Chiang Mai University's Master of Arts in Social Science (Development Studies) (MASS); Chulalongkorn University's Master of Arts in International Development Studies (MAIDS); and the Asian Institute of Technology's Master of Science in Gender and Development Studies (MGDS). Although the Consortium's program focuses on the relationship between development studies and social sciences, each of the programs has a different emphasis. The Chiang Mai degree focuses on social sciences and anthropological perspectives, with research interests in environmental and resource management, food security and local livelihoods, labour migration and trans-border issues, ethnicity and development, health, tourism, and agrarian transitions. Chulalongkorn's program concentrates on the political dimension of development, including democratization, human rights, conflict resolution, international and civil society development organizations, community development and globalization. The Asian Institute of Technology focuses on the relationships between gender and development—including women's rights, civil society, and gender dimensions of urbanization and industrialization.

The CDSSEA program has a practical dimension, building leadership capacity in mainland Southeast Asia's regional development, bringing together postgraduate students, encouraging debate, and promoting the rethinking of development alternatives in such areas as social equality, justice and participation, environmental and economic sustainability, and community development. In this regard, a major objective is to develop the knowledge and skills of development practitioners and to enhance the quality and effectiveness of policy-making and its implementation in the region.

The publications in this series—selected from the CDSSEA Master's program—are designed to express this diverse range of interests in development studies and regionalization, and to emphasize the relationships between empirical and theoretical research, policy-making and practice.

Victor T. King, Senior Editorial Adviser,
Critical Perspectives on Regional Integration Series

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Abbreviations

MARD	Ministry of Agriculture and Rural Development
MOC	Ministry of Construction
MONRE	Ministry of Natural Resources and Environment
NTP	National Target Program
UNDP	United Nations Development Program

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Thi Huyen Cham Nguyen

Chapter 1

Introduction

Research Statement

Water plays a critical role in sustainable development and given the importance of water to alleviate poverty and improve human and environmental health, water resource management becomes of central importance (Charles, 2007)

Gia Lam is a peri-urban district in the eastern part of Hanoi, the capital of Vietnam, and functions as a main transport hub for surrounding industrial cities and provinces. Due to its favorable location and a rather plain geography, Gia Lam district offers many advantages to develop a wide range of economic sectors.

Unfortunately, arsenic, a heavy metal which is considered to be one of the most significant environmental carcinogens (Elizabeth, 2009) is present at higher levels than the drinking-water standard limits and surpasses levels of any other Hanoi district (Dan & Dzung, 2002). Additional groundwater pollution comes from agricultural fertilizer residue and untreated industrial and household wastewater.

It is only fair and reasonable to consider the implementation of piped water supply. First, piped water is supposed to meet the requirements of the Ministry of Health and thus to be treated accordingly. Second, central water harvesting through piped water supply is supposed to reduce the threat from private wells on groundwater.

Over recent years the Gia Lam district government has been implementing a piped supply system but results so far haven't been very positive: according to the report from the Gia Lam Economics Department, in 2014 only 52% of households in 15 (out of 22) communities have access to piped water while daily usage is even less: some households returned to drilled water wells, while others combine both sources. Due to geographical problems the other seven communities have been left out, but local government is planning further expansion.

These observations convinced me that further research needs to be done so I chose "Access to and usage of clean water in peri-urban Vietnam: a case study of Gia Lam district, Hanoi" as my Master thesis from which this book has emerged.

Research Questions

Main question

- How to improve clean water usage for locals in Gia Lam district, Hanoi, Vietnam?

Specific questions

- What is the current situation of water usage for local residents?
- Which parameters affect water usage?
- How efficient is water governance?
- How can water governance be improved?

Research Objectives

- Investigate clean water usage for consumption.
- Analyze which factors affect water usage.
- Evaluate water governance.
- Seek for a solution to improve future water usage.

Research Methodology and Scope

Research Sites

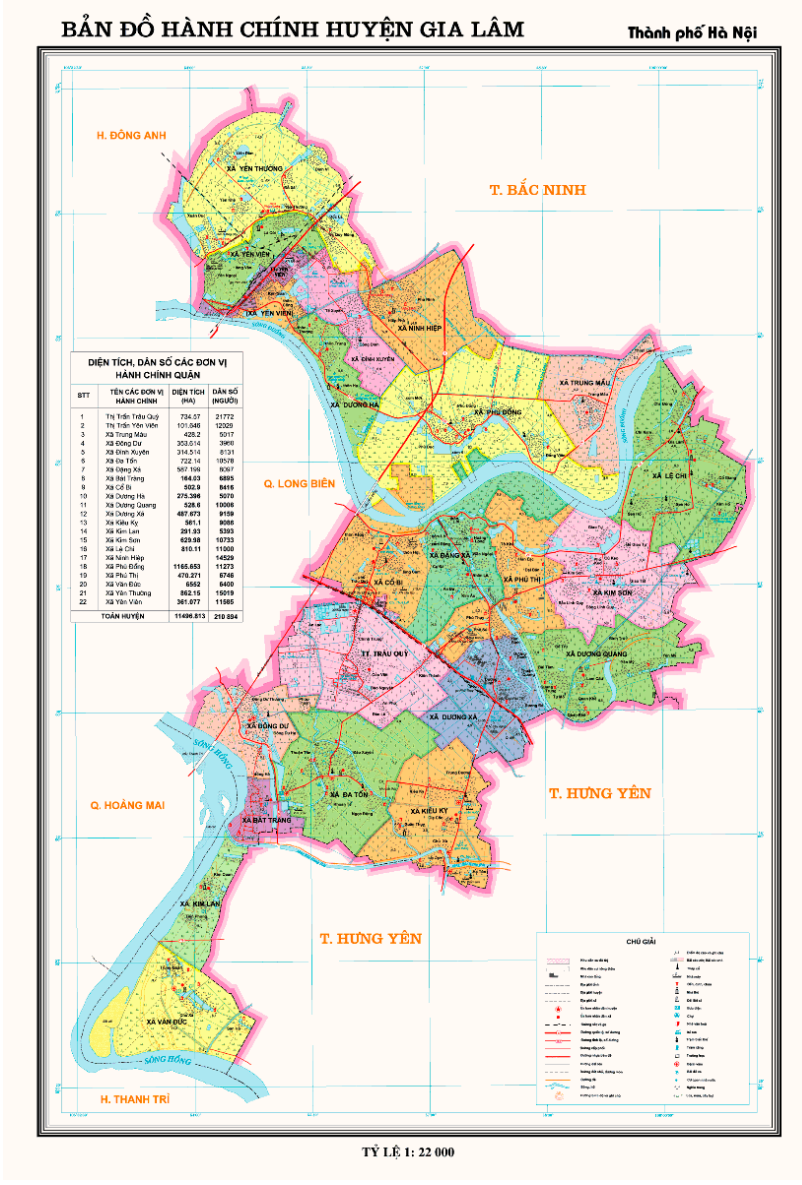

Figure 1.1: Research Site. *Source: Gia Lam People's Committee*

Natural features of Gia Lam district

As mentioned earlier, Gia Lam is a peri-urban district in Hanoi with main routes crossing the region and connecting the district to other industrial provinces in the North of Vietnam such as Hai Duong, Hai Phong, Quang Ninh and the Hung Yen province. Therefore, Gia Lam is convenient for economic and commercial purposes and very attractive to investors.

The Red River Delta enjoys a typical tropical climate, with two distinct seasons every year: a hot, wet Monsoon season from April to October and a dry season from November to March. Temperature on average is 23.5^{0}C and goes up to 27.4^{0}C during hot season. Yearly precipitation is 1,400-1,600mm while most rain falls from May to September. Total number of yearly sun hours is 1,500. Together with its plain geography and fertile soil along the Red River Delta, Gia Lam comprises a rich tropical and subtropical biodiversity.

Socioeconomic features of Gia Lam district

Total population in Gia Lam district at the end of 2013 reached 253,800 people. Average growth is around 2% yearly. In 2011, the total household number was 61,806 increasing 2.07% in both 2012 and 2013. Migration and population growth are partially the result of industrialization and urbanization and already create pressure on local authorities how to maintain basic services and how to control social evil. Nowadays, young laborers tend to leave the area and look for non-agricultural jobs. So it is a good sign to shift labor structure, suitable to the trend of urbanization and modernization. Nevertheless, it creates challenges as well because most laborers are old with a limited skill set facing difficulties to adapt to new technology.

	2011		**2012**		**2013**	
	Quantity	**%**	**Quantity**	**%**	**Quantity**	**%**
Total population	243,957	100	248,991	100	253,800	100
Agricultural	183,923	75.39	176,780	71.00	172,849	66.10
Non-agricultural	60,034	24.61	72,211	29.00	80,951	31.90
Total households	61,806	100	63,751	100	64,386	100

	2011		2012		2013	
	Quantity	**%**	**Quantity**	**%**	**Quantity**	**%**
Agricultural	45,983	74.40	45,238	70.96	43,975	68.30
Non-agricultural	15,823	25.60	18,513	29.04	20,411	31.70
Total laborers	166,876	100	174,040	100	185,439	100
Active	133,500	80.00	139,232	80.00	149,561	80.65
Distribution laborers						
Agriculture	83,238	49.90	78,660	45.20	75,273	40.59
Industry	46,725	28.00	49,131	28.23	52,946	28.55
Commerce	36,913	22.10	46,249	26.57	57,220	30.86

Table 1: Population and Laborers in Gia Lam district 2011-2013

According to the 2014 report on socioeconomic development, piped water in the district is available as follows: on one hand there are rural water supply stations, financed by the World Bank, and on the other hand there is a private firm—Hanoi Water No 2 One Member Company Ltd—which is responsible for most piped supply in the district. Rural water supply station projects lack a systematic approach and once finished they never operate at full capacity (it is worth mentioning that at the time of writing these stations are undergoing modifications and are expected to work significantly better in the future).

Due to rapid urbanization and economic growth, improvements and investments are necessary. Twenty communities count 911,05 km of roads in total, of which merely half is concreted. As irrigation goes, further improvements are required to fulfill the growing needs of agricultural produce: only 8 out of 47 pump stations are working well. Canal systems for agricultural production cover 354,93 km, but hardly 1/4th is concreted. Only 16 out of 20 health centers in Gia Lam district, are qualified. Only 5 out of 21 kindergartens reach the

national standard. Investments in the electric grid have been made and now 100% of local residents have joined the national electrical grid, each of them using the grid regularly and safely.

From 2011-2013 a shift to other sectors boosted economic growth: gross output for agriculture, forestry and fishery proportionally decreased while industrial and services oriented activities are flourishing.

The development of industrial zones has created opportunities as well as challenges for the district government. Labor migration causes social issues and weak-technology and untreated wastewater in small factories pose environmental threats.

	2011		2012		2013	
	Value (VND)	**%**	**Value (VND)**	**%**	**Value (VND)**	**%**
Gross Output	1,867.785	100	2,087.629	100	2,280.139	100
Agriculture, forestry, aquaculture	265.801	14.23	270.107	12.94	263.421	11.55
Agriculture	256.349	96.44	260.115	96.30	253.141	96.10
Forestry	88	0.03	71	0.03	80	0.03
Aquaculture	9.364	3.52	9.921	3.67	10.200	3.87
Industry and construction	1,063.322	56.93	1,188.634	56.94	1,296.012	56.84
Industry	802.502	75.47	885.561	74.50	950.206	73.32
Construction	260.820	24.53	303.073	25.50	345.806	26.68
Commerce and services	538.662	28.84	628.888	30.12	720.706	31.61

Table 2: Gross Output economic sectors in Gia Lam district 2011 - 2013

Sampling

To understand the reasons why households with access to piped supply, are so reluctant to use them, my goal was to aim for communities who are already supplied with piped water. So I discussed with district leaders which community and which households would be appropriate and we selected the Dang Xa community which counts 10 villages, mostly identical. In agreement with the village headman I chose 10 households in each village based on income.

Number of selected households can be explained by this formula:

$n = N/ (1+Ne^2) = 96, 5338$

With a total number of households N = 2785, and standard error e = 10%, I rounded the result, shown above, up to 100 samples.

Data Collection Method

Secondary data were mainly collected at the offices of the provincial People's Committee and involve more general features like natural and socioeconomic characteristics of the district, information about water accessibility, some related decrees and the current status of supply stations.

Primary data come from surveys and in-depth interviews with both households and local government staff. For the survey of 100 households a questionnaire was used requesting general household information as well as more specific information about water accessibility and usage. Then I conducted in-depth interviews with 10 households. The Bases of selection comprised either popular or unique point of views. Next, I held a non-structured interview with local government officers. Specific information that I was looking for, were related to mandate, coordination and difficulties and the reasons why water governance so far has not worked out well. Most in-depth interviews were recorded carefully by listening, taking notes, audio recording and completing questionnaires.

Data Analysis Method

All collected data was processed combining qualitative and quantitative methods. 100 questionnaires and some socioeconomic statistics were processed by Data Analysis Regression Software (qualitative research mainly through in-depth interviews as described above).

Descriptive statistics were used to obtain an overall picture of the situation in the field as well as interviewees' different opinions. Comparative statistics were used to observe the changes over the years. Finally, OLS regression helped to see which parameters have been influencing water accessibility.

Significance of Research

My research will assess in more detail the current situation of water access and governance in the Gia Lam District and show the obstacles of water governance and difficulties within households. A more transparent view on which parameters affect water accessibility will help the local government to play a better role, encourage communities to engage in water governance and obtain access to sustainable, clean water improving public health and quality of life.

Ethical Issues

In order to interview all ten households and local government officers, I informed each of them about the reasons for my research and asked the local government for written consent and a recommendation letter which I showed to the village headman and each household. When meeting the interviewees, I introduced myself and said that their support to provide information and to complete the questionnaire would be deeply appreciated while affirming that all information would be kept confidential and used for academic purpose only.

Chapter 2

Literature Review

Literature Review

Rural Water Supply

First, I would like to commence my discussion with rural water supply issues dealt with in some other countries for comparative purposes. Then water usage in general in Vietnam will be outlined. I conclude with water governance in Vietnam, with a particular focus on current issues related to drinking water governance.

Water governance implementation in Tanzania

Its long development process and many milestones makes Tanzania an excellent comparative example to observe (Jimenze & Perez-Foguet, 2010) and I would like to discuss how funding and stakeholder responsibility changed over time.

At first 75% of funding was handled by the state, 25% by local governments. Through water tariffs and taxes, local governments could deal with operation and maintenance costs. In 1965 the state decided to cover all funding, while local governments remained responsible for maintenance. A few years later it became clear that local governments did not perform well and maintenance duties were transferred to the central government. That time water usage was free for everyone but it turned out to be unsustainable due to overconsumption and cost-ineffective funding.

In 1991, the central government became responsible for most activities, but lack of stakeholder participation turned out a major drawback and Tanzania had to evolve further to its current water supply policy.

Today water is acknowledged as a human right and the central government acts as an intermediary while district governments handle implementation and maintenance and interact directly with the community.

The community is supposed to pay for maintenance costs. Cost contribution is flexible, either cash or workdays, and depends on preference and the particular conditions of each household. This is a feasible model as it promotes a sustainable supply system, positive community participation and efficient water usage (due to participation).

The role of the district level administration seems decisive and most suitable to play a key role. Its mandate must be utterly transparent.

Challenges of rural water supply

"Tanzania showed some basic challenges: low quality of rendered services, low sustainability, lack of pro-poor targeting and an inadequate information system (Jimenze & Perez-Foguet, 2010). Analyzing these challenges can lead to improvements.

First, pollution of ground water points was common and mainly the result of poor catchment management and uncontrolled network connections.

Second, in Tanzania only 45.3% of all hand pumps, 48.6% of gravity-fed systems and 44.4% of motorized systems were functional. In some areas water points turned out to be quite sustainable while totally failing in other areas. Furthermore, sustainability was challenged by limited community funding, the difficulty of building harmonized relationships between user and village representatives, inefficient services management and the limited role of local governments. Most parts of the system are handled by the community, however support to build an effective and sustainable model was failing. Therefore, the role of the state should include capacity building, consultancy and coordination.

Third, lack of pro-poor targeting by overemphasizing on infrastructure development while neglecting capacity building, post-project aid and equality. The greatest challenge for targeting the poor can be found at district level: after analyzing needs and demands, district councils seem to be inclined to prioritize

more affluent villages and thus widening the inequality gap. Moreover, the village headman is often not qualified as a decision maker.

Fourth, an inadequate information system also contributes to the failure of targeting the poor. Tanzania's case reveals common challenges. Data were collected from local authorities, published and analyzed by the ministry, but once checked by the districts, processed data did not seem very accurate.

In summary, the main challenges in rural water supply are sustainability, equality, clear mandates, stakeholder participation and organizational structure.

Effects of rural water infrastructure

The availability of a decent rural water infrastructure drastically reduces the time spent on collecting water. For instance, women in Pakistan, for whom water collection is one of their main daily tasks (Ilahi & Grimard, 2000) have less time left, at household level, for other work that could generate income and for leisure at the individual level. Investing in infrastructure would not only reduce the workload for women, but would also change their financial contribution to the household.

Furthermore, improving water access brings many more benefits, especially to vulnerable groups like women and children (Ivens, 2008): better quality and higher volumes of water result in more dignity enhancing gender equality. Children can perform better at school due to better hygiene and sanitation, fewer illnesses and less absenteeism. Higher self-esteem and more self-confidence have been observed as well.

The relationship between community participation and the outcome of rural water supply

There is a small but growing understanding about community participation in rural water supply. First, participation can contribute to the achievement of all five main objectives: effectiveness, efficiency, empowerment, equity and coverage (Narayan, 1995). However, some criticism implies an unfair burden on the shoulders of rural people (Oakly, 1991), when they are forced to participate, whether they want to or not, without any authority to influence the project's direction. So, to achieve favorable and sustainable participation, involvement on higher levels of decision making is essential (Schouten & Moriarty, 2004).

There are different levels of community participation in water supply (Prokopy): At the lowest end of the ladder, also called non-participation, involvement is limited to the contribution of money, labor or materials only. Participants are hardly given a choice and may have no idea about what and where their input is being used for and where it is being used. Only a material dimension is added to the project. A higher form of participation involves engagement in deeper decision making about largely (still) predetermined questions. Households attend meetings, express opinions and are involved in the decisions to be made. The highest form is when participants are in charge of their own initiatives, develop strong leadership roles and are basically in full control of their project. The fact that committee members are likely to possess more power than others can be accepted because their power is limited by other aspects of the projects like budgets, schedules and deadlines.

Community participation plays an important role in building a sustainable rural water supply and households are encouraged to engage in every aspect of the project.

How Costa Rica and Cambodia have dealt with rural water supply issues.

Costa Rica and Cambodia have dealt with water supply in different ways, both worth analyzing.

Communities in Costa Rica overcame many hurdles (Madrigal, Alpi'zar, & Schluter, 2011), worth discussing is a set of working rules enforced by local communities defining local accountability and the capacity of local leaders to generate incentives and engage the community in sustainable solutions.

Local accountability mechanisms reflect an effective governance structure: the local community itself, an 'internal' factor, is seen as most suitable to monitor those who are directly responsible for rural water supply in the community instead of 'external' factors, such as a central government. Costa Rice showed that creating a sense of ownership is very rewarding. However, if leadership is too strong or highly dependent on external funding, it might create a motivational problem, where community members remain passive, not willing to spend time or money for necessary maintenance and investments.

A district government can be considered most suitable to implement rural water supply while community members should be encouraged to join and monitor.

Phnom Penh is a great example of how privatization dealt with a poor infrastructure while still supporting the poor (Tortajada & Biswas, 2011). During the 1970s and 1980s, investment in water infrastructure was so weak that maintenance was neglected and shortage of clean water became such a heavy burden that the government had to ask Japan for technical assistance. One decade later, the Cambodian government declared water an economic and social good, putting a price on water, so private suppliers were allowed to run businesses and sell affordable, high quality water. To guarantee an affordable price, the government has made great efforts: once particular groups who represented the poor, were outlined, representatives were elected to negotiate reasonable prices with suppliers.

In my view privatization as seen in Cambodia is likely to be more practical for less developed countries. Support from developed countries through positive relationships and cooperation is the fastest way to improve infrastructure both in terms of quantity and quality.

Water Usage in Vietnam

At the moment water in Vietnam is mainly sourced from water companies, water supply stations; treated drilled wells managed by the government; private boreholes or drilled wells; and rain water harvesting mainly for poor people living near the river (Huong, 2013). Urban citizens utilize 70% of clean water for consumption, the rest is for all other activities.

Until the late 1990s, the numbers of rural residents with access to clean water was merely 30% (MDG National Report 2010). The National Target Program of Rural Water Supply and Sanitation started in 1999 and reached its goal of 95% of rural residents with access to clean water by 2015.

Although great efforts have been made, the percentage of rural households in remote areas with access to clean water remains low. In 2010, following geographical and financial difficulties and limited awareness, 41 million rural residents still did not have access to clean water. Most water for consumption still comes from streams, rivers and lakes and clean water is not a priority for locals: in some areas, people don't use piped water at all or at best in combination with other unimproved sources. This all jeopardizes the sustainability of piped water projects.

Research shows the difficulties in accessing water sources in remote areas. For example, in the Kien Hai district (Kien Giang province) rainwater is the primary water source and during dry season locals have to walk around 10 km or buy at high prices up to 120-150.000 VND per $1m^3$.

Similar problems occur in large urban areas. In 2010 less than 60% of urban residents had access to piped water while the target was originally set around 88%. Even worse, quantity and quality seem both in decline and neither monitoring nor management are done properly due to insufficient budgets. It is not uncommon that new constructions are only operational for a few years.

> A few reasons for these unexpected results: first, the living standard in Vietnam is not high enough to obtain funding for water supply projects and funding relies mainly on the state. Second, lack of communication and management delay constructions in remote communities. Third, untrained staff and inadequate constructions result in inefficient projects. Last, insufficient funding makes it difficult to acquire new and qualified technology.

Inequality is another major concern. 70% of the more affluent residents have access to clean water while only 40% of the poorest do. Especially in mountainous and coastal areas people have less than 20 liters per capita per day (the minimum quantity set by the WHO to assure basic hygiene and food hygiene needs). Poor rural residents still suffer unhealthy conditions and increasing scarcity is a huge threat to poverty reduction.

Water Governance in Vietnam

The process of institutional changes in water governance in Vietnam

Doi Moi (Renovation) with its formal introduction of a market economy in the mid- 1980s marked a historical break and public and private sector have come together since then.

While the Law on Water Resources (1998) still emphasized on administrative measures only, the National Water Resources Strategies (2006) moved from a rather socialist concept to a market-oriented model, recognizing water as an economic good, with the government in a regulating role for water

markets to perform and behave well. Pricing of water as well as full-cost recovery practices were introduced.

Water governance on the ministry level

At the macro level water is managed mainly by two ministries: the Ministry of Agriculture and Rural Development (MARD) and the Ministry of Natural Resources and Environment (MONRE). MONRE was created in a later stage and is considered a rather needless entity by various scholars.

While MONRE's core functions are environmental protection and water resource management, including land-use planning and the international coordination of the Mekong River Basin, MARD is responsible for rural development and agricultural production and is involved in structural issues such as flood control and (rural) water supply. Conflicts between both ministries over decision-making power and resource allocation often require the prime minister's intervention.

Many other ministries are involved but worth mentioning are the Ministry of Construction (MOC), responsible for urban and industrial water management, the Ministry of Health which sets clean water standards while analyzing its implementation nationwide and the Ministry of Industry and Trade, responsible for hydropower (in close coordination with the MARD; Decree No. 189/2007/ ND- CP).

Conceptual Framework

Before we advance towards the concepts of clean water access, water usage and water governance, I believe it's important to have a look at the UN declaration about water as a human right.

Through Resolution A/RES/64/292 'The human right to water and sanitation' (United Nations General Assembly, 2010) the UN declared clean drinking water and sanitation as a human right, indispensable for the full enjoyment of life. In international development clean water is a priority and a state needs to ensure a safe and healthy environment for each group in the society.

In "Charting the Progress of Populations" (United Nations Population Division, 2000), access to safe water is measured by the percentage of the

population with access to an adequate amount of safe drinking water within a convenient distance. While "safe" is commonly being assessed, the two other parameters, adequate amount and convenient distance, are not.

Water consumption depends on personal involvement, attitude, intentions, habits, reflexes and situational factors such as income (Gregory & Lee, 2003).

The right to water has been approached from opposing viewpoints (Mary, 2006). From a contemporary, western point of view water is considered as a commodity, a good with a market value while traditionally a community and/or individual is entitled to benefit its local water resources, in other words water is considered a free, natural good. Water right as a formal right has been created by the state within a given social context when water scarcity and infringement became common. Climate change and population growth have made water security only more difficult.

It is clearly a state's obligation to address the right to water in a consistent and constructive manner.

A shift towards water as a commodity can be seen in Principle 4 of the Dublin Statement (International Conference on Water and the Environment, 1992), another UN document, which claimed that water has an economic value and should be acknowledged as an economic good while the right to water, a human right, still takes precedence and entitles every person to affordable water and sanitation. These conferences recognized the past failures by realizing the economic value of water. The concept of 'water is free' in their view lead to wasteful practices.

While we are on the subject, it might be useful to have a look at the definition of water governance which consists of political, social, economic and administrative systems, in place to develop and manage water resources, and the delivery of water services at different levels of the society (Rogers & Hall, 2003). The point I would like to make here is that more research on the local level needs to be done.

The UNDP has made clear what the purpose of water governance should be and which I believe is an important one. By the UNDP water governance is considered to comprise political, economic and social processes and institutions that governments, the private sector and civil society decide upon while all

involved partners articulate their priorities, exercise legal rights, meet obligations and mediate differences.

Although the reform of water institutions and policies is taking place in many countries, progress in nearly every case has been rather slow, limited and often unpredictable. In most developing countries water institutions do not function properly and often display fragmented, institutional arrangements with overlapping and/or conflicting decision-making structures. These observations are close to my research as Vietnam is now in the process of such reforms, transitioning from a centrally planned economy to a market economy. Old, inefficient mechanisms still exist and that surely counts for the water governance sector.

More effective water governance is required for several reasons. Due to rapid economic growth pressure on water ecosystems is increasing and water scarcity makes meeting demand for good quality water very challenging. Beyond that, water governance and service delivery is often corrupted. Finally, decentralization and other aspects of integrated water resources management are considered to be important aspects of sector reform programs that, to be effective, require improvements in water governance systems (Yahua, 2009).

Some ideas were proposed to improve water governance. Institutionalize a method of promoting continuing innovation, the discovery of new and better technical means, not least in order to adapt to a future that involves greater uncertainty and risk. However, water governance needs to fit local situations and flexibility is the key, therefore technology also should be fit to each level of water governance and fit to the certain situation. No single model of effective water governance; indeed, to be effective governance systems must fit the social, economic and cultural particularities of each country. Besides, there are some basic principles that are considered to be essential for effective water governance. We need some types of approaches like open and transparent, inclusive and communicative, coherent and integrative, equitable and ethical. About performance and operation, we need accountable, efficient, responsive and sustainable (Charles, 2007). The role of market mechanism and technology should be concerned (Tortajada & Biswas, 2011). Moreover, while establishing a sound legislation is expected to support water governance will work better, it is expected that by directly involving users of water in the governance of the resource, the knowledge on which the participation is based will be more

meaningful than otherwise (Tortajada & Biswas, 2011). The reason is that the locals may often be more familiar with the peculiarities of local economic, social, cultural and environment situations. This point is totally right, especially in the researched place, although water system already built, but the access of water is still low because of many reasons related to the economic, social and cultural sides. Therefore, good water governance needs to consider about those components to fit in the specific conditions of the locals.

The outcome of water governance can be measured by the improvement of basic access (quantity, quality and timing of water use) and livelihood, in terms of social relations and processes, for example, in conflicts about access to water. And a political dimension can also be seen (the change of power structure). In this respect, the governance of water, an essential resource in which all people are stakeholders, is often seen as a key to much wider issues of governance and political development.

Chapter 3

Parameters for Water Usage in Gia Lam

In this chapter, I will relate the basic findings, first by a general overview to depict the current status on the supply of piped water, followed by an in-depth analysis on data derived from all household interviews. Then I will discuss key parameters (generated from analysis regression) which influence daily use of water. Last I'd like to make a point about equality and sustainability.

Current situation on piped water supply and usage

15 out of the 22 communities in the Gia Lam district are currently supplied with piped water, either by rural water supply stations, under the administration of the MARD and with support of the World Bank, either by the Hanoi Water Limited Company 2, a private firm which falls under the administration of the MOC

At the moment, there are 5 rural water supply stations in 4 different communities: 2 stations in Bat Trang, 1 in Kim Lan, Ninh Hiep and Phu Dong. All stations date from 2003-2004, but as mentioned before, due to inconsistency some stations never reached full capacity and actually only three are functional: both stations in Bat Trang and the one in Kim Lan. Bat Trang is a pottery craft village with affluent residents who can easily fund operating and maintenance costs. With a shift towards a more enterprise or cooperative management model, the other stations are expected to work better in the future.

Seven communities are still without access due to geographical difficulties and at this moment no official plans have been made public by the local government.

Order	Community or town	Population	Population with access to piped water	Percentage
1	Trau Quy	15,924	15,924	100%
2	Yen Vien	13,866	8,392	60.52%
3	Bat Trang	8,241	8,015	97.26%
4	Da Ton	12,585	12,585	100%
5	Dong Du	5,162	3,949	76.50%
6	Kim Lan	5,861	482	8.22%
7	Van Duc	7,276	0	0.00%
8	Kieu Ky	10,677	10,408	97.48%
9	Co Bi	9,386	8,876	94.57%
10	Dang Xa	9,436	9,436	100%
11	Phu Thi	8,059	8,059	100%
12	Duong Xa	11,460	10,766	93.94%
13	Duong Quang	12,542	4,919	39.22%
14	Kim Son	12,093	0	0.00%

15	Le Chi	11,565	0	0.00%
16	Duong Ha	6,333	0	0.00%
17	Phu Dong	11,506	0	0.00%
18	Trung Mau	5,565	0	0.00%
19	Ninh Hiep	17,118	0	0.00%
20	Dinh Xuyen	10,294	9,127	88.66%
21	Yen Vien	13,964	6,031	43.19%
22	Yen Thuong	17,683	4,356	24.63%
Total all districts		236,596	121,325	51.28%

Table 3: The situation of supplying piped water in Gia Lam district, 2014

At start, residents welcomed the arrival of piped water in their community and happily paid the startup costs. However, along the way their excitement got tempered and most families started to consume water from different sources.

Gender ratio M/F	50/50
Average number of household members	4.59
Average number of laborers	2.53
Average school going years	8.98
Average income	2.236.000 VND
Average age	57

Table 4: Profile interviewed households

As shown in table no. 4 hundred household heads (with a gender ratio of one to one) were interviewed with an average income of more than 2 billion VND per person per month and mostly with a quite equal education level.

The majority was aware of piped water being a safer source and those with a higher education understood the health benefits of clean water, strongly approved the use of piped water and tried to persuade their neighbors and relatives to join. Of the 22 interviewees who got more than 10 years of schooling, more than half was aware of the health risks caused by elevated arsenic levels. One person stated "I read the newspaper and watched on the television about arsenic. It is really dangerous, groundwater here is not secure and I believe that piped water is treated and therefore more safe." Among other interviewees awareness ware rather moderate and they simply believe that water is treated by the state and/or by a company, so it must be good.

When asked if water was consumed either for every task or rather limited to a few activities, it became clear, as shown in table no. 5, that most households prioritize piped water for the most important activities like drinking, cooking and showering. For other activities households rely on drill wells. One house stated "We combine to keep the water bills under control, price rates for piped water is progressive, so we have to consume economically".

Order	Actions	Household percentage (%)
1	Drinking	96
2	Cooking	94
3	Showering	76
4	Washing	72
5	WC	67
6	Watering	33
7	Others	33

Table 5 Main activities for which piped water is used

Order	Water volume usage	Price (Since 01/01/2014)
1	≤10 m^3	5,020
2	10m^3 - 20m^3	5,930
3	20m^3 - 30 m^3	7,313
4	>30 m^3	13,377

Table 6 Price of piped water *Source: http://hawacom.vn/?p=10031*

Asked for the reasons why the costs were so much higher for piped water, one man said that if his family uses only water from a drill well, it has to be filtered at home first and even then the total cost is still much smaller than the charges for piped water. To extract water from a drill well, the user needs electricity to pump and sand to filter. Sand costs 80,000 VND and can be used for 6 months, so that makes 13.000 VND per month. Electricity costs 18.000 VND per month. That's a total of 31,000 VND. The monthly rate for piped water, besides the startup costs, is around 105,000 VND. That's almost 3.5 times more.

How households perceived the quality of piped water was perceived, they answered some questions, graded from 1 to 4 (1 = best, 4 = worst)

	Smell	Color	Water pressure	Availability
Very good	13	25	0	1
Good	73	70	93	97
Acceptable	13	5	7	2
Bad	1	0	0	0

Table 7 Results questionnaire piped water quality

Only 13% confirms that there is no smell, while 73% considers the smell is nothing more than acceptable/good while noticing a smell of a grinded grain as a result of water processing in the factory. As one of the interviewees shared: "We have to filter first, otherwise we cannot make a delicious tea". 25% is convinced that the color of piped water is perfect. However, 70%, again a clear majority, stated that the quality is nothing more than acceptable and that sometimes even a very bad color can be seen. "I don't know why, maybe the staff only cleans the big tank, but I hope they will find a way to improve this soon", one housewife told. After boiling water for drinking purpose, another lady discovered sediment collected at her kettle's bottom. Most users are convinced that water pressure and availability are not very good either and sometimes households have to reserve water in a tank overnight as the day after there simply might be no water available.

So, just like water from a drill well, piped water has to be filtered, and therefore an extra cost has to be added to the water bill. Either households deposit a kind of sediment in a stainless steel tank which has to be bought only once, or they buy an RO water filter which costs 450,000 VND, usable for 12 months. That's an additional cost of 37,500 VND each month.

Every household agreed that over the past two years, they had never ever seen anyone to come and inspect the water quality. So there is no regular examination of water quality. The lack thereof is on the district level, bureaucracy, not enough staff and simply no clear guidelines are the main reasons.

Analysis Regression came up with 3 valid variables: income, household members and education level.

	Coefficients	t Stat	P-value	Reliability
Intercept	-37.1989	-1.88797341	0.06214715	95%
INC	0.007047685	10.64320856	9.0243E-18	95%
MEM	5.654348942	2.731535532	0.00754315	95%
LAB	-4.02388173	-1.45784822	0.1482511	95%
GEN	-0.54336759	-0.09919878	0.92119395	95%
AGE	0.339680288	1.275626321	0.20526472	95%
EDU	2.431315936	2.832541531	0.00566177	95%
R Square	0.754136754			

Table 8: results of estimation and factors which affect to water usage

Valid Variables in Table no. 8:
WU = -37.1989 + 0,007Inc +5.654 Mem + 2.431Edu [1]
WU: Water Usage, measured by 1,000 VND
INC: Income per month, measured by 1,000 VND
MEM: Members of household, measured by person (s)
EDU: Education, measured by the number of school years

$R^2 = 0.7541$ which means that variables in the model can explain 75.41% of changes in the use of water while 24.59% is due to external factors.

Assume other variables do not change and only household income increases 1,000 VND, the water bill increases 7 VND. If the family expands by 1 member, the water bill increases 5,654 VND and if 1 year is added up the number of school years, the water bills increase 2,431 VND.

Household income is one of the most important factors because it correlates directly to the ability to pay for the water bill. If income goes up, so

1 The result from Data Analysis Regression

will the use of piped water and vice versa. Now while the price of piped water is considered to be high, and it is also progressive, income becomes lower comparatively. Therefore, to increase water usage, it is necessary to consider the factor of income, in other words income and price of piped water need to be fit each other. Or with the situation of low income of the peri-urban, to improve piped water accessibility, it is urgent to concern the factor of price, how piped water can be purchased by locals.

As many other vital goods, water was already subsidized. However, since Vietnam followed the marketed- economy, subsidy is eliminated gradually. Therefore, it needs to be concerned thoroughly both sides of it.

When users were asked that what make them feel reluctant to use piped water, 74% opinions said that the total cost for piped water is too high, just need electricity to pump, 16% opinions revealed that the quality of drill wells is still good, they do not see any abnormal signs during the using time. The rest showed that they do not care piped water, do not believe the quality of piped water and other reasons. Therefore, it can be deduced that with existing price affects greatly to water usage.

The number of members in a household plays a role as well. More members suggest that there will be more consumption. So planning sufficient supply on the long term beholds a proper prediction of population growth and an according capacity of water mills.

Education is a decisive factor as well as it raises awareness about the relationship between water and health. My findings show that awareness among most interviewees was still rather modest and when water rates become high, they tend to simultaneously source water from a drill well (or even from a drill well only) to save money on piped water bills. But those who were more educated acknowledged the importance of piped water on health more easily. One retired lady with 14 years of schooling said "I know piped water doesn't come cheap, but it is processed by a company, a state company I believe, and although with the naked eye we don't see the difference between water from a drill well or piped, I do believe piped water is secure and I convinced my family that we should use piped water, that is our right!".

Habit also affects slightly the use of water. But I noticed that implementing this variable in a quantitative assessment is difficult. Although piped water is

available and paid for, the habit to get water from a drill well still remains. One lady shared "We have set up piped, but still consume from a drill well. We don't notice any difference, so we just keep using. Maybe later we start using piped water." But this attitude seemed rather rare in the Gia Lam district, because they gave it deep thought before switching to piped water.

General examination of water usage in Gia Lam district

I would like to discuss some other dimensions, specifically the access to clean water, equality and sustainability.

We have seen that the actual use of piped water in the Gia Lam district is not high. Although the goal was to supply 60% of rural residents in 2015, in the Gia Lam district, and this was at the end of 2014, only around 52% had access to piped water and actual use, as discussed earlier, is even lower.

The use of piped water so far has not been very sustainable either and this counts for both types of supply. Quantity and quality of water supply is not secured and actually going backwards, monitoring is not conducted appropriately and rates are too high. Budgets for operation and maintenance costs are too low and cause some constructions to be out of use only a few years after completion. A few reasons come to mind.

First, the living standard in Vietnam is too low to provide sufficient funding for new water supply projects and new technology, funds still depend on state investment. Second, most rural communities are remote and cope with difficulties in communication and management. Third, untrained staff and unsystematic constructions result in inefficient projects.

And then there is inequality. Seven communities still have no access at all while in the other communities anyone who is not a permanent resident, like students and tenants, and who cannot show a registered household book—an official document—is seriously disadvantaged and pays for piped water at much higher rates.

Chapter 4

Examining Water Governance in Gia Lam District

Water Governance in Vietnam

Piped water governance

The People's Committee, the executive arm of a provincial government in Vietnam, is responsible for the implementation of water supply in their respective province. Both the MARDE and the MOC act as advisory agencies, in rural zones, respectively urban and industrial zones.

There is a clear mandate on the government and the provincial level, however it is at the lower district level where a lack of transparent mandates undermine proper functioning.

Water supply is guided by principles. First, business activities are examined by the state to ensure the legal rights and benefits for both the water supplier and the user. It is advised to consume water reasonably, economically and for various economic sectors and the community to invest and manage water supply systems together. The quality of clean water used for consumption must meet the requirements of the Ministry of Health. All partners, authorities, private firms and individuals must take accountability and preserve water resources. Violation will be punished strictly. The MOC guides the process of generating information and monitors constructions.

Charges for piped water

To set a water price, good regulation is necessary as production and distribution costs need to be covered while the price remains affordable and water quality guaranteed.

The Ministry of Finance's Department of Price Management coordinates with related agencies and sets a price framework for water consumption which then is submitted to the Minister for approval. Once issued, suppliers can finalize their water plan which on its turn is submitted to the Department of Finance for agreement.

Now, on the provincial level the People's Committee has the right to adjust water pricing but if the price point is too low, then it is their duty to foresee funding and offset the losses made by the suppliers.

Evaluation of Water Governance in Gia Lam district

Next I would like to reflect on water governance on transparency, communication and accountability.

Right now mandates are rather transparent on government level, but clearly lacking on district level. I would like to make this point by setting quality inspection as an example. Inspection and monitoring water quality is within the framework of Preventive Health Care. However, on the district level there is no regulation whatsoever, not any guideline on testing domestic water in water supply systems is available which makes actual implementation almost impossible.

Another example, water supply systems in 4 communities of the Gia Lam district are beyond the scope of national decree 117/2007/ NĐ – CP which stipulates production, supply and consumption of clean water but only for completed water supply systems. Consequently, small and uncompleted water supply systems (about 80% of all systems in rural areas) are basically unmanageable. No other official documents are available and interviews I conducted with local government and involved staff only confirmed a lack of systematic approach and transparent guidelines.

Furthermore, my findings showed that communication among stakeholders, both horizontally and vertically, is weak especially at the higher

levels and partially due to the lack of transparency and unclear mandates which I discussed above. Communication between local government, supplier and consumer is failing as well. So the district's duty to reconcile conflicts between supplier and user in order to improve water quality is underwhelming. Communication with health agencies is none either. One staff member shared "We do not see any document about monitoring of water quality passing by, maybe something sometimes randomly from the MARDE, but we never know in advance".

Accountability requires each institution to take responsibility, violation should be penalized and arbitration-enforcing mechanisms should be in place. However, there is no clear accountability in the district. Again it comes down to unspecified mandates.

Actually, in this study, the content of the mandate mechanism states that the district level cooperates with the specialized agencies in the People's Committee to implement water management in the domain. However, who is put charge of or which one is specialized agencies to deal with it, which responsibility and which framework is it and so on, there is no answers. So the district government is limited to administration work only. Mandate and accountability of water suppliers, it is all very vague. For example, the Hanoi Water No 2 One Member Company Ltd falls under the administration of the MOC, but water quality inspection falls under the Department of Health and the lack of cooperation between both departments makes this private firm accountability low.

Chapter 5

Conclusions and Recommendations

Conclusion

The purpose of my research was to investigate the use of piped water by residents in the Gia Lam district and by which parameters its use is affected. Most remarkably, my findings have shown that of those residents with access to both piped supply and drill wells still rely on drill wells and this for several reasons.

The quality of piped water is not systematically tested and household interviews reveal that the quality of piped water is perceived as 'good enough' or 'acceptable' and that many families still have to filter water one more time before consumption (with increasing water bills as a result). So households cannot justify current pricing.

The Gia Lam district belongs to the rural area of Hanoi and so the supply of piped water falls under the administration of the MARD. The way it is setup now is that two different systems can deliver piped water: rural water supply stations and the Hanoi Water No 2 One Member Company Ltd, a private firm which supplies most piped water systems in the district and which falls under the administration of the MOC. It's the task of the ministry of Health to coordinate with specialized agencies and suppliers to make sure water is safe and clean.

There is more than sufficient support in my findings to state that unclear mandates, along with a lack of coordination between all three ministries and involved agencies make it all together a very difficult process. Beyond that, the district government's role is to organize rural water supply on a local level, but the absence of transparency, accountability and documentation undermines proper functioning even further.

Socioeconomic statistics from the Dang Xa community showed that education, income and the size of the family also affect the use of piped water. And geographical difficulties are the underlying cause that some communities haven't been supplied yet with piped water and thus far the local government has not made any official announcement that a plan is on its way.

The point I would like to make is that water governance must be improved and this can only be achieved if we work on transparency, communication and accountability

First, a clear mandate has to be issued to the district government, with a distinct role and responsibility for each related agency. On the district level, a guidance for implementation has to be promoted, along with responsibility for each involved partner.

Second, communication has to be improved between the local district government, in a central role, relevant agencies and consumer representatives. Right now the relationship between supplier and consumer seems one-sided and consumers have no choice, disregarding the quality of delivered services. So the district government should act as a representative of the consumer. Another task is to build good relationships with water suppliers and funding organizations and have their support in remote areas in terms of technology and funding.

Charges for piped water are high. Together with the additional cost on behalf of the consumer of filtering at home, piped water becomes too expensive for most households. In my view, subsidizing is not really a solution since Vietnam has evolved into a market economy. Therefore, to build a sustainable and efficient solution, it is better to negotiate lower prices with suppliers and improve the quality. Not only will piped water become more affordable, but more people will become convinced about the benefits of clean water.

Third, stakeholders have to be made accountable: transparent responsibilities and sanctions in case of infringement.

Fourth, temporary installments of small, self-sufficient rural water supply systems in remote areas are recommended.

Fifth, capacity building: staff dealing with technical aspects like monitoring and evaluation, operation and maintenance has to be trained.

Sixth, the private sector has to become involved through for example tax incentives. This can reduce the burden on state funds while developing a regional economy.

Seventh, the education of local staff has to be prioritized, so residents can be informed about the health benefits of clean water, sanitation and food hygiene. In regard to those communities without piped supply, it is cardinal for the local government to follow-up closely any planning, while guiding communities how to build small-scale water supply models.

Eight, raise community awareness about the importance of clean water and sanitation through public communication. My findings have shown that education and community awareness deliberately affects the decision to use clean water.

Research Limitations and Directions for Future Research

Although this book has highlighted the current status of the use of clean water in peri-urban Vietnam, it was conducted in only one peri-urban district of Hanoi. I did this research with the expectation that I could show a better and deeper understanding about the use of clean water in the district I am familiar with.

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Appendix

Questionnaires

To conduct the research "Water accessibility in Gia Lam district, Hanoi, Vietnam"

Part 1: Information on households

1. Name:
2. Address:
3. Phone number:
4. Total number of family members:
5. Total number of laborers:
6. Sex:
   Male: Female:
7. Numbers of schooling years:
8. Occupation:

Farmer		1
Worker		2
Civil servant		3
Free business		4
Unemployment		5
Retirement		6
Others		7

Income per month:

1. Expenditure per month:
2. Chronic diseases:

Part 2: Information on water access

1. Water sources you are using:

Code Goal	Boreholes (1)	Drill wells (2)	Rain water (3)	Piped water (4)	Others (5)
Drinking					
Cooking					
Showering					
Washing					
WC					
Watering					
Others					

1. Do you need to filter water?

Yes	
No	

If yes, please explain why: ……

2. The cost of filtering: ….

3. How do you feel about the water using these criteria below?

Smell	
Color	
Pressure	
Availability	

Grading from 1 to 4: 1 very good, 2 good enough, 3 acceptable, 4 bad

4. Do you think that your water source affects your health?

Yes	Notes:
No	

5. The reasons you do feel reluctant to access piped water supply?

Piped water bill is much higher	
The present water is good	
I do not care	
I do not believe in the quality of piped water	
Others	

6. How much is your monthly water bill?…….
7. What price for piped water (per $m^{3)}$ are you willing to pay? ……..
8. How much is the initial cost to use piped water? …….

Do you have any recommendations about this issue?

……
……

Thank you very much!

Access to and Usage of Clean Water in Peri-urban Vietnam

A Case Study of Gia Lam District, Hanoi

Thi Huyen Cham Nguyen

It is widely acknowledged that water plays a critical role in sustainable development and poverty reduction. Most countries have set high water quality standards and so did Vietnam. However, findings on access to clean water in peri-urban areas have not been so encouraging. In this document Mrs. Nguyễn, born and raised in Gia Lam district—a peri-urban region in Hanoi—offers insights into the access to clean water and its use by local residents in her district.

She frames the lack of water quality, the inequality in access and how both relate to a failing water governance. Her research shows that residents with access to both piped supply and drill wells still rely more on drill wells and this for several reasons. Part of the solution, she states, are clear mandates, in particular issued to the district government, improved coordination between all stakeholders, accountability on every level, community participation and awareness of the impact of clean water on our health. The author concludes with some strong recommendations for the ministries, related agencies, the district government, the private sector (water suppliers) and local residents.

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