# URBANIZATION OF WATER:
# ENTITLEMENTS AND LOCAL INSTITUTIONS IN THE PROVISION OF POTABLE WATER IN PERI-URBAN HANOI, VIETNAM

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAIʻI AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

URBAN AND REGIONAL PLANNING

AUGUST 2012

By

Hao Thien Nguyen

Dissertation Committee:

Clyde Mike Douglass, Chairperson

Kem Lowry

James Spencer

Brian Szuster

Miriam Stark

Key words: Urbanization of Water, Entitlements, Local Institutional Arrangements, Peri-urban Areas, Water Provision,

*We certify that we have read this dissertation and that, in our opinion, it is satisfactory in scope and quality as a dissertation for the degree of Doctor of Philosophy in Urban and Regional Planning.*

DISSERTATION COMMITTEE

_____

Chairperson

_____

_____

_____

_____

## DEDICATION

I especially want to thank my wife, Lanh Nguyen, for her sacrific, encourgement, and endless love. I could not have made this commitment without your strong support. I also dedicate this work to my beloved son, Bao Nguyen, and daughter, Minh Chau Nguyen, who have been always inspiration to me and by my side.

I am very grateful to my parents and my extended families who always support my dream to advance in education. This work could not have been done if it was not for them.

## ACKNOWLEDGEMENTS

Almost a decade had passed since I entered the Department of Urban and Regional Planning (DURP) at the University of Hawaii at Manoa. This dissertation marks an unforgettable stage in my life. It marks the end of my doctoral studies and my endless effort in gaining this achievement. There are many whome I would like to thank for helping me accomplish this study.

I am indebted to all the faculty members of DURP and members of my dissertation committee: Dr. C. Michael Douglass, my principal advisor for his enduring support and guidance; Dr. G. Kem Lowry, Dr. James H. Spencer, Dr. Brian Szuster, and Dr. Miriam Stark, who have continuously encouraged and assisted me with their invaluable comments and suggestions for this study. They have guided me to relevant documents and publications. I hold them all in reverance.

I also would like to express my endless gratitude to Mrs. Dana Singer and Irene Takata for their support and encouragement since I came to the program. I especially thank John Dietrich, Chris de Venecia, Annie Koh, and other friends in a Ph.D. writing group who helped me edit some parts of my paper. I also cannot forget many DURPies who kept me company in the wee hours of many sleepless nights at the DURP and provided me with spiritual and moral support throughout of the dissertation-writing days.

Extensive appreciation is extended to many friends in Vietnam, in particular to Mrs. Le Bich Thuan, Nguyen Thi Hanh, Luong Thi Hong Hanh, Dao Thu Huong, Phung To Hanh, Nghiem Thi Thuy, Hoang Hoa, Nguyen Vu Quynh Anh, Mr. Dang Nguyen Anh, Nguyen Thanh Liem, Nguyen Quy Nghi, Nguyen Van Hung, Phi Hai Nam, who helped me with data collection and kept me informed of updated information in Vietnam. All people in Co Nhue commune, Hanoi who effortlessly supported my field research: the leaders and staff members of the Co Nhue People's Committee; heads of 12 population clusters of the communes; and many local inhabitants of the commune. The IMV (Cooperation Center for Urban Development) Project in Hanoi for the permission of using its aerial photos of Hanoi.

The Social Science Research Council for its Pre-Dissertation Research Fellowships to conduct preliminary research on the topic; the Graduate Student Organization's travel awards and the Arts & Sciences Student Research Awards 2009, 2010 for two field research trips to Vietnam in summer 2009 and 2010; the Research Corporation of the University of Hawai'i Graduate Fellowships for the completion of dissertation writing; and the Globalization Research Center for housing me during the entire writing process.

I am indebted to more people than I can name here. I thank you all very much for supporting me throughout this journey and being present in this unforgettable stage of my life.

Hao Thien Nguyen,
August 2012

## ABSTRACT

The growing crisis of inequitable access to and provision of drinking water in developing countries has triggered the concerns of city governments, donors, and the scholarly community. The existing literature has extensively focused on equity issues and stressed the crisis of water governance among other causes. Yet, this study, among a limited number of cases, contextualizes the complexity of the issue in peri-urban areas where the public piped water network is mostly unavailable, water resources are often unmanageable, and inhabitants develop multiple strategies for water while still struggling to adapt to the transformation of the areas. Qualitatively designed, the study chose Co Nhue – a 55,000 inhabitant peri-urban community of Hanoi, Vietnam – as a single case and relied on participant observation, in-depth interviews, and focus discussions for data collection to anwer the two questions: 1) How do peri-urban residents secure water under the shared experience of rapid urbanization? 2) To what extent does the transformation of peri-urban areas influence their residents' water accessibility? Through combining the institutional approach and entitlements concept, this study attempts to offer a theoretical framework for the examination of the dynamics water governance and responses of peri-urban areas' residents and government to socio-economic and ecological transformations of the areas for securing drinking water.

The key research findings indicate that, firstly, water accessibility of peri-urban inhabitants is deeply embedded into and influenced by socio-economic and ecological transformations of the areas. As a peri-urban commune continues to be absorbed into the urban fabric of a large city, its inhabitants experience a transition in their entitlements to drinking water that is determined by the availability and quality of water resources, providers, social relations shaped in their community, and the local government's accountability. Local residents' entitlements to water are shifting from free of charge to one that is primarily determined by a monetary basis. Secondly, because of the shift in water entitlements, vulnerable groups are most severely affected and would become unable to secure water without the government's support. Finally, community-managed water supply system arrangement could be an adaptive strategy, but this cannot be vital without the local government's support.

## TABLE OF CONTENTS

**Dedication** ..... iii
**Acknowledgements** ..... iv
**Abstract** ..... vi
**Table of Contents** ..... vii
**List of Tables** ..... xi
**List of Figures** ..... xii
**List of Pictures** ..... xiii
**List of Maps** ..... xiv
**List of Abbreviations** ..... xv
**Chapter 1: Introduction** ..... 1

*1.1 The Concern Over Urban Water Crisis* ..... *1*

*1.2 Debates on Water Supply* ..... *4*

*1.3 The Need to Unveil Water Issues in Dynamic Peri-Urban Areas* ..... *7*

*1.4 The Context of Peri-Urban Water Study* ..... *10*

*1.5 Goal, Purposes, and Tasks of the Research* ..... *14*

*1.6 Research Questions* ..... *15*

*1.7. Significance of the Study* ..... *16*

*1.8. Organization of the Dissertation* ..... *17*

**Chapter 2: A Review of Water Governance in Peri-Urban Areas and the Case Study of Co Nhue Community in Hanoi, Vietnam** ..... 19

*2.1 Dynamic Water Governance in the Peri-Urban Area* ..... *19*

*2.2 A Review of Studies on Peri-Urban Water Provision and Management* ..... *23*

*2.3 A Case Study of Co Nhue Commune of Hanoi, Vietnam* ..... *27*

**Chapter 3: The Dynamics of Governance of Water in Peri-Urban Areas** ..... 31

*3.1 Institutional Approach and its Usefulness in Examining Community-Self Governance of Water Service* ..... *31*

3.1.1 Community Institutional Arrangements: Appropriating Nature through Property Regimes ..... 33

3.1.2 Community Self-Buit Water Supply System ..... 38

*3.2 Entitlements to Water* ..... *40*

**Chapter 4: Methodology, Data Collection and Data Analysis ..... 54**

*4.1 Qualitative Case Study Methodology* ..... *54*

*4.2 The Process of and the Strategy Adopted for Data Collection* ..... *56*

*4.3 Data Collection Method* ..... *62*

4.3.1 Purposive Sampling ..... 62

4.3.2 Methods of Data Collection ..... 64

4.3.2.1 In-depth Interviews ..... 64

4.3.2.2 Focus Group Discussions and Photo Elicitation ..... 67

4.3.2.3 Historical Analysis ..... 68

4.3.2.4 Short Questionnaire Survey ..... 69

4.3.3 Storing Data ..... 70

*4.4 Data Analysis Procedure* ..... *70*

*4.5 Reliability of the Field Research* ..... *71*

**Chapter 5: Contextualizing Water Supplies in Vietnam's Urban Transition and Hanoi's Transformation ..... 73**

*5.1. Vietnam from Centrally Planned to Market Economy* ..... *73*

5.1.1. General Context of the Centrally Planned Economy (1975-1986) .. 73

5.1.2. The Market Oriented Economy Since the National Economic Renovation (1986 to Present) ..... 75

*5.2 Rapid Urbanization of Hanoi and Challenges Imposed on Peri-Urban Areas*.....*81*

*5.3 Contextualizing Water Supply in Hanoi* .....*91*

5.3.1 The Governmental Organization and Regulations on Water Supply91

5.3.2 Urban Water Supply Financing .....95

5.3.3 Water Supply in the City of Hanoi .....106

5.3.4 Challenges and Opportunities for Peri-Urban Inhabitants' Water Accessibility .....128

**Chapter 6: Deciphering the Urbanization of Water in Co Nhue Commune .....134**

*6.1 Co Nhue Commune in Its Transformations* .....*134*

6.1.1 The Origin of Co Nhue .....134

6.1.2 Changes in Population .....135

6.1.3 Changes in Economic Structure.....137

6.1.4 Changes in Land Use .....140

6.1.5 Changes in Community Relations .....147

*6.2 Water Accessibility of Co Nhue Residents prior to Its Intensive Urbanization*.....*151*

6.2.1 Surface Water and Its Role in Community Life of the Co Nhue Residents .....151

6.2.2 Stories of Communal Wells – Common Pool Resource Management .....155

6.2.3 Shallow and Drilled Wells in Co Nhue – Household's Strategy Development for Water .....158

*6.3 The Piped Water Supply Network in Co Nhue Commune*.....*163*

6.3.1 The Co Nhue Community-based Water Supply Institution: Revealed to the World.....163

6.3.2 The Arrangement of the Co Nhue-Based Water Supply System....166

6.3.2.1 The Beneficiaries.....170

6.3.2.2 The Formation of the Water Management Unit .....172

6.3.2.3 Financial Arrangements .....180

6.3.3 Performances of the Co Nhue-based Water Supply System 182

6.3.3.1 Performance of the System during 2000-2003.....185

6.3.3.2 Performance of the System during 2004-2008 Period .....195

6.3.3.3 Issues of Design and High Expenditure Imposed from Fixing the Water Pipeline System.....208

6.3.4 The Role of the Local Government .....221

6.3.5 Sustainability of the Project.....223

*6.4 The Shift of Entitlements to Water: .....227*

**Chapter 7: Conclusions.....229**

*7.1 Summary of Key Findings.....229*

*7.2 Synthesis of the Findings .....238*

*7.3 Conclusions.....239*

*7.4 Policy Implications .....242*

*7.5 Limitations of the Study and Future Research.....245*

**Appendix A: Types of Water Sources Available in 2009.....248**

**Appendix B: List of semi-structured Interviews .....254**

**References .....256**

## LIST OF TABLES

Table Page

Table 3.1 Critical Conditions for the Sustainability of a Resource Management Community-Based Institution .....37

Table 3.2 Water Supplies and Entitlements to Water in the Context of Urbanization.....49

Table 5.1 Hanoi's Changes in Its Size and Population from 1954-2008 .....83

Table 5.2 Hanoi's Population and Rate of Urbanization from 2010-2050 .....84

Table 5.3 A Brief History of the Hanoi Water Supply System .....114

Table 5.4 Goals and Demands for Hanoi's Water Supply in 2020, 2030, and Vision to 2050.....124

Table 5.5 Hanoi's Existing Water Treatment Plants and Their Production Capacity....125

Table 5.6 Water Tariff Adjustments for Domestic Uses in Hanoi .....128

Table 6.1 Water Accessibility to Surface Water/Communal Well and Shallow/Drilled Wells .....162

Table 6.2 Responsibilities of the Water Management Unit, Regulated by the Co Nhue Commune People's Committee .....172

Table 6.3 Water Tariff Set by the WMU over the Years .....182

Table 6.4 Performance of the Water Management Unit during 2000- 2008 via Some Selective Major Indicators .....185

## LIST OF FIGURES

Figure Page

Figure 3.1 Components of Sen's Entitlement Approach to Water .....42

Figure 3.2 Theoretical Framework of the Study .....43

Figure 5.1 A Two Tiered Land Price Land System in Vietnam.....87

Figure 5.2 Water Sector Institutions System in Vietnam .....92

Figure 5.3 Organizational Structure of Hanoi Water Business Company.....108

Figure 5.4 Water Supply Capacity of HWBC from 1954-2009 .....110

Figure 5.5 Percentage of Non-Revenue Water During 1995-2009 .....111

Figure 5.6 Number of Water Meters Installed from 1996-2007 in Hanoi.....112

Figure 5.7 Urban Population of Hanoi from 1994-2010 .....122

Figure 5.8 The Fluctuation of Water Table in Trung Tu.....132

Figure 6.1 Population Increase in Co Nhue during 1989-2009.....136

Figure 6.2 Different Economic Sectors of Co Nhue's Economy, 2002-2004.....139

Figure 6.3 WMU's Annual Revenues and New Connection Revenues.....190

## LIST OF PICTURES

Picture Page

Picture 6.1 A 17.6 Hectare New Residential Area for 1,900 Inhabitants of Co Nhue ...140

Picture 6.2 Abandoned Rice Field in Co Nhue .....142

Picture 6.3 Abandoned Rice Field in Co Nhue (From another Angle) .....142

Picture 6.4 Un(productive) Paddy Field in Co Nhue .....143

Picture 6.5 and 6.6. A New Unmanaged Landfill in the Co Nhue Paddy Field.....143

Pictures 6.7 and 6.8 Pervasiveness of Newly Self-Built Housing in Co Nhue .....146

Pictures 6.9 and 6.10 Shelter for Rent in Co Nhue .....147

Picture 6.11 A Snapshot of a Spontaneous Fleamarket in Co Nhue .....150

Picture 6.12 Grocery Shopping of Temporary Migrants in an Alley .....150

Picture 6.13 The Hoang Communal House Well .....155

Picture 6.14 The Market Communal Well .....156

Picture 6.15 The Vien Hamlet Well (2007) prior to its Renovation .....156

Picture 6.16 The Vien Hamlet Well (2009) after Its Renovation.....157

Picture 6.17 An electric pump for groundwater extraction .....159

Picture 6.18 Drill Well Construction Sketch.....160

Picture 6.19 A water equipment store in Co Nhue commune .....160

Picture 6.20 Multiple water sources for household purposes.....199

Picture 6.21 A water tank and a water filter.....199

Picture 6.22 A water filter for household's drinking purpose.....199

Picture 6.23 An Abandoned and Wasteful Water Meter.....151

## LIST OF MAPS

Map Page

Map 5.1 Water Treatment Plants of Hanoi Water Business Company .....107

Map 5.2 Projection of Hanoi's Population Distribution in 2020 .....122

Map 5.3 HWBC Water Supply Plan to Accommodate the Extended Hanoi's Urban Population.....126

Map 5.4 Groundwater Accessibility in Hanoi City .....131

Map 5.5 Groundwater Quality in Hanoi: Iron Levels in Pleistocene Aquifer .....131

Map 6.1 Three Residential Areas of the Existing Co Nhue , Tu Liem District .....137

Map 6.2 Bodies of Surface Water in Co Nhue Commune in 1994 .....153

Map 6.3 Area of Service Coverage of the Local Piped Water Supply System. .....170

Map 6.4 A Sketch of the Co Nhue Piped Water Supply System .....205

## LIST OF ABBREVIATIONS

| | |
|---|---|
| ABD: | Asian Development Bank |
| BOT: | Build-Operate-Transfer |
| B.O.O: | Build-Operate-Own |
| CPC: | Co Nhue Communal People's Committee |
| CWSC: | Cau Giay Water Supply Company |
| DANIDA: | Danish International Development Agency |
| DFID: | Department for International Development of the United Kingdom |
| FINIDA: | Finish International Development Agency |
| GDP: | Gross Domestic Product |
| HCMC: | Ho Chi Minh City |
| HCMC PC: | Ho Chi Minh City People's Committee |
| HPC: | Hanoi People's Committee |
| HWBC: | Hanoi Water Business Company |
| IMF: | International Monetary Fund |
| JICA: | Japan International Cooperation Agency |
| MOC: | Ministry of Construction |
| ODA: | Official Development Assistance |
| UNICEF: | the United Nations Children Fund |
| WMU: | Water Management Unit |
| WTPs: | Water Treatment Plants |

# CHAPTER 1
# INTRODUCTION

*"A great deal of literature, research, policy analysis and implementation exists on either the urban or rural spheres. Where the two meet however is no man's land, where it is most needed for urban and rural institutions to cooperate. Instead what is found is that both sets of institutions tend to neglect the PUI [peri-urban interface). The PUI thus represents a space crying out for attention. However for policy makers to address the peculiar needs of the PUI, first and foremost is that its specific needs, characteristics, and features should be known and better understood." (Brook, Purushothaman and Purohit 2003: 131)*

## 1.1 The Concern over Urban Water Crisis

Water is vital for life and for many aspects of human development. For the multitudes of the less fortunate, the issue of water is even more critical. Since water is essential to life, ensuring access to safe and affordable water for human beings has become a global concern. The United Nations, international institutions, and individual countries around the world continually document and express their concerns over the number of inhabitants who live without or with limited access to drinking water since lack of access to potable drinking water threatens global efforts in reducing water borne diseases, eliminating poverty, enhancing gender equity, strengthening human capabilities, and promoting human development (World Bank 2003, UNESCO 2009). Consequently, technological, institutional, and other planning measures and solutions have been proposed, discussed, and implemented for the purpose of enhancing water accessibility to these water-deprived groups. These projects have proliferated, especially in urban areas not only because of the urge to pragmatically address the human need for water, but also due to the influence of international donors and benefactors. However, perceptions of the value of water are different and diverse. At times, divided perceptions have led to conflicting action plans, regulations, and policies over water resources management, including appropriation and delivery of drinking water. Competition over water accessibility and water usage continues to intensify at all organizational levels (local, regional, national, and international) not only because of water scarcity, but also due to

inequitable control over water resources and provision of drinking water. Thus, water is and has always been a contentious and pressing issue to both developing and developed countries.

Ensuring the accessibility of urban dwellers to adequate environmental services, such as potable drinking water, is an ideal for city governments and nation-states. The reality, however, is far from the expectation, as the issues of intermittent and inequitable access, insufficient provisioning of both public and private water supplies, and the widely documented failures of water privatization efforts prevail in urban areas of both developed and developing countries. Recent statistics on the inadequacy of essential water services, compiled by international organizations project a dismal picture of living conditions for city inhabitants. In 1994, more than 220 million urban dwellers (13 percent of the developing world's urban population) did not have access to a safe and reliable water resource (World Resource Institute 1996). The situation did not improve a decade later, as the World Development Report 2004 indicated that two out of of every 10 people in developing countries in 2000 were without access to safe water (World Bank 2003). In 2006, the percentage of people who relied on unreliable water sources remained unchanged (13 percent), although the absolute number ballooned to 884 million people (UNESCO 2009). WHO and UNICEF (2006) estimate that about one sixth of the world's population (a total of 1.1 billion people) has no access to improved sources of drinking water.

Although the aforementioned statistics might not reflect relevant deficiencies in drinking water service provision and actual accessibility to this service at the local context, I believe these numbers certainly portray the burgeoning water crisis facing urban inhabitants. Additionally, these numbers should serve as a warning to the world of the continuing and unabating crisis in drinking water access and provision in urban areas. The crisis tends to be deepened in the face of two complicating factors: (i) the global competitive uses of water resources to meet increased demand and pressure for food, basic goods and services in industries and; (ii) the development of energy resources and its related impacts associated with global climate change, disease outbreaks, rapid

urbanization, polarized development and skewed population distribution in major metropolitan centers.

I am especially interested in examining and explaining issues associated with the deficiency and social inequity of water provision for urban dwellers, specificially regarding politically and economically deprived social groups. I am equally concerned about how to achieve the goal of efficiency in drinking water supply and environmental conservation of water resources. Moreover, I am intrigued at the process of how to provide water to urban inhabitants in the most equitable manner. Most importantly, I want to explore which stakeholder(s) and governance actor(s) will be in charge in serving humanity's need for water services and preservation and management of water resources. I am particularly intrigued in researching and documenting the social, political and spatial processes of urban water supply and management. These processes can potentially address the demand for drinking water at the local level. However, these processes when implemented improperly, can also create impediments to people's accessibility and make them more vulnerable. I strongly believe that any neighborhood or municipal planning initiatives that equitably address the urban water crisis will significantly contribute to the process of building human capabilities of individuals and the collective well-being of local communities.

More than a century ago in Great Britain and the United States, public health and sanitation planning movements were initiated to address water, sanitation, and other environmental issues. These were enacted to alleviate the impending and newly discovered challenges of urban residence and significantly improve the well-being of city inhabitants. In the present, I posit that political will and just political processes can have substantial impacts on efforts in building an inclusive city which provides infrastructure and public services in addition to other aspects of social lifeworlds for urban inhabitants, regardless of their socio-economic, ethnic, and political status. If economic efficiency, social justice and equity, and sustainability are considered as guiding principles and rationales for planning as a profession, these principles should drive all the efforts contributing to the improvement of urban water service provision and the enhancement of

water accessibility, especially for the economically, socially and politically disadvantaged.

### 1.2 Debates on Water Supply

Debates on the deficiencies of urban water supply partially rest on explanations as to why urban inhabitants do not have adequate access to drinking water services. Rapid urban population growth is seen as one of the contributory causes of the problem (UN-HABITAT 2003). Rapid population growth in urban areas mean more pressures are imposed on the service providers. In many cities, especially in the developing world, increasing influx of urban migrants and the emergence of informal settlements where inhabitants do not have land entitlements have tremendously challenged the city government's decision-making in serving the aforementioned groups.

Resource constraints are listed as an underlying cause, which can result in inadequacies of drinking water services in cities. It is reported that many cities do not have sufficient resources for public water service investment. City governments of numerous Asian, Latin American, and African countries suffer from resource shortages, especially after the Asian financial crisis in 1997, the monetary devaluation on the Latin American continent, and war and civic conflicts in Sub-Saharan Africa. Other governments, nonetheless, divert their attention and resources to mega-projects in the hopes of hosting and attracting global capital and competing for world city status, instead of making investments in upgrading the deteriorated water supply systems or expanding service to deprived populations. Consequently, capital and resources are unequally distributed geographically within a nation; the conventional environmental services including drinking water provisioning has not been improved; and vulnerable population segments such as the poor and migrants are subject to marginalization and discrimination in accessing these services.

Furthermore, water scarcity is certainly a central challenge to drinking water service providers in countries where natural water resources are becoming increasingly depleted. Coupled with the unavailability of possession and/or access to reused water

technology and the pressure of over population, this factor significantly threatens the safety and security of urban inhabitants. Resource mobilization and collaborative transnational water governance have been highlighted and advocated as solutions to overcome these constraints. However, the aforementioned solutions rely heavily on political will and planning efforts of governments at many different levels (Douglass 2009).

Examining the crisis of urban water provision, many arguments have centered on the supply side which basically concentrates on the role and performance of major service providers: firstly the state and its public water utilities and then secondly the private sector and various forms of water privatization projects. Debates over the binary state/private sector's performances in drinking water supply are mostly rooted in perceptions of water values (commodity versus public good), economic efficiency versus equitable distribution, public versus market failure, the role and accountability of the state and public sector to its citizens versus plentiful resources, effective management, and effective operation plans that the private sector can potentially contribute (Almansi, Hardoy, Pandiella et al. 2003, Bakker 2010). A relatively large amount of literature has exclusively focused on water privatization because during the 1990s, some of the world's biggest multinational corporations in water supply, such as Bechtel, Vivendi, Suez, Saur, and Veolia and Thames Water began their expansion and ownership of water supply systems in Latin America, Southeast Asia, and Africa under the promotion of the World Bank, International Monetary Fund and other financial institutions. Their operations in many of these countries have ended up with water-based social turbulence, protests, and riots (i.e. city of Cochabamba in Bolivia), rather than making water delivery more efficient and equitable as advocated (UNESCO 2009, Bakker 2010). These incidences have raised arguments about the failure of markets along with the failure of the state in securing water services for urban inhabitants. A common term for these failures, according to Anand (2007) is institutional failure.

Equally important in the existing literature on the crisis of urban water supply is discussions over the role of the small-scale water vendors and local communities. The former has been increasingly recognized as an active provider in serving many informal

settlements and less fortunate communities in the developing world. Because of its contribution to meeting the needs of such communities, small-scale water vendors have even been considered becoming formalized, regularized, and legalized like other conventional, formal water providers (Collignon and Vezina 2000). Unlike the former, the latter seems to be less recognized as a water service provider because community-based drinking water supply systems in urban contexts are not well documented. Although the involvement of local community in water supply projects at the municipal and neighborhood levels is undeniable, there has not been a firm recognition of local community as the sole provider of this indispensible service. Their role is limited to participation in the delivery of water service at the locality, and some discussion surrounding this matter calls for better understanding of the role of decentralization of service provision and market reform (Spencer 2008).

In contrast, research projects that have explored the demand side emphasize how people use and secure water daily. In addition, these projects reveal relationships between the water providers and users and how the relationships influence the quality of water service provision and the performance of the provider(s).

The foundation of much debate over the role of the state versus the pervasiveness of the private sector in water supply is the notion of water as a basic human right. A starting point of the idea is the right to a basic minimum amount of water. However, the main focus of the rights-based approach should be on the outcomes, not the inputs (which imply quantity of water per person) (Anand 2007). The rights-based approach places humans in the center of the issue and assumes that water should be provided to people for the sake of human development. A right to water prioritizes people's basic needs of drinking water and domestic requirements against other forms of water consumption, i.e., industrial development, public displays (Anand 2007). This, according to Jayyousi (2007), is to put human needs first, but not for the sake of economic benefit because the latter is mainly concerned with property rights.

The emergence of the notion of water as a human right derives from the promotion of securing water for the poor and other marginalized groups. In addition, the

spotlight on the issue works to urge national governments to place water issues as a national priority to correspond with the United Nations' Millennium Development Goals (MDGs) (Jayyousi 2007). This water policy approach has been associated with arguments for pro-poor water perspectives, which basically calls for attention and actions from various water governance actors to improve the accessibility to water service as well as other water sources for the poor and other vulnerable population segments. A great number of these populations dwell in informal settlements, slums and other unserviced peri-urban areas.

Spatially, issues associated with the provision of water service and water accessibility in peri-urban areas have not received proper attention. There is a gap in the literature in describing, interpreting, and explaining these issues in one of the most dynamic settings in many developing countries in the urban era.

### 1.3 The Need to Unveil Water Issues in Dynamic Peri-Urban Areas

Situated in the extended areas of the city, the majority of peri-urban areas in the developing world do not have conventional drinking water systems either provided by the public utility or the private company. Peri-urban settlements attract little interest from transnational water supply corporations because the small scale and low density of users significantly affect profitability potential (Bakker 2010). In the meantime, resource constraints and ineffective management and operation of the public utilities prevent planning of the water supply system to extend towards the periphery of the city. Inevitably, in the wake of the absence of a formal water supply system, various informal sources of drinking water provision have formed to meet the needs of the inhabitants. Limited research on water crisis in this particular geographical setting have highlighted the difficulties of peri-urban households in collecting water for their survival and their coping strategies for water appropriation and accessibility. Purchasing and strategically using various sources of water for different needs in the household, buying off of truck drivers of a public water supply company; and/or stealing water are a few examples of

the households' coping strategies (Torregrosa, Arteaga, and Kloster 2004, SUSTAIN 2004).

However, everyday struggles for water of peri-urban inhabitants have not been deeply revealed and discussed compared to other issues of the urban metropolitan or small town water crisis such as water policy reform, water resource management, and/or institutional failures, i.e. water privatization, incapacity of the public utilities. There is a huge dearth in knowledge, action, and policy regimes of nations in the developing world and international agencies on water stress and other water-related issues in the peri-urban setting. Existing interconnected issues in the area have not received proper attention from states or international agencies and therefore are not internationally documented in global reports. Quoted from the World Health Organization report (2010), Hofmann (2011: 43) pinpoints that "60% of aid commitments towards water supply and sanitation are allocated to large-scale systems that are not operational in the peri-urban interface." Peri-urban water issues are not incorporated into developing countries' national agenda, while international organizations have placed far greater emphasis on issues associated with urban centers, i.e., determinants of low water coverage, water providers' performances (metropolitan centers or small towns) (UN-HABITAT 2003, Meinzen-Dick and Appasamy u/d). According to McGranahan (2002), one of the reasons is due to the international system of water indicators, which inevitably favors international comparability over local contextualization of water stress conditions.

From a sectoral perspective, the provision of water for the peri-urban area in developing countries is under-planned and poorly managed because the area administratively falls outside the rural-urban classification system (Allen, Dávilla and Hofmann 2006a, McKenzie and Ray 2005, UN-HABITAT 2006). Water supply-related issues in the region are neither in the agenda of rural/urban administrations (as each only takes on responsibilities and design strategies responsive to the needs of their designated residents) nor institutional frameworks. This type of administrative division in the water sector could also be seen in the way in which water statistics have been collected and presented in both nationally and institutionally released reports (ADB, UNDP, UNESCAP and WHO 2006, WHO and UNICEF 2004, 2006, UN-HABITAT 2006).

Consequently, the water issues of peri-urban areas tend to be left out in policy and practice.

In many settings, public investment in environmental-related infrastructure and services, especially regarding water supply, have been reduced and have stagnated (UN 2003, 2005), not to mention becoming inefficient in performance. In addition, management and provision of public water utilities have failed to keep up with economic and population growth. As a result, public piped water systems cannot be extended to serve residents of many peri-urban areas (Anand 2007) and hundreds of millions of urban dwellers today live in homes and neighborhoods with little or no clean/improved water supplies (Hardoy, Mitlin, and Satterthwaite 2001, UNDP 2006, WHO and UNICEF 2010). Ironically, while arterial roads, ports, housing and other types of infrastructural projects are being constructed in peri-urban areas, limited action has been taken (by the state or the corporate sector) to enhance access to improved drinking water sources for their inhabitants. All of the above factors generate great concern over whether the world will be able to achieve the Millennium Development Goals – To halve, by 2015, the proportion of people without sustainable access to safe drinking water" (UN-HABITAT 2003: 260) – for water supplies in the urban setting of the developing countries by 2015, provided that existing national and international actions, strategies and policy regimes fail to address the needs of substantial numbers of peri-urban dwellers. As long as the operation of public water utilities is economically inefficient, the likelihood of obtaining piped drinking water for peri-urban inhabitants is deeply dependent on the political will of the city administration as well as the dedication and accountability of governmental officials. In the face of ongoing intensive urbanization, peri-urban inhabitants continue to face potential risks and vulnerabilities incurred from the complexity of service provisioning in the area, as long as no action is taken.

To effectively plan and enhance the accessibility to drinking water for peri-urban inhabitants for the future, including the impoverished and poor, it is essential and imperative for urban planners and city administrators to comprehend the complex governance of water. They should have insights into how ecological, physical, and social transformations in this particular geographical setting could influence water appropriation

to the inhabitants and stimulate the emergence of new institutions as an adaptive response. Efforts to improve the accessibility to clean drinking water for peri-urban dwellers might possibly be less effective if there is still a large gap in the knowledge of policy-makers, urban planners, and other scholars on how peri-urban inhabitants organize to secure drinking water. Another obstacle is the lack of information on how local institutions are built to provide water for peri-urban populations. Finally, there is still much confusion as to what extent the transformation of water resources under the impacts of rapid urban expansion affects the social and physical resources of peri-urban inhabitants in appropriating water.

This research provides insight into how rapid change in peri-urban settings can influence local people's access to water and stimulate a new water supply institution through dynamic governance of water provisioning. In addition, the research reveals contextualized adaptation and coping strategies for peri-urban inhabitants. Co Nhue commune, a peri-urban community in the rapidly urbanizing city of Hanoi in Vietnam is chosen as a case for illustration.

### 1.4 The Context of Peri-Urban Water Study

Cities in developing countries are continuing to expand in the context of urban transition. In a large number of developing countries, the expansion of the city has caused substantial effects and challenges for planning in the peri-urban area (Hudalah, Winarso and Woltjer 2007). The peri-urban area is defined in this study as a transition zone where urban and rural activities are juxtaposed and are comprised of diverse and rapidly changing socio-economic segments (Allen, Dávilla and Hofmann 2006a).

Conceptualized and theorized as a place and a process (Narain and Nischal 2007), the peri-urban area has become an object of great interest starting in 1965 when Mortimore and Wilson (1965) did research on land issues in the city of Kano in Nigeria. As a geographical place, the peri-urban area is situated in between the city and countryside (Cadene 2005) and alternates rapidly over time and space (Dupont 2005). The conceptualization of peri-urban areas as transitional highlight the flow of financial

resources, labor and services entailed in socio-demographic, economic, environmental and institutional changes into a particular geographical setting, while strongly influenced by socio-economic and political discourses in the adjacent city or metropolitan center (Friedberg 2001, Halkatti et al. 2003). Peri-urban areas, in a number of existing research and publications, are conceptualized with very diverse characteristics.

Economically, this is the land of diverse income sources, the proximity of markets, available farm labor, possibility of off-farm employment, industrial developments, and changing agricultural practices (Marshall et al. 2009). Ecologically, this is the area of high levels of pollution and other environmental problems, and intensified resource extraction (Briggs 1991, Friedberg 2001, Marshall et al. 2009). Demographically, this area contains already high and still increasing population densities and migration (Torres, Alves, and De Oliveira 2007). Socially and politically, this area concentrates a heterogeneous mix of urban and rural features such as poor slums, poverty, rich countryside homes, a lack of regulation, contested land tenure rights in the face of agricultural land and resource acquisition for urban development, and severely insufficient service provisioning (Simon et al 2003, Allen et al. 2006c, Shatkin 2007, UNFPA 2007).

Notably, the dynamism of the peri-urban area in many developing countries, according to Marshall et al. (2009) and other scholars' perception, such as Friedbeg (2001), Simon et al. (2003), and Satterthwaite (2007), is recognizably shaped by broader structural (political and economic) processes, i.e., globalization, decentralization, state-led development, governmentalism, and/or war and political independence (in some African contexts). The peri-urban area is a place that generates massive profits through (agricultural) land acquisition for urban development, and therefore has attracted global capital for mega housing projects and new towns. Inevitably, many city and national governments could develop urban development strategies based on land acquisition to attract global capital. However, what has been considered as challenges to the sustainability of the peri-urban area is many poor and marginalized inhabitants are struggling due to the area's environmental degradation. Other factors include the loss of

livelihood, being subject to dislocation and involuntary resettlements, and severely inadequate access to reliable basic services like drinking water.

In peri-urban area dynamics, the way in which water is sourced for household usage both in availability and supply is being transformed. This transformation process is taking place along with social (community relations) and physical/ecological (resources) changes in the area, resulting in a complexity of water provision and significantly influencing water accessibility of the inhabitants. The complexity of water governance is demonstrated through the involvement and performance of water providers and the dynamics of inter-relations between the providers and water users. In the case of peri-urban areas, water governance becomes complex because of factors relating to water resources, service providers, and users: (i) unreliability of water quality, which is directly appropriated, due to the demise of surface water resources and the prevalence of unregulated and unmanaged exploitation of groundwater sources, (ii) low levels of state involvement in serving its peri-urban residents, and (iii) the lack of interest from the transnational corporations in the sector in opposition to the emergence of small scale private providers, and individual opportunistic behaviors of residents, and/or local institutional adaptations to cope with the changes in water resources and increasing demand for water usage.

While rural dwellers have access to secure natural water sources through direct appropriation, and urban residents receive highly regulated service provision from either the state or the corporate sector, peri-urban inhabitants face numerous challenges concerning access to one of the most fundamental services because of changes in water resources and unprecedented arrangements for service provision. The continuous peri-urbanization process, in essence, is exemplified in the form of agricultural land acquisition and conversion into urban land use, coupled with changes in both economic structure and social organization of local communities. New housing complexes, new towns, and industrial/economic zones are also continually being erected in the periphery. The emergence of these projects is further complicated with the construction of new roads/lighting systems and waste collection services. Other environmental services, sanitation and drinking water, for instance, if available, are only for residents of newly

developed areas. While local inhabitants of peri-urban communities might not be able to access to such environmental services, the emergence of the urban (aforementioned) projects substantially cause the shrinking of surface water resource and affect its quality in the area. Adaptively, peri-urban residents, regardless of their economic status, develop their own strategies for obtaining drinking water from various sources, i.e. underground, surface, and/or bottled water. What can be inferred from the unavailability of public water utilities and the deterioration and depletion of natural water resources in the area is that peri-urban inhabitants' use of water tends to be subject to unreliable service, health risks and economic vulnerability.

The complexity of water governance in the peri-urban context of developing countries introduces both opportunities and challenges to urban planners and administrators in examining how the needs for essential environmental services like drinking water can be addressed in urbanized contexts, where development schemes are continuously being driven by both the state and the global corporate sector. On the one hand, the unavailability of public utilities for water services generates opportunities for the emergence of other unconventional pathways of water provisioning, including local entrepreneurs, community-based institutions and other forms of innovative financing for water services. In that sense, less pressure will be imposed on the public water utilities for not being able to extend their service coverage to the area. On the other hand, the dynamics of water access, water provision and management in the peri-urban areas have brought tremendous challenges for multiple reasons:

- First, in the face of not having a predominant and reliable water service provision in the peri-urban area, it is essential to decipher the dynamics of adaptive strategies, which have been developed by its inhabitants over the time. There is also the necessity to understand the degree to which the dynamics of water access and provisioning have inflicted risks and vulnerability to peri-urban inhabitants, especially the poor and other disadvantaged groups. In other words, to what extent has peri-urban dwellers' physical and social resources affected their entitlements to obtain water, in an atmosphere of ecological and socio-economic transformation of the area?

- Second, to what extent has the newly arranged form for water supply performed and adapted to on-going urbanization processes? More specifically, is it prudent to be concerned about institutional adaptation and sustainability in the face of continuous urban growth? Another concern is the ability to integrate the newly developed water supply system by the local/community-based institutions into the piped city system when the public water utility is finally able to extend its coverage to the area to avoid any unnecessary wasting of resources.
- Since the peri-urban areas will be incorporated into the city as urban settings in the future, what policies are required to address the immediate needs for clean water and reliable services of peri-urban inhabitants and to best manage the water resources, which have been exploited without proper regulation and monitoring?

### 1.5 Goal, Purposes, and Tasks of the Research

The overarching goal of this research is to build a framework that explains the complex water governance of peri-urban areas to better plan for the enhancement of accessibility to improved drinking water sources for peri-urban inhabitants of developing countries.

From a planning perspective, this dissertation research has two purposes. Firstly, the research seeks to explore responses of residents of the Co Nhue commune in Hanoi to changes in local water resources, population, and socio-economic structural conditions, all in the context to secure drinking water. In other words, the research will attempt to answer the question of how Co Nhue residents organize and manage to gain access to drinking water under conditions of continual and intensive urbanization. The responses of the people of Co Nhue will be investigated through adaptive strategies deployed by local households and community institutional adaptations to secure drinking water. These responsive strategies are going to be analyzed along with the description of existing water sources and water providers in the community under the impact of intensive urbanization processes in Hanoi.

To comprehend the arrangement and performance of the Co Nhue residents and government in water supply and management as well as impacts of urbanization on local water resources/water supply, the research will trace the history of water management in the commune prior to the onset of Hanoi's intensive urbanization process. This research also examines (i) whether the formation and performance of the community-based institution for drinking water in Co Nhue is related to traditional ways of managing water in the past and (ii) to what extent the local authority facilitates and/or contributes to the institutional arrangement.

Secondly, the research project examines how changes in water resource conditions and institutional arrangements at the locality relate to the transition of Co Nhue residents' entitlements to natural water resources (as a property) and drinking water service. The research analyzes what segment(s) of the people have received benefits from and what segment(s) have been made more vulnerable due to the transformation of water resources and the resulting local institutional adaptations of the commune. The research also examines to what extent the changes in the social fabric of the local community, local authority's responsibilities, the transformation of local water resources, and the operation of other sources of drinking water supply in the commune affect the arrangement and performance of local institutions.

### 1.6 Research Questions

To fulfill the aforementioned goals, purposes and tasks of the research, the following inquiries are set for in-depth exploration:

1) How do peri-urban residents secure water under the shared experience of rapid urbanization? What are their strategies deployed for securing water?
2) To what extent do the transformations of peri-urban areas affect water accessibility of peri-urban inhabitants?

## 1.7. Significance of the Study

This dissertation research seeks to contribute to the body of knowledge on governing environmental service provision by studying local community institution-building to secure drinking water service. Using drinking water supply as an illustration for urban services, this research explores how local communities in peri-urban areas, as a governance actor, can take actions to improve their living conditions in a turbulent and dynamically changing setting.

Using a case study of Co Nhue, a peri-urban community in Hanoi, Vietnam, to explore and illustrate dynamic and complex water governance, the research shows how access to water is embedded in the urban transition and becomes spatially contentious under the decline of water resources, population increase, and changes in economic structure, land use, and community relations. The transition of people's entitlements to water from rural to peri-urban to urban geographical settings implies that access to drinking water of human beings correlates with their respective place of residence. For that reason, public policies on water supplies and/or water policies should particularly take into consideration the geographical differences and ecological changes in water resources. In addition, the analysis of various adaptive strategies for drinking water of peri-urban households and the impact of shifting entitlements to water among various segments of peri-urban populations can generate policy implications regarding how to enhance and support the impoverished and vulnerable groups to obtain better access to drinking water services.

The conceptual framework (Chapter 3) of this study is to examine both internal and external relationships within the peri-urban local community institution for drinking water. The framework is further elaborated through concepts of entitlements as a question of socio-political organization and the appropriation of nature as a form of establishing property regimes. This development introduces another angle of examining the role of community-based institutions in environmental service provision.

This research enriches the body of knowledge of community-based common pool water resources management in a peri-urban context. This is an area that is vastly under-

explored in studies on water supplies, especially when situated in the cities of developing countries. Research findings also make a contribution to the existing body of knowledge on general issues in peri-urban settings.

Since water supplies in peri-urban areas have been ignored by many national governments, this research's findings significantly raise awareness of both policy-makers and planning practitioners about the importance of access to water for peri-urban inhabitants. The case study of Vietnam will also contribute to a limited number of case studies on water supplies in Southeast Asia - a region with a high level of diversity of cultures, societies, economic structures and political systems.

### 1.8. Organization of the Dissertation

This dissertation report is comprised of seven chapters. This initial chapter has just provided an introduction to the study and an explanation why the issues complex governance of water accessibility and provision in peri-urban areas is essential for doing the research. This chaper also presents the goal, purposes and tasks as well as the significance of the study. Chapter 2 first provides an overview of dynamic water governance in the peri-urban area. Then, it introduces a review of studies on peri-urban water provision and management and a case study of Co Nhue commune in Hanoi, Vietnam.

Chapter 3 presents a conceptual framework for a description and examination of the complex governance of water in peri-urban areas under the impact of urbanization. This framework steers the research examination of the ways in which inhabitants of Co Nhue commune individually and collectively appropriate and secure drinking water for their daily lives. The framework is also given for the purpose of explaining how access to and provisioning of water services are spatially embedded and contentious.

Chapter 4 describes the methodology deployed for data collection and data analysis. This chapter provides explanation for the case study formulation of this

research and introduces the process and the strategy adopted for data collection as well as ow collected dta have been sorted and analyzed in this research.

Chapter 5 sets up a broader context of the case study. The chapter starts with a brief introduction of Vietnam's development path, followed by a description of a rapid urbanization of Hanoi city in Vietnan's urban transition stage. The chapter also discusses the contextualization of the water supply sector in the city of Hanoi: the organization, evolution of the city water supply program and how the city's rapid urban growth has imposed challenged in meeting the daily needs for water of Hanoi citizens as well challenges face by the peri-urban Hanoian in their everyday and future water accessibility.

Chapter 6 presents a thick description of how Co Nhue residents secured water under the shared experience of rapid urbanization and the extent to which the transformations of the commune affected its inhabitants' access to water. The responses of the Co Nhue residents are described through their community institutional adaption and households' adaptive strategies to secure drinking water.

Chapter 7 summarizes and discusses findings of the study. It also provides the study implications, discusses its limitations, and outlines avenues for future research.

# CHAPTER 2

# A REVIEW OF WATER GOVERNANCE IN PERI-URBAN AREAS AND THE CASE STUDY OF CO NHUE COMMUNITY IN HANOI, VIETNAM

## 2.1 Dynamic Water Governance in the Peri-Urban Area

Access to natural water resources for people residing in peri-urban areas is termed as an appropriation because the resources were once perceived as free assets or as part of the commons, to be collectively managed and monitored by local communities. Prior to the onset of urban sprawl and intense urbanization, inhabitants of these areas used to mainly appropriate surface water sources, e.g., rivers, lakes, and ponds available to and within the community. In addition, they harvest rainwater and/or fetch water from communal wells for daily consumption, such as drinking, cooking, bathing, cleaning, and washing clothes. As the city expanded toward the suburbs, the emergence and encroachment of urban housing development projects, major infrastructural developments and new towns substantially caused the decline and depletion of natural water resources, leading to unreliable water provisioning for local peri-urban communities. As a result, these once rural communities are under immense water stress. Dependence on lakes, ponds, rivers, and communal wells have been dramatically curtailed, as many of these sources are either being filled up or depleted by the deterioration of the natural drainage system caused by urban expansion and the development of new urban settlements. Surface water sources also become increasingly polluted to the extent that these sources can hardly be used for domestic purposes, including drinking (Lindl and Gilbrich 1996; cited in Bakke 2003).

In the face of surface water deterioration, ground water has become a reliable source for household usage. However, besides households, groundwater has been concurrently exploited by various other actors, including enterprises, construction companies, and development project owners for commercial purposes e.g., city beautification and landscape. In many cases, competition over the use of this resource result in water conflicts (Bouwer 1993, Botton and Merlinsky 2007, Bakker 2007, Meinzen-Dick, and Apprasamy u/d, Janakarajan, Llorente, and Zérah 2006, Butterworth

et al. 2007). To access groundwater, peri-urban households have drilled their own wells and many of them invest in building artesian or modern water treatments for making water potable. At this rate, peri-urban households have to compete with business enterprises, construction companies, and public water utilities for groundwater – a resource which in most cases is defined and claimed as public property. At the same time, they are exposed to the increased risks of using contaminated water (Allen, Dávilla and Hofmann 2006c, Guzinsky 2007) because the existing processes for groundwater extraction is not effectively managed or regulated by government.

While the production and distribution of water in the city, which entail technology in the form of biological and chemical treatment processes, as well as a distribution network, are dominantly in the hands of the state or financially powerful transnational corporate companies, the provision of water services in peri-urban areas is relatively more complex because of the unavailability of a public piped water network (Conan and Paniagua 2003, Nguyen 2004, Allen, Dávilla and Hofmann 2006c, Guzinsky 2007). Transnational water companies, if involved in the production processes in metropolitan centers, e.g., Jakarta and Manila, fall far short of serving the interest of peri-urban inhabitants, and in many cases this actor fails to address the needs of the poor and other vulnerable segments of the population (Budds and McGranahan 2003, Davis 2005, Esguerra 2003, Gutierrez 2003a , Gutierrez 2003b, UN-HABITAT 2003).

The small-scale private sector, local authorities, and communities do not usually get involved in drinking water production, but participate in the drinking water distribution cycle in many ways. Small-scale private providers and/or water vendors/tankers have played a crucial role in supplying water to the peri-urban areas, and especially in serving the poor (Butterworth et al. 2007, Conan and Paniagua 2003, Guzinsky 2007, Janakarajan et at. 2007, Kjellén and McGranahan 2006, McIntosh 2003, Solo 1998, 1999, 2003, Triche, Requena and Kariuki 2006, Hofmann 2011). In some settings, peri-urban communities collaboratively work together or with the support of non-governmental organizations and/or engineers from public utilities to create and maintain their own small-scale water production and supply systems (Kyessi 2005, McKenzie and Ray 2005, Allen, Dávilla and Hofmann 2006a, Cain and Mulenga 2009).

In other instances, these local communities coordinate with water supply public utilities to set up deep, complex community wells and piped networks within their localities (Spencer 2007). Another form that involves local community participation in drinking water service provision is the purchase of piped water from a public utility (in bulk) by local authorities. They can then sell the water at retail rates to the residents through a local piped network (Spencer et al. 2008).

To adapt to the absence of a public water supply form, the decline in natural water resources and more importantly, the demise of their access to surface water, peri-urban inhabitants strategically adapt to the contextual changes to secure multiple water sources (Hofmann 2011). They have gradually shifted their reliance from surface water to groundwater as their main source of water. In competition with industrial and commercial uses, they dig and drill wells individually or collectively (Nguyen 2004, Guzinsky 2007). Many collect rainwater, others seek more improved sources like purchasing bottled water (Allen, Dávilla and Hofmann 2006a, McKenzie and Ray 2005, Swyndedouw 2004, Field notes July 14 2007) and/or tap into any available water supply network locally in the meantime. Acts of resistance, like illegal tapping or stealing of water, also emerge in inequitable water distribution contexts (Swyngedouw 2004). Other strategies like storing, filtering/treating of water through varied methods of treatment (artisanal versus technologically entailed methods) and facilities have also been quickly adapted by the inhabitants regardless of their socio-economic status and capabilities to mitigate health risks that might be caused by deteriorating water resources. However, better-off groups have the resources to adapt capably to the dynamics and complexity of water governance in the area than poorer groups. Their adaptive strategies might reflect pragmatic responses and opportunistic behaviors, but apparently highlight unconventional pathways of water supplies being developed to address the need-driven aspect (Hofmann 2011) and everyday practices of water supplies in the peri-urban area.

As peri-urban areas continue their physical and ecological transformation because of the encroachment of the city, only people who live in new towns, or residential areas newly developed within the peri-urban territories have access to an internal water supply network, built by the developer. Access to water for the poor and other disadvantaged

groups, on the other hand, is severely affected and economically challenged. In the face of the decline of their major asset endowment (surface water), poor people are left without much choice but to significantly rely on the remaining surface water, ground water and other unimproved water sources, or to spend a large proportion of their household income on purchasing water from small-scale water providers (Angueletou 2006). Since public piped water, usually subsidized by the city government, is not available in the area or frequently distorted due to poor operation and management (Hofmann 2011), these particular populations are financially unable to obtain water from improved sources (such as bottled water) as a coping strategy (Nguyen 2008). In the face of their own financial constraints (limited financial capability), reducing consumption via prioritization of needs for drinking, cooking, bathing, cleaning, toilet uses and gardening, storing rainwater, and treating water in order to minimize costs are all thrust upon the poor (Angueletou 2006, Spencer 2007). This situation has been documented and highlighted throughout the experiences of developing countries, i.e. Mexico, Indonesia, India, and Vietnam (Bakker 2003, Spencer 2007, Ruet, Gambiez and Lacour 2007, Torregrosa y Armentia, Arteaga and Kloster 2004a).

The depletion of surface and ground water sources, in essence, takes away peri-urban people's abilities to directly appropriate water free of charge. It ultimately imposes increased levels of dependence on providers, higher health risks and economic vulnerability on its users. Mutual assistance from relatives, reciprocity and other social forms of support, which could be prevalent in organic/cohesive communities (Polanyi 1957), have been found to be less effective in facilitating access to water in poor, peri-urban settlements. Although community-based water supplies have been implemented in some settings, this new form of water supply has not been deeply analyzed in terms of its establishment, operation and maintenance, community participation, and its impacts on water access for peri-urban residents, especially for the poor and other disadvantaged population segments. Undoubtedly, the more natural water sources are deteriorated during the urbanization process, the more dependent on drinking water providers poor people literally become, regardless of their coping and adaptive strategies. Therefore, for peri-urban inhabitants, losing entitlements to appropriate natural (surface) water also

mean being more economically vulnerable. Thus, the peri-urban poor and other disadvantaged groups are the most affected and afflicted in this struggle.

## 2.2 A Review of Studies on Peri-Urban Water Provision and Management

Research projects on peri-urban water issues are relatively limited and spatially dispersed, especially in developing countries. The majority of existing studies have explored the existence of various water supply sources and the performance of water providers (Allen, Dávilla and Hofmann 2006a, Torregrosa, Arteaga and Kloster 2004a, Torregrosa *et al.* 2004b); the strategies of households for securing water (Spencer 2008); the conflict over scarce water resources between the peri-urban inhabitants and dwellers living in the core and inner areas of the city (Janakarajan et al. 2007); the conflict between different water providers (Faysse et al. 2007); and the governance of water supplies and production under conditions of rapid urbanization, especially focusing on local innovation in the provisioning and production of drinking water (Guzinsky 2007, Spencer 2007).

Among the scattered research projects on peri-urban water, a recent three-year research project funded by DFID (Department for International Development of England) concentrates on the governance of water and sanitation services for the peri-urban poor in metropolitan regions in Mexico, India, Tanzania, Egypt, and Venezuela as a large-scale comparative study. Aiming at "examining ways to improve urban governance and management of water and sanitation services for the benefit of the poor in the peri-urban area of metropolitan regions," (DPU 2004a: 4) this research project explores the existence of various water supply providers, identifying the peri-urban poor in most need, and examines the challenges faced by the peri-urban poor in accessing water supplies and sanitation services, e.g. in relation to health risks, well-being, and livelihood. The comparative research has identified the diversity and institutional fragmentations of water provision in the peri-urban settings of the five metropolitan regions – Mexico City (Mexico,) Chennai (India,) Dar es Salaam (Tanzania,) Caro-Giza (Egypt,) and Caracas

(Venezuela) - although these systems are differently organized and operated by each region/country.

The DFID funded research project put an emphasis on the peri-urban poor. The project's synthesis report defined who the peri-urban's 'water poor' are and indicated that these peri-urban poor are conceptualized as both citizens (for whom water is provided through a heavy state subsidy) and customers (who have to pay for water), even though water was also viewed as a social good (in Tanzania), universal right (in Mexico), and human right (Egypt and rural India) (Allen, Dávilla and Hofmann 2006a, 2006b). Later, in her analysis of access to water and sanitation by the peri-urban water poor, Hofmann (2011) – one of research project team members – not only refered to the water poor and service users, but highlighted them as contributors to service provision. Hofmann recognized the efforts of poor communities in making contributions to the improvement of water access in the peri-urban area. Moreover, she reinforced the realization that poor people/communities are proactive on the issue, able to participate through contribution, partnership and self-mobilization in water service provisioning. In addition, the DFID comparative research project proclaimed that the peri-urban poor suffer from higher levels of health risks compared to the rural or urban poor. The research also indicated the relationship between informal and illegal access to water services and insecurity of tenure to land and housing rights as well as the relationship between lack of water access and livelihood vulnerability of peri-urban inhabitants of developing cities (Allen, Dávilla, and Hofmann 2006c, Karen 2006).

This project's results describe the complexity in the provisioning of water supply and sanitation services in peri-urban areas of five different metropolitan regions in the developing world. Specifically, this comparative research has successfully documented the engagement and performance of diverse water providers: both formal (public water supply companies) and informal (small-scale private providers, water vendors, community-based water supply programs) (Allen, Dávilla, and Hofmann 2004, Hofmann 2011), their contributions to, as well as challenges in, water provision for peri-urban dwellers, especially the poor in illegal/informal settlements. However, detailed strategies deployed by peri-urban households, and especially poorer groups were not deeply

revealed. Although the research project put issues of water provisioning in peri-urban areas in the context of chaotic development, heterogeneous socio-economic structure, "heterogeneous mosaic of 'natural' ecosystems, 'agro-ecosystems' and 'urban' ecosystem" (Allen, Dávilla, and Hofmann 2006a: 21) and institutional fragmentation, the contextualization of the water issues faced by the poor and other socio-economic groups in general were not clearly presented in the analysis of the interrelation between the transformation of water resources in the peri-urban area and access to water for dwellers.

In research on water supplies for the peri-urban Can Tho city in Vietnam, Spencer mainly relied on a survey questionnaire and additional in-depth interviews to explore household strategies for securing clean water (2008) and local initiatives on water provision in the absence of a public piped water supply (2007). The research project identified various water sources at the surveyed sites and surveyed local households about their strategies in water utilization from all identified sources. Revealing stories of local entrepreneurs' cooperation with a public water supply company in setting up a small piped water network to provide drinking water for a small group of people in two communities adjacent to the city of Can Tho, the research additionally investigated and highlighted local innovation in financial mobilization as a means of enhancing access to water locally. Spencer (2007, 2008) emphasized decentralizing practices and the advocacy of privatization and multi-stakeholders' participation in service provision in the cities of Vietnam when considering them as a platform for the emergence of such innovative financial action concerning water in Can Tho province, Vietnam. However, since the study was quantitatively designed, the story of local innovation did not provide sufficiently detailed insights on the process of how local community people were involved in the arrangement and/or how trust was built among the community, the selected local entrepreneurs, and the local authorities as well as its trajectory in the future regarding the urbanizing process of Can Tho city.

There is also a number of studies focusing on conflicts over water access in the peri-urban setting. Emphasizing the contextual complexity of the peri-urban areas in Chennai (India), Cochabamba (Bolivia) and Sao Paulo (Brazil), a four- year Negowat research project of the International Water and Sanitation Centre, the Netherlands,

specifically focused on the conflicts over the use of natural water resources among different groups in peri-urban settings in order to find a framework that supports dialogue and negotiation among different water governance stakeholders. These conflicts arose as various groups of water users (i.e., agricultural production, household use, and selling groundwater for commercial benefits) could not reach common ground on how to appropriate natural water sources without restricting access to other groups. The core reason for conflicts over water usage in these cases was the well-being and livelihoods of peri-urban people were critically hampered and affected when their appropriation of water was controlled. The project also explores how local authorities and the community work together to cooperatively address water stress issues. The research findings reveal that local authorities/institutions in peri-urban areas are weak, lacking in capacity and can barely support community level structures, even though they are quite active. Community organizations' actions to enhance access to water for people are ineffective, especially in contemporary migrant areas, where social cohesion is absent and the social fabric is weak (Butterworth et al. 2007).

This dissertation research project shares a commonalities with the aforementioned reviewed studies in terms of investigating the complexity of water governance in the peri-urban setting of developing countries. It further explores how urbanization has changed the ways people appropriate water in order to depict and analyze any adaptive actions that have the flexibility to respond to changes in the water domain and context. The research, however, is designed differently compared to the other studies because:

(i) It specifically focuses on local institutional arrangements and adaptation to changes in water resources, caused by the accelerated urbanization process, particularly on community-based water provision. Qualitatively designed, this research attempts to provide an in-depth investigation and a thick description (Geertz 1973) of the manner, in which local institutions are arranged to function in order to secure water for peri-urban inhabitants of Hanoi.

(ii) It examines the evolution of institutional arrangements for the provision of drinking water in the peri-urban settings in correspondence with contextual change. For this reason, it entails a historical analysis to explore how water was

institutionally arranged for and managed prior to the intensive urbanization of Vietnam. This is the main point of difference with previous research projects on water provision issues because they tended to be grounded in issues-based approaches in looking at water provision issues, and only in a contemporary context.

(iii) It also attempts to build a conceptual framework to explain the complex goverance of water in the peri-urban area.

(iv) This research will investigate the intricate relationship between social relations and political power in the arrangement and performance of local institutions for drinking water supply.

### 2.3 A Case Study of Co Nhue Commune of Hanoi, Vietnam

In this research, the case study of the Co Nhue commune in the city of Hanoi, Vietnam serves to portray stories of access to water of its residents, embedded in the socio-economic and political structural changes of the city under Vietnam's urban transition stage. The city of Hanoi illustrates in depth the dynamics of governing water in peri-urban areas in Vietnam in two respects - its uniqueness and its commonality with other metropolitan centers in the region. Vietnam is experiencing an urban transition at an accelerated pace in both planned and unmanaged settlements. The city of Hanoi is a typical urban metropolis under tremendous urban transition pressure with 65 percent of its population (approximately 5 million residents) residing in the urban districts of the city (Hanoi Statistical Publishing House 2009). Within the past decade, more than a hundred urban housing development projects have been proposed and implemented in Hanoi. The city's expansion towards the west and the south has created immense transformation in peri-urban areas ecologically, socially, and demographically, as exemplified by the emergence of new towns and residential areas, dumping sites, new arterial roads, industrial zones, a high percentage of rural-urban migrants, and rapid reduction in agricultural land.

The urban development of Hanoi outpaces city investment in and development of the water supply system. Although two Hanoi Water Business companies have gradually increased their water supply capacity since the city's liberation in 1954, around 30 percent of the city's population, especially people in the peripheral areas have no access to clean drinking water (UN-HABITAT 2003b). The 400,000 $m^3$/day-production volume of water (Adcom 2003), produced by the two Hanoi water supply companies, only serves between 60 to 76 percent of the city's inhabitants during the 1996-2003 period (Adcom 2003). The proportion covered in suburban areas of the city has reached only 32 percent. Ironically, while a significant proportion of Hanoi residents are without piped water (UN-HABITAT 2003b) and must rely on borehores, wells, ponds and rainwater, there has been a high percentage of non-revenue water[1] during water distribution, comprising around 70 percent of total production in 1995, 1997 (McIntosh and Yniguez 1997, JICA 1997), 65 percent in 1998, 1999 (MOC 1999), 50 to 60 percent in 2000-2003 (Adcom 2003, Do 2003), and around 44 percent in 2004 (JICA 2004). Despite tremendous efforts of the city and central governments in the improvement of the public piped water system, the current public utility water system in Hanoi is unable to provide convenient and safe access to drinking water for a large segment of its residents.

The situation has worsened in the peri-urban areas of the city, exemplified by the decline in surface water, groundwater depletion and poor maintenance of existing infrastructure. Peri-urban areas in Hanoi are home to long-established communes/villages and many of these villages are historically renowned for their production of specific commodities/goods. Their existence is associated with the agglomeration of cottage industries as settlements (i.e. noodles, mochi rice cake, weaving, pottery and ceramics, etc.) These areas have undergone enormous transformation because of the emergence of urban mega projects, (e.g., new towns/new cities) for hundreds of thousands of new inhabitants, the formation and expansion of landfills and industrial zones, and other infrastructural development projects. This has caused substantial ecological stress and hastened the demise of traditional ways of

[1] Non-revenue water is defined as produced water, which is lost dues to leaks, illegal connections and/or inaccuracy of water meters.

providing and managing common water in many areas. With the unavailability of a public piped water network, peri-urban inhabitants have created a diverse and complex system of water provision and water access in these areas. Traditional communal open wells, once used by villagers for hundreds of years, are either filled up or abandoned by peri-urban inhabitants along with the encroachment of the city. Peri-urban households have shifted their reliance from surface water sources, once available in these areas, to common groundwater (free extraction for household utilization purpose) as the main source, supplemented by rainwater and water provided by vendors/local water entrepreneurs. While these adaptive strategies (to the transformation of water sources) have been gradually deployed, a majority of peri-urban residents may not recognize the on-going decline of self-provisioning of surface water sources, which were mainly deployed by households and/or community as a whole, and the increasing levels of dependence on water providers as the community/area is urbanized. They also may not notice that their free-access to ground water sources gradually causes ecological challenges for Hanoi city, specifically city subsidence and the depletion of water sources.

Located in the west of Hanoi city, Co Nhue commune is a long-established community in the Red River Delta of Vietnam. Under an increased rate of urbanization of Hanoi, the commune has been significantly changed in its economic structure, ecology, population, and social relations. This research attempts to examine changes in land use, social relations, economic structure and livelihoods in the commune of Co Nhue over the past two decades and how these changes have affected water resources, water provision and accessibility when the commune is undergoing its urbanization.

The commune of Co Nhue was selected as an illustration in this research because Co Nhue is located in the periphery of Hanoi and its the inhabitants of Co Nhue have experienced various forms of water provisioning over the past two decades. The communal traditional water wells, which were built back in the 17$^{th}$ and 18$^{th}$ centuries and used to be the main sources of water supply for the whole commune, were completely reclaimed and abandoned. Household-owned shallow (hand dug) wells, which were commonly used in the 1980s, have been mostly replaced with drilled wells in every household in the commune, so that the residents can extract groundwater free of

charge. The pervasive and unmanaged ground water exploitation, the demise of traditional water supplies, the depletion and shrinking of surface water sources in the face of rapid urbanization of Hanoi, and the rise and fall of the Co Nhue's community-based water supply have made this commune one of the most fascinating cases for the study of complex governance of water provision in the peri-urban area of Vietnam.

# CHAPTER 3
# THE DYNAMICS OF GOVERNANCE OF WATER IN PERI-URBAN AREAS

This chapter constructs a conceptual framework for a description and examination of the complex governance of water in peri-urban areas under the impacts of accelerated urbanization as highlighted in chapter 2. Figure 3.2 in this chapter visually demonstrates a dynamic water accessibility of peri-urban inhabitants, the coexistence of various, but not necessarily reliable, water provision sources, and local reponses to secure drinking water in the study's conceptual framework. Grounded in the institutional approach, which is broadly employed in studies of the common pool resource governance and management (Ostrom 1990, Ostrom, Gardner and Walker 1994, Mosse 1997, Imperial and Yandle 2005, Agrawal 2001, 2002, 2003, 2008), elaborated through Sen's perception of entitlement (Sen 1981), this framework steers the research examination of the ways in which inhabitants of Co Nhue commune in the city of Hanoi, Vietnam individually and collectively appropriate and secure drinking water for their daily lives. The framework also helps explain how access to and provision of water servcices are spatially embedded; and the spatial embeddedness of water provision and raw water appropriation is associated with local social power and water resource conditions and influences human entitlements to water.

## 3.1 Institutional Approach and its Usefulness in Examining Community-Self Governance of Water Service

The co-existence of multiple non-traditional forms of water service delivery in peri-urban areas, i.e. small-scale water vendors, has been revealed in the literature on water supplies both in urban and peri-urban settings. In addition, community-self constructed water supply systems, pervasive in poor and/or informal settlements, has been called for attention, and the call has gained momentum because of a desire for more cooperative, democratic forms of urban supply governance (Bakker 2010). Adopting the institutional approach to examine the establishment and performance of such water

supply systems, i.e. the Co Nhue communal water supply network, is suitable to this research.

Generally, institutions could be interpreted as formal or informal systems of norms and sanctions, but traditionally, in the context of water supply, water accessibility is detemined primarily by formal institutions (Anand 2007). Institutional approach-based research explores or seeks to explain the way in which water resources and services are allocated, controlled, and managed by governance actors; and under which perceptions, ethics, and norms these mechanisms are embedded. Anand (2007) perceives that "informal institutions emerge to lobby and influence policy or to stake claims over resources, or to help clarify arrangements in allocation and appropriation or harvesting of a public good or common property for private consumption" (144) Therefore, Anand (2007) introduces three models of institutional arrangements for water supply in different countries throughout the world: (i) the state, exemplified through the public sector entity, (ii) the market, exemplified through privatization, and (iii) some degree of autonomy falling in between the public sector entity and privatization models.

All of the three models Anand (2007) classifies are similar to the way many studies on water supply have been formulated in order to discuss and seek insights into the role of the public water utility, the private sector water corporations (Idelovitch and Ringskog 1995, Bakker 2003, 2010, McDonald and Ruiters 2005, Hall and Lobina 2007), local entrepreneurs (Spencer 2007, 2008; Triche, Requena, and Kanuiki 2006), small-scale vendors (Solo 1998, 1999, 2003; Conan and Paniagua 2003) and community governance of water (self-help/self-reliance) (Yeung and McGee 1986; Akbar et al., 2007, Chen 2008). To have a thorough understanding of the community governace of water and more specifically of the development, performance and evolution of community-self built water supply network like the case of Co Nhue, the adoption of community-institutional arrangement for the organization of resources through property regimes is the most useful way. The section below will introduce the details of this approach.

### *3.1.1 Community Institutional Arrangements: Appropriating Nature through Property Regimes*

An institution is perceived as a socially constructed and made up of rules, laws, constitutions, customary sanctions and social norms, and their enforcement characteristics. Both formal and informal rules/norms are developed by a group of individuals to regulate the institutional activities and the utilization of natural resources (North 1993, Ostrom 1992, Jentoft et al. 1998, Poteete and Ostrom 2007).

The institutional approach is well recognized and widely applied in the field of natural resources management, and institutional building at the community level is one of the three types of institutional arrangements in the scholarship of the commons: community institutions, private management, and public management. In the wake of the inefficient management of natural resources of both the market and the state, there has been a call for the direct engagement and self-governance of natural resources of local residents. In this regard, community institutional arrangement is (i) related to the promotion of decentralization and devolution that encourages the autonomy of the local government in decision-making and financial management to address local emerging issues, including resource management and service provision (Reddy and Dev 2006); and (ii) associated with the role of local residents in appropriating and mornitoring resources in the most effective and sustainable manner via collection action (Olson 1965, Ostrom 1990, Choe 1992).

The notion of seeking a promising institutional type that accounts for sustainable resource use and management has triggered the attention of many anthropologists, rural sociologists, economists, environmentalists and political economists since the mid-1980s, although the early roots of literature on the management of the commons can be traced back to studies of Commons (1924) in “Legal foundation of capitalisms” and/or “The exchange of enforcement of property rights” of Demsetz (1964) (Agrawal 2001). Such common pool property institutions have been broadly applied in a variety of sectors, including forestry (well documented in Nepal, India, Indonesia), fisheries (in New Zealand, Pacific Islands), and water irrigation systems (in Indonesia, India, Nepal) (Bess

and Harte 2000, Imperial 2005, Kadekodi 2004, Klooster 2000, Nagendra, Karna, and Karmacharya 2005, Ostrom 1999, Poteete and Ostrom 2002, 2004, Rangan 1997, Rangarajan and Yandle 1996, Schouten and Moriarty 2003, Van Laerhoven and Andersson u/d, Varughesse and Ostrom 2001, White and Runge 1995, Yandle 2003, Baker 2005). Institutional analysis (Ostrom 1990, Ostrom, Schroeder, and Wynne 1993) for community-based common property resource management has been used as a tool for understanding how local communities consume and manage natural resources and how the management of these resources is rooted in a specific locality can be improved through local institutional arrangements.

The primary concerns of community-based common pool resource management are (i) how to develop an optimal institution at the local level to achieve the purpose of sustainable resource management, (ii) what would make the institution effectively work, and (iii) how to sustain the instituton in the long run or find an answer to the concern over what factors influence the performance and sustainability of the institution. Thus, the institutional approach specifically focuses on desgining and operating principles and threats to collective action as well the sustainability of the institution. Ostrom (1990) sets up a set of eight 'design principles' that, to her represent "an essential element or condition that helps to account for the success of these institutions in sustaining the CPRs [Common-Pool Resources] and gaining the compliance of generation after generation of appropriators to the rules in uses." (1990: 90) These principles, including 'clearly defined boundaries,' 'congruence between appropriation and provision rules and local conditions,' 'collective-choice approach,' 'monitoring,' 'graduated sanctions,' 'conflict-resolution mechanisms,' 'minimal recognition of rights to organize,' and 'nested enterprises,' focus on the ways in which an institution is arranged, operated, and managed, as well as relationships of member groups within a institution or between the institution and external governmental authorities. It is challenging for the community as an institution to develop rules/norms and sanctions to control and enforce the appropriation of the drinking water (protecting its members while excluding and sanctioning the intrusive action of outsiders), to institute rules to regulate and to address potential emerging conflicts in watere accessibility among its members.

In addition, existing institutional arrangement studies have also focused on (i) different types of institutions, i.e., centralized/decentralized and polycentric (Ostrom Schroeder, and Wynne 1993), (ii) the ways in which institutions are arranged and operated, (iii) issues emerged during the performance of an institution, e.g. conflicts between users and regulators (the state); conflicts among different user groups, (iv) dimensions of access control, regulation of use, maintenance, and enforcement (Choe 1992; Kadekodi 2004); (v) issues of how to overcome collective action problems, i.e., free-riders (who seek short-term, self-centered benefits that detract from community effort), factors that stimulate individuals to be engaged in the institution (Ostrom 2004), (vi) governing institutions which particularly focus on the relationship between the management of institutions and democratic practices (Singleton 2000), and factors influencing the performance of common property institutions and sustainable governance of resources (Agrawal 2001, 2008, Baland and Platteau 1996, Ostrom 1990., Wade 1988).

To sustain the institution and improve its performance, scholars of community-based institutions for common property resources management have attempted to build institutional analysis frameworks to analyze the influence of various factors on specific institutional outcomes. The economic analysis of the institution was constructed to examine economic rationality of individuals in co-operative actions by concentrating on choices made, costs and benefits to individuals, and incentives-penalties (Ostrom, Gardner, and Walker 1994). This analysis seeks to predict the factors leading to cooperative action among people under certain circumstances. This framework has received praise for its ability to calculate a cost-benefit analysis related to individual decision-making (Agrawal 2001) and its advantages in making projections for the theory of cooperative action (Mosse 1997a). In addition, Imperial and Yandle (2005) complimented the framework's careful consideration of contextual factors, (i.e., physical setting, attributes of the community, existing institutional setting) paying attention to the full range of transaction costs, (i.e., information, coordination, and strategic costs), and the use of a variety of criteria to assess the performance of an institution (i.e., efficiency, equity, accountability, adaptability, and policy outcomes).

However, the institutional-economic analysis framework does not include some external factors that have been reported to critically influence institutional arrangements and performance (Agrawal 2001, 2002, 2003, 2008). Baland and Platteau (1996) examined histories of concrete societies and culture, and incorporated political factors into their analysis. Agrawal and Yadama (1997) examined the impact of population and market forces on resource utilization and management. Regev et al. (1998) incorporated both the effect of market forces and technological progress in their analysis when examining the determinants of natural resources sustainability and preservation. Greif (1994) explored the relationship between cultures and institutional structure, while McCay (2002), Cleaver (2000), and Uphoff and Langholz (1998) highlighted and emphasized social, cultural, ecological and historical impacts on the utilization of resources and the institutional management, and/or the integration of a historical factor in a contextualized and fine-grained historical analysis (Mosse 1997a). The complexities of state-community relationships (Gibson 1999) and market mechanisms also play a constructive and important role in the resource management practices of community-based institutions (McCay and Jentoft 1998).

Among the aforementioned external factors, historical, cultural, and social relations are part of the institution's contextual setting in the economic analysis of the institutional framework. These factors can be added into the 'attributes of the community,' which comprises of "norms of behavior, level of common understanding, homogeneity of preferences, and the distribution of resources" (Imperial and Yandle 2005). The distinctiveness between the institutional economic analysis framework and the latter on the arrangement and performance of community-based institutions in resource management is that the latter places more value on the cultural and historical context, socio-political and market forces rather than the rational choice theorizing of individual decision-making.

In search of sets of variables that determine the development, performance, and sustainability of community-based institutions for natural resource management, Agrawal (2001, 2002, 2003, 2008) reviewed three comprehensive studies of Ostrom (1990), Wade (1988), and Baland and Platteau (1996) to construct a list of the enabling conditions,

which he names "sets of causal variables." Agrawal categorized these conditions into four groups: (i) resource system characteristics, (ii) group characteristics, (iii) institutional arrangements, and (iv) external environment (see Table 3.1).

***Table 3.1 Critical Conditions for the Sustainability of a Resource Management Community-Based Institution***

***1)Resource System Characteristics***

(i) Small area of the resource
(ii) Well-defined boundaries
(iii) Low levels of mobility
(iv) Possibilities of storage from the resource
(v) Predictability

***2) Group Characteristics***

(i) Small size of the group
(ii) Clearly defined boundaries
(iii) Shared norms
(iv) Past successful experiences – social capital
(v) Appropriate leadership-young, familiar with changing external environments, connected to local traditional elite
(vi) Interdependence among group members
(vii) Heterogeneity of endowments, homogeneity of identities and interests
(viii) Low levels of poverty.

***3) Institutional Arrangements***

(i) Rules are simple and easy to understand
(ii) Locally devised access and management rules
(iii) Ease in enforcement of rules
(iv) Graduated sanctions
(v) Availability of low cost adjudication
(vi) Accountability of monitors and other officials to users.

***4) External Environment***

(i) Technology
  a. Low cost exclusion technology
  b. Time for adaptation to new technologies related to the commons
(ii) Low levels of articulation with external markets
(iii) Graduate change in articulations with external markets.
(iv) State
  a. Central governments should not undermine local authority
  b. Supportive external sanctioning institutions

| | |
|---|---|
| | c. Appropriate levels of external aid to compensate local users for conversation activities<br>d. Nested levels of appropriation, provision, enforcement, governance. |

*Source: Agrawal (2001)*

Agrawal emphasizes the importance of every causal group in the study of the sustainability of institutions that governs access to and control over of resource. In addition, these sets of causal variables are helpful in the creation of research on common property resouces management.

It is worth noting that the scholarship on communal institutional building in water resource management has primarily concentrated on issues in the rural setting as opposed to the peri-urban are. These studies have emphasized the aspect of water (bodies) resource management rather than the production and provision of water for domestic purposes. Among the issues in water resource utilization, as common property, the primary focus has been on (i) conflicts between user groups (agriculture versus household utilization), (ii) access dimensions, which clarify levels of dependency of users on resources under the community-based institution (by poverty, habits, or culture) and resources under other property regimes, i.e., the government and the private sector (Kadekodi 2004). Some studies have also explored traditional way and modern way of managing irrigation system (Sengupta 1990).

### *3.1.2 Community Self-Buit Water Supply System*

This research adops the institutional approach in community-based common pool resource governance and management examine communal water service provision and governance at the commune of Co Nhue. Specifically, the research seeks insights into the institutional building, operating and sustaining process via looking at the development of rules and sanctions in association with conditions of the water resources (water resource is appropriated through property regime), the role of the communal authority

(the Co Nhue People's Committee), other competing sources of water supply, and the Co Nhue commune's social, cultural, demographic, historical community attributes.

In addition, focusing on peri-urban inhabitants' appropriation of water as a common property resource, which is embedded in contextual changes in the commune's physical, social, and ecological condtiions, this research also pays attention to the adaptive strategies of Co Nhue households for water accessibility and how these strategies could be influenced by the emergence of the communal built water supply system, the shrinking of water resources, the responsibility of the local authority, and the local social networks.

The institutional approach is a powerful tool in looking at:

- interrelationships among the institution's members;
- how they build trust and cooperate with other institutional members;
- how decisions related to the development of rules are made and used to regulate the appropriation of resources/services, punish violators, and eliminate free-riding actors; and
- how to make adaptations to any changes in environmental disturbance, socio-economic and political conditions to sustain the institution.

In short, the scholarship on community-based initiatives/community participation and community-based institutions in resource management and service delivery shows that community people can work together and with other governance actors to fulfill their needs and to promote a sustainable means of using resources (Runge 1995, Varighese and Ostrom 2001, Agrawal 2001) as well as providing services (Akbar et al 2007, Brannstrom, Clark and Newport 2004, McGranahan 2002, Schouten and Moriarty 2003, Un-Habitat 2003, Winayanti and Lang 2004). A community-based institutional arrangement, in the study of the commons, usually emerged from the aspiration to find a promising actor to better govern and sustain common resources. However, in the aspect of service provision, local actions and/or a community based water provision model are

shaped, as people have little choice to fulfill their needs for drinking water. If alternatives are available, they are not sustained for a long-term (rainwater and shallow well water); or they impose economic burden on users (bottled water). When the change in water resources is controlled, local collective efforts in peri-urban settings, in essence, are driven by government opportunism, lack of political will of governmental officials, inefficient performance of public water supply utilities, and the lack of interest of the private sector.

Jaglin (2002) doubted that the community-based urban service provision model could be an answer to enhance the equity in service provision because its rules exclude no participants. Practical experiences from case studies also reveal that those poor people, who have the most to gain through collective efforts, are the least involved in the management of these local systems (Schouten and Moriarty 2003). The answers actually lie behind the way in which the model is organized and arranged. Therefore, it is compelling to study how people cooperate with others, how they are inspired to be part of an institution, how relationships among the institution's members are set and built, and whether mutual assistance is constructed along with those rules that regulate the performance of the institution.

### 3.2 Entitlements to Water

Sen's entitlements concept (1981, 1990) is adopted to describe the complex water accessibility and changes that occur to peri-urban inhabitants' access to water when a peri-urban community is undergoing the impact of city urbanization. Sen (1981) studied the Great Bengal Famine of 1943 and used the concept of entitlements to argue that most farmines are not caused by food shortages, but by the social systems that determine how food is distributed in the society. In other words, it is not a matter of there not being enough food to eat, but people who did not have sufficient food because of many reasons associated with inequitable distribution process, which Sen calls "entitlement failure". Three basic concepts in Sen's entitlements approach are:

(1) Endowment set is defined as the combination of all resources legally possessed by a person. In Sen's perception, resources could be in the forms of tangible (assets, natural resources, i.e. land, equipment) and intangible (knowledge, skills, labor power, social network, being affiliated or membership of a network)

(2) Entitlement set: this is defined as the set of all possible combintions of goods and services that a person can obtain legally by the resources of his/her endowment set. These resources can be utilized via transfer, exchange and production to obtain goods or services. It is noted that the manner in which a person uses his resources must have the saction of the law.

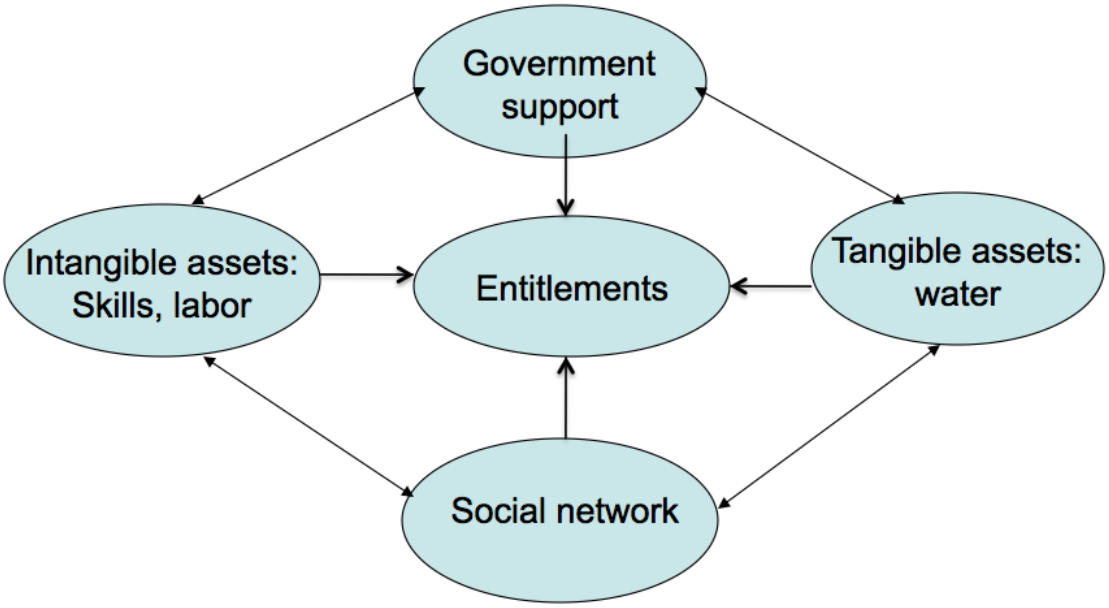
(3) Entitlement mapping: this reflects the relationship between the endowment set and the entitlement set.

Sen uses "entitlement failure" terminology to explain causes of modern famines in any form of econoic system. When a person suffered from endowment loss, and failures in resource production, exchange, and transfer did not help obtain sufficient food for the person, and s/he could not avoid starvation. The entitlement failure can only happen because of an adverse change in either endowments (loss) or entitlement mappings (failure in transfer, exchange and production of resources).

In the context of water supply, the endowment set of an individidual regardless of his/her residence status comprises of the individual's personal attributes and skills, assets, and social networks (which could be community or the state). Raw water also belongs to the andowment set because in many contexts raw water can be directly used for household purposes. In addition, as water is sourced for life, and secure water accessibility with the government support in many countries potentially leads to greater human (individual) capabilities, especially for the poor and other marginalized populations; and therefore, the government support is also another endowment. Thus, an individual is able to appropriate water if s/he possesses, mobilizes, and exchanges/transfers her/his various endowments for water. However, accesss to water, according to the entitlements to water perspective, is dependent not only on individual

capabilities and government policies on water, water doctrine, but also on wider social network and kinship ties and how water management practices need to be viewed as embedded in wider social relations (see Figure 3.1).

***Figure 3.1 Components of Sen's Entitlement Approach to Water***



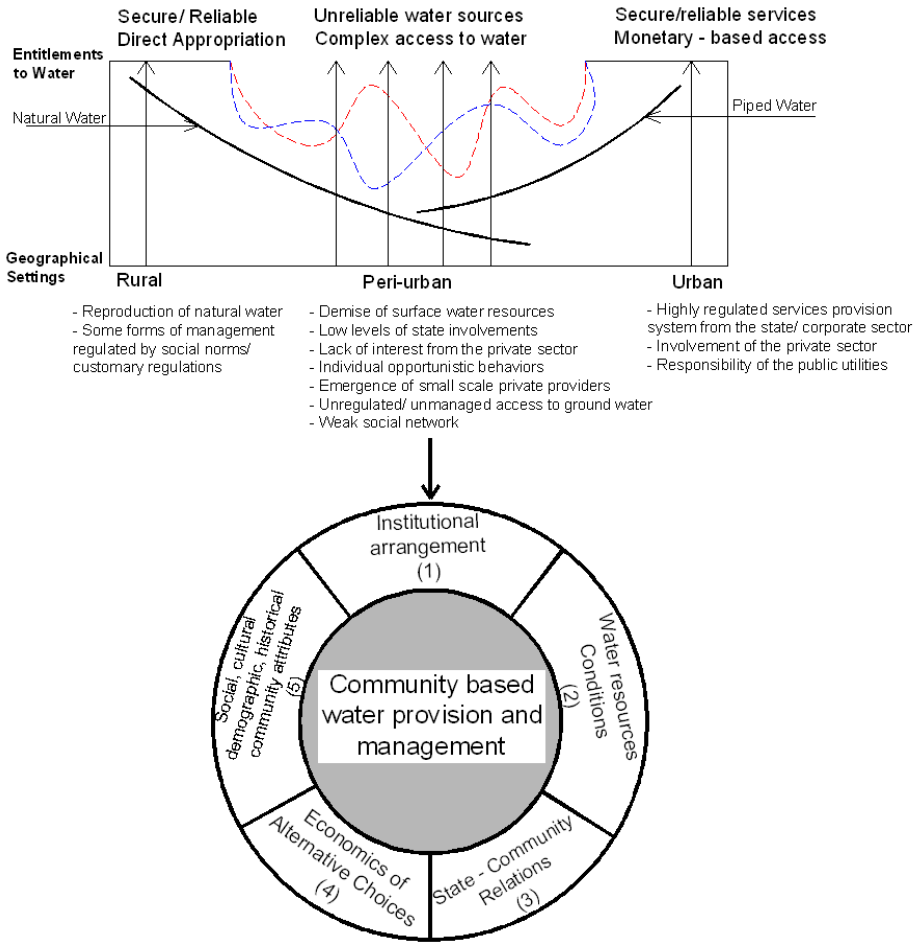

*Souce: Adopted from Sen (1981)*

The entitlements to water of an individual can be affected depending on the stability or changes in his/her set of endowment. Thus, it is very compelling to see the transition in entitlements to water of peri-urban dwellers when their setting and community are undergoing the rapid urbanization process of the broader city context. By examining the depletion of natural water resource in the commune, the emergence of the communal-self built water system, the dyamic social relations in local community, the viewpoint and action of local authority towards its residents' needs of water, households' strategies for securing water, this study discusses the extent of change in the entitlements to water of Co Nhue residents. The entitlement transition can also be recognized through a comparison of the way in which people accessed to and managed water in the past and at present in peri-urban communities in Ha Noi. Information on mutual support, social

relations between groups in the community, and the arrangement and performance of local institutions also supports the analysis of entitlement transition between groups of peri-urban populations.

The entitlements concept assists the institutional approach in this study in understanding how water appropriations of peri-urban inhabitants under the impact of rapid urbanization could be different from rural and urban contexts. Figure 3.2 presents a theoretical framework for this research.

***Figure 3.2 Theoretical Framework of the Study of Dynamic Water Governance and Institutional Arrangements for Drinking Water Provision in Peri-Urban Areas***




*Source: Author*

Theoretical Framework Interpretation

The rapid urbanization process, i.e., exemplified via continual urban population growth, intensified construction of housing and urban development projects, has caused substantial changes in the availability of water resources, ultimately influencing the appropriation of water by peri-urban inhabitants. From directly appropriating surface and groundwater as a principal source in the past, peri-urban inhabitants have become more and more dependent upon water producers and suppliers because of the depletion of the natural water resources. Facing the unavailability of public water supply utilities and a lack of interest by the corporate sector in the area, peri-urban communities have little choice, but to adaptively self-organize and manage their own institutions and/or individually develop strategies to secure drinking water.

The arrangement, performance, and sustainability of community-based institutions for drinking water supply and management are constructed by five groups of causal factors: (1) the development of rules and norms directly attributable to the institutional arrangement and management; (2) conditions of water resources in the area, which influence the arrangement and sustainability of the institutions; (3) state-community relations that affect the performance and management of the institutions; (4) the economics of alternative choices in access to drinking water; and (5) the social, demographic, and historical community attributes. Each of these causal factors is explained in details below:

(1) The development of rules: Natural water resources could be claimed by the state as a public property, or as a form of open access property that is accessible to everyone without any constraints, or as common property resource that is collectively utilized and managed at community level (Bromley 1992). In this research, the piped water supply system of Co Nhue commune was examined, it was compelling to understand the bulding process of Co Nhue communal water supply system, i.e., the initiator(s) of the system; the beneficiaries (whom was serviced and whom was not); punish violations by members, eliminate free-riders, and address the full range of transaction costs that could harm the operation of the water system; leadership selection; water

tariff formulation; means of water delivery within the institution, and guidelines for how the network was maintained; the formation of an independent unit, i.e. the Water Management Unit, that protects the institution and forces the institution's members and non-members to comply to the rules.

(2) Conditions of the water service entail elements such as the quality of the water and the performance of the communal water supply system operational and management unit (Water Management Unit).

(3) State-community relations reflect forms and levels of assistance and legal support that the Co Nhue community-built water supply system might receive from the local authority, the city government, and other governmental agencies. The state-community relationships were also revealed by the degree to which city development and planning policies affect the performance and existence of the communal model in water supply.

(4) The economics of alternative choices, in this case, were examined via relations between the communal water supply system and other sources of drinking water provision in Co Nhue commune. The development of other water supply sources significantly imposes challenges to the performance and sustainability of community-based institutions.

(5) The community attributes are revealed through social, cultural, demographic, and historical dimensions, including: similar livelihood activities; degrees of engagement in reciprocity and mutual assistance; shared cultural values; a uniform interest group or existence of socio-economic tensions among various groups; social cohesion among community members; historically self-organized and managed institutions for water provision and management and or for other purposes; cultural background of collective action in the community; religious beliefs related to appropriating water and water resources management; and population density, migration patterns, and levels of poverty.

The local community-based institution for drinking water provision are not only ecologically influenced, but also socially constructed. The social construction of these institutions is manifested through social relations among various segments of the peri-urban community, the institution, and local authorities, as well as through political influences from public policies on water-related issues, city development and planning policies.

The urban political ecology approach, through its integration into the framework of the institutional approach, powerfully analyzes the embeddedness of social power in the creation of nature in cities and human-environmental relations (Swyngedouw 2004, Heynen, Kaika, and Swyngeduw 2006, Walker 2006), and the concern over how political and social forces produce and influence highly uneven and deeply problematic access to drinking water of various peri-urban inhabitant groups both included in and excluded from the local institution (Swyngedouw 2004, Loftus 2005). This approach helps examine the question of who gains the most benefit and who becomes more vulnerable in appropriating drinking water as a result of the transformation of water resources and the emergence of local institutions for driking water supply.

To better understand the arrangement of community-based institutions for securing drinking water as an adaptive strategy in a particular peri-urban setting, the shift in the appropriation of water resources by people over time, and the transformation of natural water into property under conditions of urbanization, the entitlement concept is introduced and integrated into the institutional framework. Douglass (u/d) supposes that the entitlements of people to water are spatially different by geographical (rural/urban) setting; and the difference is distinguished and influenced by the availability and transformation of water resources, the engagement of diverse governance entities in the water provision, and social relations embedded in the locality.

The nature of appropriation of water by people shifts from rural to peri-urban to urban settings. In rural settings, the entitlements to water are dependent on natural water resources and the social fabric or solidarity of a community. Because of the availability of surface water resources, people are more likely to provide water themselves.

Therefore, rural people's entitlements to water are mainly in the form of direct appropriation from natural water sources. Since social relationships are mainly driven by kinships and mutual assistance, rural people are also entitled to water through a reciprocity and/or redistribution with others in the community (Polanyi 1957).

On the other hand, in an urban context, inhabitants become more and more reliant on separate water providers. Essentially, urban dwellers have more opportunity to access to reliable service provision by the public utilities. In a context like Vietnam, urban residents are entitled to be accessible to piped water and the city water supply company has a mission to serve them. In addition, transnational corporation in water production and distrbution show their interest in investing in the city/urban setting. Inevitably, because of high population density and demand for development, surface water source in the urban context has been shrunk and depleted. Access to groundwater resource to urban households is possible. However, the usage of this source requires households' large investment in water treatment and filtration because the source itself contains high potential of depletion compared to the city edge or rural settings. As a result, the self-provisioning of water entails high financial investments in the production and health risk in utilization. For these reasons, surface water and groundwater are not reliable sources for the urban residents, and therefore, their direct appropriation to these sources is very rare.

Becoming reliant on water service providers means that urban residents' access to water is primarily determined on a monetary basis. Without capital and/or mutual assistance, urban residents would be in a struggle to gain reliable access to secure drinking water. Urban communities may self-organize to secure water; however, community-based water supplies may not be viable and sustainable over the long-term in the face of dramatic and continuing urban population growth (increasing population density), socio-economic heterogeneity, high risks of water pollution, and limited access to technologies. Again, urban inhabitants have a choice to temporarily drill a well or use water from other unimproved sources; but ultimately, to secure water for household purposes they have to depend on the service providers.

As rural settings continue to become absorbed through urbanization, peri-urban residents experience a transition in their entitlements to drinking water. Their entitlements are mainly determined by the availability of water resources, water providers, and how social relations are shaped in their community, as well. The transformation of water resources and corresponding water service provision as well as entitlements to water are presented in Table 3.2 below.

*Table 3.2 Water Supplies and Entitlements to Water in the Context of Urbanization*

| | **Rural** | **Peri-urban Areas** | | | **Urban** |
|---|---|---|---|---|---|
| **Socio-ecological characteristics** | Rural physical features: agricultural production, availability of surface water | - Being urbanized.<br><br>Urban footprints: with emergent industrial areas, arterial road construction, landfills<br><br>-Agricultural lands and surface water areas are shrunk | -Higher level of urban expansion and recognizable urban footprints: emergent new residential areas; alternation of economic structure with less degree of agricultural shares in local economy<br><br>-Intensified incoming and outgoing migration | -Higher level of urbanization: greater reliance on services than agricultural production<br><br>-Social-economic heterogeneity<br><br>-Surface water and drainage areas can hardly be used.<br><br>-Public piped water system is laid in | -Almost no agricultural production.<br><br>-Mixed land use<br><br>-Higher level of public investment in water supply |

| | | | | | |
|---|---|---|---|---|---|
| | | | | many parts of the area. | |
| **Entitlements to Water** | Appropriation | ***Transitioning processes*** | | | Monetary-based |
| | Self-provision | Less appropriation | Mixed: appropriation, reciprocity, redistribution among community | More monetary-based | Reliance on service providers (state or private sector) |
| **Models of water provisioning** | Direct appropriation to water/self provisioning of water.<br><br>Conflicts may exist between domestic use and agricultural use of water | ***Co-existence of Various Types of Water Supply*** | | | - The dominance of public & private sector<br><br>Proliferation of bottled water<br><br>-Less individual efforts for water, except water theft. |
| | | -Slightly decrease in the level of direct appropriation of water.<br><br>- Households rely on the small-scale water vendors where water | - Mixed levels of both self-provisioning of water, community-based water supply programs and the existence of small-scale | -Existence of various water provider s (small-scale water vendors, local entrepreneurs, public and/or transnational private corporation). | |

| | | | | | |
|---|---|---|---|---|---|
| | | resources are depleted or polluted.<br><br>-Competition between consumption and production exists. | water vendors.<br><br>-Public piped water system is in place in some parts of the city.<br><br>-Competition between consumption groups may exist. | -Public and private sector show their dominance in most corners of the city | |

As the socio-economic status of peri-urban groups is a concern in the analysis of transitioning entitlements to water in a transformed peri-urban context, poor and other disadvantaged groups suffer the most from the loss and depletion of surface water sources. The maintenance of this asset endowment, according to Sen's (1981) perception of entitlement, is the most crucial component in the entitlement management for rural people, since this endowment provides the means of self-sustenance or self-provisioning for the rural community. When peri-urban poor no longer have access to surface water source, they lose their asset endowment/entitlement to water.

Poor people are often considered to possess less educational qualifications and occupational skills – Sen referred to them as skills and personal attributes, which is another (the second) component of entitlement. Peri-urban poor also cannot rely on the support of the city government (the fourth type of entitlement, as perceived by Sen (1981)) because no public piped water system is available/accessible in the area. The poor and other underprivileged, however, might rely on the social network of the community (the third entitlement component). If the community social network has eroded under the impact of urbanization and the community-based water supply institution does not serve the poor and others, these segments of the population face greater vulnerability.

In short, this conceptual framework is grounded in the institutional approach and elaborated through concepts of entitlements as a question of socio-political organization and the appropriation of nature as a form of establishing property regimes. The framework of this research project shows its spatial element in describing and analyzing water accessibility and water governance issues. It is also helpful in investigating the arrangement and performance of peri-urban community-based institutions under a situation of complex water governance due to the impact of a rapid urbanization process. By examining five groups of causal factors that possibly affect the arrangement, performance, and sustainability of an institution, the framework is also useful in tracing the degree to which the existing community-based institution is related to the way in which water resources were managed, monitored, and distributed in the past. Yet, the

framework does not help in predicting how a community-based institution would evolve in the future.

According to the existing literature on the community based institutional arrangement for common pool resource management, institutional changes are driven by contextual changes, e.g., redistribution of property rights and re-structuring the governmental administrative system. Studies on institutional arrangements and development in resource management and service provisioning assume that an institutional change is more path-dependent than newly constructive. Empirical research, however, reveals mixed results. The five groups of factors influencing the arrangement and performance of local institutions change over time, ultimately resulting in changes in the institution's performance as well. In an accelerated urbanization process, peri-urban communities continue to be subject to more increased population density and increasing depletion of natural water resources. A review of the literature suggests three possible scenarios for the future of community-based institution for water supply in particular, and urban service in general:

Scenario 1: Water supplies developed by peri-urban community institutions will be incorporated into an effectively functioning urban water supply system under the government or a government-regulated private water utility. This scenario shows the success of the local responses to a drinking water crisis in peri-urban areas. It also supports local collective actions in addressing emerging issues in the locality.

Scenario 2: (Small-scale and large-scale) private providers emerge and offer services for the peri-urban communities in the absence of a public utility. In this situation, the community-based institution will have to compete with the private sector providers over the water resources, and could probably be subject to defragmentation.

Scenario 3: The community–based water supplies suffice and will remain static in the absence of both public and private utilities. However, even when no competition exists from private and public water supply systems, this system will not necessarily be maintained, and is subject to deterioration or collapse under high levels of water pollution, higher population densities, or increasing decline in water resources.

# CHAPTER 4
# METHODOLOGY, DATA COLLECTION AND DATA ANALYSIS

This chapter provides explanation for the case study formulation of this research and introduces the process of data collection, the strategy adopted for the purpose of data collection, as well as how collected data have been sorted and analyzed in this research.

## 4.1 Qualitative Case Study Methodology

As a form of qualitative research, the case study method is defined as " an empirical inquiry that investigates a contemporary phenomenon in-depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident." (Yin 2009: 18) Patton (1990) also supposes that qualitative research aims at investigating how people make sense of and experience the world. Technical characteristics of the case study research, manifested via its data collection and data analysis strategies, are the reliance on the study inquiry of multiple sources of evidence and the benefits from the previous development of theoretical propositions that guide data collection and analysis (Yin 2009). Because of the needs for the variety of evidence, the case study research method investigator typically utilizes a variety of data collection procedures and techniques, such as face to face interviews, focus group discussions, documentation, archival records, participant observation, direct observation, and physical artifacts (Creswell 1998, Yin 1993, 1994, 2009). However, Yin (2009) supposes that as a research method, a case study does not necessarily solely include the detailed and in-depth observational evidence. It could utilize mixed qualitative and quantitative evidence, and therefore entailing both qualitative and quantitative data collection techniques.

Yin (1994), Stake (1995), and Creswell (1998) introduce five types of case study: (i) intrinsic case study focuses on the case because of its uniqueness, (ii) an instrumental case study focuses on an issue, (iii) an exploratory qualitative case study, which can communicate research-based information about a phenomenon to a variety of nonspecialists, (iv) a descriptive qualitative case study, and (v) an explanatory qualitave

case study, which poses competing explanations for the same set of events and to pintpoint how such explanations might be used to apply to other contexts and situations. Thus, according to Creswell's suggestion, prior to carrying out case study research, the researcher first and foremost takes into his/her consideration of the question, what type of case study is most promising and useful.

In his second edition of "Case study research design and methods," Yin (1994) proposes five research skills useful for conducting a case study: (i) willing to ask questions and judge why something has happened, (ii) observing, sensing and assimilating new information, (iii) accommodating unanticipated events in a flexible way and changing data collection techniques, (iv) understanding clearly the issues being studied to interpret them thoughtfully, and (v) testing for bias by reporting pilot findings to colleagues to seek comments. Subsequently, in his 4$^{th}$ edition of the book Yin (2009) gives his advice regarding how to select case for case study. In his opinion, research questions significantly determine the decision on what cases will be chosen. The researcher is advised to choose the case or cases that will mostly light up the research questions.

Designed as a single case study (Yin 1993, 1994), this research sought for detailed information and multiple points of views (Neuman 2004) on various water sources currently available and accessible in Co Nhue commune in Hanoi. A strong focus was aimed at the exploration of the arrangement and performance of the Co Nhue commune – based institutional building and performance for drinking water. Data, for this research, was gathered through documenting direct observation, recording the content of interviews and group discussions with local residents, studying written documents and achieves, and examining visual images from local population groups with varied demographic, socio-economic characteristics (Patton 2002).

As the topic of water supplies for peri-urban communities is embedded in the context of those communities, attention to local social context of Co Nhue and a broader setting of Hanoi city was significant for the study (Neuman 2004). The meaning of various strategies for securing drinking water of Co Nhue people might not be well

explained if those strategies were separated from the context from which they are embedded and constructed. Designed as a qualitative case study, this research was able to relate the existing institutional building process and performance of the communal water supply network institution in Co Nhue to the historical way of institutional arrangements for drinking water supply and management in the community.

## 4.2 The Process of and the Strategy Adopted for Data Collection

Creswell (1998) states that there are multiple phases in data collection in qualitative research. He identifies seven phases of data collection that form a data collection circle. I strategically used all of these phases in my two trips for data collection for this research. Box 4.1 below presents the detailed of seven phases highlighted by Creswell (1998):

***Box 4.1 Data Collection Circle***

1) Locating site/Individual

    a. Finding a case or cases, an atypical case, or a maximum variation, or extreme case.
    b. Choosing site(s) is important. These sites may be programs, events, processes, activities, or multiple individuals.
    c. Choosing "your own backyard" as a site is not recommended, unless a compelling argument can be made for the rationale.

2) Gaining access and making rapport

    d. Gaining access through gatekeeper, gaining confidence of participants;
    e. Permission need to be sought from a human subjects review board, a process in which a campus committee reviews research studies for their potential harmful impact on subjects (or participants);
    f. Consent form needs to be prepared and presented to the participant;
    g. Access typically begins with a gatekeeper, an individual who is a member of or has insider status with a cultural group.

3) Purposefully sampling (selection of participants)

    a. This is sampling so that one can best study the problem under examination. The researcher needs to determine the type of purposeful sampling from the array of possibilities and present a rationale for the selected approach.

b. The qualitative research designer needs clear criteria in mind and need to provide rationales for their decisions.

4) Collecting data

a. Extensive forms of data such as documents, records, interviews, observation, and physical artifacts.
b. New form of data collection
c. The depth and multiple forms of data collection can be illustrated by a matrix that presents types of data in columns and specific forms of information in the rows;

5) Recording information via fieldnotes, interviews, and observational protocols;

6) Resolving field issues regarding common data collection issues

7) Storing data in the forms of fieldnotes, transcriptions, and computer files.

*Source: Creswell 1998*

Data collection for this research was conducted in two phases between June of 2007 and September of 2009. I first learned about the communal water supply system in Co Nhue in summer 2006 when I was first concerned about water accessibility of peri-urban inhabitants in Hanoi. Under the financial support of the Social Science Research Council, I first visited several communes on the periphery of Hanoi city (approximately 15 kilometers radius from the center Hanoi) to document how residents of these communes accessed water. Then, I took the initiative to make an appointment with the Director of Hanoi Water Business Company (HWBC) because I assumed that the company might have a plan to extend its service to the periphery of Hanoi and the company leader was probably aware of the status of water resources and water uses of peri-urban Hanoians. The conversation that I had with the HWBC director turned out very helpful as I was filled in on the existing performance of the company and challenges facing the company during the rapid urbanization of Hanoi. Also thanks to this conversation, I was informed of the existence of a communal water supply system in Co Nhue, which was essentially a service contract between the Co Nhue People's Committee (the communal authority or Co Nhue CPC) and a branch of HWBC – The Cau Giay

Water Supply Factory (CWSF). The company sold water to the Co Nhue CPC via a master water meter and the Co Nhue CPC retailed the water purchased in bulk to its residents through its own piped water supply system.

With the reference of the HWBC director, I set up an appointment and a meeting with the director of the Cau Giay Water Supply Company to gain some insights and narrative from the company leader regarding its service contract with the Co Nhue CPC. Through the conversation, I noticed that the Co Nhue CPC was facing its own difficulty in operating and maintaining its communal water supply network and had missed several payments to the Cau Giay Water Supply Company for its water service.

The story of Co Nhue communal water supply system was captivating and immediately caught my attention. Subsequent to the conversation with the director of Cau Giay Water Supply Factory, I contacted a representative of the Co Nhue CPC to schedule an appointment with one of its vice presidents, and then officially made a request for an academic research on the provision and access to water of Co Nhue people under the impact of rapid urbanization process of Hanoi.

Upon the approval of the Co Nhue communal leader, I combined my first exploratory field research with my implementation of the University of Hawaii Globalziation Research Center's research project on households' strategies for securing water in Co Nhue community during June to August 2007. I had the opportunity to obtain a list of 6,739 households of Co Nhue from the local authority and worked with the head of 12 population clusters of the commune to identify 7 sources of water resource and systems which were accessible by the communual inhabitants and a number of households that get accessed to the aforementioned sources. These sources were: (i) piped water, directly supplied and managed by Cau Giay Water Supply Company (ii) piped water supplied by Cau Giay Water Supply Company, but retailed and managed by the Co Nhue local authority (CPC), (iii) household's shallow drilled well with electric operated pump, (iv) colllective neighborhood deep well, (iv) bottled water, (vi) rain water, and (vii) household's shallow open well. This was the first time I was referred by the Co Nhue local authority to the leader of the Co Nhue Water Management Unit (WMU), which was in charge of monitoring and managing the local water supply system.

I acknowledged the importance of building trust and good relationship with the leader of the WMU for the future study; and therefore, I took every opportunity to have conversations with that leader, i.e. meeting with him in his office, at home, and even at local pubs and/or Mom and Pop stores. At times, I gradually asked him about the origin of the communal water supply system, its evolution, existing operation, and challenges.

The WMU leader also introduced me to his staff with whom he ran the Co Nhue communal water supply system. While the WMU leader provided me with an overall situation of the system, his staff shared with me stories of their tasks, responsibility, and experience in serving local clients. I, then, was provided with annual financial reports of the WMU since 2000, a map of the water system, and challenges faced by the WMU in generating sufficient revenue through retailing this water service to make up the debt its was oweing to the Cau Giay Water Supply Factory. Given time constraints, I was not ble to double-check the information collected from the WMU staff with leaders of the CPC and the CWSF, but I later incorporated the information collected from the WMU into my research design for the second field research in summer 2009.

Also during this exploratory fieldtrip, I traveled around the Co Nhue commune area with a motorbike, took notes on what I observed, and documented all the conversations I had with various residents. Thanks to the head of 12 communal population clusters' arrangement, I was able to have quick and spontaneous interview with households that were using 7 aforementioned water supply sources in the commune. I listened to numerous stories these people shared about their everyday appropriation of water, the quality of each water supply source, and their concerns over water uses and health. Through my interviewees' spoken language usage and gesture expressions during the conversations, I felt their anger and tension when they complained about bad water quality, intermittent and unreliable supply from the communal system, and the affordability for alternative sources. I also sensed their anxiety when expressing their concerns over the uncertain accessibility to a reliable water supply system in the future, as well as their sentimental longing for the disappearance of the communal traditional well.

Most qualitative researchers strategically use their existing relationships and contacts for their research (Silverman and Marvasti 2008), which ultimately makes their data collection process become easier. I personally neither had connections to the study site nor insiders from the community. In addition, I was not familiar with the case prior to the exploratory trip. Therefore, before approaching the local authority to ask for its approval of my preliminary research plan, I had to collect as much and detailed information on the case of communal water supply system in Co Nhue as possible. To the leaders of the commune, I sincerely expressed my particular interest in its non-traditional model of water supply and my plan to study it. To the leader of the WMU, I clearly stated that I was a doctoral student and my study of the local communal water supply system would reveal its lesson of how to better improve the acess to water for peri-urban communities like Co Nhue. I took time to observe the work he performed everyday as the head of WMU. I asked for his permission to follow him around the community to spot any leakage from the water supply system when a local pump station was operated, and that I could observe the way he addressed his clientelle's concern over the quality of the water and intermittent supply. I avoided probing inner feelings and/or asking questions without giving him concrete examples or situations. In several conversations I had with him, there were no questions about the local water supply system, but about his family life, the history of Co Nhue community, how local people used to get water and manage the local water resources. After a week with numersous meetings and conversations, I was able to probe more in-depth into sensitive issues of the Co Nhue communal water supply system, as well as issues facing the WMU, particularly its leader.

In essence, the exploratory trip provided me with major outcomes. First, I became familiar with the study area. Second, I developed rapport with the commual leaders as well as key informants in the community. I was able to anticipate other potential key informants who were possibly knowledgeable about various water supply systems in Co Nhue. Third, I was able to use collected information during the trip to narrow down the scope of the topic of focus for this study.

The second field research occurred from May to the end of September in 2009 after my dissertation proposal was approved. Returning to Co Nhue this time, I selected an ethnographic approach with a long stay on the study site for data collection and to better strengthen the relationship with the communal leaders and other key informants that I had worked with during my exploratory trip in 2007. I met and communicated with community people daily, conducted my observation and interviewed with them. I joined community meetings, a community festival and other cultural and religious activities at the locality to better understand local cultures, the solidarity as well as fragmentation (different interests of varied groups) of the community. My stay in the community not only saved my commute time, but also allowed me to work and meet with people very late in evenings.

My first point of entry was the local authority of Co Nhue because with the local leaders' approval, I was allowed to conduct my research in the community. I presented to a leader of Co Nhue People's Committee my research plan, which clearly states that I would conduct study on the contemporary water supply and water uses in the Co Nhue commune as well as examine how the residents historically manage and organize water accessibility in the locality. This time, the research would last approximately 4 – 4.5 months.

I also received tremendous support and assistance from the head of population clusters in the neighborhood, who have a list of the entire Co Nhue households and deeply understand the existing living conditions of the local inhabitants and issues relating to water supply at the neighborhood level. These people play a double role in the local governance. They serve as a liaison for the local government at the neighborhood level. In this capacity, they disseminate and keep local residents updated on new governmental regulations, policies, and programs on every aspect of local and municipal development. In the meantime, they also serve as a representative of local residents. In this capacity, on the local residents' behalf, the head of the local population cluster presents local reflections and recommendations towards the governmental policies and programs. Because these persons play an important role in the construction and performance of the local governance and receive respect fom local inhabitants, their

assitance in arranging for most of my meetings and interviews with the local residents made my data collection process very effective.

## 4.3 Data Collection Method

Creswell (1998) emphasizes that because case study researchers attempt to build an in-depth picture of the case, case study inquiry basically involves the widest array of data collection. Thus, in this research project multiple methods were deployed for the purpose of data collection, including in-depth interviews, focus group discussions, photo elicitation, observation, and documentation of the secondary data sources.

### *4.3.1 Purposive Sampling*

Purposively sampling is recommened by most writers on sampling in qualitative research- based on interviews (Creswell 1998, Denzin and Lincoln 2000, Bryman 2004, Silverman and Marvasti 2008). The researcher purposefully selects his/her respondents who are relevant to his/he research questions. In this research, my steps of choosing samples as follows:

First, I selected key informants who could provide me with facts and their opinions about various water sources in the commune of Co Nhue. In my exploratory field research I had identified various sources of water supply in Co Nhue, therefore I chose the heads of population clusters in the areas that had been served by those water sources. As a representative of his/her community, the head of population clusters could give an overall picture of the water issues facing his/her area.

The second group of key informants was members of the water management unit of the Co Nhue Communal water supply network: the head of the unit and its staff. These clienteles could provide me with detailed information on the establishment, evolution, and performance of this local water supply form, as well as its financial, technical, managerial and other constraints that were threatening the existence of this

water supply network. Because the communal water supply system was constructed in 1997 and first operated in late 1999, I had to use the snowball-sampling technique (Bryman 2004) to interview the people who had been involved in the establishment of the network and who used to serve in the water management unit.

The third group of respondents was households across socio-economic statuses that were currently using various sources of water supply in the locality. To better reveal a panoramic picture of water provision and accessibility of Co Nhue inhabitants, I selected a representative of poor households, better-off households, migrant households, households that were stably using water from the communal water supply system across population clusters, household that used to connect to the communal system, but had been terminated the service, households waiting to be connected to the communal network, households that primarily relied on drilled well, shallow well water, households primarily relied on piped water directly supplied and managed by the Cau Giay Water Supply Factory.

The fourth group of respondents was a representative of other water supply sources available in the commune of Co Nhue and local leadership. To obtain diverse perspective on the Co Nhue communal water supply system I chose to interview the existing and former directors of the Cau Giay Water Supply Factory. To gain a better understanding of water resource mangement and provision in the locality, I identified a person who was running a well drilling business at the locality, sellers of bottled water – an alternative water source, which has been strategically used by Co Nhue households. Additionally, I also interviewed a vice president of the local authority (the Co Nhue People's Committee), a representative of the communal grassroot organizations, such as the Women's Union and Farmer's Union to collect baseline information on the communal development over the time.

### *4.3.2 Methods of Data Collection*

#### *4.3.2.1 In-depth Interviews*

Like all ethnographic research, collecting multiple realities with diverse perspective is important in case study research project, and in-depth interview is one of the most effective methods that qualitative researcher can employ for that purpose (Stake 1995, Yin 1994, 2009).

Because an interview normally is a joint product of the researcher and a clientele, a high quality of an interview must come from both sides. An experienced interviewer must be the one who masters techniques involved in the interviewing process. More specifically, the interviewer must learn how to listen, attend to, and encourage the interviewee. The interviewer is also expected to effectively interrupt the conversation, to disgress and initiatiate topics, and to terminate responses when relevant (Mishler 1986). Creswell (1998) and Bryman (2004) highlight the importance of being a good listener, rather than a speaker to the interviewer during an interview. Below are hints Kvale (1996), Creswell (1998), and Bryman (2004) call for the interviewer's attention while conducting an interview:

- Give purpose for interview, rounds it off, ask whether interviewee has questions;
- Ask appropriate questions; ask simple, easy, short questions with no jargon;
- Be gentle, let the interviewee finish, give him/her time to think, tolerate pauses;
- Be sensitive via listenining attentively to what is said and how it is said, being empathetic in dealing with the interviee, and handle emotional outbursts;

- Address when the interviewee strays from the interview questions, clarify and extend meanings of the interviewee's statements without imposing meaning on the interviewee;
- Be open by responding to what is important to the interviewee;
- Be critical and prepared to challenge inconsistencies in the interviewee's replies;
- Be able to relate what is said to what has previously been said;
- Move from ice-breakers to questions in interview;
- Rely on informants to discuss the meaning of their experiences require patience and skill on the part of the researcher; and
- Be ethically sensitive to the ethical dimension of interviewing, ensure the interviewee appreciates what the research is about, its purposes, and that his or her provided evidence/information will be confidentially treated.

The technique used in this research was a semi-structured approach that involves asking a set of structured questions followed by clarifying unstructured and open-ended questions. Semi-structured interviewing itself is very flexible because this technique allows one to respond to the direction in which my respondents take the interview. Being able to identify key informants during the exploratory fieldtrip was very useful for me to prepare some questions and specific topics to be covered (Bryman 2004). In principle, detailed guidelines are unnecessarily prepared for semi-structured interviews because content of the semi-structured interviews is driven by the answers of the respondent. Levels of details and depth of this interview type requires the interviewer to be able to generate questions either to clarify or elaborate further what has been said by the respondent. However, this research prepared guidelines for in-depth interviews with key informants given the fact these informats had a busy working schedule.

The interviewing method was employed to examine the changes in water resources and drinking water provisioning in the study areas over time, household's strategies and constraints for accessing water over time, and the impact of factors on the establishment and performance of local community institutions for drinking water supplies. As mentioned in the sampling session, the method was applied to collect information from the local authority (commune People's Committee), head of the community population clusters, a representative of every water provision sources available at the community, representatives from the community organization for water provision (the water management unit), and selected households across socio-economic and residence status. A list of selected interviewees of the study can be found in Appendix B.

Determining the place for conducting the interview was necessary. It is important for the interviewee to feel comfortable during the interview. For this reason, with the assistance of the population clusters, I always asked my clientele where s/he wanted the scheduled interview to take place. I preferred not having third person present during the interview. However, sometimes I had to conduct interviews with my clienteles in the presence of other people because my clienteles expressed their choice of having the interview with them at their residence. The majority of my interviews took place at my clientelles' residence.

I always presented a consent form to and collected it from the clientele prior to the interview. Obligated to the instructions of the Office of Human Subject at the University of Hawai'i, I clearly explained to the clientele the purpose of the interview, on what topics the interview would be centered, the right to participate and not participate of the clientele, and the right to be anonymous in the research project (Miles and Huberman 1994). They kept a copy of the consent form (in Vietnamese) and could contact either the Office of Human Subject, my principal adviser – Dr. Michael Douglass at the Department of Urban and Regional Planning, and I, as the principal investigator of this project, if they had any questions related to the content and protocol of the research project.

*4.3.2.2 Focus Group Discussions and Photo Elicitation*

Like in-depth interviewing, focus group discussion has been extensively employed in numeous qualitative research projects for data collection purpose. In essence, this is a joint production between one interviewer and a group of respondents. These respondents are interviewed in an unstructured way to share their opinions, perceptions, feelings, and/or facts they have experienced; and therefore this method produces evidence that provides insights into participants' attitudes, perceptions, and opinions (Krueger 1988). Observing, listening, moderating, and analyzing are several functions that the interviwer/qualitative researcher serves in focus group discussions. Bryman (2004) indicates the disctintion between the individual in-depth interview and focus group discussion techniques. He wrote:

> "In a normal interview the interviewee is often asked about his or her reasons for holding a particular view, but the focus gourp approach offers the opportunity of allowing people to probe each other's reasons for holding a certain view… For one thing, an individual may answer in a certain way during a focus group, but, as he or she listens to other's view; or alternatively may want to voice agreement to something that he or she probably would not have thought of without theopportunity of hearing the views of others. These possibilities mean that focus groups may also be very helpful in the elicitation of a wide variety of different views in relation to a particular issue." (348)

In this research, focus group discussions were used as a subordinate technique for photo elicitation, which was used to collect memories and document oral stories of selected Co Nhue elderly residents on how water had been supplied in the commune in the past. Photo elicitation, according to Denzin and Lincoln (1994), is a technique for data collection among a group of respondents in which participants are shown pictures, their own or those taken by the researcher, and asked by the researcher to discuss the contents of the pictures. To employ this method, I had identified and took pictures of sources of water, i.e., open water wells, or communal/traditional water wells, used by Co

Nhue inhabitants around 40 years ago and longer. These pictures were shown by an LCD projector at three focus group discussions during the second field research period. There were 7-10 respondents participating in each of the focus group discussions. Upon seeing the pictures the respondents might recall and tell stories of events that occurred in the community from their personal experience and memories. This technique was very useful for the study when being used to examine and collect information on events and issues occurred in the past.

#### *4.3.2.3 Historical Analysis*

This method was used to investigate how water was institutionally managed and provided in the past in the commune of Co Nhue. This method is helpful in examining the evolution of local institution building for the provision and management of drinking water over time.

To discover how water were managed and supplied in the past, the study retraced the institutional arrangement for drinking water prior to the intensive urbanization in Hanoi, which widely recognized in the mid 1990s. Then, the study continued backward to the periods 1986- mid 1990s; 1975-1986; and before 1975.

Information on the history of water supplies in the community was collected through conducting photo elicitation as afore-described, doing desk studies, reviewing secondary documents, reports, stories, newspapers, and retrieving archival records (pictures and stories). The research also documented stories from the community leaders and/or local residents, especially those who have been living in the community for around 30 years and plus. Given a long duration of residence in the community, these selected individuals had experienced or indirectly heard various stories of how water was managed, controlled and distributed to local residents in the past. Some major topics/prompt questions that were used to collect the history of water supplies information include: How was drinking water provided and managed in the past? What

types of local institutions were arranged? How were rules set? How effectively and efficiently did institutions perform and execute their responsibilities?

*4.3.2.4 Short Questionnaire Survey*

To collect baseline information of the researched site, a short-questionnaire was designed and used for an interview with a representative of the Co Nhue People's Committee. The questionnaire comprises of questions that seek information on general demographic, socio-economic characteristics, and issues relating to existing water resources:

- General information: total area of the commune, the percentage of agricultural land over the total area of the commune; the percentage of the urban land over the total are of the commune; the total of agricultural land converted into urban use over the past 5 years.

- Demographic characteristics: total population, number of households, percentage of poverty population over the total population, the percentage of migrant people over the total population, total elderly population (over 50 years old).

- Socio-economic characteristics: number of household in poverty, the percentage of households by the local economic structure (agriculture, commerce, construction, industry, and service); the share of each sector in the total revenue of the commune; number of existing urban development projects (by residential and other infrastructural development).

- Water resources/services: the percentage of households with access to piped water, and/or using surface water, rainwater, bottled water, a community-based water supply network, a community well, a shallow well, or drilled wells; the total number of drilled wells in the commune (households and enterprises); the total of open/shallow wells in the commune; number of stores that provide drilling service; a number of bottled water manufacturers in the commune

### *4.3.3 Storing Data*

With a permission of the clientele, every interview and focus group discussion in this research project was recorded and stored as an audio file. I conducted all the individual and group interviews in Vietnamese and later these recorded files were transcribed and saved as Microsoft word documents. Because Vietnamese is my native language, I had no language barriers during the implementation of the interviews. I took notes and recorded reflections immediately after the interview. The reflections included descriptive notes on the behavior of the interviewees, some insights from the interview and the researcher's thoughts. I chose not to translate all the transcribed documents into English while analyzing the interviewed data. To protect my clientelles' primacy, I transcribed all the interviews and focus group discussion audio recording files by myself. All original data, including audio recordings of the interviews, field notes, photographs and documentation remains in my possession.

## 4.4 Data Analysis Procedure

All interviews and focus group discussions were transcribed into Vietnamese, the language of the interviewees and the researcher, by the researcher to ensure consistency and reliability in the results. Transcribed data files were named by role of respondents and the consecutive order of the interviews.

The researcher read all the transcribed interviews several times before creating themes or categories based on the constructs gathered from the research questions and the interview guides, which were formulated prior to the field trips. Using Miles and Huberman's (1994) suggestions, the researcher identified and categorized all of the items the respondents described in the interviews and focus groups. The process of identifying themes and categories is an iterative process of studying the data segments by grouping, regrouping, refining, rearranging the categories until the most important and relevant categories for the study are established and new relationships are discovered (Goertz and LeCompte 1981).

The findings from the interviews, focus groups, and secondary sources from historical analysis were analyzed interchangeably to provide a broad picture of respondents' perspectives on the dynamics of water accessibility and provision in Co Nhue commune.

### 4.5 Reliability of the Research

The reliability of the field research can be assessed through internal consistency and external consistency. Internal consistency reflects whether the respondents' actions are consistent over time and in various social contexts, while external consistency could be achieved via cross-checking information with other divergent sources of data (Neuman 2003).

Neuman (2003) also advises that a researcher should take content into account as s/he evaluates credibility of the provided information because actions and statements are basically constructed by the context in which they emerge or appear. During the data collection process, a researcher might face intentional acts of avoiding or not revealing information from the research clienteles. Neuman (2003) also highlighs a researcher's insight, awareness, suspicions, and questions might affect the realiability in field research.

Because this research heavily relies on information collected from in-depth interviews and focus group discussions, it was very important to check if the provided information from the research clienteles was reliable, if the clienteles had any reason to lie when exchanging with the researcher during interviewing. To avoid evasions from my respondents/clienteles, I sometimes had to rephrase my questions and ask questions in a particular context. When my respondents avoided answering my questions, answering different questions than was asked, or switching topics, or answering it a purposefully vague and at an ambiguous manner, I still took the answer. However, I noted down and re-asked the question when relevant. With the interview guidelines in hand, I had a list of issues to ask my clienteles. To collect detailed information on an issue, I asked my clientele various questions from different angles. Most of the conversations/interviews

were developed based on the information provided by the respondents. Information provided by one respondent would be confirmed or declined by others. Basically, I did not control the interview time. If my issues had not been completely discussed, but the respondent had to stop, I managed to schedule another one. However, when I did not reveive any more different responses from the respondent for the same question I asked, I attemped to rephrase the question differently, and/or switch the conversation to a new direction.

Information collected from one group of respondents/clienteles was verified and confirmed with other groups and secondary data/reports, and I managed to adop various perspectives to construct a story of dynamics water accessibility and provisioning in the case study.

# CHAPTER 5

# CONTEXTUALIZING WATER SUPPLIES IN VIETNAM'S URBAN TRANSITION AND HANOI'S TRANSFORMATION

This chapter provides description of the broader context of the case study. The chapter starts with a brief introduction of Vietnam's development path, followed by a description of a rapid urbanization of Hanoi city in Vietanm's urban transition stage. The second session of the chapter is focusing the contextualization of the water supply sector in the city of Hanoi: the organization, evolution of the city water supply program, and how the city's rapid urban growth has imposed challenges faced by the city administration and the municipal water supply company in meeting the daily needs for water of Hanoi citizens, as well as challenges facing the peri-urban Hanoian in their everyday and future water accessibility.

## 5.1. Vietnam from Centrally Planned to Market Economy

### *5.1.1. General Context of the Centrally Planned Economy (1975-1986)*

After the national unification in 1975 Vietnam adopted a centrally planned economy with the prominence of state control over all national economic activities. Two main economic components of the Vietnam's economy at that time were the state owned enterprises in urban areas and the collectivization in rural areas. Agriculture was typically organized into large production cooperatives. Members had no assets of their own and were paid based on the amount of work they contributed. In the industrial sector, the few large enterprises were nationalized, and the many small firms were merged into cooperatives. The whole country was economically dependent on the Soviet Union and China until around 1980 (Wolff 1999). The state subsidized and closed the whole economy, and domestic trade was controlled. State-owned enterprises[2] had to

[2] State-owned enterprise means an enterprise of which 50 percent of total capital owned by the state, according to the 2003 Enterprise Law.

meet the quotas set by the central government. Procurement, production (input and quality of products), labor and product price were decided under the government's national economic development plan. Vietnam was a closed market, in which customer and seller had no goods and services exchange with international partners.

Nationwide, the state developed a model of national development of large-scale industrialization and rural collectivization, and avoided high concentrations of economic power at few centers. During this time, rapid urban growth was regarded as detrimental to planning and orderly development. The growth of medium and small cities was encouraged in a reciprocal relation with rural hinterlands, leading to the dynamism of local economies instead of concentrating on city development strategy.

The development policies of Vietnam did not stress the important role of the urban area, especially the large concentrations of population in the city. City development was not even highly promoted in the national economic development. All the migration patterns were under the control and organization of the state. The state discouraged any changes in residence from rural to urban setting and put organized migration programs under its control, i.e., (i) job replacement, (ii) family reunion, and (iii) rural resettlement programs. The policy of household registration (Hộ Khẩu) was essentially aimed at controlling population mobility. This policy was also closely tied to household's eligibility for the public social and environmental services at the place of residence. For example, foods, other essential groceries, and water services were also distributed by the state based on the household registration system.

Because development policies of Vietnam did not stress the important role of the urban area, the city existed indifferently from the village as a geographic area. The state was very concerned over what was called over-urbanization (Dang 1997). Its success in controlling domestic migration, urban-ward migration and regional migration patterns, for instance, in combination with limited economic development generated from the city had made urbanization stagnant prior to the national economic reform era.

The first five-year development plan of 1976 - 1980 right after the national unification (1975), which targeted "promoting industrialization," was assessed as not

being feasible. The growth of Gross Domestic Product was low and could not meet the needs of the national population growth. Capital designated for construction and building was scattered, leading to unfinished projects. The mismatching between investment and production resulted in the national income deficit. Because the central government heavily subsidized its-owned enterprises, they ineffectively and inefficiently performed (Dao 1990). Their inefficient operation along with high rates of inflation (up to 100 percent in 1982 and 1983; and almost 500 percent in 1986), the currency reform (in 1985), and the adjustment of civil service salaries (in the mid 1980s) (Wolff 1999) made the national economic picture dismal and the quality of life of the Vietnamese people was severely affected. In the water sector, the municipal water supply companies provided water for the urban residents and their business plan and capital were developed and heavily subsidized by the municipal authority. More detailed description of the public utility in the water sector and other related issues are presented later in the second session of this chapter.

### *5.1.2. The Market Oriented Economy Since the National Economic Renovation (1986 to Present)*

In 1986, the national economic renovation was launched in Vietnam under the slogan of *Đổi Mới* [reform] in order to promote socioeconomic development, to meet the requirements for foods and other staple commodities, to improve living standards of people, and to achieve closer integration into the rest of the world (Pham, Be, and Hainsworth 2000). The reform has brought a new way of thinking in economic management with a number of remarkable features, i.e., the opened economy to trade and foreign investment since 1987 (Phan, Mai, Nguyen et al., 2008), the co-existence of multiple economic sectors beside the public sector, the abolition of subsidization for many state-owned enterprises, the reform of the public sector, and the rise of the Consultative Group, headed by the World Bank and the International Monetary Fund (IMF). During the period of 1986-1990, the national economic development strategy centered on industrialization, and the central government spent up to 45 percent o the

public budget on industrial investment among many other economic sectors. In essence, the economic reform in Vietnam reflects a shift from "the centrally planned economy to a multi-sectoral[3] economy guided by market economy principles, with property predominantly in the hands of the state and cooperatives, and with government performing a strong steering function." (Wolff 1999: 1)

It has been reported that Vietnam has gained significant achievements since the *Đổi Mới*, illustrated via the rapid growth in domestic and international trade, higher agricultural productivity, higher income and improved living standard for people, influx of international goods, new ways of interaction and commercial organization, better chance for income generation, and better global integration (Brothroyd and Pham 2000). In industrial and service production, competition among the state owned enterprises, between the state and the private sectors and between local and foreign producers is generally not encouraged. Despite the decentralization of decision-making, there has not been a significant reduction in the level of public monopoly in the industrial sector. The domestic private sector in particular still suffers from discriminatory practices, which prevent the sector from acquiring capital and foreign trade exchanges. Most foreign companies have so far found it advisable to go into partnership with local state-owned enterprises rather than enter into direct competition with them (Wolff 1999).

In agriculture, the new system created a number of changes. For examples, farmers were given the right to lease land from the state for a long period of time (since 1987), farmers were permitted to buy inputs and market their products; and irrigation system, fertilizer, and seed varieties were strengthened and invested. Under positive reform, agricultural production "has been increasingly oriented toward intensive and multiple crops as well as increased diversification of plants, resulting in an increasing food supply to meet both domestic and export requirements [after three years of the reform-since 1989]" (Pham et al., 2000: 30). But, under the requirement of agricultural

[3] Multi-sectoral is a reference to the co-existence of different forms of ownership: state, cooperative, and private (joint venture and limited liability companies) (Wolff 1999).

intensification, the excessive use of chemical fertilizers and insecticides[4] has brought not only negative impacts on land but also on water resources.

The changes in the economic structure with the restructuration of many state-owned enterprises had led to the surplus of people in labor market. Furthermore, land de-collectivization in rural areas released people to seek jobs elsewhere while at the same time made the issue of rural surplus labor more serious. The labor force essentially became goods that could be sold and bought in the free market; and therefore, its impacts destroyed the spatial barriers of administrative units. The abolition of state subsidies greatly reduced the function of the household registration system as the major means of population movement control, while industrialization and economic efficiency were highly linked to the agglomeration economies of cities. Primary cities, i.e. Hanoi and Ho Chi Minh City (HCMC) grew in size with the influx of rural-urban migration[5]. City governments, for the first time, are facing issues imposed by urbanization process: how to accommodate the needs of migrants for social and infrastructure when they moved to the city. In addition, the city government has developed solid infrastructure systems to attract foreign direct investors to Vietnam.

Urbanization during this era has been considered as being an important force in gaining material welfare and economic growth (Douglass 2001), thus both the national government and city government of big cities like Hanoi and Ho Chi Minh City, have invested in a great number of development projects. A great amount of money, sourced from Office Development Assistances (ODAs), development loans and funds, channeled via the World Bank, Japan International Cooperation Agency (JICA), the Department for International Development (DFID) of the United Kingdom, the Asian Development Bank

---

[4] Compared to other countries in Southeast Asia, the average use of chemical fertilizer per cultivated hectare in Vietnam is around the median level. It is reported to be higher than Thailand and the Philippines, but lower than Indonesia and Malaysia. However, the use of insecticides in Vietnam is relatively high (Pham et al., 2000).

[5] HCMC was the center of migration activity, being the largest receiving place of inter-provincial migration with the net gain was 410,553 persons (April 1, 1999), with a net migration rate of 8.15 percent. The figures for Hanoi were 114,617 persons and 4.29 percent, respectively (Central Census Steering Committee (CCSC) 2000).

(ADB), and other institutions, has been inclusively invested in infrastructural development in cities, i.e. arterial roads and highways, elevated/ underground rail system, sea and airports. Subsequently, new towns, residential areas, and large-scale development have been planned and developed, and many of these projects situate on the periphery of the big cities.

The development strategy during the decade of 1990s promoted the role of industrialization and service industry in the national economy. The national economic structure changed. The share of agricultural production was reducing, while the share of industry, construction and services were increasing in the Gross Domestic Product (GDP). The country attracted tremendous capital from foreign investors, especially during the first half of the 1990s (prior to the Asian financial crisis). 1,397 licensed projects were endorsed with registered capital of US$16.2 billion (Phan et al., 2008). Undeniably, a foreign-invested and the multi-sectional economy played an increasingly important role in generating growth in Vietnam during the 1990s. The quality of life was much improved in both rural and urban areas.

The Ten Year Socio-Economic Strategy 2001-2010 presents a vision for building Vietnam to become one of the industrialized countries[6]. The national economic development strategy during 2001-2010 continued building the country under a vision of "a prosperous people, a forceful country and an equitable, democratic and civilized society." (Douglass 2001) The national economic development strategy gave priority for poverty reduction, employment generation, and sustained economic growth through accelerated industrialization and modernization in both rural and urban areas. Since early 2000, the country has been transitioning from agrarian to urban-based economies. All resources and adopted technologies have been mobilized and vested in industry, construction, and services as these sectors have made great shares in the national GDP, while the industrialization and modernization of countryside aim at reducing the share of agricultural production in the GDP, liberating a large number of rural labor force, and to

[6]http://www.chinhphu.vn/portal/page/portal/chinhphu/NuocCHXHCNVietNam/ThongTinTongHop/noidungvankiendaihoidang?categoryId=10000714&articleId=10038387

develop comprehensively rural economy. The ultimate goal is to boost the economic growth rate for the whole nation of Vietnam (Vietnam 2006).

Major metropolitan centers of Vietnam, such as Hanoi and HCMC, have been experiencing the process of population concentration that has already finished in more developed countries and regions. While in the more developed regions, counter-urbanization decreases sizes, density and leaves behind disadvantaged and vulnerable groups in the center/core of the city (Berry 2008), the reverse trends are happening in Hanoi, HCMC, and to lesser extent, in the other national cities of Vietnam: Hai Phong, Da Nang, and Can Tho. These large urban centers have been places of greater productivity, economic and life opportunities, and as a result, they become a magnet to attract human resources from other less wealthy and developed regions. Although environmental burdens and high cost of living in these cities are increasingly intensified and proliferated, i.e., crime rates, air pollution, traffic congestion, these externalities of city growth do not outweigh other bright lights, such as employment opportunity, higher standards of and better service in educational, healthcare, and other aspects.

More than ever before, the government of Vietnam orients and plans for accelerated urban growth. The city is regarded as an economic engine and its growth is expected to more greatly contribute to even boost the national economic development and address other social issues. According to the general planning orientation for urban development in Vietnam to 2020, prepared and issued by Ministry of Construction, the share of Vietnam's population residing in areas classified as 'urban' would increase from 23 percent in 2000 to 45 percent in 2020 (MOC 1999, Phan et al., 2008). To specify and translate the goal into action plan, the Ministry of Construction proposed to extend the development projects from the city to its periphery, to build satellite cities and new towns, and to catalyze the urbanization process in rural areas (MOC 1999). The urban growth pattern in Vietnam, since late 1990s, shows polarized development: the tremendous growth in two primary urban centers (Hanoi and HCMC), and the lag-behind secondary cities and district towns, especially in the central region of Vietnam (MOC 1999). Historically, the central government has promoted urbanization of district towns and planned development in lagged behind regions to mitigate rural-urban migration and

more importantly to divert slow down the development of Hanoi and HCMC (World Bank 2006). However, results of such effort have not been seen as expected while Hanoi and HCMC remain the destination of many rural populations.

Accelerated urbanization has been considered as a characteristic of urban transition in the context of Vietnam. Since the 1990s the country has created favorable conditions to attract foreign investment in real estate and development projects in designated urban centers. For the last two decades (1987-2007) Hanoi and HCMC led the whole country in receiving foreign capital and the capital flow was directed into industrial and service sectors (Dau 2008), causing uneven development by spatial polarization in these two metropolitan centers and growing rural-urban disparities (Douglass 2001, World Bank 2011). To accommodate land for large and fast urban development, many city governments have acquired agricultural land in the periphery of the city; and most of the land for urban development was found fertile and could have been used for agricultural production. The MOC, since 1999, estimated that agricultural land would be reduced 3,800 hectares every year on average (MOC 1999). Obviously, the national development pressure has been directed to rural districts and or the peri-urban areas of the Vietnamese cities.

The urban transition process in Vietnam is also characterized by unguided urbanization process (de Loddis 2006). Since the 1990s, the city edge (Harms 2011) or peri-urban areas, has become the most dynamic area because of real estate transactions amongst residents. The demand for rapid urbanization coupled with the demand for more rural land acquisition in the periphery of the city and the capability to build and improve road/traffic and other infrastructure systems as well as housing construction of some major city governments have partially contributed to the sudden increase in land value in peri-urban areas. Many land transactions occur without the approval of the local government.

## 5.2 Rapid Urbanization of Hanoi and Challenges Imposed on Peri-Urban Areas

Historically, Hanoi is the city of long tradition and rich culture. Being the capital of Vietnam, Hanoi inevitably possesses many advantages compared to other cities in being allocated public budget, attracting global capital, resources, and more importantly, the national political support to become a metropolitan center for economic development. Since urban development has been supported and regarded as a catalyst for national economic development, Hanoi has demonstrated its own ambition in building many residential areas and new towns, and become a destination for many mega urban development projects. Box 5.1 briefly presents timelines of Hanoi's urban development from 1981 up to present, followed by a description and discussion of challenges imposed on peri-urban areas of Hanoi due to its accelerated urbanization process. This illustrates one of many forces driving the country to its urban transition and provides a general context within which dynamic water accessibility and governance in Hanoi's peri-urban settings are both broadly and specifically discussed in the second half of chapter 5 and chapter 6, respectively.

***Box 5.1 Timelines of Hanoi's Urban Development (1981-Present)***

- 1981: Ha Noi Conceptual Plan was developed with the assistance of former Soviet Union experts; the construction of South Thành Công living quarter - the first residential area that incorporated the construction of necessary amenities, like school;
- 1986-1988: urban planning in Hanoi was limited to the city orientation of internal development;
- 1988-1990: adjusted the city's administration boundaries. Some communes and rural districts were returned to Vinh Phuc and Ha Tay – two neighboring provinces;
- Abolished public housing subsidy;
- 1992: established City Chief Architect Office and urban planning was integrated into the City's Socio-economic and Urban Development Strategy.
- The second time, Hanoi developed its Development Plan.Bắc Linh Đàm (North Linh Dam) residential area was built, followed by were Đại Kim -

Định Công (Dai Kim - Dinh Cong), Trung Hòa – Nhân Chính (Trung Hoa – Nhan Chinh) housing development projects.

- 1995-1996: Hanoi established three new districts namely Tay Ho, Thanh Xuan, and Cau Giay in order to meet the demand of city development. During this period, Hanoi started planning for new parks and recreational projects, urban residential areas, small and medium sized- industrial zones, i.e. Thang Long Industrial Zone in Me Linh district;
- 1997: The city collaborated with a foreign company to develop the first Master Plan of Hanoi Development;
- 1998: The Pime Minister approved the amended Master Plan of Hanoi. As a result, specific plans were developed for 10 urban and rural districts of the city. Urban planning was regarded as premise and orientation, and essential conditions for economic development and accelerated urbanization.
- December 2000: the 8$^{th}$ City Party Meeting indicated: city construction and urban management had to be accelerated.
- 2003: extended city development by establishing two more new urban districts, namely Hoang Mai and Long Bien districts. The city had incrementally developed infrastructural systems, especially the transportation system in its outer zone and paid attention to the formulation of specific plans for rural and urban districts. The city's economic development in combination with population growth has stimulated the construction of many housing projects, residential areas, and industrial areas in the periphery of the city.
- 8/2008: The National Parliament approved of a Central government's planning project which aims at extending Hanoi's administrative boundary to accommodate the demands for development as the capital city of Vietnam. As a result, Hanoi's area is three folds larger than its original size (334.7 km$^2$ area) with the total of the city population of 6,448,837 persons. The undermining purpose and vision of this planning project is to build Hanoi to become a national hub in Vietnam and a global hub in Asia.

*Source: Phung Huu Phu 2005, Pandofil 2006*

The population of Hanoi has increased over the year regardless of its changes in size over the time since 1954 (see Table 5.1). The city has been the destination of migrants coming from different Northern provinces. According to the results of the latest two censuses, the population of Hanoi in 1999 and 2009 were 5,244,149 and 6,448,837,

respectively. The urban population of Hanoi also increased from 34.2 percent (1999) to 40.5 percent (2009) (Perkins, Posco, and JINA 2011). Each year, the city received approximately additional 200,000 persons and half of this population growth comes from in-migration (X. Truong 2009). The average city population density was 1,926 persons/km$^2$. However, the density of the city up to now has not been evenly distributed. The latest 2009 Census results revealed that the highest density was in urban districts, such as Dong Da district: 36,550 persons/km$^2$.

***Table 5.1 Hanoi's Changes in Its Size and Population from 1954-2008***

| Year | Area (km$^2$) | Population (person) | Note |
|---|---|---|---|
| 1954 | 152 | 53,000 | |
| 1961 | 584 | 91,000 | 1$^{st}$ expansion |
| 1978 | 2136 | 3,5000,000 | 2$^{nd}$ expansion |
| 1991 | 924 | (unknown) | Reduction in size |
| 2008 | 3,344 | 6,300,000 | 3$^{rd}$ expansion |

*Source: Dao Ngoc Nghiem 2012*

In their preparation for the Master Plan of Hanoi to 2030, outlook to 2050, Perkins, Posco, and JINA (2010) estimated that Hanoi's population and rate of urbanization are steadily increasing over the upcoming decades. By 2050, the population of Hanoi will reach 10.8 million inhabitants at an urbanization rate of 80 percent (see Table 5.2). Although the statistics of Hanoi's population might be underestimated compared to the reality, there is no doubt that the city of Hanoi is growing and will continue to grow in the future, especially when it serves as the political, cultural and economic center of Vietnam.

***Table 5.2 Hanoi's Population and Rate of Urbanization from 2010-2050***

| | 2010 | 2020 | 2030 | 2050 |
|---|---|---|---|---|
| Total of Population | 6.45 million | 7.1-7.4 million | 9.0-9.2 million | 10.8 million |
| Rate of Urbanization | 41% | 64% | 70% | 80% |

*Source: The Government of Vietnam 2010*

Inevitably, the urban development of Hanoi has been politically influenced. As one of the two special cities (HCMC is the other), which are directly managed, planned and monitored by the central government (led by the Prime Minister), the development of Hanoi city is highly guided with clear vision of development by its Master Plan. In 1965 two plans, namely "Zone Plan for Hanoi Construction" and "Leningrad Plan," were prepared for Hanoi by a team from the Leningrad Institute of Urban Research and Planning (Logan 2000, Geertman 2007). In 1981, Hanoi Institute of Construction, a domestic institution, developed the first Master Plan that was developed by a domestic institution. In 1992, the second Master Plan was prepared for the socio-economic and spatial development of Hanoi ( Leaf 1999). In 1998 the third Master Plan of Spatial Development of Hanoi to 2020 was prepared and revised under Decree 108/1998/QĐ-TTg, approved by the Prime Minister (Lancret 2005, Economy and Urban Newspaper 2008). And recently, on 26 July 2011, the Prime Minister of Vietnam approved of the Master Plan of Hanoi to 2030, vision 2050, jointly planned by Perkins Eastman Architects (USA), POSCO E&C CO., Ltd and JINA Architects, Ltd (Korea) (Hanoi Architecture and Planning Department u/d, Perkins, Posco, and JINA 2011) to construct a "modern and dynamic metropolitan center, the national political and administrative center, a primary national cultural, scientific, educational, and economic center, and a center for tourism and international trading in Asia and the Pacific." (Decree No 1878/QD-TTg, approved by the Prime Minister on December 22, 2008). More evidence illustrating the political influence in the development of Hanoi is that the city's area has been adjusted by the central government several times since its liberation in 1954 (Table 5.1). The latest adjustment in 2008 was to accommodate the demand for more urban land for the city's rapid economic transitions toward heavy manufacturing as well as to

improve the city's comparative status in regional and international levels (Pham Quoc Truong 2002, World Bank 2011).

Leaf (1999: 305) indicates that "in sharp contrast to the clear, modern vision of Hanoi's master plan, the physical emergence of the of the *Đeaf (19*city – the rebuilding of inner-city sites from one-storey shop houses to three-, four- or five-storey apartments and the rapid transformation of farmer's peripheral plots into urban construction sites- has occurred with virtually no planning or construction controls." In other words, there exists an unmanaged peri-urbanization of Hanoi in parallel with the planned city. The fact is many newly constructed houses/apartments have been built without planning permits. At the local (commune/ward) level, land/housing transactions take place everyday. According to Leaf's estimate (1999), unpermitted construction of new housing is up to 70 percent to 90 percent of the total. Many of them were built without "a proper authorization of land-use rights." (Leaf 1999: 305) In addition, in many places in the cities, the local authority intentionally breaks the laws when approving housing development projects without checking if these projects match the city's master plan of spatial development. For example, 750 housing development projects were approved prior to the extension of Hanoi's boundaries in August 2008. For this reason, the chairman of Hanoi People's Committee had to evaluate whether these projects could be constructed after the new Master Plan of the city was approved by the Prime Minister (in July 2011) (Thu Lý 2011).

The rapid urbanization process of Hanoi, driven by mega urban construction and development projects, requires capital intensive, and the city's physical and landscape changes have been influenced by global capital because of its mobilization of the private sector's capital and resources (Pandolfi 2005). Since 1992, the capital city of Vietnam has been the destination of international real estate and construction corporations, and the first foreign real estate corporation set foot on Hanoi and proposed a new town – Citra Lake City for 100,000 inhabitants – in a 392 hectare area at the edge of the city is Ciputra of Indonesia (Leaf 1999, Pandolfi 2005). This has been seen as a small town in a big dynamic city of Hanoi, and as a prosperous archipelago as well as a gated community at Hanoi's edge (Pandolfi 2005, Douglass 2009). Followed by the Indonesian are (i) a

Japanese corporation that invested in the development of a North Thăng Long (Thang Long) Industrial Zone, (ii) Daewoo, a Korean corporation, that proposed to build Hanoi as a hub city, not only in Vietnam, but also in Asian continent (Pandolfi 2005). Among many mega projects that have been considered in planning processes are a 7 billion US$ new city in an area of 4200 hectares by the Red River (collaboratively planned by the government of Hanoi and Seoul administration), requiring a replacement of 39,000 local households (Ha Noi Municipal Urban Development and Planning Office 2007, 2008) and a new 2 billion US dollar town arising with a twin 70 floor tower and a hundred of high buildings in an area of 264 hectare in North An Khanh[7].

Since 2000, more and more Asian and American foreign investors arrived in Vietnam to set their footprints in the aspect of urban planning development in Hanoi. Many choose to do business in partnership with domestic construction/real estate companies, i.e., Vinaconex Construction Corporation and Posco E&C., Ltd. jointly invest in North An Khanh Star World/Splendora new town[8]. Among multiple construction investors/developers, Korean investors have been well recognized for their construction technologies via many mega-construction projects, and one of the contemporary landmarks of Hanoi– the tallest skyscraper in Vietnam, The Keangnam Hanoi Landmark Tower[9] - is a product of Korean investors.

The intensive growth of Hanoi takes place in the periphery of the city where many hundred years old established villages situate. To reduce its high population density in the core an inner zone, the Hanoi municipal government has extended its city development and put tremendous pressure into its peripheral areas. Ciputra, the first International City in Hanoi, is one of many urban development projects, which was purposively located in a peri-urban district of Hanoi. There have been some housing renovation in the inner city, i.e, renovation projects of the living quarters which were built in the 1960s, 1970s of the

---

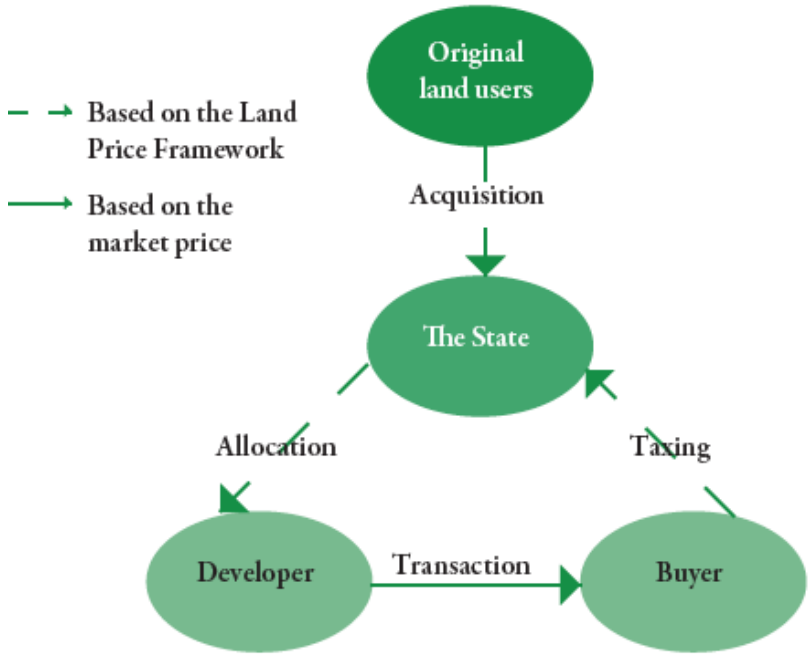
[7] http://www.nhadatviet.vn/du-an-bat-dong-san/khu-do-thi-bac-an-khanh/0861315111162.html

[8] http://wn.com/bac_anh_khanh_starworld__ha_noi

[9] http://impressivebuildings.com/the-kangnam-hanoi-landmark-tower-hanoi-vietnam/

last century (Cerise and de Maximy 2006); yet, almost all new towns, residential areas, industrial zones, and other amenities have been allocated to the edge of the Hanoi. It is obvious for the municipal government to choose an easier solution – building new housing projects from rice fields or vacant land, rather than choosing in-fill development within the core and inner zone, where land clearance and acquisition will certainly and comparatively be very expensive. In essence, the government acquires land from the rural land users with minimal compensation based on the land price framework, issued and regulated by the city government. The acquired land, then, is assigned to developers to initiate a development project. When the project is completed, the developer sells their housing to buyers at the market price to gain profit (see Figure 5.1).

***Figure 5.1 A Two Tiered Land Price Land System in Vietnam***




*Source: World Bank 2011*

In July 2008, the Vietnamese Prime Minister approved a plan to transfer 7155 hectare of agricultural land and 963 non-agricultural lands for committed urban

development projects. Inevitably, city grows and expands at the expense of shrinking significant agricultural land areas. Additionally, another relatively large agricultural land is left abandoned from production by owners and land speculators to wait for urban land prices to rise, resulting in a sharp reduction of the agricultural share into the local economy, the alteration of local economic structure and livelihood of people. As a result, it is the farmers who lose in this game. They receive one-time compensation from the government for their land loss at the expense of their livelihood. Many gain and become rich or richer while others are rendered to become marginalized and victimized, especially pure farmers who primarily rely on agricultural production (Leaf 1999). The affected people view such development projects in the peri-urban areas as an opportunity and a threat and their feelings are mixed (Leaf 1999, Harms 2011).

The major concern over rapid urbanization of Hanoi, as well as other metropolitan centers in Vietnam is whether rapid growth has generated better socio-economic and environmental conditions for urbanized areas. Sociological studies on urbanization in Hanoi reported socio-economic changes in peri-urban Hanoi. Results of a study conducted by the Institute of Sociology in four rural communes in the periphery of Hanoi revealed that: the changes in macro economic policy, the emergence of industrial zone, the conversion of land use (at the expense of agricultural land loss) dramatically altered rural communities at the edge of Hanoi. The changes were exemplified via local economic structure, source of income, the quality of life, physical landscape, housing, infrastructure systems, material life and spiritual life. Generally, the share of non-agricultural occupations in household's income increased. Agricultural land was shrinking at the expense of rising housing development projects and this became a threat to the livelihood strategy of many households of which the primary source of income relied on agricultural production (Institute of Sociology 2003). Six years later, another study on two communes in Hanoi's Western Suburbs also shared the same concern over the threat of agricultural land loss on the livelihood of families in the surveyed areas (DiGregorio 2011). However, DiGregorio (2011) also reveals adaptive strategies for securing livelihood of many peri-urban households when they rely on agricultural practices for their basic needs while maintaining non-agricultural work to meet their growing needs they cannot rely on themselves. "Proximity to the city had made it

possible for villagers to combine work in agriculture, both for self-provisioning and sale, with non-agricultural work as craft and industrial workers, small-scale retailers and service providers, and laborers," DiGregorio (2011: 293) wrote.

The co-existence of various housing forms reflected a physical transition in peri-urban communes. During a short period of time in many communes of the peri-urban Hanoi, rural villages' housing/residence form, which was characterized by "one story with several compartments, build of wattle, stone, rammed earth or wood" (DiGregorio 2011: 297) has been replaced with the modern/urban housing style, which was described by DiGregorio (2011) as free standing villa, the duplex, and the row house with tiled roofs, high ceilings, masonry walls, balconies, wrought iron railings, and wooden shutters. The sociological study tried to link correlation between the level of urbanization and area of residence in their four surveyed communities. Specifically, the higher level of urbanization, the more obvious characteristics that can be observed in the peri-urbanized communities, such as smaller area of housing/residence, modern architectural style, and using improved source of water (Institute of Sociology 2003).

Generally, the quality of life of peri-urban households is being much improved. Durable goods, such as television sets, video home systems, DVD players, refrigerators, washing machines, air conditioners, computers, mobile phones, and motor cycles, which were luxurious to many after the national economic reform, are very common in peri-urban households. The majority of families possess television set, radio cassettes, motorcycle, and landline telephone and mobile phones. Some have access to the Internet while the rich possesses automobiles. Services, such as Café Internet and game rooms, hostels/small scale hotels, beauty salons, make-ups, cell phone shops, restaurants, which used to be only found in urban settings, are now available in peri-urban settings as well. New residents arrived and shared space of the village. Many of them purchase land to settle down as new residents. Others temporarily inhabit for work and/or education. As a result, the demand for shelters rises and the local residents start building low quality of shelter or share rooms in their house to meet the need of the in-migrants. Subsequently, construction service and stores that provide construction material, water pipeline, and others appear in the locality. This process shows the intensive changes taking place in a

short period of time in peri-urban communities in Hanoi. This also substantially brings to our awareness of the fact that increased population growth and proliferated construction projects in Hanoi's extended urban center have rapidly transformed the city's peripheral areas physically and socio-economically.

To many, the transformation in peri-urban communities of Hanoi reflects every demonstration of rural modernization that has been promoted by the government of Vietnam. To others, Hanoi's expansion to its edge has "destroyed a social basis of village cohesion in shared agricultural work; brought new residents into the space of villages, increasing density, environmental problems and local governance issues; and disrupted family life cycle plans for the education of children, current and future employment, and retirement." (DiGregorio 2011: 294) For example, the rise of Ciputra (late the 1990s) - the first International City project in Hanoi – brought revenue to the city government, but imposed tremendous challenges and uncertainty to Phú Thượng residents who lost agricultural land - their means of production, assets, and livelihood - to the project (Leaf 1999, Hanoi Institute of Socio-economic Studies 1999). Land compensation cannot make up for the loss of livelihoods to local households. Many farmers did not know how to efficiently and wisely use the compensation to generate more economic profitability. They had to split the compensation to their sons/daughters, purchased durable goods, improved their existing house or built a new one. When the amount was completely spent, they are still jobless. Those who lost their land feel insecure and uncertainty about their future and therefore, confrontation and contestation between the developer, the local authority and farmers over land compensation in hundreds of the existing 750 projects similar to Ciputra prevail in Hanoi (Perkins, Posco, and JINA 2011). Inevitably, the larger scale the project is, the more impacts it imposed on the affected communities.

Peri-urban communities in Hanoi are experiencing both in-situ urbanization and urban growth (Labbé 2010, DiGregorio 2011) processes because of their rapid changes in socio-economic structure and physical setting. Population rapidly increases in these communities because of net migration. The local economic structure is being shifted from heavy reliance on the agricultural sector to services and construction. Many

households rely on diverse livelihood strategy, rather than sole dependence on agricultural production. People in these communities cannot wait to be completely urbanized or classified as urban residents so that they are entitled to better access to urban environmental services, i.e. trash collection, wastewater treatment, and clean piped water supply, and their children are entitled to better educational services, according to the binary classification of rural/urban administrative system in Vietnam. How has the city government and the state-owned utilities in environmental service provisioning responded to the city rapid urbanization and increasing demands of both urban and peri-urban residents? What challenges are they facing? These questions will be discussed in the next section, which exclusively focuses on challenges in service provision and the quest for improved potable water accessibility in Hanoi under its rapid urbanization process.

## 5.3 Contextualizing Water Supply in Hanoi

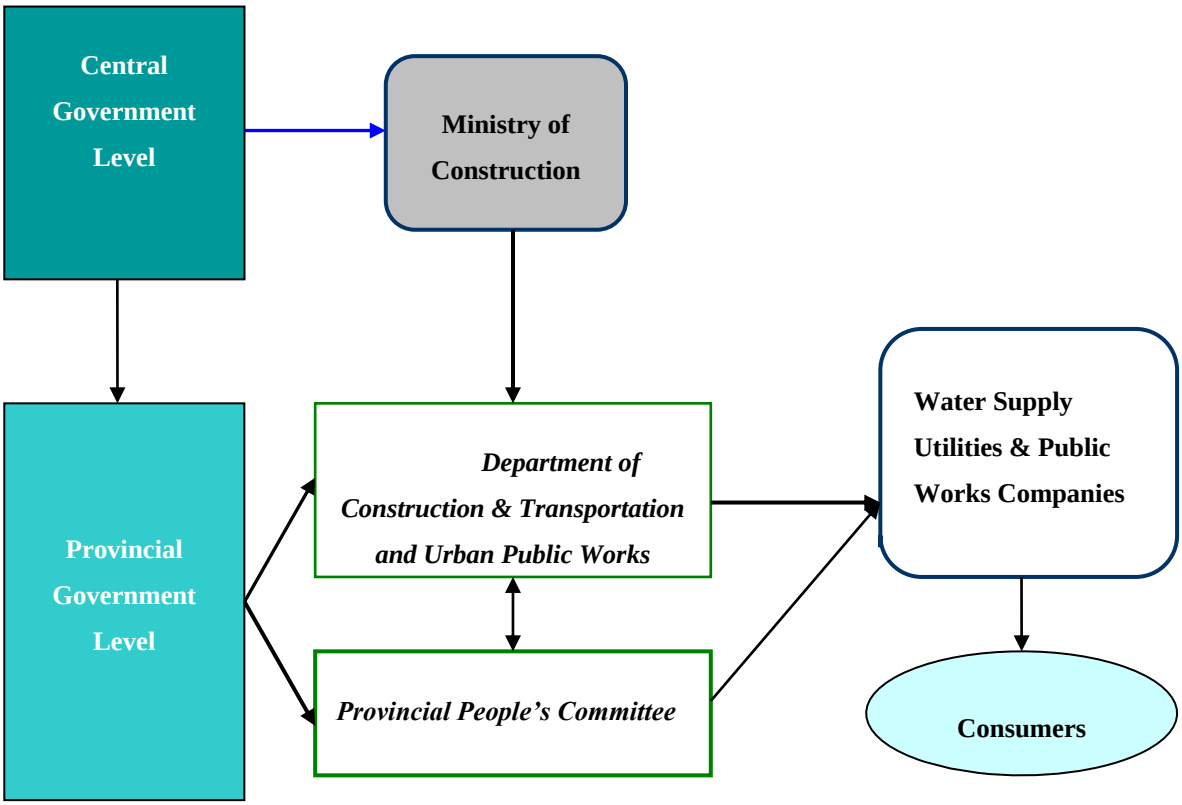
### *5.3.1 The Governmental Organization and Regulations/Policies on Water Supply*

In Vietnam, the public water sector enterprises are defined as public utilities that provide public merit goods upon one of the three methods: bidding, order, or assigned plans. Potable water is highly regarded as a merit good because ensuring water accessibility would contribute to public health and other aspect of human development. For this reason, the government of Vietnam closely steers and monitors the implementation and operation of the public utilities in the water supply sector (Pham Sy Liem 2005). The urban water sector of Vietnam is comprised of 67 provincial water companies (Pham Sy Liem 2005). Each takes responsibility for water delivery to the urban areas of one province[10]. The main objective of water utilities is described as to "ensure sufficient and safe water supply for people, industries and other consumers in urban areas" (Do 2003: 84).

[10] Hanoi, HCMC, Vinh Phuc, Ha Tay, Dong Nai, and Long An provinces each have two water supply companies (World Bank 2002)

Regarding management (Figure 5.2), water supply utilities are under the management of both central and provincial governments. The national government's responsibilities are to make the national plans, to approve regulations and rules, to implement criteria, and to allocate the investment budget. The Ministry of Construction holds key roles in monitoring and managing the whole water supply and drainage sector at the national level. The ministry "supports the subordinate departments and companies in preparing their plans, managing, designing and assisting the implementation of urban water supply and drainage projects. It is also responsible for construction and investment project and technical design, and some supervision in tasks." (Do 2003: 84)

***Figure 5.2 Water Sector Institutions System in Vietnam***



The provincial government is responsible for carrying out construction, operation, maintenance, upgrading and expansion of urban water supply systems and sanitation services. Additionally, the provincial government level takes responsibility for financial management issues and setting water pricing[12] (GKW CONSULT 1994). Besides these roles, a number of policies on water supply, i.e., the sectoral development, water production and distribution objectives, water tariffs, and investment, are also decided by Provincial People's Committee (Do 2003).

City/provincial government sets up water tariffs to protect the public interest so that all residents, including the poor as well, can afford the tariffs. In actuality, water tariffs are differentially regulated based on the classification of clients (industries, services, domestic uses). Water users have to pay for the pipes and water meters needed for a house connection and monthly tariff. Water supply provision activities, i.e., water distribution, management and operations are delegated to water supply company that is under the supervision of the provincial Department of Construction.

During 1975-1986, the operation of water supply utilities was passive as it was still planned by the city and central government like other stated-owned enterprises under the command and planned economy. After the national economic renovation (1986), the passiveness in the operation and performance of the public water supply utilities remained unchanged because their operation continued following the economic plan initiated by the city government. As water supply companies charged water users at a flat rate, these companies did not efficiently work and they often received subsidy for their financial inefficiency/deficit. Later, when the water sector adopted block tariffs (as a mean to encourage users to be more accountable to water resources), these utilities' performance was improved, but they still received subsidy from the provincial government (WB 2002, Do 2003). On 20 January 2004, the Instruction numbered 04/2004/CT-TTg – "Strengthening the management of water supply," promulgated by the Prime Minister on 20 January 2004 – has contributed to institutional changes in the water

[12] That is the result of the water supply reforms initiated in 1990 with the promulgation of Resolution 217, which delegated the authority for setting water tariffs from the central government pricing committee to Provincial pricing committee (UNVN 2001: 4).

supply sector. This instruction commands the water supply sector and the provincial government to corporatize the existing water supply utilities to improve their autonomy and financial accountability. This legal document has encouraged more participation of the private sector in water supply provisioning (Pham Sy Liem 2005).

With efforts to reform the public sector since the 1990s, the central government has gradually cut and halted the subsidy for public enterprises and has created favorable business environment for enterprise competitions. Water supply is not an exception. The Ministry of Construction (MOC), as a national agency, is responsible for the urban water supply and drainage sector. In 1999, the MOC and the government pricing board issued the Circular[13] for guidance in water tariffs calculation and the authorization of determination of urban water tariff, with the objectives of ending subsidization, ending provision for deficits in the business of water supply (Nguyen Ton 2000). Thus, water tariffs must be sufficiently calculated to include all the cost elements in production, distribution, and consumption, taking into account the economic ability of users and the return of loans, so that the piped water supply business companies could survive and develop (Nguyen Ton 2000). The Orientation clearly indicated the objective of the sector for the coming time: "water supply companies should be considered as public utilities enterprises to phase out the subsidy regime" (Tran 2000: 95).

Central government empowers city and provincial government in water supply and sanitation services provision management by giving them decision making and financial authority in order to achieve effective and efficient water supply and sanitation management. In addition to encouraging reform among water supply companies, central government seeks to help those companies deal with financial burdens by mobilizing domestic resources of other sectors and communities. It also calls for grants from foreign governments and international organizations.

[13] The Circular originated from the Orientation of the state for the national water supply sector to the year of 2020, approved by the Prime Minister by Decision No. 63/1998/SD-TT dated March 8th, 1998 (Tran 2000).

Water tariffs, however, are set up differently at the provincial/city level. Based on the locality's production and consumption of clean water, the city/provincial People's Committee and/or People Council decide a reasonable clean water tariff. The appropriate concern of local government, the fluctuation of production costs, structure of water consumptions, source of water for production, living standard, and income of local residents all influence water tariffs (Ta 2000).

### *5.3.2 Urban Water Supply Financing*

#### *5.3.2.1 Source of Finance*

Regarding water financing, water supply utilities receive funding from three sources: i) Official Development Assistance (ODA) from international financial institutions (Asian Development Bank, the World Bank) and donors, i.e. the United Nations Children's Fund (UNICEF), ii) bilateral aid funds, i.e., Finish International Development Agency (FINNIDA), JICA, Danish International Development Agency (DANIDA), and iii) central government funds. Prior to *Đổi Mới* (1983-1986) national funding allocation for the urban water sector was very low, while the country's international isolation was attributed to low attraction of finance from international donors. The most significant water supply projects back to that time were the Hanoi Water Supply Project, funded by FINIDA, and the UNICEF Rural Water Supply and Sanitation Programme (GKW CONSULT 1994, Skyttä, Ojạnperä, and Mutero 2001).

The investment and improvement of the water supply sector in Vietnam after *Đổi Mới* in 1986 have primarily relied on ODA. The national budget has been used as matching fund with ODA for the purpose of project management and land clearance. Since the early 1990s, the water sector has received more than US$1 billion from the ODA. JICA (2004) reported that during 1993-2003 there was US$1,103.78 million invested in urban water supply systems in a series of cities throughout Vietnam: Hanoi, Ha Tay, Hai Phong, Nam Dinh, Lao Cai, Ho Chi Minh City, Da Nang, Ha Long, Quang Ngai, Dac Lac, Vinh Phuc, Dong Nai, Ba Ria, and Vung Tau. Among the

donors/investors, the Asian Development Bank and the World Bank provided with the largest amount of funding to build a new or improve the existing water supply systems in several of the aforementioned cities and enhance the accessibility of urban residents to potable drinking water service in 1993-2003 and 2004-2010, respectively (JICA 2004).

#### *5.3.2.2 Foreign Private Sector Participation*

Since 1986, economic reform in Vietnam shifted the country from "the centrally planned economy to a multi-sectoral economy guided by market economy principles, with property predominantly in the hands of the state and cooperatives, and with government performing a strong steering function." (Wolff 1999: 1) The reform has brought a new way of thinking about economic management with a number of remarkable features, including the abolition of subsidization for the state-owned enterprises, the reform of public sector and the rise of the Consultative Group, headed by the World Bank and IMF. However, in industrial and service production and provisioning, competition among state owned enterprises, between the state and private sectors, and between local and foreign producers is generally not officially encouraged. Almost all infrastructural services are provided by the state-owned enterprises (World Bank 2006). Despite the policy of decentralization of decision-making, there has not been a significant reduction in the level of public monopoly in urban service provision, including water supply. Under the pressure of urban population growth and budget constraints, the water supply sector has to mobilize finance from other sources, rather than ODA and public finance. The government of Vietnam has called for the participation of the private sector both domestically and internationally (via foreign direct investment).

Foreign companies have so far found it advisable to go into partnerships with the Vietnamese state-owned enterprises rather than entering into direct competition with them (Wolff 1999). According to the World Bank's report (World Bank 2006) on the infrastructure development strategy of Vietnam, the country's efforts to involve the private sector in infrastructure sectors is primarily focused on meeting financing needs,

through the equitization program and Built-Operate-Transfer (BOT) projects, rather than improving infrastructure efficiency. Vietnam once allowed the participation of water transnational corporations to collaborate with domestic public utilities in the production and distribution of water supply. The central government had issued investment licenses to a number of foreign investors in this sector, such as Saur in Quang Ninh province (Nomemzo 2003). Under another BOT contract with Ho Chi Minh People's Committee, Suez Lyoniase des Eaux (France) and Tractebel (Belgium), and Pilecon Engineering Berhad (Malaysia) jointly constructed: i) a water pumping station, ii) one water treatment plant in the area of 7 hectares which was close to the Ho Chi Minh City Water Supply Company (in Thủ Đức District), and iii) 25 km pipeline system in length which delivers drinking water from the water treatment plant in Thủ Đức to Nhà Bè District. In HCMC, two Malaysian corporations: Emas Utilities Corporation and Sadec Malaysia Consortium also received a BOT contract under which a new water treatment plant in Bình An District was built (HCMC People's Committee 2004).

The practice of foreign private sector participation (under a BOT model arrangement) in the urban water sector has produced with mixed results. In the Thủ Đức BOT, the three transnational corporation alliance signed a contract in July 1977, and an investment license numbered 2018/GP was issued on 26 December 2007. According to the license, the foreign alliance had to start their business in 2004[14]. However, this BOT contract failed before the water treatment plant ever was put into use. The HCMC People's Committee submitted a request No. 2072/UB-ĐT dated on 9 May 2003) to the Ministry of Planning and Investment, Ministry of Construction, and the Office of Government to terminate and resolve the BOT contract with the alliance of Lyoniase, Tractebel, and Pilecon Engineering. On August 18, 2003, the Vice Prime Minister of the government not only approved of the request, but also asked the government of HCMC to look for potential domestic investors as a replacement[15]. Suez Lyonnaise, Tractebel, and Pilecon Engineering withdrew from the Thủ Đức water treatment plant project in 2003 after having disputes with the HCMC Water Supply Company (because their

[14] http://www.scribd.com/doc/56564443/BOT
[15] http://vietlaw.vn/Van-ban/Dan-su/Cong-van-ngay-18-08-2003-cua-Chinh-phu-ve-viec-du-.aspx

proposed/imposed water tariff, based on their production cost, well exceeded the existing tariff, which was heavily subsidized by HCMC People's Committee). In August 2005 a Vietnamese consortium led by Ho Chi Minh City Infrastructure Investment Joint Stock Company (C.I.I) won the tender to replace the foreign investors under a revised Built-Own-Operate (B.O.O.) scheme (Pham Sy Liem 2005, World Bank 2006).

In contrast to the Thủ Đức BOT, a 100,000$m^3$/day Bình An water treatment plant was built in HCMC's neighboring province – Binh Duong - and operated under a 100 percent foreign investment BOT of Emas Utilities Corporation and Sadec Malaysian Consortium. These corporations were given an investment license numbered 1170/GP on 15 March 1996 and operated the Bình An water treatment plant for 20 years under a Built - Operation – Transfer model[16]. Most of the water treated in this project is allocated to Bien Hoa Industrial Zone and met about 10 percent of HCMC's demand. This BOT was achieved not through bidding, but negotiation with the HCMC People's Committee in August 1994. A license was issued in March 1995 (World Bank 1999). Although this project's scale is considered small, its success has proved that BOT in the water supply sector can work. Some key characteristics of this BOT were highlighted and have been used by the World Bank as a lesson learned for future BOT projects in the water supply sector (World Bank 1999, 2006):

(i) The project contract was negotiated with a single investment group. The BOT concept was used for the first time in the water sector in Vietnam and the government's inexperience led it to negotiate a deal with a single supplier rather than employ a competitive bidding process.

(ii) There was a one-year delay in the start of construction due to difficult land use negotiations. Land was donated "free" by HCMC, but the site location was in a different province (Binh Duong), which would receive none of the services, and reap none of the benefits of the BOT. Various fees had to be paid for resettlement and land compensation before it was approved.

[16] http://www.scribd.com/doc/56564443/BOT

It is notable that public utilities of the water sector, as well as many other urban service provision sectors, have been under the central state's subsidies. Although water tariffs could be adjusted for urban centers (regulated by a municipality/provincial authority), the current ones are well below the production and provision costs (World Bank 2002, JICA 2004). It is the city/provincial government that sets up water tariffs to protect the public interest and achieve social objectives so that all people can afford the service, including the poor. This is probably the reason why the first Thủ Đức BOT project failed. The investors' value and vision (treating water as an economic good and operating Bình An water supply company under the market principle) did not match with the Ho Chi Minh City Water Supply Utility's vision (treating water as a merit good, and therefore heavily subsidizing the full cost of production and delivery of water to its residents) (Pham Sy Liem 2005).

While water privatization, as prescribed in chapter 1, has been promoted by the World Bank and IMF, and prevailed in many countries in Latin America and some in Asia, i.e., Indonesia, Philippines, Malaysia, and China (Public Citizen 2003, JICA 2004) since early 1990s, this model does not prevail in Vietnam as international financial institutions and other donors to Vietnam would expect. Vietnam's Constitution does not allow private possession of water resources, but permits the private sector to participate in this natural resource management and water service delivery. Article 17 of the 1992 Constitution states that "land, forest, rivers and lakes, [and] water resources are under the ownership of the entire people" (Fontennelle 2001: 393). The last draft Water Law and Decrees also stipulate that water must serve economic and social needs, and water requires a "sustainable and multi-agency setting management." (Fontennelle 2001: 393) Thus, the Vietnamese government in general does not oppose the participation of the private sector in water management. Privatization has been promoted in the economic sector since Doi Moi (1986), but in the water supply sector, the participation of the private sector is, comparatively, still very limited.

The Government of Vietnam continues fulfilling its legal framework and system to call for and, more importantly, to accommodate the needs of foreign investors. The foreign direct investment law was issued on 29 December 1987 and has been revised four

times subsequently in 1990, 1992, 1996, and 2000 (Phan Huu Thang, Mai Thanh Hai, Nguyen Cao Cuong et al., 2008). Later, the 8th Plenum of the XI National Assembly of the Socialist Republic of Vietnam also adopted the Law on Investment on 29th November 2005 and its announcement was made by the Decree No 32/20055/L-CTN dated on December 12th, 2005 by the country President (MPI 2005). The Ministry of Planning and Investment has also widely circulated the United Nations Industrial Development Organization's Guides for the application and implementation of BOT projects for infrastructure development in Vietnam (MPI 2005). In addition, the World Bank has pushed the country to continue institutional reforms and corporatization of the state-owned infrastructure companies (World Bank 1999, 2006). For example, the World Bank's recent loan project investing in water supply and wastewater for Vietnam in 2011 has a sub-component that required the Ministry of Planning and Investment to develop policies on promoting the role of the private sector[17].

Investment from the domestic private sector in urban water supply is hardly recognized and recorded in Vietnam because investing in the water supply system is capital intensive, but results in slow retrieval of capital over time. Moreover, private investors often face financial constraints because domestic banks tend not to give a long-term loan for their investment (Pham Sy Liem 2005).

*5.3.2.3 Domestic Private Sector Participation*

Similar to other countries in the developing world, small private water providers are also actively involved in the distribution of water service in Vietnam. Local entrepreneurs collaboratively work with the local public utility either to build up and manage a water supply system or to contract out through a lease contract with the public utility in supplying water to local communities. In Tien Giang province in the Southeast region of Vietnam, for example, "non-state water companies are already serving about 65

[17]http://web.worldbank.org/external/projects/main?pagePK=64312881&piPK=64302848&theSitePK=40941&Projectid=P119077

percent of the 1.6 million residents. This includes private investors (17 percent), cooperatives (10 percent) and user groups that have raised capital themselves (34 percent) (Dardenne 2006: 26). In Can Tho, one of Vietnam's national cities in the South, the water public utility, local authority and private households work together to build an associated system of water supply stations throughout the province to serve local residents (Spencer 2007, Spencer, Meng, Nguyen, and Guzinsky 2008). In Ho Chi Minh City, the Municipality developed a legal framework to promote partnerships between the water utility and local operators /entrepreneurs in December 2001. The water utility must support the small entrepreneurs both on technical and administrative aspects and on procurement of materials. It is estimated that 19 percent of the households of HCMC are customers of a large number of these small private water providers. Most of these are resellers, serving three to five neighbors from their connection (Dardenne 2006).

In Hanoi, the form of Public Private Partnerships (PPPs) manifests through lease and concession contracts between the Hanoi Water Supply Company and local communities to expand service coverage. The nature of these contracts, however, is to minimize the proportion of non-revenue water of the public utility. The company sells water in bulk and sets up 10-35 percent of non-revenue water for its partner in the lease contract and concession contract, respectively. In both cases, this type of PPP seeks the convenience in business because part of responsibility in water supply and service management (billing, managing pipeline, installing water meters, and dealing with customers) falls on the contractors. Although the contractors neither assist the public utility in service coverage expansion, improved quality of service, increased productivity, nor directly reduced the company's fiscal burden they considerably have contributed to generate higher revenue for the company. As a result, the company could reduce its workload, meet the requirement of the Hanoi Municipality for the reduction of non-revenue water and non-accounted for water, and be self-financed in the long run at the expense of the risks taken by the local private contractors (Nguyen 2004).

In a study on the water supply sector in Vietnam with the participation of 22 public water utilities, JICA (2004) revealed that all the respondents agreed with the call for the domestic private investors to participate in the water supply sector. Various

expressions of the study respondents towards the participation of the private sector in the water sector are presented in Box 5.2.

***Box 5.2 Potential Roles of the Private Sector in the Water Supply Sector in Vietnam***

- It is a good idea for private participation
- It becomes great help to decrease operation cost and secure good performance in technical and administration fields.
- Assurance of clean water supply for customers.
- Long duration for equipment, timely overcome broken system, reduction of water loss and water fee, encouragement of water consumption;
- Good management helps technical staff in arranging construction items, using up the water equipment and operating system properly.
- Private sector participation should be encouraged to construct water works, preferential policies should be set up to attract more foreign investment and increase the number of household using water in rural areas.
- There should be preferential policy in providing investment license, so that attention of private sector increases;
- The private sector could invest in water supply network: 1$^{st}$ and 2$^{nd}$ pipeline, distribution pipeline to customers, management of network and customers through the application of scientific and technological advance.
- The private sector participation in water supply can avoid monopoly, thus creating a favorable business environment. However, gradual steps should be taken.
- To change awareness of distributors and consumers and to create a new concept on trading of clean water product (abolishing dependent thought in production, supply, and usage)
- Help to create more motive forces in enhancement of product quality, services quality and to create new awareness in management, use, and protection of water resources.
- The national target for clean water is soon to be achieved if the private sector is involved in the water supply sector.
- Private sector's participation has two potentials: (1) investment into ground water resources with small capacity (less than 1,000m$^3$/day) in places where there is no piped water and (2) transportation of clean water to places lacking of piped water;
- With the private sector's participation, the public utility might improve customer service as well as exerting all efforts in creasing effectiveness of the production and business performance. However, this is an important policy. Clean water is both a good business and also a vital demand for life, closely linked with politics and social issues, so privatization in water supply should be studied carefully and appropriately adopted. Conclusions from JICA analysis or summaries of interviews?

*Source: JICA Vietnam 2004.*

In the case of Vietnam, the participation of the private sector in infrastructure development is placed in a broader policy namely "*Xã Hội Hóa Cung Ứng Dịch Vụ Hạ Tầng"* [Socialization of Infrastructure Provision]. This, in essence, is the state's call for additional support of all the stakeholders, and the private sector is one of them. The central government has enacted and adopted various Decrees to build a strong regulatory foundation for this policy. Decree No 77-CP, dated on 18th June 1997 with regards to "Regulations of the Built-Operate-Transfer (B.O.T) Investment Scheme, Applied for Domestic Investors" (Nguyen Thanh Huyen 1998) and Decree No 51/1999/NĐ-CP dated on 8th July 1999 regulating the implementation of investment promotion law[18] are two examples of the Government of Vietnam's legal guidelines and commitments to support domestic investors in infrastructural development, including the development of water supply systems.

According to Pham Sy Liem (2005), the policy:

1) attracts additional resources and capita to accelerate infrastructural provisioning process. As a result, Vietnam is quickly enjoying its industrialization and modernization.
2) improves the effectiveness and efficiency in infrastructure investment and operation and the quality of services'
3) promotes a progress in creating a transparent business environment to attract greater domestic and foreign investors to all economic sectors.

This policy opens a new era of service provision and investment in both urban and rural Vietnam. First of all, domestic private entrepreneurs and companies have created favorable business conditions once they show their interest in infrastructure development. For example, the HCMC People's Committee and the Central government of Vietnam granted a license (via a competitive bidding process) that allows an alliance of six

[18] http://thuvienphapluat.vn/archive/Nghi-dinh/Nghi-dinh-51-1999-ND-CP-huong-dan-thi-hanh-Luat-Khuyen-khich-dau-tu-trong-nuoc-sua-doi-so-03-1998-QH10-vb45440t11.aspx

domestic enterprises to invest in a Built-Operate-Own (B.O.O) Thủ Đức Water Treatment Plant (HCMC People's Committee 2004, Việt Báo 2004). The Thủ Đức B.O.O was first constructed at the end of 2005, and started its operation on 20 September 2010 (V. Thuật 2010). This is the rare case in Vietnam that was successfully mobilizing large financial resources from the domestic entrepreneurs for use in the water supply sector investment.

Secondly, constructing and developing infrastructure and environmental services do not have to solely rely on the state-owned infrastructure companies. The Vietnamese domestic investors have shown their interest in the urban water sector and see their investment in water production and service delivery as a potential source for profit. VINACONEX (Vietnam Construction and Export-Import) Corp., which has almost no experience in water production and service provisioning, has recently recognized as the most potential domestic investors in the urban water sector. This Corporation has successfully constructed and operated a large-scale water production and supply system in the Western region of Hanoi. The Corporation built a 600,000m$^3$/day water treatment plant using surface water from the *Đà* River and a transmission and distribution water network extended to the city of Hanoi. The cost of this B.O.O project is about 2,545 trillion Vietnamese dong (equivalent to $US121,706,000); and funding for the project is derived from the Corporation retained profit and domestic and foreign bank loans[19].

Inevitably, the city/provincial government's financial constraints will be less burdened if more domestic companies like VINACONEX Corp. are actively involved in investing in the urban water supply sector. At the same time, urban residents could hold a high hope that they would have more opportunity to access to clean drinking water. Because enterprises like VINACONEX Corp. have no obligation to serve the general public like many other provincial water supply companies and is driven by profitability, what would be major concerns to both the city government and residents are (i) whether private infrastructure companies like VINACONEX Corp. can achieve social objectives of the water supply at their expense of financial and commercial ones and (ii) to what

[19] http://www.intellasia.net/news/articles/legal/111196058.shtml

extent these companies would collaborate with the city water supply company to serve the public.

What makes the private sector participation in the water supply sector in Vietnam different from elsewhere is the Vietnamese state's strong dominance in the patronage of public utilities and in the management of urban service production and distribution. In this country, water and sanitation are viewed as public services, which are vital to Vietnamese people's well-being; and these environmental services are highly protected and subsidized by the central and provincial/city governments for the sake of the multiple publics.

In the urban water supply sector, the state of Vietnam truly acts as a gate-keeper that strictly monitors and regulates water tariff to protect its residents' right. Any intervention of the transnational corporations in the provision of services that diminishes the general public benefit is neither welcomed, nor acceptable. The withdrawal of Suez Lyonnaise (France), Tractebel (Belgium), and Pilecon Engineering (Malaysia) from the Thủ Đức's BOT water project in 2003 could be seen as an example. Although the development of Vietnam has been viewed as being driven by the international financial institutions and other donors' agenda and only "50 percent of urban inhabitants [in 2002] had access to piped water that meet national standards" (World Bank 2006: vii) due to poor performance of the public utilities, the water supply sector seems to be immunized from the proliferation of water privatization, strongly advocated, promoted, and somehow imposed by the World Bank[20] and others. The central government of Vietnam has not ever announced its preference in light of (not) approving the participation of foreign private actor in the water supply projects, especially since Vietnam is currently a member of the World Trade Organization; but the government still takes all efforts to limit the

[20] In collaboration with the Swiss Development Co-opperation (SDC) and Finland International Development Agency (FINIDA), the World Bank has recently launched two water supply pilot projects in Lim town (Bac Ninh province) and Minh Duc town (Hai Phong province) that promote the engagement of the private sector (WB 2004). The DBL (Design-Built-Lease) model, which is being executed in Vietnam, is basically another experiment of the World Bank unit-PPIAF (Public Private Infrastructure Advisory Facility,), which is assigned to provide finances to encourage any project that promotes privatization.

involvement of water transnational corporations in the production and supply of water in reality, according to a senior staff of the Ministry of Planning and Investment.

As reviewed, partnerships are highly encouraged in Vietnam mostly between public-public utilities and between domestic private sector and public utilities. Coupled with the implementation of decentralization efforts (Spencer 2007), which authorizes more decision-making authority and financial autonomy to the provincial/city government and public water utilities to take initiatives in water production and distribution, the encouragement of PPPs in Vietnam has significantly mobilized "socialization of urban water supply" through the involvement of not only the private sector, but also other segments of the civil society. Although domestic entrepreneurs might not contribute financially to the sector, as revealed through the case of Can Tho (Spencer 2007, 2008), Ha Noi (Nguyen 2004, 2008) Tien Giang province and HCMC (Dardenne 2006), their involvement shows a new institutional form that might significantly contribute to the improvement and enhancement of urban service provision in the near future.

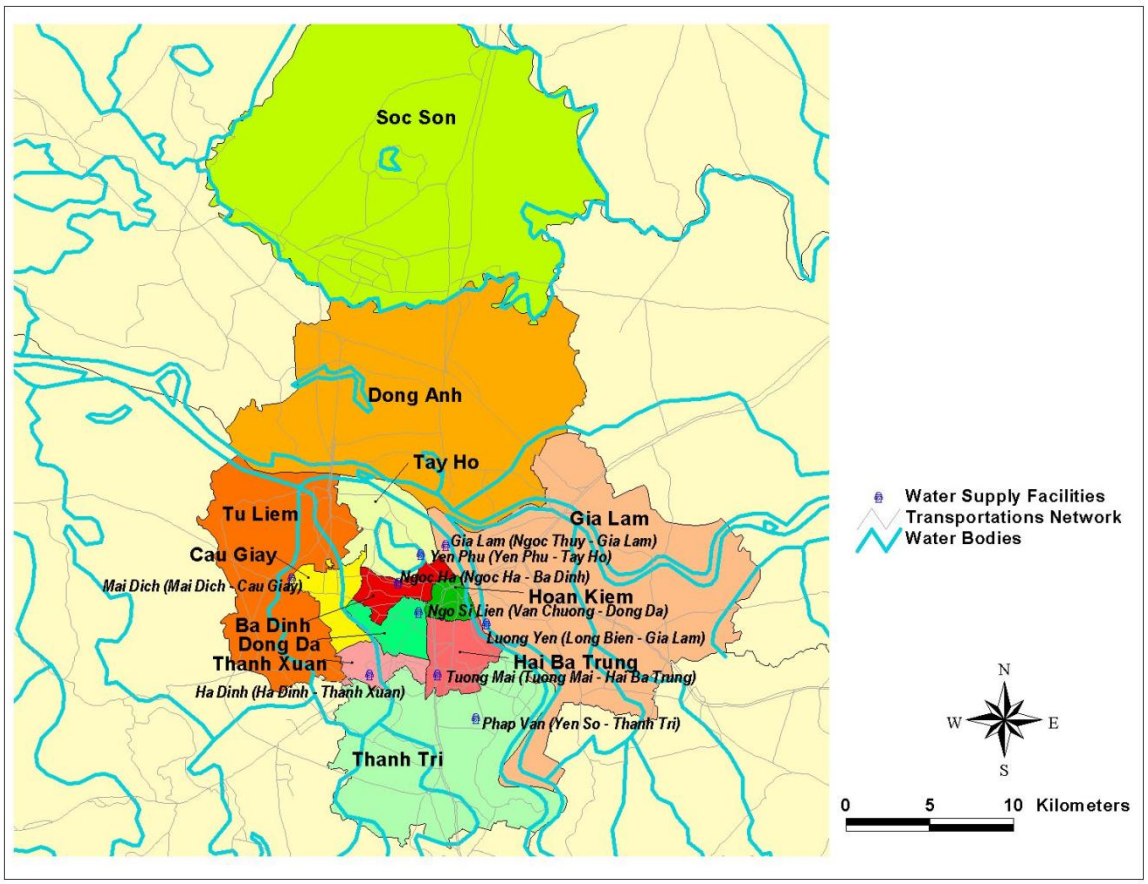
### *5.3.3 Water Supply in the City of Hanoi*

#### *5.3.3.1 A Brief Introduction to Hanoi Water Business Company*

The company was built and established in 1894 during the French colony under the name of Sở Máy Nước Hà Nội (Hanoi Department of Water Supply), and therefore it was first operated and managed by the French. It was taken over by the Hanoi government after the city liberation in 1954 with a new name that was – Nhà Máy Nước Hà Nội (Hanoi Water Factory) and that name was kept during 1954-1978. During 1978-1994, a new name was given: Công Ty Cấp Nước Hà Nội (Hanoi Water Supply Company). Since 1994, the company is officially named: Công Ty Kinh Doanh Nước Sạch Hà Nội (Hanoi Water Business Company – HWBC) (HWBC 2005). Like other water supply company, HWBC is under direct steering and management of the Hanoi People's Committee (HPC).

HWBC is managing ten water treatment plants (WTPs): Yen Phu, Ngo Sy Lien, Mai Dich, Tuong Mai, Phap Van, Ha Dinh, Ngoc Ha, Luong Yen, Cao Dinh, and Nam Du. Of the 10 plants, Cao Dinh va Nam Du have recently been added (HWBC 2006, Jenkins, Posco, and JINA 2011). The company also directly manages five water supply companies, which are Ba Dinh Water Supply Company, Hoan Kiem Water Supply Company, Dong Da Water Supply Company, Hai Ba Trung Water Supply Company, and Cau Giay Water Supply Company. In addition, HWBC possesses a number of factories that provide water equipments and material as well as services relating to water supply installation, operation, and maintenance.

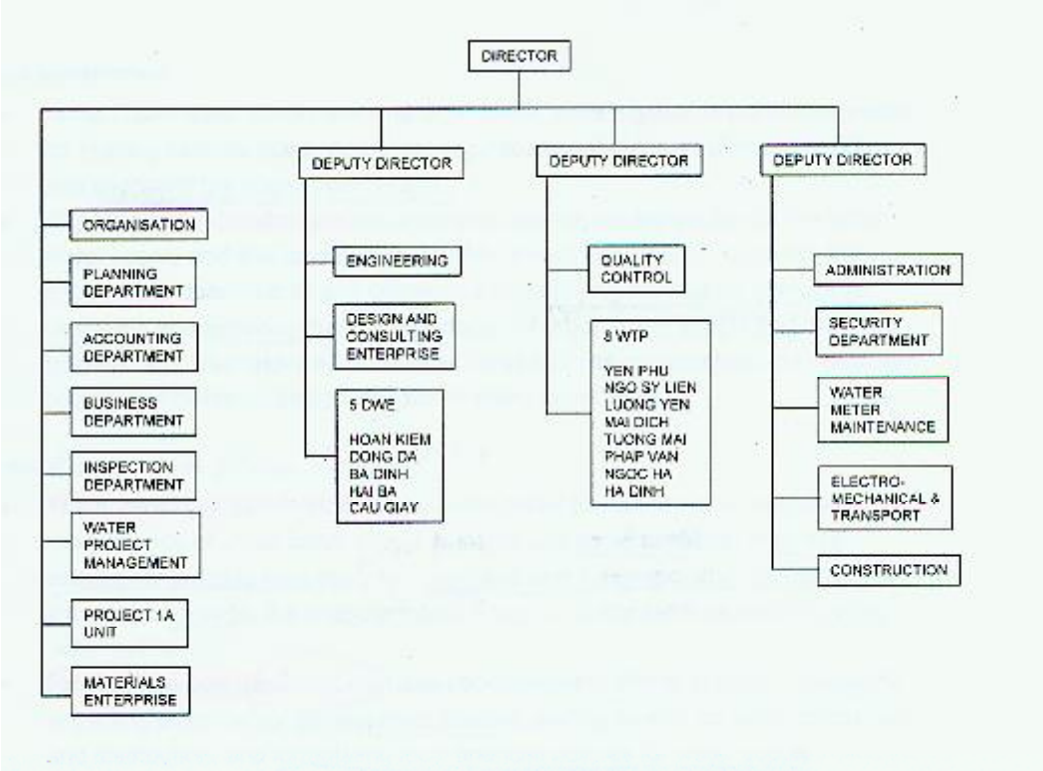
***Map 5.1 Water Treatment Plants of Hanoi Water Business Company***




The company is assigned five missions, under the HPC's Decree No 564/QĐ-UB, dated on 4 April 1994. They are: (i) production and provision of water for all types of

consumers, (ii) procurement and repair of water pipes, water meters, mechanical devices and equipment to meet the requirements of the water sector, (iii) design, construction and repair of small water plants and medium size networks at the request of customers, (iv) collaboration with local government to protect groundwater resource and water supply systems, and (v) preparation of investment plans and investment projects in accordance with the Water Master Plan of Hanoi City[21] and effective implementation of the water sector development program for Hanoi in cooperation with the international consultants (HWBC 2005). The water treatment plants (WTPs) and water distribution enterprises are assigned to manage, distribute, and be responsible for water billing and revenue collection within the water service coverage areas.

***Figure 5.3 Organizational Structure of Hanoi Water Business Company***




*Source: Do 2003*

[21] The Water Master Plan of Hanoi city was commissioned by Hanoi People's Committee and Hanoi Transportation and Urban Public Works Service.

In a conversation with the researcher, a leader of HWBC expresses his pride of the company's long tradition and being a company's member. He, however, is aware of many challenges facing the company, especially when it has to fulfill the mission given by the HPC. The following sessions present the status of HWBC's business, issues associated with water service delivery, water accessibility and challenges of the company over the time. Information used for these sessions originates from achieves, secondary data, the Vietnamese water sectoral reports, and interviews with the representative of HWBC.

*5.3.3.2 The Performance of Hanoi Water Business Company*

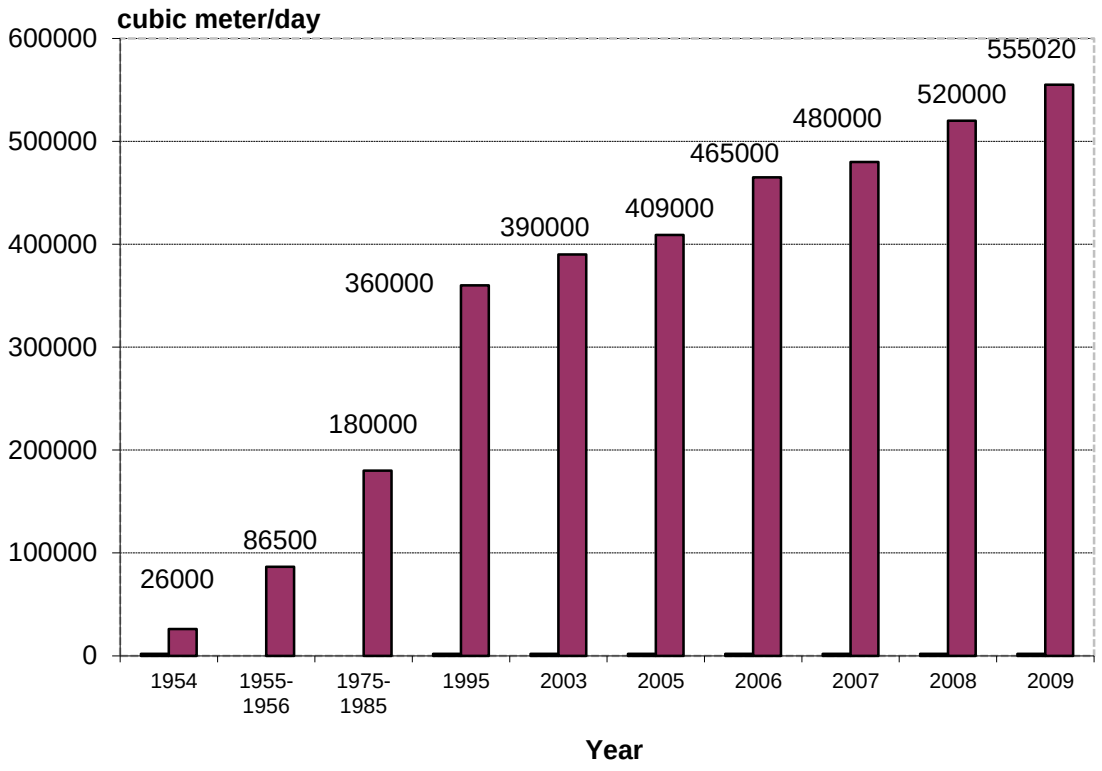
HWBC has been using groundwater intake since its establishment to provide piped water to Hanoi residents. HWBC's 10 water treatment plants are exploiting groundwater from 182-drilled wells. Generally, the quality of the groundwater source, exploited and treated by the HWBC's treatment plants is reliable. However, Ha Dinh and Phap Van – the only two southern water treatment plants are facing issues of ammonia treatment. Water wells of these two water treatment plants have been "badly polluted by organic maters and ammonia content exceeds limit value." (GKW Consult 1994: 31) GKW (1994) also indicates the fact that most groundwater supply systems are suffering from well deterioration which leads to reduced flow and quality of raw water, due to improper methods of construction, insufficient equipment and other technical and management flaws.

According to a leader of the company, over several generation of the company leadership, HWBC has put tremendous effort to upgrade the capacity of its WTPs so that it can fulfill its mission to serve Hanoi urban inhabitants and the need for the city's industrial development. Although the total capacity of the company's WTPs has been increased over the last 50 years (see Figure 5.4) from 26,000$m^3$/day (1954) to

555,020m$^3$/day (2009), the company has not been able to meet the needs for clean water of the Hanoians in both urban and peri-urban districts.

As elsewhere in Vietnam, the provision of clean water supply in Hanoi has not met the consumption needs of the city inhabitants, industries, and services (MOC 1999). Access to water has been reported statistically inconsistent. UN-HABITAT (2003b) states that nearly one-third of Hanoi inhabitants have no access to water services, especially people in the peripheral areas, while a recent report prepared for the Hanoi Capital Construction Master Plan to 2030 and Vision to 2050 reveals that more than 50 percent of the Hanoi population has no piped water accessibility (Perkins, Posco, and JINA 2011).

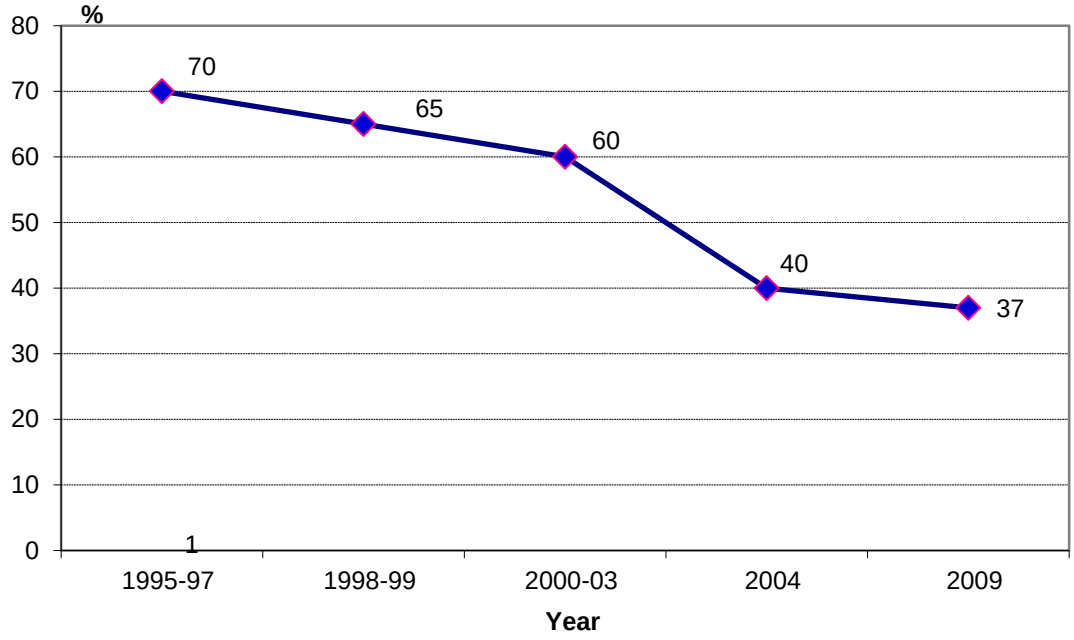
***Figure 5.4 Water Supply Capacity of HWBC from 1954-2009***




*Source: HWBC 2005, 2006, 2007, 2008, Perkins, Posco and, JINA 2011*

Ironically, while a significant proportion of Hanoian residents (54 percent) has no access to piped water, and therefore, has to rely on wells, surface water, and rainwater, the percentage of unaccounted for water and non-revenue water during water distribution remains relatively high (32.35 percent for 2007) (see Figure 5.5).

***Figure 5.5 Percentage of Non-Revenue Water During 1995-2009***

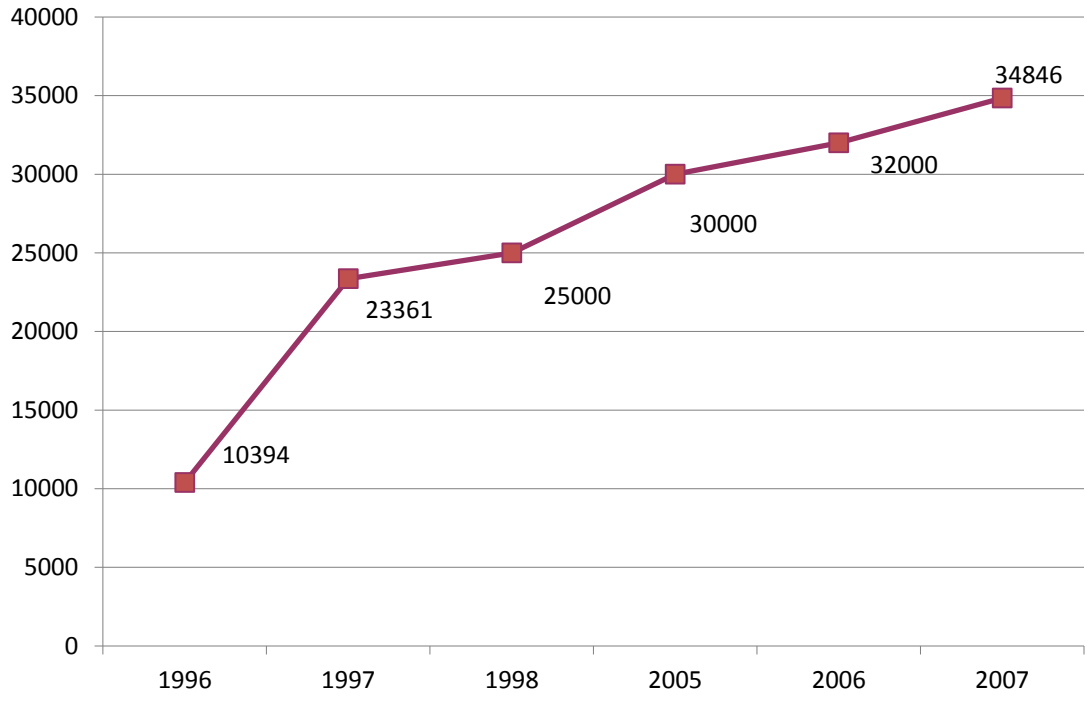



*Source: McIntosh and Yniguez 1997, JICA 1997, MOC 1999, Adcom 2003, Do 2003, Tin Tuc Vietnam, 2004, Perkins, Posco, and JINA 2011.*

One of the reasons for high rate of unaccounted for water and non-revenue water in the 1990s and early 2000s is attributed to the existence of public taps and a lack of water metering. Only about half of commercial, industrial, and institutional connections and 24 percent of house connections were metered in 1995 (Bui Van Mat 1998). Non-metered consumers pay a flat rate based on a fixed monthly per capita consumption,

especially at the areas with low water supply capacity (McIntosh & Yniguez 1997, Quang 2004). In 1996, around 30 percent of the company's total clients (133,232) used metered water.[22] The number of water meters installed for HWBC's clients has gradually increased from 1996-2007 (Figure 5.6). By 2009, HWBC was able to install water meter for 98 percent of its clients (Perkins, Posco, and JINA 2011).

***Figure 5.6 Number of Water Meters Installed from 1996-2007 in Hanoi***




*Source: Bui Van Mat 1998, HWBC 2006, 2007, 2008*

HWBC also admitted that the deterioration and brokenness of water supply pipeline system in block housing areas is attributed to both water leakages (high percentage of non-revenue water) and the pollution of water quality (Bui Van Mat 1998, Tuyet 2004). The inefficient management and incapability to control water distribution

[22] By the end of 1996, a flat rate was applied to calculate water consumption for around 70 percent of clients (Nguyen Si Bao 1998).

from seven water supply companies also contribute to the loss of the company revenues and low water accessibility in some urban districts of the city.

The quality of water is another challenge facing HWBC. Some of its WTPs are inappropriate to the raw water quality. High concentration of iron (8.1-11.2mg/l) ammonia (8-25 mg/l) (data of 1997) to 10.4-19.7mg/l (data of 2003) presents in raw water in Phap Van, Tuong Mai, and Ha Dinh WTPs making the treatment processes inadequate for this chemical removal (JICA 1997, HPC 2003, HWBC 2005, Perkins Eastman Architects, Posco E&C, JINA Architects 2011). Moreover, inappropriate treatment process at water treatment plants certainly affect the quality of clean water, especially in those region with high arsenic concentration in groundwater, such as Hai Ba Trung district and some other rural districts of Hanoi, i.e., Tu Liem, Gia Lam, and Thanh Tri (Nguyen Trong Tin 2000, Berg, Tran, Nguyen, Pham, Schertenleib, and Giger 2001, Christen 2001, Nguyen and Nguyen 2002, Tong 2002, Giger, Berg, Pham, Duong, Tran, Cao, and Scherenleib 2003). In Hanoi's southern districts, arsenic concentration is found and exceeds the Vietnamese drinking water standard, set up by WHO-50 milligrams/liter (mg/l) in some places (MOC 1999).

Results of recent research conducted by Michael Berg, Hung Nguyen, and the Vietnamese government[23] revealed that water from the tubewells was not treated, and in the most heavily affected rural districts of Hanoi, the average arsenic concentration of found was 432 mg/l. Of the tubewell samples taken, 48 percent were found to contain arsenic levels above 50 mg/l and 20 percent exceeded 150 mg/l (Christen 2001). In another research implemented by UNICEF with 200 wells tested sample in Hanoi, "35 percent did not meet the Vietnamese standard, 10 percent had "critical" levels of 100-300 mg/l arsenic, and 3 percent had "dangerously high" levels, exceeding 300 mg/l." (Christen 2001:6)

[23] Berg, Nguyen and co-workers sampled 68 private tube wells three times over a nine-month period and every two months. Of the tube well samples taken, 48 percent were found to contain arsenic levels above 50 mg/l and 20 percent exceeded 150 mg/l (Christen 2001: 3).

Similar incidences of arsenic level in water were also found in the results of Hanoi's eight big drinking water treatment plants, which serve the city's estimated 2.5 million people[24]. The high arsenic concentrations investigated in the tube wells (48 percent above 50 mg/l and 20 percent above 150 mg/l) show that several million people consuming untreated groundwater might be at a considered risk of chronic arsenic poisoning (Berg, Tran, Nguyen, Pham, Schertenleib, and Giger 2001: 2621).

In fact, issues of water supply in Hanoi, such as low service coverage, high proportion of non-revenue water and unaccounted for water, low percentage of water metering, and capacity of suppliers, are connected to the history of water distribution system, water financing, and investment for the services. First, many parts of urban water supply and sewerage network at present in Hanoi were built for about a century ago and were not renovated until 1985-the time Vietnam obtained financial support from Finland (see Table 5.3). For a long period of time, there existed a number of public taps that significantly contributed a large non-revenue water rate (McIntosh and Yniguez 1997, Nguyen Si Bao 1998).

***Table 5.3 A Brief History of the Hanoi Water Supply System***

| **Year** | **Characteristics** | | | | |
|---|---|---|---|---|---|
| | | Tube wells | Water treatment plants | Total capacity | Pop. served targeted |
| 1894 (French colonial time) | Hanoi water supply system was built | | | | |
| 1954 (Hanoi was liberated | The system lengthened 80 km | 7 | 6 (Yen Phu (1896), Don Thuy (1934), Bach Mai (1936), | 26,000 $m^3$/day | 24,000 |

[24] Analysis of raw groundwater pumped from the lower aquifer for the Hanoi water supply yielded arsenic levels of 240-320 mg/l in three of eight treatment plants and 37-82 mg/l in another five plants (Christen 2001).

| | | | | | |
|---|---|---|---|---|---|
| from French colony) | | | Ngoc Ha (1939), Ngo Si Lien (1944), and Gia Lam (1953) | | |
| 1955-1965 (Peaceful time) | | | Two more WTP were built: Luong Yen (1957) and Tuong Mai (1963) | 83,500 $m^3$/day | |
| 1965-1975 (sabotage time during Vietnam-American war) | Hanoi was bombarded and heavily destroyed | | One more WTP was built: Ha Dinh (1972) | 154,500 $m^3$/day | 650,000 in both urban and periphery. 60 percent of urban areas were covered. |
| 1975-1985 (centrally planned system) | The system was maintained and renovated. Length of the network was expanded to 250 km.<br><br>New network: 400km | 3 | 9 | 210,000 $m^3$/day | |
| 1985-1997 | A joint decree between the Vietnamese and Finland Governments was signed. FINIDA supported HWBC to renovate and newly develop the water supply system. | | | 380,000 $m^3$/day | |
| 1992-93 | Hanoi Water Supply Plan, approved in 1993 | | | | |
| 1995 | Built water supply network for firefighting with 74 fire hydrants citywide | | | | |
| 1996 | A JIA's study on Hanoi water supply | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | development to 2010 | | | | |
| 1997 | M-POWER (USA) company conducted a feasibility study for a HWBC's B.O.T project. | | | | |
| 1998 | Gia Lam water supply company was built under JICA's ODA. 601km with two old and new water supply networks;<br><br>Hanoi Water Supply Plan to 2010 was developed; | 30 | 8 big ones and a couple of small stations. | 380,000 $m^3$/day | |
| 1998-2000 | Project 1A (water supply and environment in Hanoi) Use credit loan of the World Bank | | | | |
| 2001 | | | Built Cao Dinh 1+2 WTP with the capacity of 30,000 $m^3$/day. Renovation in 2005 | | |
| 2003 | Proposed a feasibility study on Building a Water Treatment Plant Using Surface Water from Red River (first capacity: 150,000$m^3$/day) | | | | |
| 2004 | | 69 | Built Nam Du 1+2 WTP with the capacity of 30,000 $m^3$/day. Renovation in 2007 | | |

| | | | | | |
|---|---|---|---|---|---|
| 2009 | A total length of the distribution system (D300-D1500 mm) = 167,929km; A total length of the distribution system (D90-D250mm) = 1,003,728m. | | 11 WTPs with total capacity of 555,020 $m^3$/day | | 1,924,261 people (90%) |

*Source: VIWASEEN 1995, Nguyen Si Bao 1998, Tuyet 2004, Perkins Eastman Architects, Posco E&C, JINA Architects 2011*

*5.3.3.3 Challenges of the Hanoi Water Supply*

Acknowledging the fact that HWBC has gradually managed to improve its performance in water production and service provision to serve Hanoi residents, a leader of the company, however, indicates interconnected challenges facing the company: institutional arrangement issue, capability to keep pace with the city growth and population growth, funding accessibility, and water resources. These challenges potentially influence the existing performance of the company and its possibility to meet the needs of many underserved inhabitants in one of the most dynamic city in Vietnam.

Institutional Challenge

The Vietnamese legal framework, which is used to regulate the organization, operation and maintenance of public goods and service provision enterprises, has not completely thorough, and this has affected the organizational management, performance, and future development of a state-owned water provision companies, like HWBC. The Vietnamese Law on Enterprises, first enacted and adopted on April 20th, 1995, classified state-owned enterprises into two groups: commercial driven enterprises and public service provision-based enterprises. In such classification, HWBC belongs to the latter group. Later, the 2003 adopted Law on Enterprises, dated on 26 November 2003, eliminates the aforementioned classification of the state-owned enterprises. The 2003 law officially creates the opportunity to any state-owned enterprise that shows its interest in

public goods and services investment under which drinking water is classified (Pham Sy Liem 2005). In that sense, HWBC, like other city/provincial directly managed water supply companies, is no longer the sole producer/provider of the water service. Specific rights and obligations of the public goods/services provision-based enterprises are clearly defined in Article 10 of the law, as follows[25]:

**Article 10** *Rights and obligations of enterprises involved in production or provision of public services or products:*

1) The rights and obligations specified in articles 8 and 9 and in other relevant provisions of this Law.

2) To conduct cost accounting and be entitled to cost recovery at the price for tender implementation, or collect charges for provision of services in accordance with the regulations of the authorized State body.

3) To be guaranteed an appropriate period for production and supply of products or provision of services in order to recover its investment capital and gain reasonable profits.

4) To produce and supply products or provide services in correct quantity and quality and on time as agreed at the price or charge rate stipulated by the authorized State body.

5) To ensure that the same equitable and favorable conditions are applicable to all types of customers.

6) To be responsible before the law and customers for quantity, quality, terms of supply and prices, charges for supply of products or provision of services.

7) Other rights and obligations as stipulated by the law.

[25] http://www.e-alin.org/file/attach/upload_4102989599440916659.pdf

In addition to the rights and obligations, specified in Article 10 above, the state-own public goods provision enterprises have:

(i) To produce and distribute public goods/services via either one of the three modes, which are competitive bidding, orders, and assigned/designated plans from the city/provincial government.

(ii) To receive public funding from the government to conduct assigned tmissions in public goods/services production and provision.

(iii) To be accountable to clients and to the national legal system for products and services, produced and supplied by the enterprise.

(iv) To organize and implement commercial activities to supplement their defined missions, and those commercial activities must not jeopardize their primary mission, which is to produce and deliver public goods/services. (Pham Sy Liem 2005)

According to a HWBC leader, the company is trapped under an unclear distinction whether it is a business enterprise or a public utility. Since taking over from the French people in 1954, HWBC has been providing services to residents of Hanoi under the command and plan of the Hanoi People's Committee. However, in accordance with the regulation under the 2003 Law on Enterprises and the Government of Vietnam's Decree No 31/2005/NĐ-CP in regard to the Production and Delivery of Public Goods and Services, HWBC remains a state-owned enterprise but is not obligated to serve the multiple public as other enterprises being assigned to produce and supply public goods/services must do. The underlying cause is that water production and service provision are not classified as public goods/services under the regulatory framework of Vietnam, according to the two aforementioned lawful documents. And so does the reality. The chairman of Hanoi People' Committee has never signed any legal document under which HWBC is a state-owned enterprises that produces and provide water as a public good/service (HWBC 2005).

The fact is there is a real gap between the impact of the Vietnamese legal framework and the practice of companies operating and participating in the urban water supply sector. In the perception of the Vietnamese people piped water is a public good because it is very essential to life and urban inhabitants, generally, have a high expectation from the city government to secure clean drinking water for them. This perception has been, undoubtedly, socially and politically constructed in the urban context of Vietnam because of the state's heavy subsidy policy in the water sector both prior to and after the *Đổi Mới* policy. For the case of Hanoi, the HPC strictly monitors and regulates HWBC's operation and plan, as it provides the city budget to the company and significantly arranges for ODA projects to accommodate the company's plans annually. Moreover, the decentralization policy initiated by the central government provides the city authority more autonomy in its decision-making and financing HWBC's water supply activities and projects. The city/provincial government in general, HPC, in particular, benefits water users by retaining a low water tariff. HPC, in principle, would carefully review any proposal of water tariff increase proposed from HWBC. To compensate for HWBC's low revenue because of the low water tariff, HPC gives subsidization for the company's water pricing. Perhaps, the city government does not want to deal with any complaints/claims from the general public, catalyzed by the mass media, when the company submitted a proposal of change in water tariff, reported by a HWBC leader. "You know, people complain to journalists all the time. Every summer we have to deal with intermittent or disrupted supply in certain corners in the city, and certainly we will have to explain to journalist why those incidents actually happened and answer questions about whether our operation was efficient, our funding or ODA loan was efficiently used and invested, etc., That happens almost every year [chuckled]," added by the HWBC leader.

Population Increase

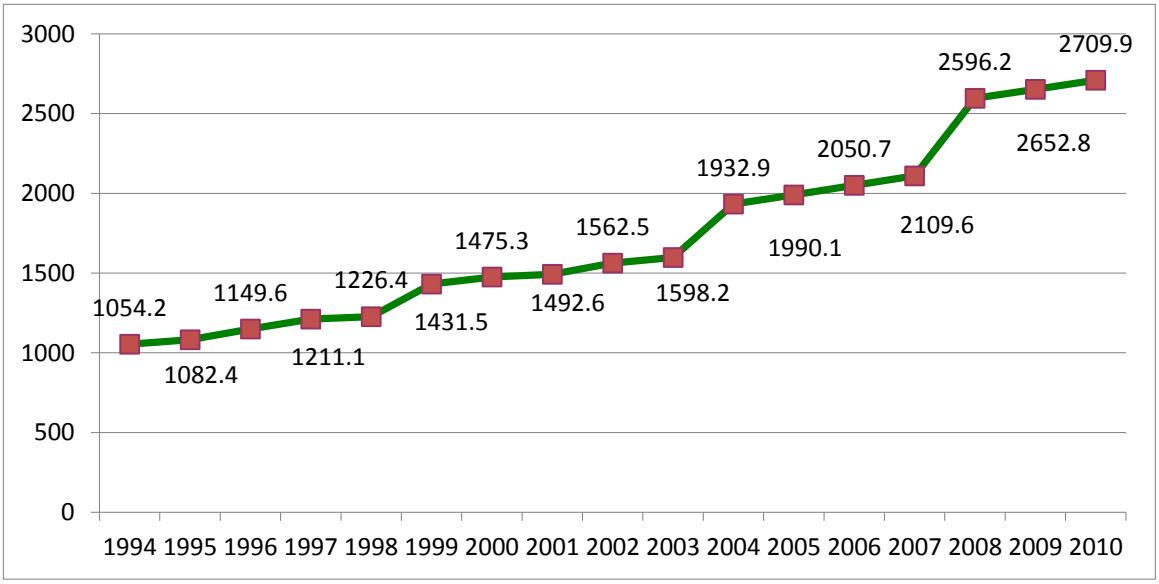
The water supply sector in Vietnam is structured into two separate systems - the urban and the rural water supply - and the provincial/city water supply company is

assigned a mission to serve residents residing in urban areas. Non-urban areas of a province will be served by Center for Rural Water Supply and Sanitation, which is directly managed and steered by Ministry of Agriculture and Rural Development (Stone and Webster Consultants 2002). In the case of Hanoi, because the city's area has been extended three folds larger (the city's current area is 3,344.6km$^2$) than the original size in August 2008, rapidly demand for drinking water in newly included urban centers certainly is one of the major challenges for the HWBC. A concern of one of the HWBC leaders below somehow reflects challenges facing the company:

> "The expansion of the city, generally speaking, brings us both opportunity and challenge. People said that we would have more customers as the city is growing. Many new urban housing projects and new towns are proposed and constructed in Hanoi as you can see. We are concerned the most of our business strategy and how to meet the needs of our new customers. Everyone living in urban areas wants to use piped water, and thus, we feel more about pressure than we are excited about new business opportunity. Don't you agree with me? I even have not mentioned about our concern over additional funding, reliable source for raw water, and coordination with other water treatment plants that we have never worked with…wow… what can I say? We will do what we have to do…" (Key informant interview, case 33)

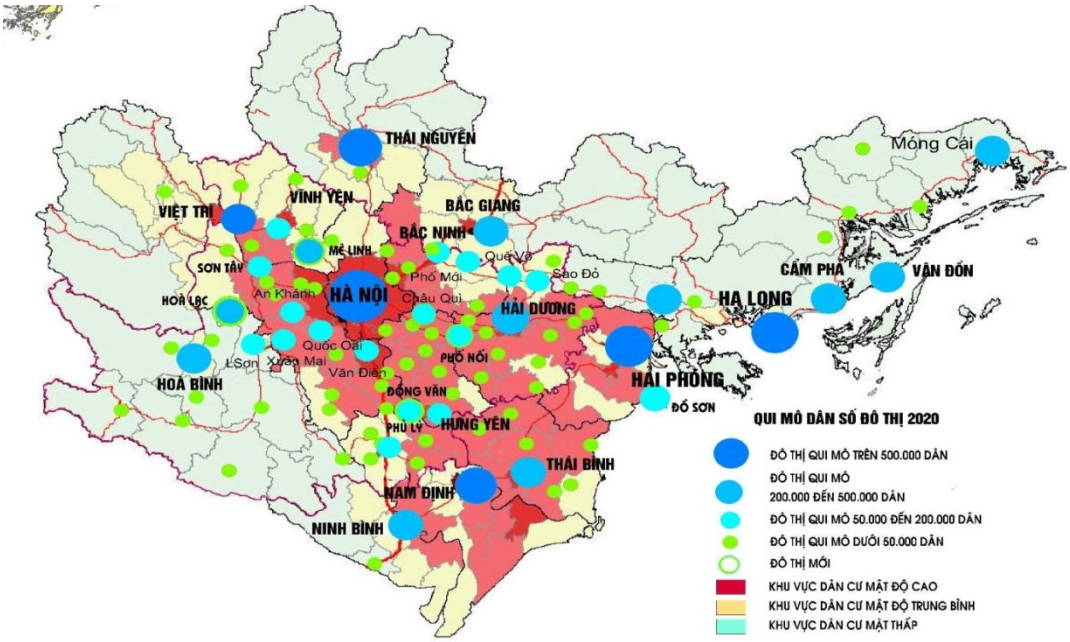
The HWBC representative's concerns are very understandable. Hanoi's population has increased over the years for the past two decades and so is the proportion of its urban population (see Figure 5.7) and is projected to continue its trend in the future (see Map 5.2)

***Figure 5.7 Urban Population of Hanoi from 1994-2010***




*Source: Perkins, Posco, and JINA 2011, Hanoi Statistical Office 2011*

***Map 5.2 Projection of Hanoi's Population Distribution in 2020***




*Source: HAIDEP 2006*

As discussed in the first section of the chapter, the city continues growing as the biggest urban agglomeration in the North of Vietnam because of its net migration. Thus, it is the growth of population in urban areas concerning HWBC the most. I have learned through the company annual reports and my exchanges with HWBC representatives that the company has taken an incremental approach to gradually adapt to the increase in demand from the city inhabitants. Improving the quality of the service and efficiently operating its business are strategies the company is trying at best as of now. Upgrading the water supply systems, applying technology-based network monitoring to reduce non-revenue water rate, improving billing system, raising public awareness of preserving water resources, and providing mid-career training to improve the staff capacity have been employed by HWBC. However, the company still faces two other factors that go beyond its control which are the water resources and water finance.

Searching for Funding and Water Resource

As the primary water supply company in Hanoi, HWBC's business development plan is strongly influenced by the City Master Plan and the National Urban Water Supply Strategy. The recently approved Hanoi Construction Master Plan to 2030 and vision to 2050 and its proposed plan for urban water supply, which was approved by the Prime Minister in 2011, set the following goals and demands for the city water sector as presente in Table 5.4.

The planed water production and supply indicators, as can be seen in Table 5.4, reflects that location of residence matters to water accessibility and the amount one might be entitled. What could be possibly inferred from the table is that HWBC is expected to serve the inhabitants dwelling in areas classified as urban areas of Hanoi whether it is in the city core or in a rural district. The core residents have higher demand for water compared to other urban areas in Hanoi. The water demand of residents residing in areas defined/classified as rural areas would not be met, theoretically, by the urban water supply system.

***Table 5.4 Goals and Demands for Hanoi's Water Supply in 2020, 2030, and Vision to 2050***

| | | 2020 | 2030 | 2050 |
|---|---|---|---|---|
| Goals | Central (Old Hanoi's urban districts) | 160-170 (100%) | 170-180 | 190 |
| | Satellite cities (coverage rate) | 130-150 (80-90%) | 140-160 (100%) | 170-180 |
| | Rural urban districts (coverage rate) | 110-120 (70-80%) | 120-140 (90%) | 150-160 (100%) |
| Demands | Demand for $m^3$/day | 1,911,024 | 2,462,796 | 3,233,144 |
| | Demand for capacity $m^3$/day | 3,039,000 | | |
| | Funding demand (million US$) | 837 | | |

*Source: Compiled from Perkins, Posco, and JINA 2009, 2011*

If water supply companies of Hanoi are all working to achieve the goats (shown in table 5.4), the Hanoi People's Committee might have to monitor and coordinate their business performances and funding sources; and these companies have to jointly work. To achieve the set goals, according to a HWBC leader, the company will have to upgrade their existing WTPs and build new ones. In addition, the company will certainly have to build new water distribution system and closely work with other companies in the city to make the goals possible. While HWBC and other public water supply utilities have been criticized for their low tariff levels, which fail to cover all costs of operation and provide fair return on the investment capital, their weak management know-how, insufficient capacity, and lack of commercial orientation in operation (World Bank 2000), how could they secure water resources and funding to achieve the set goals is a fair question to ask.

As the water resource issue is concerned, HWBC, over the past century, has been relying on groundwater for its business. According to the company annual reports, the total capacity of the existing 12 water treatment plants (with a total of 207 active wells) in 2009 was 555,020$m^3$/day and the company faces no challenges in providing raw water for its current distribution systems. This number is a bit higher compared to the number

of 542,020m$^3$/day, which has recently been reported in the Hanoi Construction Master Plan to 2030 and Vision to 2050 report (Perkins, Posco, and JINA 2009). A list of WTPs with detailed information on their capacity is provided in Table 5.5.

***Table 5.5 Hanoi's Existing Water Treatment Plants and Their Production Capacity***

| *Order* | *Name* | *Year of Construction* | *Year of renovation* | *Number of active wells* | *Average depth of the wells (m)* | *Capacity (m$^3$/day)* |
|---|---|---|---|---|---|---|
| 1 | Yên Phụ | 1909 | 1970, 1977, 2005 | 33 | 70.06 | 94,760 |
| 2 | Ngô Sỹ Liên | 1944 | 1987 | 19 | 75.50 | 47,900 |
| 3 | Ngọc Hà | 1956 | 1970, 1992 | 14 | 66.98 | 35,020 |
| 4 | Pháp Vân | 1988 | | 11 | 62.31 | 22,050 |
| 5 | Mai Dịch | 1988 | 1991 | 31 | 59.62 | 65,920 |
| 6 | Hạ Đình | 1967 | 1972, 1999 | 12 | 71.22 | 23,100 |
| 7 | Lương Yên | 1959 | 1992 | 15 | 69.89 | 56,140 |
| 8 | Tương Mai | 1962 | 1989 | 13 | 79.75 | 23,680 |
| 9 | Cáo Đỉnh | 2001 | 2005 | 19 | 69.49 | 57,680 |
| 10 | Nam Dư | 2004 | 2007 | 18 | 70.32 | 60,770 |
| | Bắc Thăng Long | 2004 | | 9 | 60 | 22,000 |
| 12 | Gia Lâm | 1992 | | 13 | 80 | 33,000 |
| | Total | | | 207 | | 542,020 |

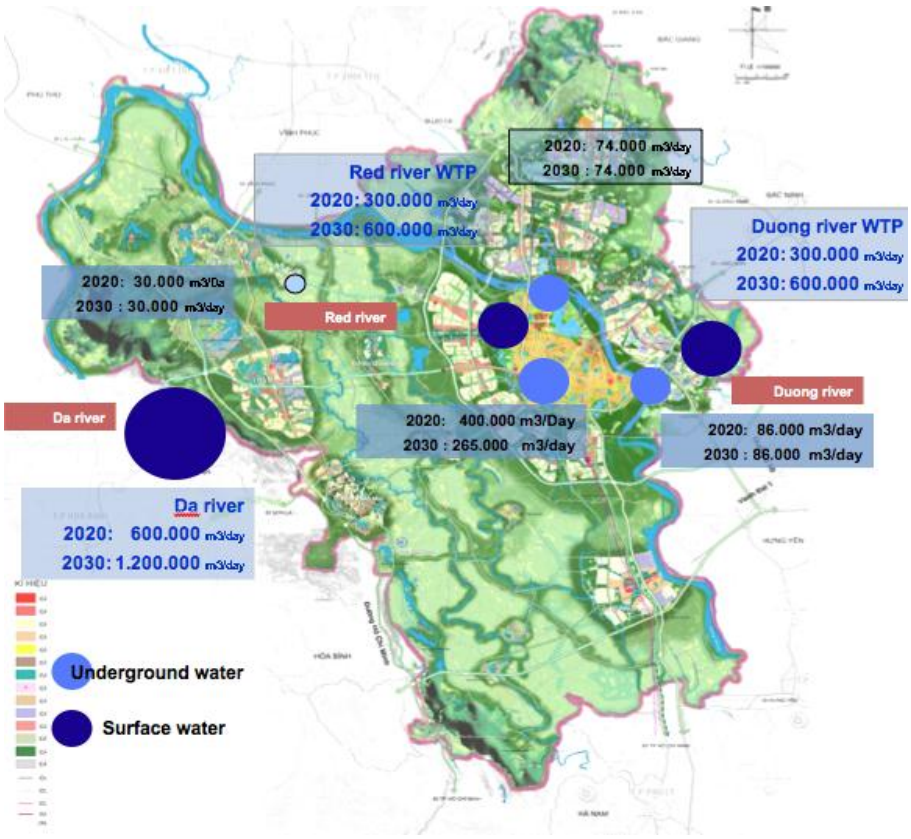
*Source: HWBC 2005, Perkins, Posco, and JINA 2011*

According to a JICA expert, the goal set in the Hanoi Construction Master Plan is unrealistic and infeasible because of required funding. More specifically, this expert states that it is ambitious to have the whole urban areas of Hanoi under HWBC's coverage of services. To translation that ambition into practice, the company has to build

additional 36,000 km of piped network, improve its WTPs' capacity to 4,600,000m3/day and all in all the total of investment would be approximately US$2 billion.

A leader of HWBC released that the company would not be able to keep pace with the demand because it faced water resource (raw water) shortage. Currently, HWBC is negotiating to purchase water from VINACONEX, the corporation constructed a WTP using surface water from the *Đà* (Da) river in Hoa Binh (a neighbor province of Hanoi) to meet the need of urban inhabitants in the West of the city. To secure raw water for the near future, HWBC has planned to construct two water treatment plants for surface water exploitation from the *Hồng* (Red) and *Đuống* rivers to combine with its continung groundwater extraction (see Map 5.3).

***Map 5.3 HWBC Water Supply Plan to Accommodate the Extended Hanoi's Urban Population***




*Source: Perkins, Posco, and JINA 2011*

These two WTPs are planned to be constructed by the two rivers and their capacity is estimated at 300,000$m^3$day (in 2020) and 600,00$m^3$/day (2030). If these two WTPs are going to be built, their construction cost is estimated at $US837 million (HWBC 2003, Perkins, Posco, and JINA2009). Then, it is reasonable to ask if HWBC is able to secure sufficient capital for its investment. HWBC proposes to rely on an ODA from Austria for the *Đuống* (Duong) river WTP construction and to borrow loans from Vietnamese commercial banks as well as to mobilize domestic resources from public-private partnership schemes for the Red river WTP construction (HWBC 2003, MOC 2006).

Financially, HWBC is not autonomous. The company heavily depends on grant financing from city government, ODA, and foreign loans. The city government annually grants the company with money from the city revenue, but the amount is not fixed each year, i.e., VND241,450 million for the year 2005, VND62,900 million for the year of 2008 (HWBC 2006, 2008). The city government also directs ODA loans to the company one it approves of the company's business plans. HWBC has been benefited from foreign non-refundable aids or loans from Denmark International Development Agency (DANIDA) (old distribution system renovation during 1998-2000), FINIFA (old system upgrading and build up a new system from 1985-1997), JICA (1997), French

Government (support to supply new pipeline for water distribution and metering installation during 1999-2000), and the World Bank (water supply and environment project for 1996-2000) (JICA 1997, Nguyen Si Bao 1998). Projects and programs offered by foreign sources have brought not only finance but also technical assistance and training for city water supply companies. The improvements brought from foreign assistance are manifested in the reduction of non-revenue water and physical loss and the increase of water meter installation, as discussed. However, HWBC also faces with the mechanism for re-loan of some ODAs with high interest rate (6-7 percent). When the company has to pay for this interest rate (with every US$ 100 million, the enterprise has to return nearly VND 90 billion), it has to generate revenue through water tariffs (Nguyen Ton 2000).

Because water tariffs, set by the Hanoi People's Committee, are much lower than the actual required production costs (Nguyen Si Bao 1998, Do 2003, Quang 2004, Tin Tuc Vietnam 2004, Tuyet 2004), HWBC wants to increase the tariff to compensate for its production, distribution, and system maintenance expenditures. The Hanoi People's Committee, however, always tries to stabilize water pricing because its constituent body perceives water is a public good and choose to subsidy the users. While gasoline and electricity sectors have increasingly adjusted their pricing several times for the last five years, the urban water supply sector of Hanoi has made a slight increase in its pricing adjustment, which was approved by the city government in December 2009 (see Table 5.6). However, the new pricing of water is still, according to the department of Finance, Labor, and Construction of Hanoi, far below the construction and maintenance costs, and therefore, the government of Hanoi continues its subsidy for the urban water supply sector.

***Table 5.6 Water Tariff Adjustments for Domestic Uses in Hanoi***

| | Prior 1/1/10 | | Since 1/1/10 | |
|---|---|---|---|---|
| Domesic Uses of Water | Price (VND) | Price (US$ | Price (VND) | Price (US$) |
| 1st 16m$^3$ | 2,800 | 0.13 | 4,000 | 0.19 |
| 16-20m$^3$ | 3,500 | 0.17 | 4,700 | 0.24 |
| 20-35m$^3$ | 4,500 | 0.21 | 5,700 | 0.27 |
| >35m$^3$ | 5,000 | 0.24 | 9,400 | 0.45 |

*Note: 61.36 percent water users are in this category*

*Source: Doan Loan 2009*

### *5.3.4 Challenges and Opportunities for Peri-Urban Inhabitants' Water Accessibility*

Compared to other rural communes that are located away from the city, the peri-urban communes are undergoing their transition to urban administrative units. The peri-

urban communes of Hanoi have been a destination of many rural-urban migrants who go to seek for educational and economic opportunities in the city. A number of inhabitants in the commune has gradually increased over the year because of the net migration, leading to an exponentially high demand for dwelling space, electricity consumption, social and environmental services, such as school, healthcare, trash collection and cleaning water supply. While electricity, housing market, and other services are accommodating peri-urban inhabitants' needs that facilitate their transition into urban residents, the urban water sector is not yet there for their needs.

From administrative management perspective, the transition process occurring in peri-urban communes of Hanoi does not give them entitlements to piped water supply as urban wards. On paperwork, they are classified as rural administrative unit. HWBC is not obligated to serve peri-urban communes. The expansion of Hanoi's area has imposed many challenges on its business plan, as discussion in the previous section. Because HWBC's operation is not commercially, but socially objective driven, there is no motivation for the company to include more clients without guiding policies and plans from the Hanoi city government. While the participation in the water supply sector via B.O.O and BOT projects has not been impressively recognized within the country, secure financial plans for the purpose of water supply network extension to the peripheral areas of Hanoi will be strongly relied on the political will of the government of Hanoi, rather than HWBC itself.

In the Hanoi's peripheral areas, groundwater has been used as the principal source for residents (see Map 5.4). Before drilling well techniques and technology prevailed, rainwater and surface water were major source for rural communities and peri-urban inhabitants. The majority of peri-urban dwellers do not use these two raw water sources anymore because of their unreliable quality, which is claimed to be associated with air pollution and rapid industrialization of the city. In 2008 there were about 20,000 wells

In Co Nhue commune as elsewhere in the Hanoi's peri-urban areas, almost every household has one drilled well to extract groundwater. In many Co Nhue residents' perception, it is simple and cheap to treat groundwater, which generally follows the

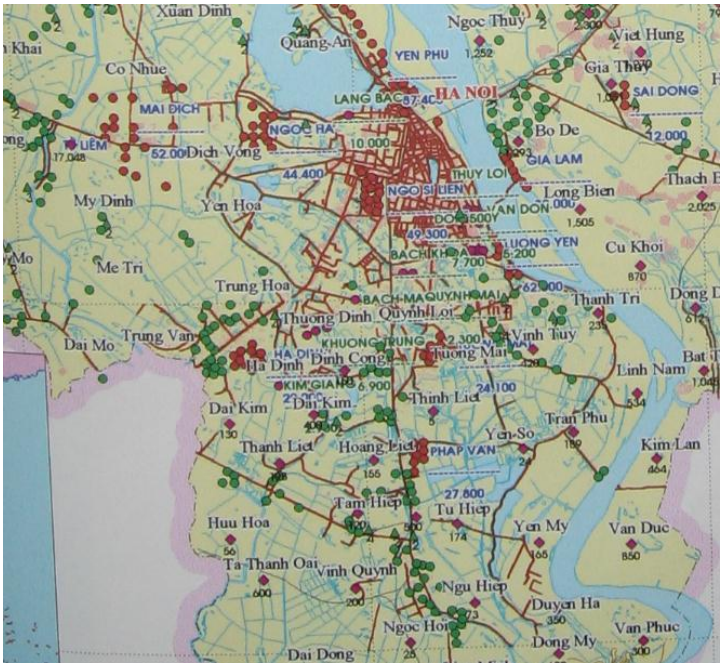
sequence of raw water pumping station, mixing basin, flocculation, sedimentation, filtration and disinfection. To many Co Nhue commune inhabitants, it is easier to see the pollution of a river, a lake, or a pond in the commune, but it is harder to find out whether the groundwater source they are using for daily life is polluted. Their perception of safety is to filter and treat raw water and boil water for drinking and cooking. They are less knowledgeable about high concentration of ammonia, manganese, iron, arsenic[26] and other metal substances in raw groundwater in many sites in both urban and peri-urban districts of the city that would significantly affect their health (UNICEF Vietnam and GMSV 2001, Berg, Tran, Nguyen, Pham, Schertenleib, and Giger 2001, Nguyen and Nguyen 2006, Perkins, Posco, and JINA 2011, Winkel, Pham, Vi, Stengel, Amini, Nguyen, Pham and Berg 2011) (see Map 5.5).

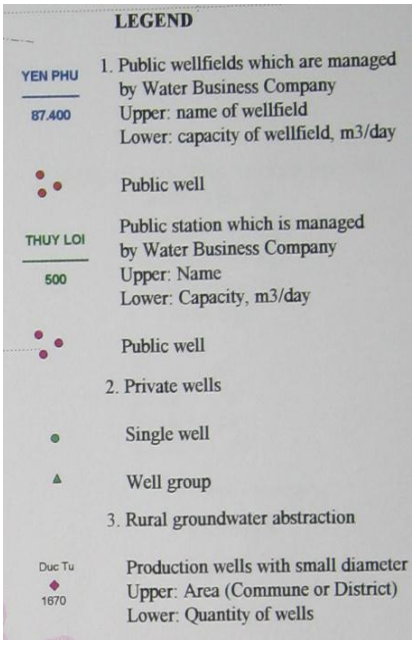
Neither be they aware of the fact that groundwater levels have been dropped down over the time and that the city is subject to subsidence because of long time unmanaged households' extraction and illegal tapping into the groundwater system for commercial profitability of many small businesses in the city[27] (Ngoc Tu 2008) (see Figure 5.9). Thus, their reliance on groundwater has made both their health and their future water accessibility at risk.

[26] "A Northern Water Resource Planning and Survey Federation's study result in 2008 revealed that arsenic in Hanoi's water resources reaches 40 times higher than the standard limitation." http://www.lookatvietnam.com/2008/12/hanoi-polluted-underground-water-and-alarming-depression.html, retrieved on April 16, 2012.

[27] A report from the Viet Nam Department of Geology and Minerals stated that there were about 20,000 illegal wells throughout the city of Hanoi (Ngoc Tu 2008).

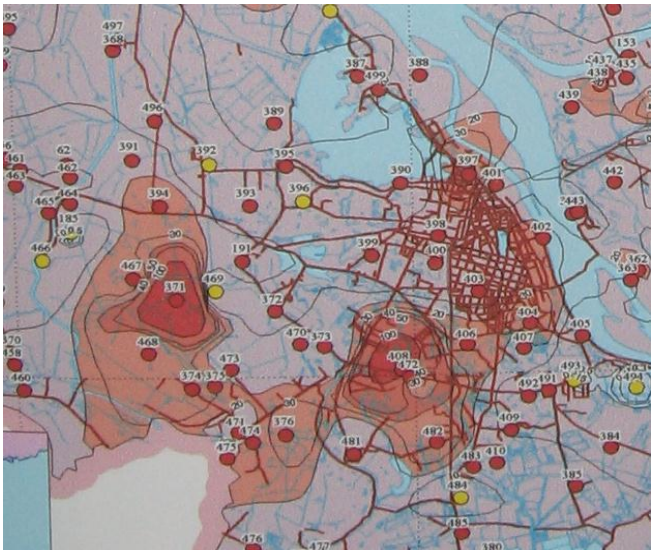
***Map 5.4 Groundwater Accessibility in Hanoi City***

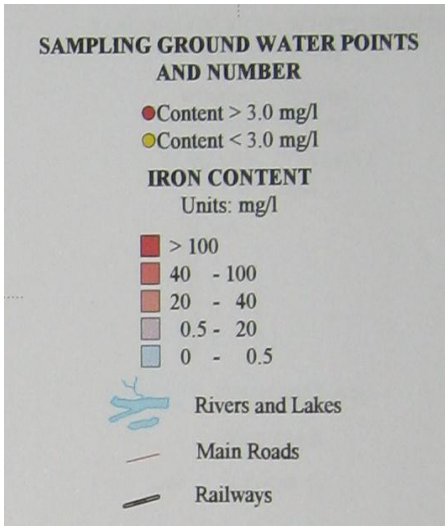



*Source: Northern Hydrogeological and Engineering Geological Division 2002*

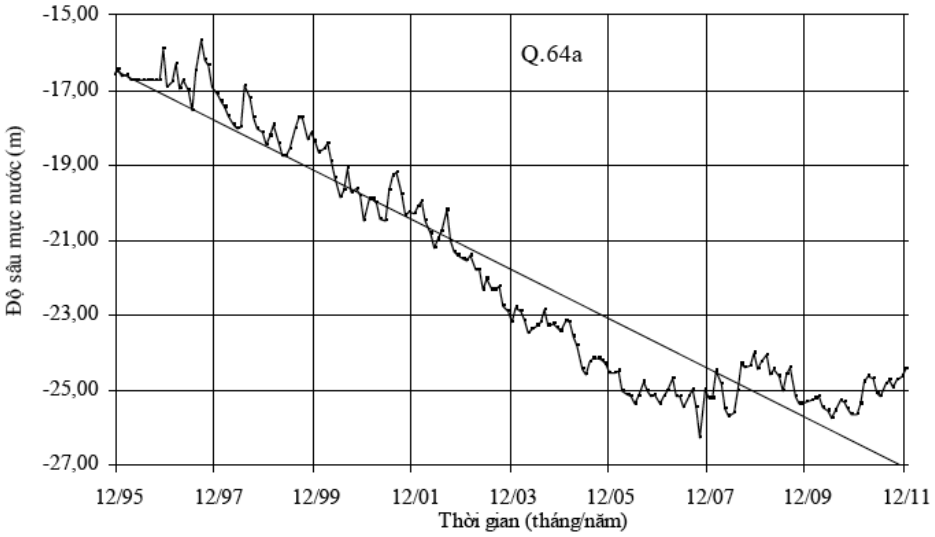
***Map 5.5 Groundwater Quality in Hanoi City: Iron Levels in Pleistocene Aquifer***






*Source: Northern Hydrogeological and Engineering Geological Division 2002*

***Figure 5.8 The Fluctuation of Water Table in Trung Tu, Dong Da District, Hanoi - One of the Hanoi Groundwater Environmental Monitoring Samples***




Note: Value of the Y = the depth of groundwater level
Value of the X = Month/Year

*Source: Center for Environmental Monitoring and Projection of Water Resources 2011*

While new towns and residential areas, arisen right at the edge of Hanoi – Hanoi's peripheral area – have their own water treatment plants, invested by the developer, local peri-urban inhabitants, ironically, are not accessible to this water source. Along came these new residential areas and new towns are modern infrastructural arrangement, i.e. a water treatment plant, wastewater connection to the city wastewater/drainage system, roads with tree lines, which are in complete contrast to the physical setting of a typical peri-urban commune: mixed modern-traditional housing architectural styles, narrow roads, long alleys, lack of drainage and wastewater system, and no piped water supply. Although few peri-urban communal authorities (the commune people's committee) has taken the initiative to bring piped water to their residents, the initiative did not last after several years of operation, i.e. the case of Co Nhue commune which will be extensively discussed in chapter 6. This generates more desire from the peri-urban inhabitants for

clean water accessibility. To meet the demand for clean water and to reduce any potential risks emerged from groundwater accessibility, many peri-urban households, especially the better-off group, have strategically used bottled water and/or invested in advanced water treatment.

The next chapter will describe how access to water in a peri-urban commune of Hanoi like Co Nhue is spatially contentious. The chaper will reveal institutional issues relating to the water supply sector at locality, the relationships amongst the local residents of Co Nhue, Co Nhue communal People's Committee (CPC), the Cau Giay Water Supply Company – a branch of the HWBC, households's adaptive strategies to changes in water resources in the locality, and a shift in entitlements to water of the Co Nhue residents under the rapid urban growth of Hanoi city.

# CHAPTER 6
# DECIPHERING THE URBANIZATION OF WATER IN CO NHUE COMMUNE

This chapter presents findings to the primary questions of how Co Nhue residents organized and managed their water accessibility under conditions of intensive urbanization and to what extent the transformation of a peri-urban commue like Co Nhue has affected the way in which water is secured for daily life of the local residents. The chapter first presents the urbanization process of Co Nhue, exemplified via its ecological setting, water resource, land use, demographic and socio-economic issues. Then, in its subsequent sections, the chapter describes responses of Co Nhue residents and local government to its commune's urbanization process via their community institutional adaptation and households' adaptive strategies to secure drinking water. These responsive strategies are analyzed along with the description of existing raw water resources and water supply providers accessible to Co Nhue inhabitants.

## 6.1 Co Nhue Commune in Its Transformations

### *6.1.1 The Origin of Co Nhue*

The Co Nhue village or commune[29] is a long-established residency, situated in Tu Liem – a Western rural district of Hanoi city, Vietnam. There is no documentation that shows when the village was first established, but according to Pham, Do, Luong, and Phan (1994), the village had existed prior to the King Lý Công Uẩn of the Lý dynasty moved his kingdom to Thăng Long (Rising Dragon) – the city of Hanoi nowadays – in 1010. One of the current Co Nhue's hamlets – the Vien Hamlet – was formed by the 4th

[29] "Village" (Làng) and "Commune" (Xã) are used interchangeably in the reality. Co Nhue has been called commune (Xã) since its was integrated as an unit of administration under Tu Liem District (Huyện), which was established in 1961 (Pham, Do, Luong, and Phan 1994).

princess of the King Trần Thánh Tông[30], Princess Túc Trinh, in 1265 (Pham, Do, Luong, and Phan 1994).

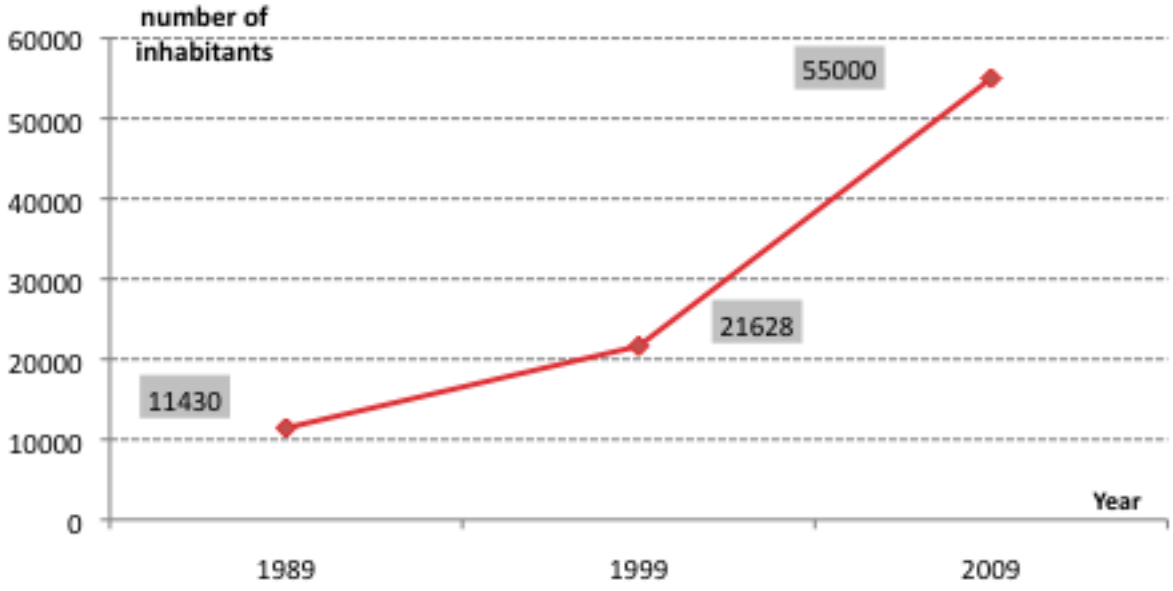
Dwelling in an area of 615.2147 hectares in the West of Hanoi, Co Nhue commune has been recognized as a garment village in the Red River Delta of Vietnam. Until the 1990s of the last century, the commune could be seen as a typical rural village in the Delta because the majority of its population relied on agricultural production. Within the past two decades the commune has undergone a rapid change under the impact of accelerated urbanization process of Hanoi. The following sections depict the change of a rural society of Co Nhue in population, economic structure, livelihood, and social relations to reveal its incorporation into a state-market economy of Hanoi city.

### *6.1.2 Changes in Population*

For the past two decades the population of the twelve hamlets[31] of Co Nhue has dramatically increasing, according to the result of the 1989, 1999, and 2009 censuses of Vietnam. From the number of 11,430 inhabitants (1989), the population of Co Nhue increased to 21,628 inhabitants (1999), and remarkably to 55,000 inhabitants (2009) (Pham, Do, Luong, Phan 1994, IOS 2003, Co Nhue CPC 2009) (see Figure 6.1). Most of the increase, according to the local People's Committee representatives, caused by migrants who moved to reside in Co Nhue or rented a place for college education or employment they have in the city.

[30] The Trần dynasty took over the governance of the nation from the Lý's. The Vien hamlet built a temple to remember of and worship the Princess Túc Trinh.
[31] The traditional village of Co Nhue was comprised of four hamlets, which were: Thon Hoang, Thon Dong, Thon Tru, and thon Vien.

***Figure 6.1 Population Increase in Co Nhue Commune during 1989-2009***

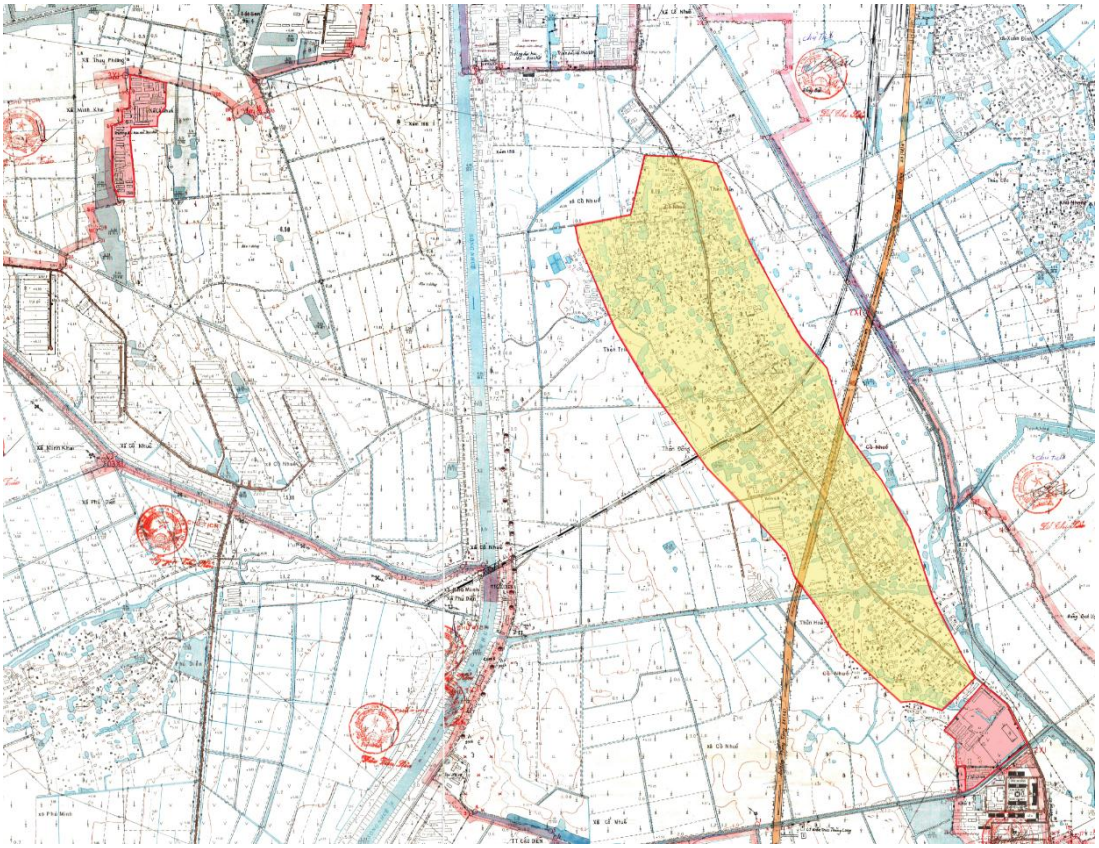



*Source: Pham, Do, Luong, Phan 1994, IOS 2003, Co Nhue CPC 2009*

The existing commune *(Xã)* of Co Nhue has three clusters of residential areas: the traditional/local village *(Làng)* of Co Nhue and the other two extended areas. The traditional village, prior to the Hanoi's Liberation in 1954, was comprised of four hamlets: Thon (Thôn) Hoang, Thon Dong, Thon Tru, and Thon Vien. During the first 15 years of Hanoi's rehabilitation after the French war, the village of Co Nhue substantially developed thanks to the productivity of its agricultural cooperatives and its garment sector's extensive development.[32] Co Nhue became a home to a number of universities, centrally-managed offices, and an army base: the Ho Chi Minh National Academy of Politics and Public Administration, E Hospital, Police Training Academy, Hanoi University of Mining and Geology, and College of Finance. The arrival of these offices and institutions formed two extended residential areas of Co Nhue, as illustrated in Map 6.1.

[32] Garment has been regarded as the traditional craft of Co Nhue.

***Map 6.1 Three Residential Areas of the Existing Co Nhue Commune, Tu Liem District***



Note: The biggest yellow shaded area is the traditional village of Co Nhue. The two smaller red shaded areas are the two extended residential areas

*Source: The administrative and boundaries map of Co Nhue commune, Tu Liem district, Hanoi, produced in 1994.*

### *6.1.3 Changes in Economic Structure*

During the past two decades the economic structure of the Co Nhue commune has been in a transition. Like other rural villages in the Red River Delta, Co Nhue's economy was heavily dependence on agricultural production. In other words, agricultural production made the greatest share in the communal economic gross of Co Nhue. Prior

to the 1990s, the share of trade-service and industry-construction in the local economy was very limited. The Co Nhue's well-known garment cooperatives in Hanoi, such as Nhue Giang, Son Ha, Tu Cuong, were established after the liberation of Hanoi (1954) to serve the purpose of rehabilitation and construction of the country during the American War, but were disbanded after the national econmic reform (1986). The disappearnce of those cooperatives provided an opportunity for the emergence of the household economy in garment production in Co Nhue. Many garment workshops, owned by local families, emerged in the late 1980s and early 1990s to produce clothes for both domestic and international market, i.e. South Korea, Russa, Germany, Slovakia, Poland[33] (Pham, Do, Luong, Phan 1994). The contributon of the garment sector as well as other services to the Co Nhue commune's economy has been increasing. In 2011 the garment sector revenues were VND360,000 billion, accounting for more than 30 percents of the Co Nhue's revenues. This sector alone generated jobs for more than 20,000 Co Nhue residents – many of them used to rely on agricultural production as the major livelihood strategy.

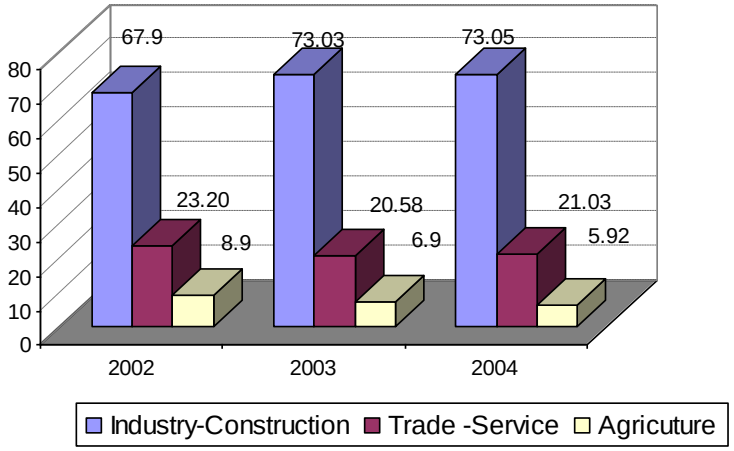
In the 1980s the extension of Hanoi's railway system and the construction of Thang Long Boulevard that connects Noi Bai International Airport and the center of Hanoi acquired Co Nhue to convert more than 200 ha of land to construction. These two mega infrastructure development projects created major changes in not only in Co Nhue's physical landscape, but also its economic development. Co Nhue was not anymore a rural commune, which was mainly dependent on agricultural production. Many services appeared to meet the needs of both the local and migrants in Co Nhue, such as photocopy, massages and beauty salons, phamarcies, construction, electronics. Since the early 1990s, Chua market and E Hospital market, in addition to several other flea markets, were built to meet trading needs of the Co Nhue inhabitants, including a great number of migrants who came to Co Nhue for education and employment purposes.

Local residents have shifted their livelihoods from pure reliance on agricultural production to a combination of trade-service-agriculture. The share of the agricultural sector to the commune economic structure is much lower than historical figures and has

[33] http://hanoimoi.com.vn/newsdetail/Doi-song/542705/tran-tro-noi-dat-nghe-tram-tuoi.htm

been decreasing compared to trade-service and industry-construction since the 2000s (see Figure 6.2).

***Figure 6.2 The Different Economic Sectors of Co Nhue Commune's Economy, 2002-2004***




*Source: Co Nhue Commune People's Committee's Annual Reports*

The increased urbanization of Hanoi and the central government's orientation to expand the city towards its West have stimulated housing construction wave and land rush in Co Nhue as well as other communes located in the Western side. To meet housing needs of increased segments of population, including students and other migrant groups, local households have built many more housing units spontaneously since the mid-1990s along with new housing construction projects planned and approved by the city government. According to the Co Nhue Commune People's Committee (CPC), during the current land rush there has been a relatively great number of real estate transactions arranged and accomplished between sellers and buyers without the local authority's approval. More and more stores and kiosks selling construction material and interior design and decoraton equipment and other goods arise in the commune area to meet the local construction demand. This explains the major share of the industry-construction sector in the local economy compared to the agriculture sector and partially demonstrates a transition in Co Nhue.

### *6.1.4 Changes in Land Use*

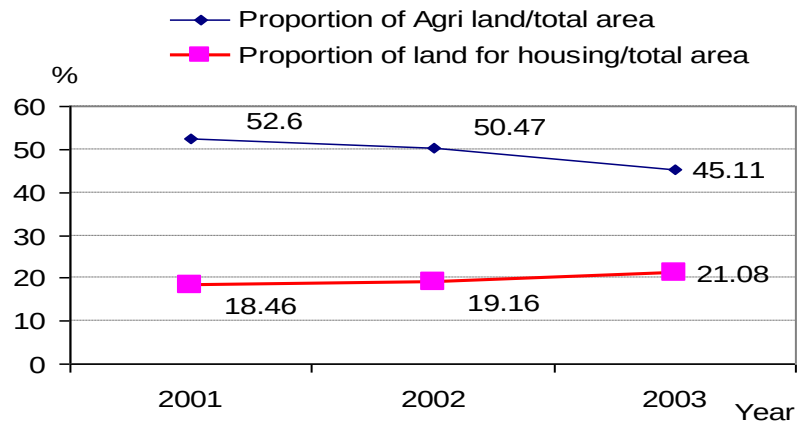
Co Nhue has undergone a rapid change in land use over the past twenty years. The commune's lands were acquired for both the city and national development projects. In the 1970s, Co Nhue became a home to a number of universities, centrally-managed offices, and an army base. In the mid-1980s, as aforementioned, two mega-infrastructure construction projects, the National railway and Thang Long-Noi Bai highway took more than 200 ha of residential and agricultural land in Co Nhue away. Since early 2000, coupled with a number of housing development projects which has been built (see Picture 6.1) is several other city projects that have been planned for a new hospital, a city park, and a biology science and technology park (Co Nhue CPC 2008). Inevitably, the city has asked the commune to provide with more than 218 ha of land for the development of the aforementioned projects.

***Picture 6.1 A 17.6 Hectare New Residential Area for 1,900 Inhabitants of Co Nhue***


*Source: http://pvv-ic.com.vn/182/384/khu-do-thi-moi-co-nhue-ha-noi.html*

Agricultural land of Co Nhue has been acquired for the emergence of urban development projects and therefore, land ares for agricultural production has been significantly shrunk every year. Figure 6.3 below demonstrates a trend of changes in land use of the commune during a short-term perid (2001-2003). It shows that the gradual decrease in agricultural land area is linear with the increase in land area for housing and other development projects.

***Figure 6.3 Changes in Land Use in Co Nhue Commune during 2001-2003***




*Source: Co Nhue Commune People's Committee's Annual Reports*

According to a representative of the Co Nhue CPC and other selected household representatives, no one in the commune focuses on agricultural cultivation nowadays. The communal agricultural cooperative was disbanded in early 2000. Farmers do not have to pay tax as the local authority stopped providing irrigation service. Many areas in the local paddy field have been abandoned (See Picture 6.2 and 6.3) by farmers, and the ababdance affects the production of others (Picture 6.4)

***Picture 6.2 Abandoned Rice Field in Co Nhue***

*Source: Author*

***Picture 6.3 Abandoned Rice Field in Co Nhue (From another Angle)***

*Source: Author*

***Picture 6.4 Un(productive) Paddy Field in Co Nhue***

*Source: Author*

Land acquisition for urban development projects has resulted in the disappearance of the Co Nhue's rice field. Local farmers prefer doing other works rather than farming because their work and efforts were not worth the compensation. Yield of agricultural products, including rice has been low because of poor irrigation, rats, and pest control. Many local households cannot wait to have their agricultural land acquired, so that they will be compensated with money by either the city government or the developer. Because local farmers have hardly cultivated on their land, certain areas of the local rice field are being converted into a dumping site as can be seen in Picture 6.5 and Picture 6.6.

***Picture 6.5 and 6.6. A New Unmanaged Landfill in the Co Nhue Paddy Field***

*Source: Author*

The shrinking of agricultural land affects livelihoods of landowners and their households. For many, agricultural land acquisition equals a big loss of their assets. Those who rely on agricultural cultivations as the principal source of household income would suffer the most, especially when they did not know how to efficiently use the developer's compensation to prepare for alternative livelihoods both in short-term and long-term. Some purchased a sewing machine to provide sewing services, which were ordered by local garment workshops' owners. Others spent the compensation on purchasing a motorbike, drilling a well, upgrading their home, paying medical bills for other family members, or paying family's debts. Reported by a leader of the Co Nhue CPC and head of a population cluster of the commune, the majority of farmers did not know how to wisely spend their compensation. Both developers of development projects and the local authority do not provide vocational training for farmers so they can secure their livelihood after loosing their assets – agricultural land. Some might able to develop an adaptive livelihood by providing trading service in the commune's fleamarkets or find non-agricultural work to meet their daily needs, but their life was still struggling.

> "I live with my husband and a 11 year-old son. I am a farmer while my husband works for his sister in a tailer shop in the city [Hanoi]. My family used to have four *Sào* of land for rice cultivation, thus we did not have to worry about rice throughout the year. Two years ago, the local authority informed us that our two S*ào* of land were acquired for a city

> development project. We did receive thirty million Vietnamese Dong as compensation. We spent part of that money on fixing this house because it was dilapidated. We also had to cover the cost of a new-drilled waterwell because the local water supply system was intermittent and not reliable. We still have the other two S*ào* of land, but we cannot cultivate on it anymore. The local authority no longer collects agricultural landuse tax, thus no more irrigation is provided. We still have land, but we now have to buy rice every month." (Key informant interview, case 27)

The excerpt above is from an interview with a family that relies on drilled well. This case is an illustration for many other households in Co Nhue commune in particular, peri-urban Hanoi in general, whose land were lost at the expense of the city's expansion. Those who lost land, their access and means of production, feel insecure and uncertainty about their future. As agricultural land area continues shrinking, the proportion of households in Co Nhue of which agricultural production is the primary source of income is reducing, resulting in more and more households that rely on diverse livelihood strategy.

Another issue associated with land use changes is the increased land/housing transactions in Co Nhue commune, especially after the national government of Vietnam had planed to extend the Hanoi city boundaries to accommodate the demand for more urban land for the city's rapid economic development (World Bank 2011). As elsewhere in Hanoi's Western suburbs, Co Nhue was into the land rush from early 2000 to 2007. Land/housing transactions took place everyday in the commune even without the local government's approval. Many local residents sold their vacant land to improve their quality of life[34] because the economic value of land exponentially increased day by day during the land rush. The whole commune became a grand construction site because construction was found in almost every alley (Pictures 6.7 and 6.8). The typical rural housing style in the Red River Delta– "one story with several compartments, build of wattle, stone, rammed warth or wood" (DiGregorio 2011: 297)– once was popular in Co

[34] Money gained from selling land was spent on building new, luxurious house, purchasing vehicles such as motorbikes and other valuable goods.

Nhue, has been gradually replaced with the modern/urban housing style – multi storey with balcony, high ceilings.

***Pictures 6.7 and 6.8 Pervasiveness of Newly Self-Built Housing in Co Nhue***


*Source: Author*

The co-existence of various housing forms refects a physical transition in Co Nhue commune. New residents, once arrived, shared space of the village. To meet the increased demand for shelter of temporary inhabitants who stay in Co Nhue for work and

education, the local residents have built low quality of shelter or share rooms in their houses. For many households, renting rooms/apartments becomes the principal source of income. Therefore, building new apartments or upgrading the existing shelter for rent become pervasive just for a short period of time. Pictures 6.9 and 6.10 illustrate renting shelters and rooms for temporary inhabitants in Co Nhue.

***Pictures 6.9 and 6.10 Shelter for Rent in Co Nhue***

*Source: Author*

### *6.1.5 Changes in Community Relations*

Studies of social capital and social interactions indicate that social interactions among members relatively reflect cohesiveness of a community. The economic structure, demographic changes, and the land rush have considerable impacts on community relations in the commune.

First, because the communal economic structure has been shifted from sole dependance on agricultural production to construction, trading, and service, household's

livelihood strategies tend to be diverse. In the past, local residents shared their common interest in how to increase yield of crops. They gathered and had conversations about everything relating to crop, farming, animal husbandary and other gossips in the village. During planting and harvesting seasons, they mutually helped one another. During off-seasons, they spent more leisure time with others. Their reciprocal support bonded them together. Thus, a common comment shared by leaders of Co Nhue CPC, population clusters and other respondents is that everyday relations among families in the Co Nhue village were socially constructed based on kinships and mutual reciprocity.

As the livelihood strategies become very diverse among families, their interest tends to be different from each other. Small segments of the village population were created based on shared interest. Being busy to make ends meet, low-income family members tend to have less and less leisure time. Better-off people now prefer watiching cable televeision or resting at home when they have free time instead of visiting neighbors to enjoy a cup of tea together.

Social interactions become less and less frequently happened even between neighbors, as the commune is influenced by urban way of life. Interpersonal communications are being replaced with conversations by landline telephone/mobile phone thanks to technological advancement in telecommunication. When being asked "To what extent has the relationship between people in Co Nhue changed over the years?" respondents from diverse social and economic status shared their perspectives as blow:

> " We are so struggling for life. We just do not have time for chitchatting. I just want to sleep after a long working day." (Household interview, case 14)"
>
> "Life is getting busier these days. Everyone is busy with his or her own life. My wife and I work outside whole day, while our kids are busy with studies, too. We only have dinner together. I wish I had more free time for the family. Others might have time to drink a cup of tea or a glass of beer together. I just cannot have that privilege." (Household interview, case 16)
>
> "I used to visit my neighbors for chitchatting. Since they get rich, their house is bigger with many luxurious equipments and goods. They now have a convenient life, which is far different from us. It is quite

> intimidating when seeing each other. I, therefore, less frequently meet them. They might think I see to seek helps from them." (Househol interview, case 7)
>
> "The relationship between people have changed so fast. If your family has a wedding or a funeral, neighbors still come to spiritually and economically support you. However, people less visit one another these days. They are afraid that they might bother others." (Key informant interview, case 3)
>
> ""I would say human relations nowadays are getting worse. People do not support one another like before. When a small parcel of land is far more expensive than a tiny piece of goal, people are willing to fight and kill each other for it. It is truly said to see that because of being greedy, people trade off their kinship as well as the mutual assistanship from the neighbors." (Key informant interview, case 12)

With the arrival of newcomers and temporarily inhabitants social relations have become more complex. Newcomers come to Co Nhue to purchase land and later reside; therefore, the majority of them is better-off and have well-paid jobs. Household headers of selected family for interview in this research happen to be employed as teachers, police officers, and state employees. These people go to work in the city and only get home when it is dark. They stay inside and limit to have conversations with their neighbors. If they need administrative and legal support, they visit the Co Nhue CPC. Reported by a representative of the Co Nhue CPC, the majority of the newcomers do not pariticipate in community meetings; however, they comply with local regulations with regard to security, contributions to community development budget and disaster relief. When being asked to comment on this group, a head of population cluster supposed that: "Newcomers are friendly people. Generally they are well-educated and accountable citizens. They obey both the local and legal regulations." Nonetheless, a local resident provided with a less friendly comment on the newcomers: "they are newcomers, but they scorn us. They do not want to associate with us. They hardly join any community event."

The relationships between temporary inhabitants, the renter, and local residents are mutually beneficial. Like the newcomer group, this one shows limited interest in community issues and rarely joins community meetings. In addition, this group gets involved in many documented social deviance incidences compared to the local residents, according to secondary reports of the Co Nhue CPC. On a positive side, this temporary

inhabitant group provides the opportunity for local residents to earn income. To meet their demand for housing and daily needs, more apartment units have been built and a great number of shops and Mom-and-Pop-stores arise both in spontaneous fleamarkets (Picture 6.11) and in alleys (Picture 6.12).

***Picture 6.11 A Snapshot of a Spontaneous Fleamarket in Co Nhue***

*Source: Author*

***Picture 6.12 Grocery Shopping of Temporary Migrants in an Alley***

*Source: Author*

In short, the transformation of Co Nhue commune for during the last 20 years (1989 to present) in demography, landscape, socio-economic structure, and social relations demonstrates both its experiencing in-situ urbanization and the impact of rapid urban growth of Hanoi city. This community has witnessed its substantial increase in population because of net migration, a major shift in the local economic structure from sole reliance on agricultural production to construction, service, and trading. Physical landscape of the commune is being changed because of the adoptation of modern housing style and the addition of more housing units to meet the need of both local residents and temporary migrants. Surface water body has almost disappeared within the village because they have been reclaimed for housing development. Co Nhue commune is no longer a rural setting. The paddy field area is shrinking as a large number of agricultural land has been converted for urban development. To meet the needs of 55,000 inhabitants, variety of service and trading have significantly developed in Co Nhue. My major concern is under the impact of rapid urbanization of Hanoi to what extent Co Nhue residents' access to driking water has changed and whether the demand for drinking water of growing population of Co Nhue is being met. The following Sections 6.2 and 6.3 provide detailed description of the way in which Co Nhue residents, like other peri-urban inhabitants, secure water prior to and under their shared experience of demographic, ecological, socio-economic, and land use transformations.

## 6.2 Water Accessibility of Co Nhue Residents prior to Its Intensive Urbanization

This section presents how the appropriation of water by Co Nhue residents has changed over the decades and how these changes have influenced the community relations and water entitlements of its residents.

### *6.2.1 Surface Water and Its Role in Community Life of the Co Nhue Residents*

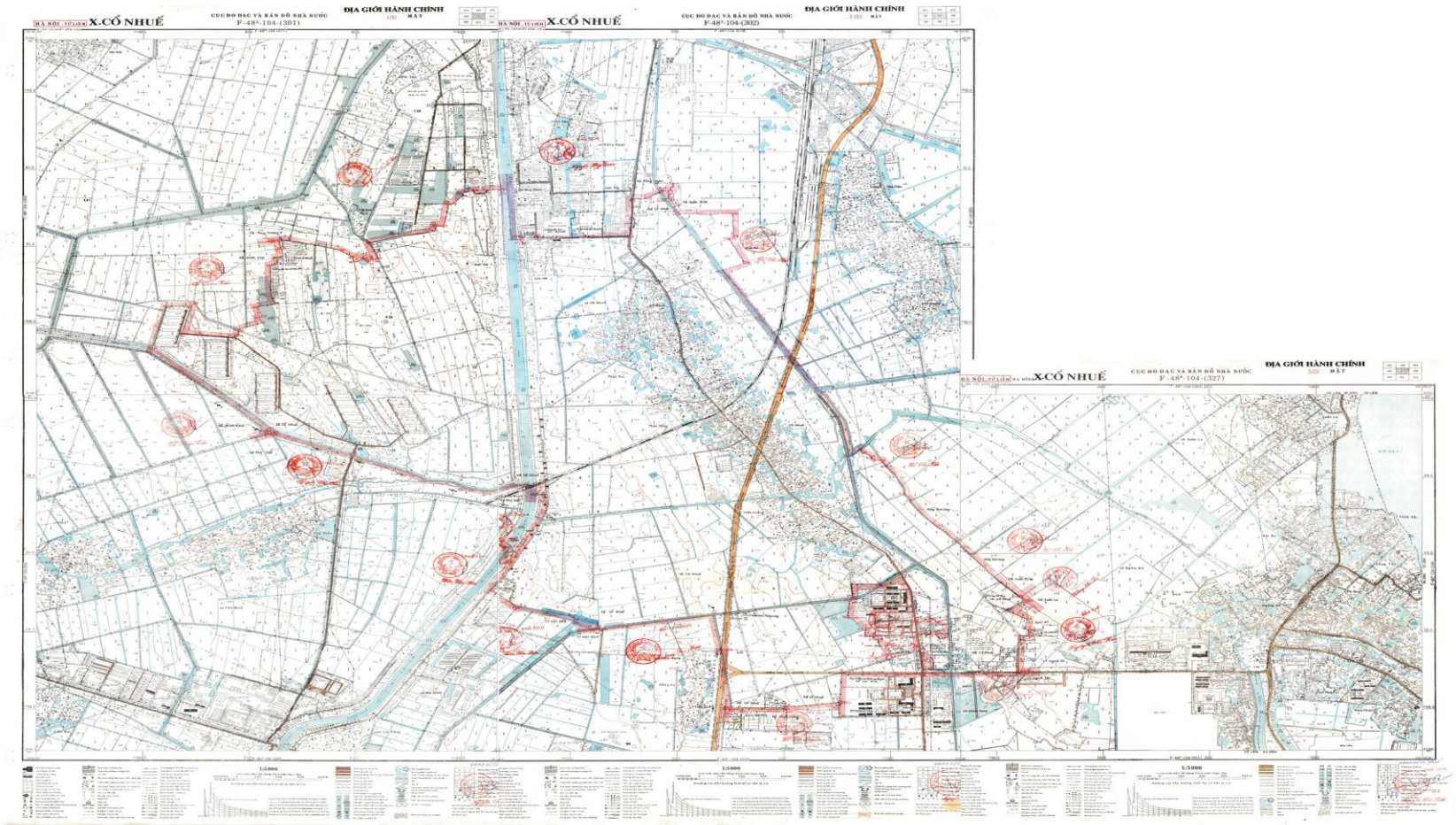
Water is the source of life, and as late as the 1980s in Co Nhue commune, surface water was one of the major sources counted on by every household. In the early 1980s,

before the village was heavily impacted by the arrival of two mega infrastructure development projects – the Hanoi railway and the arterial Pham Van Dong road[35]– and the intensive urbanization of Hanoi city, Co Nhue had abundant ponds and lakes dispersed throughout its residential areas (see Map 6.2). However, the need for more dwelling units under the imperative of urban development and population increase since the mid-1990s has pushed land values in Co Nhue extremely high. While gardens and vacant lands in the commune were divided into small parcels for sale, many bodies of surface water i.e., ponds and lakes, were gradually reclaimed for housing development to meet the needs of newcomers to Co Nhue and the rental market.

The decline in surface water resources, in fact, has had a strong impact on the community life of the local inhabitants in Co Nhue because ponds, lakes and other surface water areas were not only ecologically beneficial and convenient, i.e. serving as a natural drainage system, but were socially meaningful and significant to the villagers. Their everyday life practices were embedded in the existence and management of these local water resources. In other words, lakes, ponds and other forms of surface water resources were incorporated as an essential part of everyday life custom of the Co Nhue people.

[35] The Pham Van Dong road that connects the Center Hanoi to the Noi Bai international airports runs through Co Nhue communal areas.

***Map 6.2 Bodies of Surface Water in Co Nhue Commune in 1994***




Note: Bright green shaded areas were bodies of surface water.

*Source: Co Nhue CPC (1994) Boudary Map of Co Nhue Commune in 1994*

Results of the focus group discussions and in-depth interviews with elderly groups in the Hoang, Dong, and Tru Hamlets of the Co Nhue revealed that as late as the 1980s, one could have a thorough grasp of community relations and lifeworlds just by observing daily activities at a wooden/concrete pier over a pond inside the village. People gathered every day at such area and had conversation about everything relating to crops, farming, animal husbandry, and general village news while washing vegetables, clothes or cleaning farming tools prior to returning home after a long day in the field. Additionally, at times men taught children how to swim in those big ponds around the commune. Many ponds and lakes were private property, but they were all freely accessible to everyone. Although water access of the Co Nhue villagers during this period was compromised by the decline in water resources, their access to surface water sources was not constrained by any means of monetary constraints.

> "Water in the Cau Da River [the river ran through the Hoang Hamlet] was very pure. I clearly remembered that our family washed vegetables for lunch/dinner, clothes, blankets, sedge matts, etc. on the Cau Da river. Children of the Hamlet used to swim and jump off a small bridge into the river. They had a lot of fun." (Member #3, Focus group discussion at the Hoang Hamlet)

> "… In this Vien Hamlet, almost every family used the Le's pond because the pond was big and its water was pure. On the occasion of the Tet (the Chinese New Year), three wharfs at the pond were occupied most of the time. Just a couple of days before the Tet, every family had to clean Dong leaf to make Banh Chung cake[36]. They did that at the pond's wharfs. People chatted with others while cleaning and washing their stuff. The whole area echoed with joy." (Member #7, Focus group discussion at the Vien Hamlet)

It is believed that community relations which were socially constructed from kinships and mutual reciprocity set a foundation for the villagers of Co Nhue to use and

[36] Dong leaf was used to make Banh Chung – the traditional cake that was primarily made only for Tet occasion in Northern Vietnam.

manage the surface water source. Big ponds and lakes normally belonged to the rich families, but everyone, including the poor, had no difficulty or constraints in accessing those bodies of water for their daily usage. It is possible to state that the surface water was the primary water source of Co Nhue villagers in the 1980s, and it was rendered accessible for the every inhabitant or family based on the mutual assistance and solid community relations embedded in the lifeworlds of the Co Nhue residents.

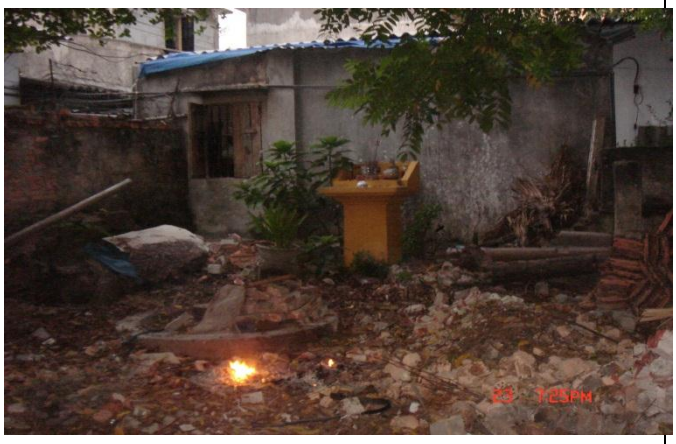
### *6.2.2 Stories of Communal Wells – Common Pool Resource Management*

Another source of water that was made publicly accessible among the Co Nhue residents during and prior to the 1980s were the communal wells. Three communal wells were constructed for the utilization of the four traditional hamlets of Co Nhue hundreds of years ago, which were the Hoang, the Dong, the Tru and the Vien, according to the interviewed elderly dwellers of Co Nhue.

| | |
|---|---|
| ***Picture 6.13 The Hoang Communal House Well***<br><br>This well was located inside the boundary of the Hoang Communal House and therefore it has been called the "Hoang Communal House Well." This was the major sources for drinking and cooking purposes of the Hoang villagers. No one in the Co Nhue commune remembers when the well was created. Co Nhue inhabitants refer to it as the hundreds-of-year-old well.<br><br>*Source: Author* |  |

| | |
|---|---|
| ***Picture 6.14 The Market Communal Well***<br><br>This traditional communal well was located in the Dong hamlet, and it used to be the crucial source of water for the hamlet inhabitants. In the early 1990s, the market of Co Nhue was constructed in the area. Afterwards the local inhabitants did not use this water source, and therefore it was covered.<br><br>*Source: Author* |  |

The local villagers fetched water with a bucket from these wells and carried water home for their everyday drinking and cooking purposes. Before the appearance and prevalence of shallow, hand dug wells and drilled wells in the commune (since the late 1980s), every household of the commune appropriated this water source. Images of the three communal wells can be seen in Picture 6.13 to Picture 6.16

| | |
|---|---|
| ***Picture 6.15 The Vien Hamlet Well (2007) prior to its Renovation***<br><br>Used to be the main source for the appropriation of the Vien hamlet residents. This was abandoned since early 1990s when almost every household of the hamlet possessed a shallow or drilled well. People started dumping trash inside the well and surrounding area.<br><br>*Souce: Author* |  |

| | |
|---|---|
| ***Picture 6.16 The Vien Hamlet Well (2009) after Its Renovation***<br><br>In 2008 the head of the hamlet consulted with the whole hamlet population to rehabilitate the well and preserve it as a local landmark.<br><br>*Source: Author* |  |

There were many stories, told by the elderly residents, about the communal wells and their roles in the lifeworld of the Co Nhue people. On a daily basis, people appropriated these wells for their daily needs. These wells were a dating area for young adults of the villages. When the commune opened its traditional festivals, the most important and influential person of the village was assigned to fetch water from the Hoang Communal House's well on the village's behalf, and then offer the water, among other materials, to the Hero of the village, who was worshiped in the Communal House. This ritual practice was for the local villagers to express their sincere gratitude to the Hero of the village for his assistance and preservation over the years. The reason water was offered to the Hero because it was vital for the local villagers' livelihoods and everyday life practices. To protect the purity of this water source, women were prohibited to draw water from these wells while they were menstruating.

These communal wells were very important to both the secular and ritual life of the Co Nhue inhabitants. Apart from that, these wells became an inspiration for many local poets and writers. In their verses and writings, they appreciated the ordinary, simple, but meaningful everyday life of the Co Nhue villagers, which was surrounded by the local ponds and lakes and the traditional communal wells, as well as their motherland's scenery and landmarks.

Both these communal wells and the surface water sources started declining when living conditions of villagers began to improve and Co Nhue was selected as a site of Hanoi city's development projects. The decline in surface water resources and the demise of the communal wells in Co Nhue had led to new water accessibility arrangements among the inhabitants of Co Nhue: the appearance of shallow wells (manually dug) and drilled wells (machine based). These private water sources at household level reflect the development of the commune which went hand in hand with the improved quality of life for the residents and individual household strategies. In addition, the emergence and then pervasiveness of these private wells, to a great extent, have changed community relations among Co Nhue communal dwellers.

### *6.3.3 Shallow and Drilled Wells in Co Nhue – Household's Strategy Development for Water*

In the late 1980s and early 1990s, the household's economy in Co Nhue became prosperous after many business contracts were signed between local households and export-import garment companies. The whole commune of Co Nhue transformed into a garment factory. Households with access to loans and capital made investment in the garment industry becoming much more affluent than many others. Such households opened workshops, purchased sewing and other machines, and hired local labor force in the commune. Labor forces from neighboring communes went to Co Nhue to seek job opportunities, as well.

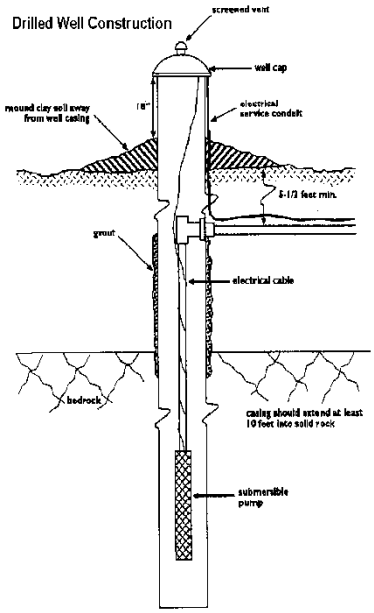
Shallow (hand dug) wells emerged at that time and they momentarily multiplied in the mostly recognized affluent households in Co Nhue in the late 1980s and early 1990s. Depending on the geological characteristics of residential areas, households in most places in the commune could dig a 7-10m well by hand (Key informant interview case #12). Like the communal well, the appropriation of water from shallow wells also required one to use a bucket.

Around the mid-1990s, the application of drilling technology introduced another form of water supply – the drilled well. This type was immediately adopted by local households because the available electricity service and timesaving. Many households of switched to use a drilled well for daily water.

| | |
|---|---|
| ***Picture 6.17 An electric pump for groundwater extraction***<br>Every drilled well requires an electric pump to extract raw groundwater. Depending on the origin of production, a pump would cost $100 -$200.<br><br>*Source: Author* |  |

Private drilled wells with electric pump (see Picture 6.17 and 6.18) have become the main water resource, chosen by more than 50 percent of Co Nhue households, to secure drinking water because of low-cost installation and relative convenience. It is not expensive to possess a drilled well for a family. It costs approximately $US 100-200 per well and it takes on average a half day to have a 30-35m drilled. In brief, the Co Nhue residents hire individuals who specialize in drilling wells and providing installation of household-based water distribution system. These individuals open their own business within or surrounding peri-urban communes to offer their services. It has been very easy for the Co Nhue inhabitants to buy equipment (pipes and fittings) and request for services (drilling wells), since there has been such a store has opened in the Hoang Hamlet of the commune (see Picture 6.19).

***Picture 6.18 Drill Well Construction Sketch***




*Source: C:\Users\HNguyen.BAUPLANUNG.001\Downloads\a_drilledwell construction.gif*

***Picture 6.19 A water equipment store in Co Nhue commune***


A store like this not only sells equipment for laying/installing a household water network, but also provides well drilling service in Co Nhue and other neighboring communes.

*Source: Author*

The owner of this business revealed that his business was quite busy as he had received many requests from customers and some of them were from Co Nhue commune. In an interview, he revealed that:

> "I have done this business for quite a long time. I recruited three more employees to work for me as more and more customers have been added into our already long list. On average, it takes my team around 3 hours to drill a 30m deep well. Because of the geological structure, sometimes it

> took us much longer to get one done. Most of my customers were in Dai Mo, Xuan Phuong, Dong Ngac [some neighboring communes of Co Nhue]. Once in a while, someone in the village requested for a drilled well." (Key informant interview, case 30)

In essence, the adaptation of shallow and drilled wells at the household level reflects the choice of households to secure water for daily utilization from groundwater. The rising prosperity of the local economy created an impetus for the pervasiveness of drilled wells in the commune over a short period of time. Appropriating groundwater at home, members of families no longer had to carry water from the communal wells on the daily basis, and as a result, people saved significant time.

In all three focus group discussions carried out in this study, respondents revealed that all of the sudden, families of Co Nhue quite quickly developed their own water distribution system inside their own residences. The process of installing a new system of water distribution was often the result of new home constructions in the commune. This, ultimately, was the main reason all the communal wells were abandoned, and quickly depleted.

Shallow wells and drilled wells were new sources of groundwater in the commune of Co Nhue. However, these groundwater dependant sources, thanks to the adoption of drilling technology as well as the low cost of installation, had radically changed the communal life. Washing, cleaning, and bathing – everyday life practices - could be conveniently contained within the household itself. As the proportion of Co Nhue households using the communal wells and the declining surface water sources shrank, social interactions amongst users, as a result, occurred less frequently as well.

Some major differentiations in water accessibility between (i) surface water resource and the communal wells and (ii) shallow and drilled wells are listed in Table 6.1 below:

***Table 6.1 Water Accessibility to Surface Water/Communal Well and Shallow/Drilled Wells***

| | *Surface water resource and the communal wells* | *Shallow and drilled wells* |
|---|---|---|
| Appropriation | Free of charge | Capita required for water installing, pumping, and filtering; |
| Time consumption | More time consumed | Convenient, less time consumed, |
| Social interaction | More social interactions | Less social interactions |
| Reliance | Surface and groundwater | Groundwater resource |
| Maintenance and management | Collectively | A single household's case |

Notably, the appropriation of groundwater in drilled wells entails capital investment. Even though this source of water provision was soon adopted by the more affluent group, this was not the choice of the less affluent ones. They asked for support from neighbors and carried water everyday to meet their needs.

In the 1990s with the local government's financial support and intiative, a piped water supply network was built in the traditional village of Co Nhue[37]. This initiative was implemented in response to the Vietnamse Government's call for mobizlation of multiple sectors in water supply as well as other social and environmental service provisioning. Practically, it was a response to rapid transformations of Co Nhue in its physical and ecological settings to meet the demand for clean water of increased population. For the first time, residents of Co Nhue had accessed to piped water thanks to their local authority's political will. The authority formed an institution to manage and monitor the new local network. The subsequent Section 6.3 provides my description and analysis of

[37] As can be seen in Map 6.1, there are three residential areas in Co Nhue commune. They are the traditional village of Co Nhue, which was established a thousand years ago, and the two extended residential areas because of the arrival of several universities and state-owned offices.

the formation, operation, and sustainability of this local initiative and learning experiences from its failure. The section will start with a composite image compiled from Vietnamese newspaper on the story of Co Nhue communal water supply system and its dilemma in doing a business with the Cau Giay Water Supply Factory (CWSF) and supplying water to Co Nhue residents. From this incident, reported from the outside by media, the section will gradually introduces the insiders' perspectives – the incident-engaged stakeholders' perspective to self-reveal a story of (i) the current water accessibility and water supply arrangement and (ii) a shift in entitlements to water of the inhabitants of Co Nhue. Individual stories and collective memories on water accessibility of the Co Nhue inhabitants who come from various socio-economic statuses will be equally utilized for the formulation of this chapter.

## 6.3 The Piped Water Supply Network in Co Nhue Commune

The community–based piped water supply network was first made public when the service was interrupted by the Cau Giay Water Supply Factory (CWSF)'s decision to stop providing water to the Co Nhue residents in July 2007. From that incidence, the case's origin, development, and evolution were examined to reveal how the Co Nhue residents and government collectively responded to the communal transformations to secure drinking water.

### *6.3.1 The Co Nhue Community-based Water Supply Institution: Revealed to the World*

On 29 October 2007, a number of newspapers in Vietnam released news on the dilemma facing Co Nhue residents who paid very high water tariffs for drinking water, but had no service for almost two weeks because the CWSF ceased supplying water service (Thanh Niên 2007, VTC NEWS 2007). This incident, to many reporters, was a pressing issue because the Co Nhue water users paid for a cubic meter of piped water double the regular rate for a cubic meter of piped water, as regulated by the Hanoi People's Committee during the same period of time (VND6,000 and VND2,800,

respectively). The Co Nhue Commune People's Committee (CPC) constructed a pipeline system and assigned it to a local water management unit (WMU), selected and appointed by the CPC to operate and manage. Thanks to this arrangement, the residents of Co Nhue had accessibility to piped water since late 1999 or early 2000. The Co Nhue CPC purchased water in bulk from the Cau Giay Water Supply Factory via a master water meter at a VND2,800/$m^3$ (US$0.133/$m^3$)[38]. The local committee retailed the purchased water to households of the commune at VND4,000/$m^3$ (US$0.19/$m^3$) to generate revenues, and then later raised rates to VND6,000/$m^3$ (US$0.285/$m^3$) in order to pay back its water arrears to the CWSF. When the WMU had not caught up on back payments after three CWSF's notices, the service was temporarily ceased. Particularly astonishing to many reporters and Co Nhue water users was that the WMU and Co Nhue CPC had planned to increase the water tariff from VND6,000/$m^3$ to VND9,000/$m^3$ (US$0.43/$m^3$) (in 2007) to fully cover arrears of VND187,716,626 (equivalent to roughly US$8,900) that they were unable to return to CWSF as of June/July of 2007 (Thanh Niên 2007). The communal authority and the WMU conjectured that a high percentage of non-revenue water was the major cause of its debt, but CWSF was not convinced by this explanation. A CWSF representative asserted that the WMU should not have been in debt because it charged its water users at much higher water tariff compared to the factory's bulk water tariff it paid. This representative, in addition, doubted about the existing financial hardship that the WMU claimed. Meanwhile, many local water users, especially the affected ones, expressed their confusion and frustration when the service was suddenly disrupted, arguing that because they had been reliable customers, they should not had been deserved such treatment.

The above reports by several journalists on water supply issues facing the residents of Co Nhue in 2007 had introduced the case to the public. Public opinion decried the unfairness of the situation, i.e. paying higher price for unreliable service, and a lack of responsiveness and accountability of the Co Nhue CPC to its residents in

[38] The conversion was calculated based on the existing currency exchange rate via the webpage: http://www.oanda.com/currency/converter/

addressing the problem in a timely fashion. However, what had not been released and discussed in the Vietnamese mass media was:

- How had the water system been established and under what design and financial principles, as well as vision, was the system constructed, operated, and evolved (from the beginning until the point the case was brought to the public)?
- What institution, if any, and who were engaged in running the system? What roles did they play? And how did they play their roles?
- Who were the beneficiaries? Who were included as members of the locally based water supply system?
- To what extent had the system efficiently served the need for drinking water of the Co Nhue inhabitants?
- How the system's finance had been managed?
- What lessons, if any, could be drawn from the case's failure?

These aspects were reviewed, analyzed, and presented in the next sections through the perspectives of the involved stakeholders: the Co Nhue CPC, the Water Management Unit members, the users, and Cau Giay Water Supply Factory (CWSF). These stakeholders' perspectives might contradict one another, but together, their viewpoints construct a panorama of the story of Co Nhue Communal Water Supply model – an unconventional method of water delivery in a peri-urban community in Hanoi. For this purpose, I collected Documentation, Decisions and other Notices/Announcements that were exchanged among the stakeholders engaged in the establishment, operation, performance, and sustainability of the Co Nhue-based water supply system in addition to conducting of in-depth interview with key informants and representatives of households. I was also able to retrieve a copy of the annual financial reports and records of expenditures and incomes for the period of 2000-2007 of the WMU. The following sessions presented the evolution of the Co Nhue commune-based water supply system: from its origin to the time it was on the verge of demise.

### *6.3.2 The Arrangement of the Co Nhue-Based Water Supply System*

There was a consensus amongst both primary and secondary sources that the Co Nhue-based water supply system was initiated and arranged by the local authority (Co Nhue CPC), not by the local residents. The chronology of activities related to this process of the system construction is shown as follows:

1991: The leaders of Co Nhue commune planned to bring piped water to the commune, using the communal revenues.

During early 1990s, the centrally-based institutions and agencies acquired lands from Co Nhue commune for their housing development projects to serve their employees. Since Vietnam's land law had not yet been passed, there was no compensation for land acquisition activities. However, those institutions acquiring lands from the Co Nhue commune made contributions to the development of social and environmental infrastructure of the locality, i.e. upgrading the village lanes, building new schools, healthcare stations, community centers, or a drainage system. The Co Nhue CPC and the People's Council planted an idea that the local community would initiate a piped water supply project for the residents of Co Nhue using its revenues. This project, in their perceptions, would potentially contribute to the public health of the communal residents since it immediately addressed the needs for clean water.

1993: A water supply project management unit (PMU) was established by leaders of the Co Nhue commune. The unit was comprised of the chairperson and vice chairpersons of the Co Nhue CPC, the Communal Party leader, a chief of the communal Fatherland Front Unit, a chief of the communal Construction Activities Management Unit, and the Communal Security Unit.

1994: The PMU lobbied the Hanoi People's Committee and the Department of Transportation and Public Works (DTPW) to initiate an investment project on water supply in the Co Nhue commune.

Administratively, Co Nhue is classified as a rural commune, which belongs to Tu Liem rural district. The commune was not entitled to be served by the Cau Giay Water Supply Factory (CWSF). Therefore, the PMU of Co Nhue commune used the influence of a well-known General of the Vietnamese Army – Văn Tiến Dũng, who was born and raised in the Co Nhue commune, to lobby the government of Hanoi and the municipal DTPW. A project proposal was submitted to the two institutions. In the submitted project proposal, the Co Nhue CPC asked for municipal investment in constructing an arterial pipeline of 2,500m that connected from the existing water supply system of the CWSF to a new pumping station[43] that was going to be built in Co Nhue with city funds. In addition, the city monies were to be used to cover the cost of installing 28 master water meters on the arterial pipeline to measure water pumping to the communal pipe system. The Co Nhue CPC would provide a matching fund of VND4 billions to cover construction costs for 43,000m of pipeline to deliver water from the pumping station to every local households.

1996: The Hanoi People's Committee approved the Co Nhue CPC's investment proposal, according to the Decision No. 1579/QĐ-ĐT-UB, signed by the City People's Committee chairman on 6 May 1996. While the arterial pipeline was constructed under the DTPW's arrangement, the PMU of Co Nhue also immediately worked with its pre-selected construction contractors to build the 43,000m (4.3km) distribution pipeline system.

[43] Its capacity was 240m$^3$/hour.

2/1997: The Co Nhue CPC disseminated a regulation applied to its residents, in which two criteria would be used for selecting the planned water supply system beneficiaries: 1) a local family has its household registration in the Co Nhue commune and 2) all members of a family fulfilled their responsibility to the locality and to the nation, such as serving in the military, paying for land use as well as agricultural production taxes, and abiding lawfully. If a local household met both criteria, the household would be eligible to connect to the communal water supply system. That household received a free connection and a water meter from the Co Nhue CPC. Non-Co Nhue villagers who had purchased properties, moved into Co Nhue commune and had already made contributions to the local development fund were required to contribute to VND 500,000 for a connection. Newcomer households that had not made contributions to the local development fund were required to pay VND 2,000,000 for a connection.

The Co Nhue CPC also appointed a Water Management Unit (WMU), accountable to the local government and local residents, to manage the locally based water supply system. Details of the WMU members' selection and performance are discussed in a later section.

1998: The municipal DTPW assigned the Hanoi Water Business Company (HWBC) to operate the newly invested city's pipeline system to provide water service to the Co Nhue residents.

26 May 1998: The chairperson of Co Nhue CPC signed a contract with the HWBC director. Under this contract, the HWBC would be responsible for managing the 2,500m pipeline and the water pumping station, as they are public infrastructure. The company was also responsible for selling water in bulk to the commune via two grand/master water meters. Meanwhile, the Co Nhue CPC (i) managed its own water distribution pipeline system and customer billing, (ii) paid 85 percent of the amount of water recorded

in the two master water meters, no later than 15 days of receiving a notice of payment[44].

In an unprecedented collaboration, the Co Nhue-based piped water supply system establishment resulted from a jointly financial investment between the Hanoi municipality and the local government. By contributing its matching fund of VND 4 billions, the Co Nhue CPC leaders demonstrated their commitment to delivering clean water to its residents, even though this arrangement was made through lobbying. Two leaders of the Co Nhue CPC and heads of the communal population cluster that I interviewed confirmed that the water system was established to avoid water borne diseases and other health impacts possibly derived from the prevalent accessibility and appropriation of Co Nhue residents to shadow wells[45] back to the 1980s and early 1990s (as depicted in 6.2).

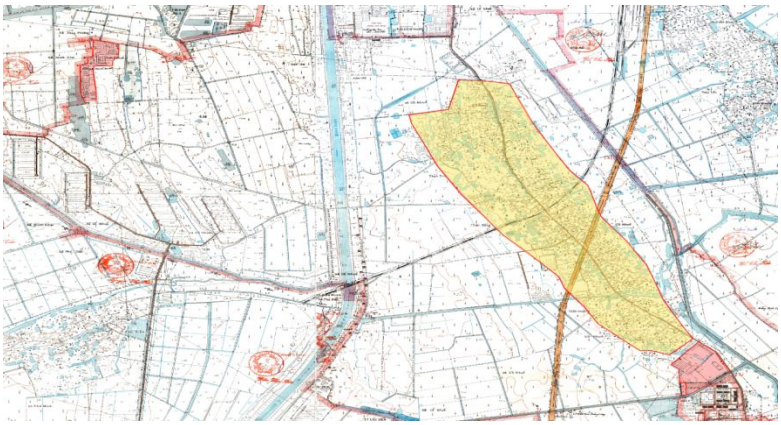
The Co Nhue communal water supply system arrangement also proved the initiative of the local authority. Matching fund of 4 billions might be relatively small, compared to the 2008 and 2009 revenues that were around VND 26 billions, and VND 29 billions, respectively, of the commune (Co Nhue CPC 2007, 2008), but was unquestionably remarkable financing feat for an investment in a piped water supply system in a rural commune of Hanoi in the 1990s.

---

[44] The HWBC subtracted 10 percent of non-revenue water and 5 percent of the system management fee.

[45] A shallow well is a hand dug water well, 3 to 6 meter deep. Users use a bucket to fetch water. If a well is sealed with a concrete top slab, a simple hand powered pump could be installed in the top slab to allow users to pump the water.

***Map 6.3 Area of Service Coverage of the Local Piped Water Supply System.***



Note: The wate system only served the villagers of Co Nhue who dwelled in th yellow shaded area.

*Source: Ajusted from the Co Nhue Commnue's Boundary Map in 1994 (Co Nhue CPC 1994)*

*6.3.2.1 The Beneficiaries*

The system was created to exclusively serve the villagers of Co Nhue – the local people. Each household was entitled to one tap connection with a free of charge initial connection fee and a water meter. Others, who inhabited, but not originally born, in the village had to pay the connection fee and other services entailing the initial installation, as regulated by the local government.

However, other inhabitants living in the village's extended residential areas (Tru 2 Hamlet) were excluded from connecting to the communal water supply system. From the local government's explanation, the pipeline system was not extended to serve households of the extended residential areas due to a physical constraint. That residential area was about 1 km away and separated by a river from the Co Nhue village. Based on-cost-benefit analysis reasoning, the local authority representative gave objective reasons

for the institution's decision of not extending the locally-based water supply system to the Tru 2 Hamlet.

The head of population cluster of Tru 2 Hamlet, the residential area that was excluded from the VND 4 billion-water supply project, was not so convinced from the local government's narrative. He stated that:

> "… The leaders [of the Co Nhue CPC] explained to us that the local revenues and budget were insufficient to extend the pipeline to our residential area because we live about 1,500m away from the coverage area. The commune had already spent VND 4 billions on this project. Besides, our residential area was located on the other side of the Nhue River and that topographical constraint would probably make the cost of construction and service provision exponentially higher. I have no evidence to jump into any conclusion, but rumors have been that the chairperson of the CPC and others who served in the project management unit took this chance to corrupt." (Key informant interview, case 19)

Sharing the concern of the head of the population cluster, an inhabitant of Tru 2 Hamlet implied that they were discriminated because they were not originally from the village.

> "We are simply not the local people, and therefore we have been differently treated. Our family has lived in Co Nhue for two generations, but I have never felt that they [the communal leader and the villagers] have treated us equally. We have made contributions to the commune over the years. We choose to settle down in this commune, we consider our home is here. We would never satisfy with any explanations of the local government. We are the residents of the commune, too. Why don't we receive benefit from the program, which was constructed by our local budget? To me, this is a matter of unfairness and injustice. It really is." (Household interview, case 26)

Rules of boundary setting and beneficiary determination of the local government of Co Nhue were not convincing to all, especially the excluded group. These people complained and shared their concerns over the local government's decision, but they had never confronted against that decision. There was not sufficient evidence to conclude

that the local government favored one over other groups of its residents when the local water supply system was formulated and constructed. Nonetheless, local residents had reasons to suspect of its government's corrupt actions associated with the formulation and construction of the project because the government was not transparent in reporting its budget expenditures. This local water supply project was hardly mentioned or publicly reported to the Co Nhue residents in the local government's annual reports during 1990-2009.

*6.3.2.2 The Formation of the Water Management Unit*

The community based water supply system was officially managed by a management unit (WMU). The selection of the WMU members involved some consultation of the communal leaders with heads of population clusters in the community. This work was implemented without the input of the residents overall. Local inhabitants were only informed of the final decision when the WMU had already been structured and established. Members of the WMU, as proclaimed by a leader of the Co Nhue CPC "must be people who were respected by the local residents, otherwise they cannot run the system effectively. Choosing people like them was not an easy job. There were many capable people out there, but they were not enthusiastic enough for the sake of the community as a whole. Without their enthusiasm and without discipline, the team would not work." (Informant in-depth interview, case 18)

Table 6.1 brieftly presents the nature of responsibilities and authorities of the water management unit under the supervision and patronage of the Co Nhue CPC.

***Table 6.2 Responsibilities of the Water Management Unit, Regulated by the Co Nhue Commune People's Committee***

| Co Nhue Commune People's Committee | Water Management Unit |
|---|---|
| - Signed a contract with the Cau Giay Water Supply Factory to purchase water in bulk for the local system. | - WMU was a business organization that was administratively supported and under the supervision of the Co Nhue |

| | |
|---|---|
| | CPC. |
| - Directly selected the WMU;<br>- Appointed the WMU chief based on recommendations of all the heads of the population clusters;<br>- Regulated monthly salary for the WMU members. | - Being selected by the Co Nhue CPC. |
| - Provided legal regulations to support the operation and management of the water system of the WMU, i.e. setting the water tariff, regulating costs of initial connection and installations; validating the contract and other documentation composed and submitted by the WMU;<br>- Provided an office/headquarters to the WMU. | - Fulfilled missions assigned by the Co Nhue CPC. Each WMU staff was expected to demonstrate the work ethics and ideology of a party member: dedication to serve the public;<br>- Ensured the provision of water to local residents was a political mission. |
| - Generally supervised the performance of the WMU. | - Self-organized and planned for its business;<br>- Purchased office supplies and equipment to run the business;<br>- Composed a template contract between the unit and household users;<br>- Developed a regulation that specified tasks and missions of each unit member;<br>- Paid monthly salary to its members;<br>- Reported annually to the Co Nhue CPC and the People's Council of the unit operation and performances;<br>- Sanctioned illegal connections or violations that potentially threaten the destruction of the system. |

*Source: Compiled from secondary documentation*

The WMU was responsible for operating, maintaining the water supply network and selling water to customers (households), and installing new connections within the commune area. The WMU was also be in charge of repairing leaks and managing the water system to avoid water loss, billing and collection of revenue, and paying the Cau Giay Water Supply Factory (CWSF) the value of water pumped in bulk into the local water supply system. The water tariff charged by HWBC to WMU was at the lowest level in the block water tariff list, as regulated by the Hanoi People's Committee (VND 1,500/ $m^3$ in 1998 and later increased to VND2,800/$m^3$ starting in June of 2006), when the contract was signed on 26 May 1998. Based on mutual agreement between the two contractors, the WMU only paid CWSF 85 percent of the total pumped water to the area because the factory subtracted 10 percent of a non-revenue water rate and 5 percent of the management fee.[46] Members of the WMU, as proclaimed by a leader of the Co Nhue CPC in 2007, were selected as follows:

> "The members of the water management unit, especially the chief of the unit, must be those who were respected by the local residents; otherwise they cannot run the system effectively. Choosing people like them was not an easy job. There were many capable people out there, but they were not enthusiastic enough for the sake of the community as a whole. Without their enthusiasm and without discipline, the team would not work." (Key informant interview, case18)

According to heads of the communal population clusters, leaders of the Co Nhue CPC consulted with about how to select members of the WMU. The heads of population clusters were asked for their recommendations of capable and reliable people living in their areas who were trusted by local residents. One of the informants shared how the selection process of the WMU members happened:

> "As the head of a hamlet in the commune, I was asked to recommend a person in my hamlet to serve in the water management unit. That was a billing staff, not the chief of the unit because back to that time the unit

[46] Because the WMU administered and monitored the water pumping station, which was operated by the Cau Giay Water Supply Factory everyday, the factory substracted five percent of the total pumped water to the locally managed piped water system.

> chief [Mr. Hung] had just retired and Mr. Thuan was appointed by the People's Committee as the new chief of the unit. I recommended Mr. M for this position because Mr. M was a member of the Veteran's Association. He was honest and reliable. More importantly, everyone in the hamlet looked up to him. I had to approach him first to let him know of my recommendation. He was told that the leaders of the communal People's Committee would invite him to join the unit. He was highly enthusiastic. Not everyone was as enthusiastic as he was. Some refused the invitation because their family was not supportive." (Key informant interview, case 13)

To better understand of the formation of the water management unit at the locality, I approached both of the unit chief. The Co Nhue's water supply system was operated and maintained from 1999-2008 under the leadership of Hung (late 1999 - March 2003) and Thuan (2003- end of 2008).

The WMU chief back to the year of 2007, Thuan, described his daily task as working with his team members to manage the pipeline and finances of the unit, fixing the pipe system, billing to household users, supervising the pipe system during water pumping hours to determine any water leaks and water theft in the commune when I first met him. He, on behalf of the Co Nhue CPC, was directly working with the CWSF on water distribution issues, and directly reporting to the Co Nhue CPC on the unit's performance and financial status every six months.

Thuan was happily introduced me the organization of the unit and the responsibilities of each team member, but had a difficult time describing and explaining why WMU was indebted to the CWSF almost $US10,000, as reported by the journalists when we first met in 2007. In his capacity, Thuan documented and retained documentation of how WMU had performed since late 1999/early 2000, including meeting notes, application for services, and contracts of Co Nhue inhabitants and copies of annual financial reports since he took over the leadership of the WMU from the first chief, Hung, in March 2003.

Thuan also shared a document, composed and signed by the first chief of the WMU regarding how the WMU should be run. As written in the document, the Water Management Unit was structured accordingly:

- 1 chief: served as a general manager of the whole unit activities and accountable to the Co Nhue Communal Party Unit, People's Council, and the chairman of the Co Nhue CPC. All applications for services to be submitted to the chief.

- 1st assistant to the chief: served as a cashier. The position mission is to supervise the fixing and upgrading of the pipeline system, as well as the installation for new customers, carried out by technicians of the unit.

- 2nd assistant to the chief: served as a secretary and an accountant and responsible for documenting and recording every expenditure and income associated with WMU activities.

- A team of three technicians: to monitor the entire pipeline system, fix any leakages of the pipe system, supervise any overflow when water is pumped at the pumping system, and carry out installation for new customers.

- Billing staff (5 staff covered 23 hamlets of the commune): to record water usage amounts from every water meter, to collect 100 percent of water tariffs from clients (households or offices) every month, and to turn in collected money to the cashier. On a daily basis, billing staff is to supervise the entire system, especially during pumping hours to spot leakages and water theft, as well as temporarily fix leakages and immediately report incidents to the unit technicians.

The whole WMU members met three times a week (Tuesday, Thursday, and Saturday) at its headquarters for one hour (5:00 – 6:00 PM). At the end of each month, there was another meeting to review activities of the month and discuss activities planned for the subsequent months.

What Thuan did not reveal to me and what I found out later from a representative of the Co Nhue CPC and other WMU members was that core positions of the unit (the chief, two assistants to the chief, and a technician team) were appointed by the Co Nhue CPC and the People's Council. People who served in these positions were members of the Communist Party at the commune level. These people were expected to highly demonstrate a party member's ethics and moral principles and to contribute to the process of building a modern and prosperous Co Nhue commune through their management and maintenance of the communal water supply system. In addition, they had the mission to persuade local residents to use clean drinking water (piped water), to protect against and to sanction any violations of illegal connections or breaking of the communal water supply system in order to minimize non-revenue water rate. These missions were clearly stated in the Regulations of the Co Nhue Commune Water Management Unit activities, approved, signed, and sealed by the chairman of the Co Nhue CPC and co-signed by the WMU chief in April 2000, a few months after the local water supply system was put into use.

In earlier conversations, Thuan shared with me the path of his life and how he ended up serving as the chief of the WMU for the commune of Co Nhue. He identified himself as a local person who was proudly born and raised in the thousand-year-old village of Co Nhue. After finishing his military service in his early thirties, he returned to Co Nhue and practiced as an electrical engineer, thanks to some vocational training he had received when serving in the army, and worked as a farmer. He started to help the Co Nhue People's Committee with administrative work in the early 1990s. As a member of the Communist Party, he was appointed by a Co Nhue CPC chairman to serve as a WMU chief in March 2003.

Thuan did not exhibit any hesitation when sharing his insight into how he and other WMU members completed their daily responsibilities or the general performance of the unit. He was also open about the challenges facing him and his team members since he took over the leadership of the WMU in 2003, which, under his description, was "constructed long time ago and as of now was about to fall apart due to deterioration." Nonetheless, he chose not to discuss or comment on the performance of WMU prior to

his leadership. Instead, he gave me the name of the WMU first chief and directed me to talk to Hung.

People like Thuan could be found in any Commune People's Committee in Hanoi. He represents a generation who completed service in the military after the Doi Moi (national economic reform) in 1986 and then ended up serving local authorities at the Commune People's Committee, in such capacities as being in charge of household registration, or as a member of the communal Farmer's Association, Veterans' Association, or Fatherland Front's Unit. Being a member of the Communist Party gives people like Thuan an advantage to be a member of several grassroots organizations under the leadership of the Commune People's Committee– the lowest unit in the Vietnamese governmental apparatus at the grassroots level. He might not serve as administrative staff whose mission was to verify and certify legal paperwork for local residents, but be given the opportunity to become involved in local security protection or construction activity management of the commune.

In essence, Thuan was selected, first, as a member and, later, as the leader of the WMU by the Co Nhue People's Committee because of his work ethics and loyalty to the local government. Choosing people like Thuan to serve in the WMU is a safe choice for the Co Nhue People's Committee because as a member of the Communist Party, he must obey orders of the local government. The following quotation explained why Thuan was appointed as the leader of the WMU:

> "Mr. Thuan was assigned a mission of managing and supervising the local water supply system by the Commune People's Committee and the People's Council because he was a member of the Party and has worked for the local government for years. He has demonstrated good work ethics and been accountable to the local government. The Commune People's Committee believed he would do well in his assigned position" (Key informant interview, case10)

Unlike Thuan, Hung – the first and former chief of the WMU – had managerial knowledge and experience and he used his lived and working experience in superivisng and managing he local water supply system. Returning to Co Nhue in 1979 after serving

many years in the military, Hung held a desire to make contributions to his motherland. During 1979-1993, he served as the principal of Co Nhue's middle school. He took individual initiative to mobilize external resources and grants to build a new middle school for Co Nhue, which was comprised of 24 classrooms. Among a limited number of well-educated persons working at the commune level, he was asked to be a secretary of the Co Nhue People's Council for 15 years (1984-1999).

In 1993, in his capacity as the People's Council secretary, he was chosen as a member of the communal water supply Project Management Unit. He worked with the communal leaders to lobby the Hanoi Municipal People's Committee and the Department of Transportation and Public Works. After the Co Nhue chairperson signed the contractual service with the Hanoi Water Business Company, Hung was transferred to and appointed as the WMU chief. He was expected to use his managerial experience and his passion for serving the motherland to run the WMU. In this capacity, Hung was assisted by Thuan, who was in charge of the communal construction activities at that time, Cat, the head of population cluster in Hoang 1 Hamlet. Thuan and Cat not only assisted Hung in the management, but also the financial activities of the water supply system. In addition, Hung also received assistance from five other staff members whose responsibilities included reading meters, collecting water tariff, and supervising the pipe system during operation to discover leaks, breakout, or illegal extraction.

During an interview, Hung shared the pressure he felt when he took the leadership of the water management unit. He was stressed because his managerial experience in the capacity of a middle school headmaster was not so much relevant to the management of an infrastructural system, like the water supply one in the commune. Upwardly, he was accountable to the People's Committee leaders as the unit chief. Downwardly, he was accountable to the residents of Co Nhue. When talking about his experience with the WMU, Hung's voice went softly. He said:

> "Those were hard days…[He suddenly stopped and lighted a cigarette, and then he continued]…The People's Committee appointed me the leader of the water management unit and I had to be in charge of the group of eight-nine persons and more importantly I had to run the water

> supply system. Personally, I had never ever done something similar in the past. I had to figure out how to efficiently run the system to bring piped water to the local people and to make the system financially sustainable. Managing the water supply system was the mission assigned by the Communal People's Committee, I just could not reject. The chairman of the commune personally told me that the commune had made a huge investment in the system and now that system was in my hands. I and other members of the unit had to be self-sustained financially, while ensuring that water was efficiently provided to users. The responsibility in my capacity, I felt, was overwhelmed. I could not sleep many nights. It was very hard for me to think of how to technically manage the system, and how to fairly treat my brothers in the unit, how to set up rules and the water tariff for every household/user to comply. Honestly, I lost my appetite and was sleepless for days just thinking of how to govern the water supply system. [He paused.]" (Key informant interview, case 3)

The provided excerpts from interviews key informants reveal that the selection of the manager/leader of the local water supply system was not necessarily based on his expertise and management know-how. The local government of Co Nhue formed the WMU and recruited the unit members out of its convenience with limited consultation with the local inhabitants, and this subsequently affected the performance of the unit as well as the sustainability of the local water supply system, which would be later revealed in this section.

Income sources that were used to pay for the WMU staff salaries and to smoothly operate the water supply system consisted of installation (initial connection) fees for households and the water tariff set by the WMU and approved by the Co Nhue CPC. The WMU did not receive any further financial support from any other sources. Working under this financial constraint, they had to use full-cost recovery principle to efficiently run the water supply system.

#### *6.3.2.3 Financial Arrangements*

As mentioned by the first WMU chief – Hung – and confirmed by a leader of the Co Nhue CPC back to 2009, literally the WMU was an independent and self-reliant.

Although the Co Nhue CPC established and was administratively supervised the unit, it did not operate the unit. The Co Nhue CPC neither paid any salary to the unit members, nor made investments in maintaining the communal water supply system except its initial investment in the system construction. For this reason, the WMU had to apply the full-cost recovery principle[48] to set up water tariffs over the years since the water supply system was first operated because the unit's monthly revenue was the major source for its members' income and determined its existence. According to this financial arrangement, every user must pay. Poor households of the commune received no financial assistance or subsidies for the water service. The revenue of the WMU came from water tariffs charged to users, new connection fees, and other service fees.

The WMU calculated water tariff, but had no authority to set the tariff itself without the Co Nhue CPC's approval[49]. The two WMU leaders and other representatives of the Co Nhue local government confirmed that the WMU had to submit a plan to increase water tariff to the local government. Upon the local government's approval, WMU staff members collaborated with heads of the communal population units to publicly notify overall residents of the commune in general, service users in particular.

According to the service contract signed between the Co Nhue CPC and the HWBC on 26 May 1998, the HWBC charged its contractor 85 percent of the total pumped water quantity recorded at a master water meter at the lowest level in the block water tariff list (VND 1,500/ $m^3$), regulated by the Hanoi People's Committee in 1998[50]. The HWBC gave the WMU a discount of 10 percent of non-revenue water rate and 5 percent of its management fee because the WMU had to deal with its own

---

[48] The full cost recovery principle is applied to pricing a service/an object. The price of an object/a service is determined by the sum of the cost of the resources that went into making it. The cost can compose any of the factors of production (including labor, capital, or land) and taxation.

[49] This arrangement followed the city of Hanoi's regulation on pricing public water service. Without the city government's approval, the Hanoi Water Business Company will not be able to increase water tariff.

[50] In June of 2006, the HWBC increased the water tariff to VND2,800/$m^3$.

customers/users. If the Co Nhue residents had any problems with the quantity and quality of water, they had to look for the WMU, instead of the HWBC. Table 6.3 shows various water tariff set by the Co Nhue CPC and the WMU over the 1999-2008 period.

***Table 6.3 Water Tariff Set by the WMU over the Years***

| Year | Tariff set by the Hanoi People's Committee (VND) | Tariff set by the Co Nhue CPC and the WMU (VND) |
|---|---|---|
| 1999 | 1,500 | 2,000 |
| Jan. 2002 | 2,000 | 2,600 |
| Sep. 2002 | - | 3,000 |
| June 2006 | 2,800 | 6,000 |
| Jul. 2008 | - | 9,000 |

*Source: Compiled from various secondary report and documents at the Co Nhue CPC and the WMU*

As can be seen in Table 6.3, the WMU had increased its tariff several times since 2002-2008 in order to maintain and sustain the locally built water supply system. Partially, the increase was set to respond to the rise of the tariff set by the Hanoi People's Committee (in January 2002 and June 2006). Additionally, constant high proportions of the non-revenue (caused by the system deterioration), the WMU staff corruption, and water arrears from users, were also attributable to the WMU's tariff increase and these issues will be more deeply revealed in the subsequent section of the WMU's performance.

### *6.3.3 Performances of the Co Nhue-based Water Supply System*

The performance of the Co Nhue-based water supply system was assessed through the usage of (i) the WMU's financial reports, meeting notes, and other documentation retained at the Cau Giay Water Supply Factory, (ii) reflections of the Vietnamese newspapers on the temporary termination of service in summer 2007, as

aforementioned, and (iii) in-depth interviews of representatives of the Co Nhue CPC, WMU members, leaders of the CWSF, and Co Nhue residents (water users). All the primary and secondary data was used to reveal issues of to what extent the emergence of the locally based water supply system improved the water accessibility of the Co Nhue residents and whether the users was satisfied with the quantity and quality of services provided by the WMU.

During my first meeting with Thuan at his WMU headquarters, which used to be an office of the Co Nhue Agricultural Cooperative, he showed me a map of the Co Nhue communal water supply system, as well as the WMU's financial reports that documented all sources of incomes and expenditures entailed in the operation and management of the water supply system from 1 December 2010 to 30 November 2006. All of these reports were signed by the preparer and the WMU chiefs– Hung, first and, then Thuan, when he took over the WMU's leadership in March of 2003. As noted on the bottom left corner of each financial report, the Co Nhue CPC and Co Nhue People's Council were also informed of the financial progress of the local water supply system. These documents were stored in a big steel cabinet in the corner of the room, in which there were other three worn, shabby desks, four benches and two chairs. This room, as Mr. Thuan told me, was the venue of his WMU meetings, which were routinely organized three times a week. It was very bright outside in a hot summer day, but very dark inside the room without the light on. I had the feeling that the room was not used very often because there was a relatively thick layer of dust on the table which adhered to my hands when I touched the table.

It took awhile for Thuan to find some financial reports, which documented and recorded the WMU activities over the years, in the cabinet. While digging that big cabinet to find out the reports, Thuan told me that this room was used as a meeting venue and tool storage. Those desks, chairs, and benches were purchased by and belonged to the WMU as well because the Co Nhue CPC did not provide the WMU anything for its operations. The technical team had to rent all the equipment and tools if they had to fix any leaks when the Unit did not have sufficient revenues to purchase them. Thuan also revealed that when he took over the leadership of the WMU, he inherited VND

113,495,819 millions (roughly equivalent to $7,000)[51], a set of tools, and other properties that were aforementioned.

I carefully opened a plastic bag containing financial reports of the WMU which Thuan handed me, noticing that all four corners of the bag were torn and broken. All of the reports were hand written on A3 papers, with corrections scattered in various places in some of the reports. Some of the reports, as I noticed, were the originals, while the others were copies. Thuan said the WMU prepared financial reports every six months. All the reports were submitted to and filed at the Commune People's Committee, the People's Council, the Communal Party Office, with the WMU naturally keeping one copy for its own records. Thuan refused to share these reports when first asked. He directed me to the office of the People's Committee if I wanted to closely examine these reports. I consented to his refusal. I had a feeling that Thuan was not ready to open up to me when our initial meeting was adjourned at the MMU headquarters. Although he did not share those financial reports, he did provide me with names and contact information of other current members of the WMUs, so that I could examine the WMU's operation and management of the system from other perspectives.

My conversation with Thuan gave me a better idea with regards to how to interview other key informants: the director of the CWSF, a representative of the Co Nhue People's Committee, the WMU's former and first chief –Hung, some members of the WMU who were working with Thuan and some members who had worked with both Hung and Thuan in the WMU in the past, and several representatives of households across 19 hamlets of the Co Nhue commune regarding the performance of the WMU and the success/failure of the communal water supply system. More importantly, by interviewing the aforementioned key informants and other respondents, I received a copy of the WMU financial reports for the 2000-2007 periods - those self-explain the gain and loss in revenues of the WMU over the years. Table 6.4 below presents some selective major indicators that imply the performance of the WMU and the level of (in)effectiveness and (in)efficiency of the communal water supply system.

[51] The conversion was calculated based on the currency rate of 2003.

***Table 6.4 Performance of the Water Management Unit during 2000- 2008 via Some Selective Major Indicators***

| Year | Revenues (VND) | Water arrears from users (VND) | System repair costs (VND) | New Installations (VND) | Non-revenue water (%) | Number of connected households | Number of actual consumers |
|---|---|---|---|---|---|---|---|
| 2000 | 41,650,579 | 6,674,200 | 0 | 8,162,000 | 29.00 | 2,580 | 950 |
| 2001 | 96,671,779 | 14,860,300 | 12,410,200 | 47,050,000 | 30.33 | - | - |
| 2002 | 134,559,279 | 24,721,000 | 24,891,000 | 96,347,000 | 33.80 | 2,972 | 965 |
| 2003 | 140,097,319 | 22,680,800 | 23,363,960 | 113,622,000 | 46.36 | 3,002 | 1,000 |
| 2004 | 138,984,119 | 26,078,000 | 27,242,900 | 66,850,000 | 40.05 | - | - |
| 2005 | 12,856,211 | 36,893,900 | - | 51,750,000 | 42.00 | - | - |
| 2006 | 36,188,364 | 26,615,600 | 6,328,500 | 48,650,000 | 60.00 | - | - |
| 2007 | - | 37,438,600 | - | - | 65.00 | 3,330 | 1,350 |
| 2008 | - | - | - | - | 75.00 | - | - |

*Note: (i) Water service was first delivered to Co Nhue residents in November 2009. The table does not include data for November and December of 1999.*

*(ii) Some missing data of 2007 and 2008. Both the WMU chief and the Co Nhue CPC leaders refused to share the financial report of 2007 and 2008.*

### *6.3.3.1 Performance of the System during 2000-2003*

Generally, the system worked very efficiently for the first three or four years, according to statements from both key informants and representatives of local households. Annual financial reports during the 2000-2003 period revealed that WMU revenues were sufficient to pay the CWSF and the monthly salaries of its members. As can be seen in Table 6.4, annual revenues of the unit gradually increased during 2000-2003 before shrinking very quickly since 2005.

From the local government's perspective, the communal water supply system was very useful to the residents of Co Nhue village/commune when it was first launched.

Around 65 percent of the village households (of 3,300 households in total) connected to the new system after the first year of operation. The household connection number gradually increased during 2000-2003. This raise significantly contributed to the WMU's revenues in the same period (see Table 6.4, column #1) because there was not anymore free connections granted to new users after the water pipe network was completely launched and operated (see Table 6.4, column #5).

In addition, users were satisfied with the service delivery and tariff. The pump station was operated by the Cau Giay Water Supply Factory twice a day to provide water to the local network. Users were satisfied with the tariff set at VND2,000/$m^3$ (13cent/$m^3$) because this price was just three more cents more expensive than the tariff charged to water users in urban districts of Hanoi (VND1,500/$m^3$, equivalent to 10cent/$m^3$).

From the users' perspective, the emergence of a new piped water system in the locality resulted in an opportunity for them to access to a clean water source beside the groundwater they had been utilizing[52]. Being local residents, born and raised in the Co Nhue village, gave them the entitlement to receive a free connection to the local water supply system and a free water meter, if their household was a responsible local tax payer. The local inhabitants appreciated the initiative of their leaders in the communal People's Committee, which was constructing a locally based water supply network, because these inhabitants were well aware of the fact that their commune, as a rural administrative unit, was not legally prioritized to receive service from the public water utility of Hanoi city. The below excerpts of the water users' interviews truly represent and reflect the local water users' experience with the Co Nhue piped water supply system when it was first constructed and operated:

> "… When we heard that the People's Committee would construct a piped water supply system for us, we were very excited. We were even curious about the new system before it was operated and put into practice. I

[52] Literally, every household in Co Nhue had one drilled well. Prior to the piped water system was developed in Co Nhue, the local residents mainly relied on groundwater. When the piped water was available, people used both sources for their daily lives.

> must say every household was excited, knowing that they would be connected to a piped water system like others in urban districts. You know…our commune is located quite close to the Cau Giay Water Supply Factory, but we did not have the privilege of using piped water as many other urban dwellers. We all learn that the quality of piped water must be better than that of the groundwater the majority of the local inhabitants in Co Nhue have been using. It is good for children, elderly, and, perhaps, for everyone. And when the service was delivered to our area, we all first experienced using piped water." (Household interview, case18)

> "….We could not ask for more, honestly. We received a free water meter and connection to the commune water supply system. We were informed of the pumping hours in the morning and in the afternoon. That was not 24/7 service, but it was reliable. Like others, we used piped water for cooking and drinking purposes. The price was acceptable. My relatives inhabiting at the end of the pipe network said her family did not receive water as much as they expected, but she did not complain about the system or the WMU staff. They were friendly. They were people living in the village. We chatted with them when they came to collect our payment for water bills." (Household interview, case 21)

For those, who did not possess a drilled well, this piped water source became the primary and these people treasured the opportunity to be accessible to this source:

> "Prior to the arrival of this source [the Co Nhue based piped water supply system], I had to use water from my brother's family or other neighbors. I lived with my younger sister and our incomes barely cover our everyday life. We have no money for a drilled well like other families. Along came the piped water system, we were happy. We were provided a free connection and a water meter. We used to pay around VND15,000/month and that amount was acceptable to us. At least, we did not have to go around the commune to ask for water." (Household interview, case 24)

Others supposed that the arrival of the piped water supply system planted a hope that the commune would be soon upgraded as an urban ward. Thus, they were willing to pay for a new installation even though they were not ready to use water from this source. I was surprised when a head of the Co Nhue's population clusters shared with me of the news.

> "… Don't you know that… people asked for a new installation even they would not use this water source. They came to ask me to certify that their families inhabit in the hamlet so that the WMU could accept their application for a new installation. They shared their mind with me that the commune might soon be upgraded as an urban ward because the Commune People's Committee had brought piped water to its residents. They rather have a connection to the local water supply system now than do it later. In their perception, urban residents would have to pay higher fees for a new service connection, i.e., piped water, or electricity." (Key informant interview, case 4)

Describing the initial achievement of the system, a head of the population clusters stated that:

> "The system worked pretty well for the first couple of years. Many households connected to the system during the first year because they received it free of charge. My family also received one free connection. Who wouldn't want to, you know? No one complained about this new source of water. Perhaps, the only complaint that I noticed was the source was not enough for people to use since the Cau Giay Water Supply Factory only operated the pumping station twice a day: two hours in the morning and another two hours in the afternoon. Although about a half of the connected households actually used the service, everyone was happy with that. I am very positive to say that at lease people in my population cluster was satisfied with this piped water source. You can confirm my evaluation with the head of other hamlets…[laugh] " (Key informant interview, case 5)

The WMU's performance was also highly assessed by the respondents. From the local government's perspective, a vice chairperson of the Co Nhue CPC gave relatively objective comments on the performance of the WMU:

> "When we looked at the revenue of the first several years, which were positive, we were happy for our staff [the WMU members]. The unit members were busy with installing new connections and closely coordinated with the CWSF staff to deliver water to hamlets. Initially, there were around 65 percent of households connecting to the [piped water] network. Later, another 5-10 percent more of the households applied for a connection. The WMU members did amazing job provided that none of them had ever experienced in operating and managing a water supply system before. We were updated on the unit's performance

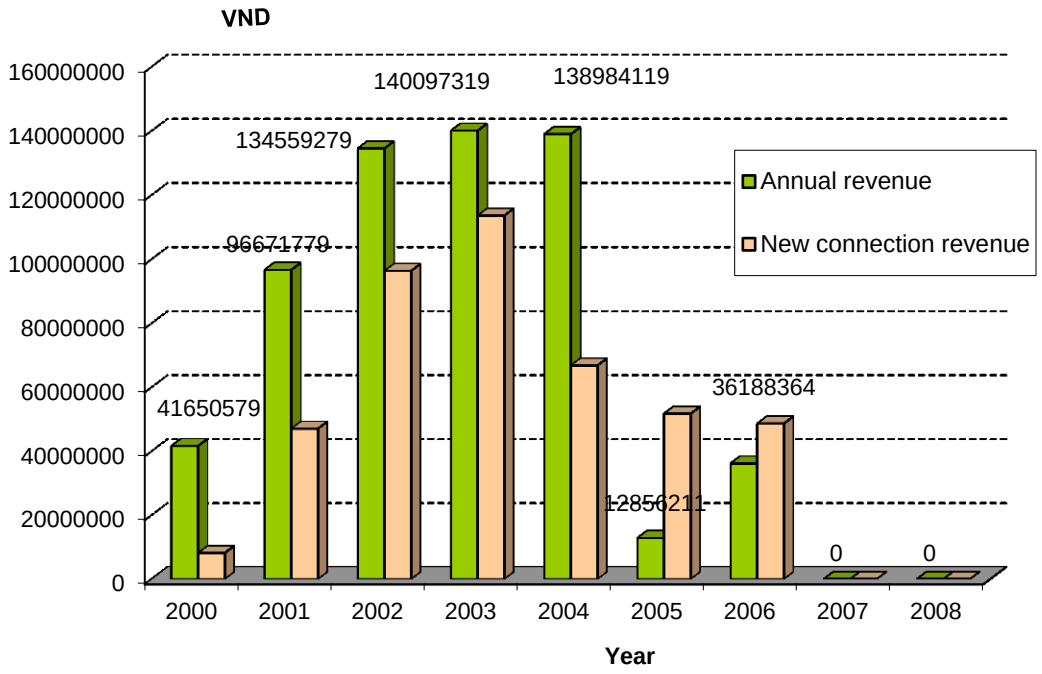
> as they submitted their financial report to the Commune People's Committee every year. As a leader of the local authority, I also encouraged them [the WMU staff] to keep doing their good work, but also reminded them that they should focus on the management of the system and build a good relationship with clients." (Key informant interview, case 10).

It is quite believable that the system was operating effectively and both the provider and users were pleased with the service. For WMU, as the pipeline system had just been constructed, there was almost no maintenance or repair costs, while the percentage of non-revenue water was low as well. Moreover, the WMU gained a relatively large amount of revenues thanks to a great number of new clients signing connection contracts. Since the free connection service was only offered once to local families, all additional clients were charged for initial connections regardless of their residency status (local or migrant). Figure 6.4 clearly shows the WMU's annual revenues rose because of connection fees charged new customers, especially during 2000-2003 period. Specifically, the number of revenues from new installation fees makes up more than two-third of the WMU's total revenues in 2002 and 2003. This indicates that the piped water supply system drew the attention and willingness to connect of a large number of Co Nhue villagers when the system was first put into use. This trend also confirms the rise in number of the WMU's total revenues, which significantly increase from VND41,650,579 (in 2000) to VND140,097,319 (ssee Table 6.4, column 2).

For those who did not possess a drilled well, this piped water source became the primary source; these households treasured the opportunity to access this source:

> "Prior to the arrival of this source [the Co Nhue based piped water supply system], I had to use water from my brother's family or other neighbors. I lived with my younger sister and our incomes barely make ends meet. We have no money for a drilled well like other families. Along came the piped water system, and we were happy. We were provided a free connection and a water meter. We used to pay around VND15,000/month and that amount was acceptable to us. At least, we did not have to go around the commune to ask for water." (Key informant interview, case 24)

***Figure 6.4 WMU's Annual Revenues and New Connection Revenues from 2000 to 2006***




Note: No new connection to the local water supply system was approved and implemented by the WMU because the WMU was suffering from its deficit and inefficient service delivery to the existing clients, according to Thuan.

Others guessed that the arrival of the piped water supply system signaled that the commune would be soon upgraded in status to an urban ward. Thus, they were willing to pay for a new installation even though they were not ready to use water from this source:

> "… Don't you know that… people asked for a new installation even they did not use this water source. They came to ask me to certify that their families unhabit in the hamlet, so that the WMU could accept their application for a new installation. They shared their belief that the commune might soon become an urban ward because the Commune People's Committee had brought piped water to Co Nhue residents. In their thinking they might have to pay for a higher fee later when Co Nhue is upgraded from a commune to an urban ward." (Key informant interview, case 5)

To examine the extent to which the performance of the WMU members had a positive impact on the system as a whole, I came to talk with Hung, the first WMU chief,

who retired in March 2003. Hung supposed that during his term serving as a chief of WMU, he had wholeheartedly dedicated his time and energy to building a solid WMU group that successfully operated and maintained the system as well as generated some income for its members. Hung told me a fascinating story with regards to how diligently he and other members of the WMUs had labored to stay on top of the communal piped water supply management as assigned by the leaders of the Co Nhue CPC. Because none of the WMU members had experience in running and managing a water supply system, he took the initiative to learn from other cases. He also shared his perspective on all the challenges that had faced him as the leader and the others when he governed and monitored all the activities and members of the WMUs. The greatest challenge, in his opinion, were water loss prevention and generating revenues for the group. He said he was fully aware of the fact that none of the public water supply companies in urban Vietnam generated profits from providing drinking water services, given that the water tariff was set well below the construction and maintenance costs. Thus, he did not expect he and his team would have a small profit for WMU, which later could be used to rehabilitate and renovate the system, as the top leader of the Co Nhue People's Council had suggested him to do. The excerpt below somehow illustrates Hung's capacity and method of managing the piped water supply system of Co Nhue.

"Hao: Would you please share with me your managerial experience of the WMU?

Mr. Hung: I did not have any knowledge of governing a water supply system. Thus, I had to learn how to run the system from other cases, i.e. Trung Hoa ward, Mai Dich town. Their model was almost the same as Co Nhue. We took their lessons and tried to replicate them in our commune. For example, we composed a contract that clearly stated the rights and responsibilities of both sides (the provider and the user). I also composed a document called Quy Chế Của Ban Nước (regulations of WMU's operations). This document also clearly defines the role of each WMU member, i.e. what the chief was supposed to do, what the water recording and billing staff was supposed to do. Every member of the WMU had a copy of the regulations. I made sure that my staff thoroughly grasped the content of the regulations that I disseminated.

Hao: How was the relationship between you and your staff? How did you fairly treat your staff? How did you ensure that individual ego would not be detrimental to the performances of the whole group?

Mr. Hung: First of all, the majority of my staff were retirees. Some staff members were even older than I am. Certainly, I highly respected every one of them. Honestly,

> this work was horribly time consuming and hard. I treasured their companionship when working with me in this project. I, however, clearly made a statement to every staff member that the local authority had assigned us to manage and monitor the local water supply system and asked us to be aware of that as a political mission, and therefore everyone had to fulfill his task. As the chief, my responsibility was to double-check all the records of the meter reading and billing staff, and I told my staff not to feel offended. That was my job. It had nothing to do with whether I trusted or mistrusted them. I had to ensure that my staff completed their job and had not skipped or delayed billing. If someone intentionally skipped billing and charging the user, that person had to made up the loss to the WMU. I realized that I just could not stay at home and ask other staff to closely examine the system. I myself had to set a good model, and in so doing, I could tell others what to do. Everyone was clear about our monthly incomes and expenditures. Financially, my records were very transparent. While I was a leader of the group, I took the whole group to eat out every month. My staff were happy and thought positively about the system."

The story told by Hung was confirmed by leaders of the Co Nhue CPC, heads of population clusters, and former members of the WMU – those worked with him during his term. Everyone spoke highly of him and his dedication to the system's management.

(i) Honest, straightforward, humble, and professional are descriptive words used by Mr. Hung's former staff in the WMU when they were asked to give some remarks about him. They listened and trusted him because he always promoted fairness in running the WMU. He expected his staff to accomplish their mission, and he was willing to assist his staff to fulfill their work.

(ii) Hung had put much effort to build a strong solidarity for the water management unit in which mutual assistance and information sharing were highly emphasized. Without any administrative assistance from the Co Nhue CPC, he independently issued the Regulations of the Unit Operation. Every unit member was clear about his mission and compensation. The whole unit members routinely met three times a week to exchange their work and update others on issues of the system operation and management and client relations. Information sharing helped the unit members better serve water users and maintain the pipe system. In addition, the unit chief was regarded as a caring leader. He organized get-together for his staff

almost every month. Once a year, he organized a summer vacation for the whole WMU members and representatives of the local government. He inspired other members to diligently work, although monthly salary for every member was not sufficient to compensate their time and effort to deliver water to local residents of Co Nhue commune and to maintain the system.

(iii) Hung was innovative in composing an economic contract that was normally signed between the WMU and a client. In the contract, rights and responsibilities of each side were explicitly highlighted. Mr. Hung stressed sanction rules that were intentionally applied to violations of the client that could affect the revenues of the unit and/or be detrimental to the destruction of the water pipe system.

(iv) Hung professionally implemented a financial transparency principle. He and his team clearly documented sources of incomes and expenditures of the unit and submitted the unit financial reports to the Co Nhue CPC every 6 months.

(v) Hung was mindful of the efficiency of the WMU's business. He was proactive in purchasing necessary equipment and supplies to run the WMU provided that the Co Nhue local government did not provide any more financial support to operate the WMU and/or to maintain the piped water system. For example, he asked the Co Nhue CPC to provide a headquarters, purchased office tables, chairs, cabinets, and especially a repair toolkit for his technicians.

(vi) Hung was also professional in building the trust with the WMU's primary business partner – the Cau Giay Water Supply Factory – by making monthly payment to the CWSF on time.

(vii) Hung also inspired other members of the WMU to be upwardly accountable to the Co Nhue CPC and downwardly accountable to the local residents, especially the WMU's clients. He received a lot of respect from the Co Nhue residents.

In his capacity as the WMU chief, Hung perceived that the locally based water supply system might not be a business opportunity for the unit and financially viable for a long term because the WMU had to use the full-cost recovery principle in calculating and setting the water tariff for the local users. He anticipated the biggest challenge facing the WMU, in his opinion, was that the WMU existed as an independent and financially autonomous business unit without any financial subsidy from the local government. The water tariff the unit set, as can be seen in Table 6.4, was not sufficient to maintain the system and cover the unit's revenue loss incurred from gradual high rate of non-revenue water (see Table 6.4, column 6). In the meantime, the WMU could not rely on the income source resulted from charging its new clients for their initial connection to the piped water system. These were the only two major income sources of the WMU. If the unit wanted to increase its revenues, it had to raise the water tariff and that would significantly affect water accessibility of local users. According to Hung, the dilemma the WMU faced was his most concern on his term as the WMU chief. He realized the dilemma after running the WMU for about two years. With the Co Nhue local government refusal to make further investment in the local piped water system, the only thing he could do for the unit is to demonstrate his diligent work spirit.

In March 2003, Hung resigned from the WMU after submitting a letter of resignation to the Co Nhue CPC. Explaining his retirement decision, Mr. Hung shared that:

> "I retired when I was early 70 years old. My health status became my enemy. I just could not constantly inspect the pipe system twice/day and execute violations in water accessibility of users every day. Personally, I felt the impact of aging on my health status. As the WMU chief, I had so much responsibility and liability. I just did not want my health concern would be detrimental to the performance of the unit and affect other members' efforts. I am happy that I did not leave behind any suspects. I am proud of myself for fulfilling the mission assigned by the local government and for serving my own community."

Thuan took over the WMU leadership since then until the piped water supply system was deteriorated and abandoned in late 2008. The next session describes the performance of the WMU and the decline and demise of the system.

*6.3.3.2 Performance of the System during 2004-2008 Period*

The WMU started noticing the decline in business when the 2004 revenue were substantially reduced from the 2003 revenue (see Table 6.4). Since 2004, the WMU had to use its income to compensate for the losses caused by constant high rates of non-revenue water which ranged from 40 percent (2004) to 75 percent in (2008). On April 11, 2004 Co Nhue CPC first received a notice of late payment from the CWSF. Six days later (April 17, 2004), the CWSF temporarily ended the service coverage because the WMU had failed to pay its water arrears. This marked the official beginning of the end of the system.

Since April 2004, the WMU had been constantly indebted to the CWSF. The unit made late payment to the factory every month. At least one-third of the water user population was disconnected from the piped water system because the WMU could not identify and control leaks within the network. The WMU chief and the local government persistently asked the CWSF to technically help with finding the defect of water meters and pipe network, and even to take over the control and management of the communal water supply system. Although agreeing examine the defect of the WMU's water meters, the CWSF refused to take charge of the system because it did not participate in the construction stage to begin with. The CWSF termination of its service delivery to the Co Nhue commune in 2007, as briefly highlighted in the beginning of this section, absolutely marked the inefficiency of the WMU in operating and managing the water supply system and the failure of the Co Nhue local government in steering the WMU's operation. The subsequent sections discuss various aspects that were associated with the inefficient service of the system as well as inefficient business performance of the WMU.

The subsequent sections discuss various aspects that were associated with the ineffective water delivery services as well as inefficient business performance of the Water Management Unit.

*6.3.3.2.1 Low Coverage: A Competition from other Water Sources and Insufficient Service Provision*

Although the Co Nhue locally based water supply system provided a free connection to local villagers, only 2,580/4,005 (64.4 percent) households were connected to the system by the end of 2000. However, less than half of the connected households (950 households) actually utilized the pipedwater service provided by the WMU during the same period of time. Although both the number of actual household users and the number of households connected to the system gradually increased from 2000 to 2007, the proportion of actual users was always less than 50 percent of the connected households. This fact was very surprising as piped urban water in Vietnam generally has been considered as the cleanest source of water, because its quality meets the World Health Organization's standards. In-depth interviews provided clarity as to why the rate of actual users of this source among the Co Nhue villagers was relatively low.

The great dependence on groundwater for daily life purposes of Co Nhue inhabitants is one of the major reasons, according to the leaders of the local government and other residents of the commune, for low proportion of piped water utilization among connected households. Prior to the arrival of the piped water system (late 1980s, early 1990s), the Co Nhue villagers primarily relied on groundwater. Depending on the household's economic status, the well-off households[53] could drill a well, which, on

[53] The well-off households were those become prosperous thanks to the garment business they provided to both domestic and foreign companies. During the first five years of the 1990s, there were 350 households that developed garment business and services and these households generated and secured jobs for 7,878 workers. Almost one-third of the workers came from Co Nhue's neighboring communes. (Co Nhue CPC 1999)

average, was 20-25 meters deep, while the less well-off [54] fetched water from a shallow well, which could be made by hand digging. According to the statistics of the Tu Liem District's Department of Environmental Management in 2005, more than 90 percent of Co Nhue's households had accessed to groundwater via their drilled wells. Some particular families practically drilled more than one well to meet the need of their families' members and other tenants[55] that rent their property.

The arrival of the piped water supply system inevitably did not interrupt the appropriation of groundwater of the Co Nhue inhabitants. Instead, that arrival provides an additional source for the local residents to strategically adapt to the substantial ecological and socio-economic transformation of the commune under the Hanoi city's rapid urbanization process. Since appropriating raw groundwater for domestic purposes has been loosely managed and enforced by the city government, for the residents of Co Nhue, this source was free of charge. When the piped water system was developed in the commune, and the connection for the local villagers was free, many households had developed parallel water systems (see Picture 6.20). The piped water became a supplementary source for households. Even though the quality of the piped water, in the local people's perception, was more hygienic, they only used this source for cooking and drinking purposes. To save their monthly expenditure on piped water, Co Nhue residents still mainly relied on groundwater for other purposes rather than drinking and cooking.

Thus, whether the WMU provided reliable piped water service (or not), the prevalence in usage of groundwater was still a major threat that was attributed to the low service accessibility and utilization of the communal piped water supply system of Co Nhue residents.

---

[54] A less well-off households were heavily depended on agricultural activity production, while poor families, according to the perception of heads of Co Nhue's population clusters, were either (i) female householders who did not have personal skills and assets, or (ii) families that did not have working labor force, or (iii) families that had mentally ill member(s).

[55] The majority of the tenants are (i) students of three big public colleges situated in the commune of Co Nhue and (ii) migrants from provinces outside the city of Hanoi.

The low service accessibility and usage of the local villagers of Co Nhue led to a concern over the origin of the piped system emergence. Key informant in-depth interviews revealed that the system was originally initiated by the Co Nhue CPC without thoroughly considering actual demands for the service of its local residents and examining their willingness to pay. According to the two chiefs of the WMU, Hung and Thuan, the local government neither communicated with the local inhabitants to find out their demands nor acquired its prospective beneficiaries to be involved in the design and construction processes. The respondents' reflections demonstrated that they had the feeling of being left out when the system was under the construction.

The interviewed residents had diverse perspective on the emergence of the water supply system of Co Nhue commune. Representatives from the poor and migrant households conveyed their appreciation for the local government's initiative and felt that they were lucky beneficiaries from the project because they acknowledged that piped water delivery was not a mission that the Co Nhue CPC was supposed to fulfill and be accountable to its residents. Two poor households were especially grateful to having access to this water supply source because they were unable to afford a drilled well. Another group of respondents including heads of the communal population clusters and members of the WMUs, however, was more critical in evaluating the effectiveness of the system. They thought the investment of the local government on this piped water supply was socially meaningful, but economically instable and inefficient because the government did not develop a strategic financial plan for the development, maintenance, and sustainability of the system. In addition, several of the respondents, whose livelihood strategies were diverse, expressed their carefree towards the effectiveness of the piped water system. To them, the arrival and existence of the locally-built piped water supply did not substantially affect their water accessibility because the groundwater source they had been using was reliable and easily exploited.

***Picture 6.20 Multiple water sources for household purposes***

This picture illustrates a typical Co Nhue household's strategy for water accessibility. Two taps were for two different sources. Piped water was used for cooking and drinking, while groundwater could be used for other household purposes.

***Picture 6.21 A water tank and a water filter***


Better-off families basically built an internal water network inside their home to extract groundwater. To minimize health risks, the majority of Co Nhue households avoided using direct raw groundwater. They installed a water filtration system with several filter tanks. Another tank was installed and connected to a filter tank so that filtered water could be stored in the former.

***Picture 6.22 A water filter for household's drinking purpose***

Vietnamese people have a habit of boiling water for drinking. When less well-off families did not have enough resource to install a more expensive water filtration system, they usually boiled raw water and filtered that water for drinking purposes. This machine costs less than US$15. It is very commonly used in both rural and urban families.

The earlier analysis of the WMU's performance and assessment of the system clients showed their satisfaction of the delivered service and its provider, the WMU, during the first three years after the system was constructed. Their assessment was made based on their experience in receiving reliable quantity and quality of service and friendly billing staff. However, those clients dwelling in the middle and at the end of the 4,300 km water pipe network reported their bad experience with the service since 2004.

> "For the first couple of years, this source [piped water] was fine. The service was provided four hours per day: two hours in the morning and the other two in the afternoon. Certainly, it took longer for us to obtain the water because we live at the end of the pipe system. But we did obtain water. Then, we have no idea when we turned the tap during the scheduled operation of the pumping station and the first thing we noticed was black and odor water. We stored that water in a bottle and showed it to the man who monthly came to our house to bill us. He shook his head once he saw the bottle. We interrogated him about that quality of water. We were told that there might have been some leaks in the system, and because of the leaks, wastewater penetrated in. Since that incident, we no longer received clean water. I and my husband checked several times, and then we decided to quit using that source of water." (Household interview, case 22)

About half of the connected households resided in the latter half of the pipe system and they complained the most about insufficient water distribution. Because of the intermittent distribution of water, 13 out of 13 interviewed households chose not to use this unreliable source. In many cases, the water meter was out of order and the tap was completely dried out when I visited (see Picture 6.23). When the quality of the delivered service was so bad and unreliable, the users refused to pay for services.

> "Many families refused to pay for the amount of cubic meters of water recorded in their water meter because they claimed that the delivered water was unusable. As a billing staff, I did not know what to do with them. The water was actually odor and dirty. We convinced them to pay. If they did not pay for the service for three months in a row; we disconnected the service and informed the People's Committee of the case." (Key informant interview, case 17)


***Picture 6.23 An Abandoned and Wasteful Water Meter***

Moreover, the quality of the distributed water was poor according to the reflections of both the WMU members and residents dwelling in the Vien Hamlet and the Tru Hamlet[56]. "We turned on the tap during the scheduled operation of the pumping station and the first thing we noticed was black and smelly water. We stored that water in a bottle and showed it to the man who came to our house once a moneth to bill us. He shook his head once he saw the bottle. We asked him about that quality of water. We were told that there might have been some leaks in the system, and because of the leaks, wastewater penetrated in." (Household interview, case 22)

[56] The Vien Hamlet and Tru Hamlet are located at the end of the pipeline system. Compared to the Hoang and Dong Hamlets, the former two hamlets had a lower percentage of households that actually using water from this system. According to the WMU members who was in charge of water meter reading and billing in these two hamlets, their clients were completely cut off from water service since mid-2005, as the WMU decided to terminate the service in these areas to minimize the high percentage of non-revenue water which ranged from 42-45 percent/month on average.

Another reason for low water usage among connected households is the great dependence on groundwater for the daily needs of Co Nhue inhabitants. Prior to the arrival of the piped water system (late 1980s, early 1990s) Co Nhue villagers primarily relied on groundwater. Depending on the household's economic status, the well-off households[57] could drill a well, which, on average, was 20-25 meters deep, while the less prosperous [58] fetched water from a shallow well, which could be hand dug. According to the statistics of the Tu Liem District's Department of Environmental Management in 2005, more than 90 percent of Co Nhue's households had access to groundwater via drilled wells. Some families drilled more than one well to meet the needs of extended family members and other tenants that rented their property.

The arrival of the piped water supply system did not interrupt the use of groundwater by Co Nhue inhabitants. Since appropriating raw groundwater for domestic purposes has been considered as a free resource once the well is dug or drilled, many households wanted to develop parallel water systems (see Picture 6.20) inside their house to save on monthly expenditures on piped water. Irrespective of whether the piped water system, managed by the WMU, provided reliable services, the prevalence of groundwater wells was still a major threat to the Co Nhue residents actually using and paying for the communal piped water supply system.

*6.3.3.2.2 High Rate of Non-Revenue Water*

Non-revenue water of a water company is normally derived from two sources: water users (illegal connected to the system and failed the water meter) and leaks of the

---

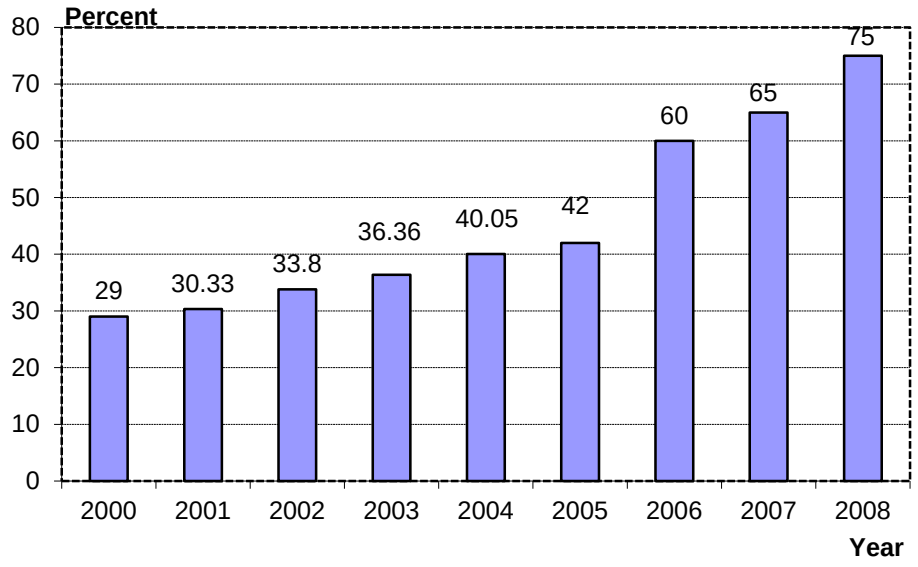
[57] Well-off households were those become prosperous thanks to the garment business they provided to both domestic and foreign companies. During the first five years of the 1990s, there were 350 households that developed garment businesses and services and these households generated and secured jobs for 7,878 workers. Almost one-third of the workers came from Co Nhue's neighboring communes. (Co Nhue CPC 1999)

[58] Less well-off households were heavily dependant on agricultural activity production, while poor families, according to the perception of heads of Co Nhue's population clusters, were either (i) female householders who did not have personal skills and assets, or (ii) families that did not have working labor force, or (iii) families that had mentally ill member(s).

pipe system. For the case of the Co Nhue communal water supply system, the non-revenue water rate in the first operation of the system was the lowest (29 percent). The exponential increase in the percentage of non-revenue water over the years (from 29 percent in 2000 to around 42 percent in mid-2000 and 60-70 percent in 2007-08 on average) was the single greatest unrecovered cost for the WMU (see Figure 6.4).

During in-depth interviews, both of the two WMU chiefs –Hung and Thuan – shared various tricks of illegal connections and failing the water meter of some Co Nhue inhabitants. Someone even intentionally broke the system to fill his personal pond for farming fish. All of the violations, according to the chiefs, were executed by applying various levels of punishment, i.e. warning, educating, giving fines, and most seriously, disconnecting the service.

***Figure 6.4 Percentage of Non-revenue Water of the Co Nhue Water Supply System in 2000-2008***




*Source: Annual Financial Reports and other secondary document of the WMU*

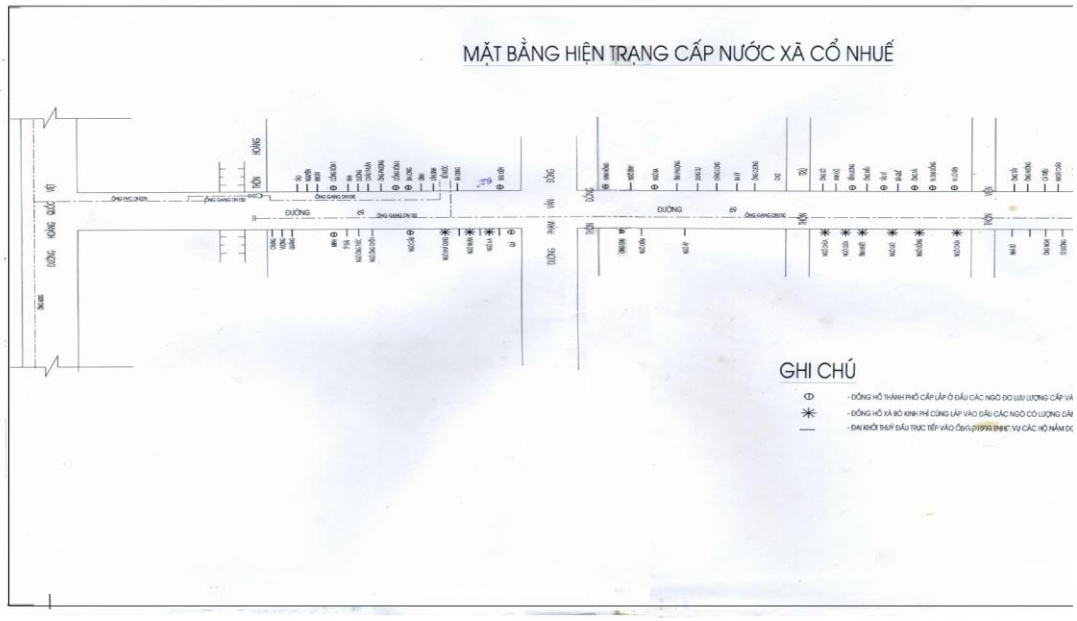
However, according to these chiefs, the significant cause of the high non-revenue water proportion was the deterioration of the system. Hung shared that:

> " The pipe network was buried under two arterial roads running through Co Nhue commune: Road #69 and Pham Van Dong-Thang Long highway. When I worked with other brothers in the unit [prior to March 2003], we were able to investigate big leakages when water was pumped into the system. Our experience was to walk along the pipe network and found if certain area on the surface was darker than surrounding areas. We dug that area and several times we found that nodes on the network were broken. It was much tougher for the WMU members later on. Because Road #69 has been elevated and upgraded 4-5 times since 2001, the pipe network must have been now buried 2-3 meters deep down from the surface. In this situation, it would have been extremely difficult for the WMU staff to track any leaks or broken nodes in the network."

Added to Hung's statement, Thuan blamed the carelessness of the city's telecommunication and electricity companies when launching and/or fixing their infrastructural systems in the communal area because in his opinion their work might have caused damages of the communal water supply network. He proclaimed that:

> "The communal piped water system was not the only one which was buried under the ground of Road #69 [see Map 4.1]. Telecommunication, Internet cables and a drainage system were all buried down there. You might not believe, but almost every year, the Road #69 was dug, either for its upgrading and elevation or for business purposes of telecommunication and electricity companies. Honestly, we could not find out if those companies damaged our pipe network. We should have been informed of their work because literally, we were in charge of managing the piped water system. The fact is we have never been. Even our local government, in many circumstances, was uninformed either. For many times in the past, I had to assign other WMUs members to observe these companies' work to self-protect our pipe network. However, sometimes they implemented their construction work during nighttime. We only discovered about their work the next morning when they already left."

***Map 6.4 A Sketch of the Co Nhue Commune-Based Piped Water Supply System***




*Source: The Water Management Unit*

Reiterating Mr. Thuan's above complain, other two members of the WMU added with some specific information from their perspectives:

> "… the pipe system was getting deteriorated since 2001 because of the construction of other infrastructural systems, such as wastewater, electric and internet wire. Companies, which were in charge of constructing those networks, might accidentally cause damages and leaks in the water distribution network." (Key informant interview, case 7)
>
> "They [those companies] executed their work without coordinating with us. They did not even inform our local authority of their execution. I and other brothers [other members of the WMU] just could not believe that. Something happened to our pipe system, they never bear any responsibility. It was us who take the responsibility to fix all the damages. That was why it cost us a lot." (Key informant interview, case 2)

Another cause attributing to the high non-revenue water rate of the system over such a long period was the utilization of bad quality water pipes and fittings when the

communal water supply system was initially constructed back to late 1990s. A representative of the Co Nhue CPC and several heads of population clusters supposed that the Project Management Unit back to the late 1990s should have consulted with the Hanoi Water Supply Company during the project's design and construction phases.

> "While the HWBC used PVC [polyvinyl clorua] pipes and fittings DN225 to distribute water from its pumping stations to the communal distribution system, the Co Nhue CPC and the Project Management Unit purchased and used cheaper material (ductile iron and galvanized pipes and fittings) DN150 for its system…. I don't know if the Project Management Unit members at that time were aware of the substantial difference between these types. Many of us know the latter is less durable compared to the former…. I was not surprised to hear from the WMU staff that the communal pipe system was broken here and there." (Key informant interviews, case 3, case 4, and case 10)

The constant high percentage of non-revenue water of the Co Nhue piped water supply system significantly threatened the performance and sustainability of the WMU. When a business unit faces the non-revenue water rate of more or less 50 percent, its business is undoubtedly facing critical economic instability. Comparatively, the public water supply utilities in Vietnam's non-revenue water rates ranged from 29-40 percent on average during the same period of time (the 2000s) (JICA 2004), but these public utilities have been heavily subsidized by the city/provincial government[59]. On the contrary, WMUs, as mentioned earlier in this section, was formed by the Co Nhue CPC and considered as an independent business unit that had to self-plan in order to be self-sustained. The unit received no additional financial support from the local government after the system was constructed. Even when the WMU was indebted to the CWSF (2005-2008), it received no aid or assistance from the government.

This indicator clearly showed that the WMU faced a financially unsustainable and economically inefficient system. By comparison non-water revenue water rate for the

[59] Water supply is perceived as a public good and the city water supply company carries out a mission of providing water to urban residents.

public water supply utilities in Vietnam's non-revenue water rates ranged from 29-40 percent on average during the same period of time (the 2000s) (JICA 2004), but they were heavily subsidized by their city/provincial government. In contrast, WMUs had been formed by the Co Nhue CPC and considered as an independent business unit that had to self-sustain its own operations. The unit received no financial support since establishment to the year of arrears to the CWSF led to a shut off of water services (2005). In 2002 for the first time, the WMU's first 6 month business activities report, submitted to the Co Nhue CPC, identified a deficit of VND1,212,300 after balancing all expenditures and income sources (Co Nhue CPC 2002). Although the unit did not owe any water arrears to the CWSF in 2000 thanks to its excessive income from new installations, this first deficit caused great concern to the unit chief:

> "Our leaders [of the Co Nhue CPC] formed this unit to manage the whole system of water supply in the locality. They emphasized that ensuring local residents have sufficient access to clean water was a political mission, and we were carrying out that mission. However, we received no financial support from the Commune People's Committee. That [the deficit] was the first time we found out in July (2002) and I had to seriously disseminate and emphasize that loss to our members. I also reported that incident to our leaders for their awareness. The fact was that back during 2000-2003 there were still many households applying for a new connection and we earned income from granting and installing those connections. Later, when the non-revenue rates exponentially increased, the WMU's business went down because no more new connections were granted." (Key informant interview, case 2)

Earlier in this chapter, we learned that various fees imposed on the household's initial connection to the local water supply system were set differently according residency status. While local households that fulfilled their responsibility to the local government and did not violate the State's laws or other regulations were granted a free water meter and connection, non-local residents who had moved into Co Nhue commune had to pay from VND600,000 – 2,000,000/permit in addition to the installation fee and the cost of water pipes, valves and other equipment, according to the Co Nhue CPC's Decision No. 2202/QLN-UB, signed on 22th February 1997. Three years later, another Decision of the local authority - No. 29/2000/UB, signed on 20 April 2000 - allowed multiple connections per a household regardless of their residency status, and this

Decision significantly stimulated Co Nhue inhabitants to connect to the local water supply system, especially from 2000 to 2003. This shift also generated extensive incomes for the WMU in the same period and even at later years (see Figure 6.2).

The other source of income the WMU relied on was the water tariff. Unlike the HWBC, the WMU operation and performance were not directly governed and steered by the Hanoi's People Committee, and therefore the water tariff set by the unit was, in fact, much higher than the one regulated by the Hanoi People's Committee. Although carrying out a political mission, as steered by the Co Nhue CPC, the WMU's method of operation of the water system did not favor water users. The unit applied a full-cost recovery principle to calculate water tariff for its clients. For this reason, the tariff set by the WMU in Jun 2006 was twice as much compared to the one set by the Hanoi People's Committee, VND2,800 and VND 6,000, respectively.

#### *6.3.3.3 Issues of Design and High Expenditure Imposed from Fixing the Water Pipeline System*

Costs incurred due to fixing leaks and water meters significantly account for all the WMU's annual expenditures. As can be seen in table 6.2, no leak fixing was required during the first two years (1999-2000) of operating the system, according to the WMU's financial reports. However, WMU started paying relatively large sums of money to cover the maintenance cost of the system in the third year (2001). Notably, that cost doubled in 2002 and remained high for the subsequent years. Obviously, the maintenance cost would be higher as time went by. In this case, high maintenance cost substantially affected the system performance and sustainability because the WMU did not have any reserved funding for the system maintenance purpose. Individual in-depth interviews with the WMU members, a leader of the Co Nhue CPC, and heads of the commune's population clusters revealed why it cost the WMU so much to fix the water pipe distribution system which was laid underneath the Road #69 (see map 6.4).

(i) The WMU members indicated that: "… the pipe system started deteriorating since 2001 because of the construction of other infrastructure systems, such as wastewater, electric and internet. Companies, which were in charge of constructing those networks, might accidentally cause damages and leaks in the water distribution pipeline." (Key informant interview case #7). "They [those companies] executed their work without coordinating with us. They did not even inform our local authority of their execution. We just could not believe that. Something happened to our pipe system, they never took any responsibility. It was us who had to take the responsibility to fix all the damages. That was why it cost us so much." (Key informant interview, case 2)

(ii) "Additionally, to avoid potential impacts of annual flooding that hit the local community that were dwelling along both sides of the Road #69, the road has been upgraded and elevated several times since 2001. Our water distribution pipe now is buried, probably 2 meter deep down from the surface" (Key informant interview, case 1)

(iii) A representative of the Co Nhue CPC and several heads of population clusters shared a statement that emphasized the utilization of poor quality pipes and fittings when the system was initially constructed back in the mid-1990s. They supposed that the Project Management Unit back to that time should have consulted with the Hanoi Water Supply Company during the project's design and construction phase. "While the HWBC used PVC [polyvinyl clorua] pipes and fittings DN225 to distribute water from the pumping station to the communal distribution system, the Co Nhue CPC/PMU purchased and used a cheaper material (ductile iron and galvanized pipes and fittings) DN150 for its system…. I don't know if the Project Management Unit members at that time were aware of the difference between these types. We know the latter is less durable compared to the former…. Many of us were not surprised to hear that the

> communal pipe system had broken here and there." (Key informant interview, cases 3, 4, and 10)

What could be inferred from the above excerpts from several key informant interviews is that the causes of high maintenance cost of the water distribution system went beyond the control of the current water management unit members, including Thuan – the chief. Essentially, they were assigned the mission to manage the system, but none of them had actually been engaged in the formulation, design, and construction phases of the project. As such, they could not change the existing design or the choice of water pipes and fittings used in the system.

Furthermore, the WMU did not have any administrative authority or capacity to protect its water supply infrastructure. The Unit could not ask any telecommunication or electric companies to stop their installation in Co Nhue because their work might cause damage to the local water pipeline. In this case, the Co Nhue CPC should have provided necessary coordination and interventions. As a governance unit in the Vietnamese government apparatus, the Co Nhue CPC could have coordinated with any state-owned companies with regards to implementing the infrastructural development within its locality. The reality was that the Co Nhue CPC did not take that action nor properly oversee the WMU's business causing the deterioration of the local piped water distribution system as time went by. As a result, system maintenance costs skyrocketed over the years, and the proportions of unbillabled water were exceptionally high during 2005 to 2008.

As analyzed in the previous section of non-revenue water, the choice of selecting water pipes and fittings material, and lacking collaboration of other public companies in developing and maintaining public infrastructural systems, to a great extent, caused the system leakages. Mitigating the impact of those factors went beyond the capacity and intervention of the water management unit members, including Mr. Thuan – the chief. Essentially, the WMU members were assigned a mission to manage the system, but none of them was actually engaged in the decision-making process in the project's

formulation, design, and construction phases. Inevitably, they could not change the existing design and the choice of water pipes and fittings used in the system.

Administratively, the WMU had very limited authority and capacity to self-protect its water supply system. The unit could not ask any telecommunication and/or electric companies to stop their work implementation in the Co Nhue commune's boundaries just because their work might cause damages on the local water pipe network. In this case, the Co Nhue CPC should have made necessary coordination and interventions. As a governance unit in the Vietnamese Government apparatus, the Co Nhue CPC could have coordinated with any state-owned companies in regards to implement the infrastructural development within its locality. The reality was that the Co Nhue CPC did not take that action and play its patronage role over the WMU's business well enough, causing its local piped water distribution system suffered from deterioration as time went by. As a result, the system maintenance cost was high over the years, and the proportions of non-revenue water, again, were exceptionally high during 2005-2008, as can be seen in Figure 6.4.

In its effort to make up the detrimental impact of high non-revenue water rate on the performance and sustainability of the water supply system, the WMUs encouraged new connections from the local residents and had to increase the water tariff in the same time. These strategies are to generate revenues for the WMU.

Earlier in this chapter, we learned that various fees imposed on the household's initial connection to the local water supply system were differently set by the status of residency. While local household households that fulfilled its responsibility to the local government and did not violate the State's laws and other regulations was granted a free water meter and connection, non-local residents who moved to settle down in Co Nhue commune had to pay from VND600,000 – 2,000,000/permit ($US 30-100, respectively) in addition to the installation fee and an expenditure of purchasing water pipes, valves and other equipment, according to the Co Nhue CPC's Decision No. 2202/QLN-UB, signed on 22th February 1997. Three years later, another Decision of the local authority - No. 29/2000/UB, signed on 20 April 2000 - allowed multiple connections per household

regardless of their residency status. This Decision significantly stimulated Co Nhue inhabitants to connect to the local water supply system, especially during 2000-2003, resulting in extensive incomes for the WMU in the same period (See Table 6.4, column 5).

Regarding the water tariff set by the WMU, unlike the HWBC, the WMU was not directly governed and steered by the Hanoi's People Committee, and therefore the water tariff set by the unit was much higher than the one regulated by the Hanoi People's Committee. For example, compared to other residents who were direct clients of the Hanoi Water Business Company, the residents of Co Nhue paid for one cubic meter of piped water 1.3 times, 1.5 times, and 2.14 times more expensive during 1999-August 2002, September 2002-May 2006, and June 2006-June 2007, respectively. Revealing by members of the WMU and heads of the population cluster, the increase in water tariff, proposed by the WMU and approved by the leaders of the Co Nhue CPC, as by default. To maintain the piped water service, the WMU had to apply the full-cost recovery principle in the face of no other funding sources or local government's subsidies. When the unit was under constant indebtedness to the CWSF from 2006 to September 2007[60], it proposed to raise the water tariff up to VND9,000/$m^3$, equivalent to 62.5 cent/$m^3$ (3.21 times more expensive than the HWBC's one. Even though the mass media/newspapers in Hanoi criticized that proposal, some water users of Co Nhue commune, surprisingly, went along and accepted that.

Another strategy, used by the WMU members, to mitigate their loss of monthly revenues due to high non-revenue water rate was to disconnect water service in some service areas. The unit staff members suspected, but could not exactly discover areas of leakage in the pipe network. This action saved the WMU's business, but critically affected a number of poor households that were not affordable a drilled well as an alternative. These family members had to fetch water from their neighbors' water well

[60] By the end of September 2007, the WMU was indebted to the CWSF almost $US10,000. This amount increased by the end of September 2008 when the system was completely demised and the water management unit was unable to pay.

everyday. Exceptionally, one had to bath at various neighbors' house for six consecutive months due to being disconnected from the communal piped water supply system.

*6.3.3.2.3 The Impact of the Users' Water Arrears*

As can be seen in Table 6.4, the WMU struggled clients' water arrears from the second year of the system operation until the system completely collapsed (in May 2009)[61]. The increase in the water arrears indicator over the years implies that the WMU had difficulties in billing and in customer relations. During the second year of operation, the WMU only had around VND 6.7 millions in user arrears. This amount doubled in the following year (2001) and gradually increased over the subsequent years. Although data from 2003 and 2006 showed a slight decrease in the monies owed to WMU by its clients, this indicator, in general, reflects a lack of capacity in the WMU staff, especially those who directly interacted with household users via meter recording and billing. A number of interviews with WMUs staff and representative household water users as well as secondary documents collected at the Co Nhue CPC revealed more specific reasons behind the statistical numbers.

As aforementioned, many households residing at the end of the pipeline in the Tru and Vien Hamlets experienced poor water quality and intermittent distribution. They did not make any payments when a WMU billing member requested because the supplied water was not usable. In addition, a large number of clients in these two hamlets deliberately did not clear their arrears because the WMU had terminated service in summer 2005 without notice. The fact is that to reduce its high percentage of non-revenue water, which ranged from 35 to 55 percents during 2004-2005 (WMU 2006), the WMU ended service coverage in these hamlets infuriating its clients (Household interviews cases 24 and 25). From the water users' perspective, the WMU was responsible addressing the issues of non-revenue water and low revenues, rather than

[61] On May 25, 2009, Mr. Thuan – the WMU chief signed a paperwork that verified the WMU's arrears to the Cau Giay Water Supply Factory, which was VND 294,816,034 (~US$15,516).

forcing clients to suffer from service termination. Because of this incident, many users verbally confronted the chairperson of the Co Nhue CPC at his headquarters. According to a WMU report submitted to the Co Nhue CPC, VND41,202,000 (US$2,423) of user arrears could not be retrieved.

This incidence implies that rules and sanctions created by the Co Nhue CPC and WMUs to facilitate the operation of the local water supply system were not effectively enforced. WMUs and household users signed an economic contract of water service provision, under which there were terms regulating responsibilities and rights of both parties. The contract, signed by the user, the WMU chief, and the WMU meter recording and billing staff, clearly states that the WMU (the service provider) has the right to terminate service and the (signed) contract if the user fails to pay for its consumption, or illegally steal water. In fact, "such violations happened, but none of the thousand contracts was terminated due to weak WMU enforcement." (Key informant interview, case 4)

*6.3.3.2.4 The Impact of the WMU's Performance*

In any community-based institutions for infrastructural service provision and environmental management, roles of the management team and the leader(s) are significantly important to the vitality and sustainability of the institution and the efficiency of services that the institution provides. This team is expected to be capable of managing and operating well infrastructural service delivery systems. The operation and management of such systems require members of the management team to be technically competent, financially transparent, professionally reliable, and socially accountable in work ethics. The team members are also expected to collaboratively work with others as a unity to effectively and efficiently operate and maintain its system. For the case of the Co Nhue locally operated piped water supply system, the ways in which the WMU operated and managed the system demonstrated its incapacity, which was eventually detrimental to the decline and demise of the system.

Being established as a business unit that runs a piped water delivery system at a commune level, the WMU of Co Nhue, as described, was selected and appointed by the local government. The unit staff members were chosen based on their levels of enthusiasm and recommendations of heads of population clusters. Although the operation of such a water supply system entails and requires varying degrees of business and technical competence, none of the MWU staff members ever received proper training or had technical knowledge and experience in water supply, water meter monitoring, piped water system billing and management. Except Mr. Hung, the first chief of the unit who gained managerial experience through serving as the principal of the Co Nhue middle school in the past, the other members of the unit worked with the guiding principle: "Learning by Doing". They gained experience from making mistakes; however, certain mistakes, incurred from incapacity and technical and managerial incompetence, had tremendously affected their unit's business goal as well as the political mission they were assigned by the local government to fulfill.

First, both of the WMU members and heads of the Co Nhue commune's 19 hamlets realized that installing a water meter inside the water user's residence was a serious mistake. That, according to three interview excerpts below, created chances for the water users to steal water, to damage the water meter while brought obstacle to billing staff members to do their work monthly.

> " Because the water meter was inside their [the water users] gate, we hardly realized what they did to the it. Some failed the meter, making it run slowly." (Key informant interview, case 12)
>
> "I found a case of illegal connection. They broke the pipe right before the water meter, so that the water meter could not record the consumed water volume." (Key informant interview, case 13)
>
> "It was very hard for me and other billing staff to read water meters every month…I had to ask the house owner let me come in to do my job." (Key informant interview, case 14)

Second, with very limited technical knowledge and skills in managing the piped water network, the WMU, as a whole, was unable to discover the defects of all the master water meters installed along the network or leaks that might have caused exceptionally high percentage of non-revenue water since 2005. Because of this limitation, the WMU

and the Co Nhue CPC had to request the Cau Giay Water Supply Factory for its technical assistance in May of 2006. The factory was only able to help with testing all the master water meters of the network, but did not agree to assist with fixing the whole pipe network. In addition, because of this limitation, the WMU had lost a great amount of revenues, which was first recognized in the 2003 financial report.

WMU had to submit its financial reports to the Co Nhue CPC every six months, but these reports were not implemented and released in a transparent manner. Copies of these reports, retained at the unit headquarters, showed their full of correction. Neither the detailed of the unit's expenditures and revenues nor a narrative of the financial report was submitted to the Co Nhue CPC. It was not clear to the Co Nhue commune's leaders why the amount of water arrears of users increased over the years as shown in these reports, while the WMU chief was unable to provide proper explanation of causes. Additionally, the WMU staff members committed violations of financial principles management, such as embezzling the unit revenues. These incidences were only released and/or reported to the local government when the WMU chief failed to convince his convicted staff to return the embezzled money.

Instability in its personnel, according to the WMU chiefs, was a huge challenges for the unit leader and affect the efficiency of the unit's business. During 1999-March 2003, under the leadership of. Hung, the WMU had five changes in its staff members due to retiring or switching positions between units under the stewardship of the Co Nhue CPC. When the assistant to the chief and accountant, cashier, or water meter reading and billing members were replaced, the chief had to re-train the substitutes, re-disseminate the WMU's guiding principle, regulations, work ethics to ensure that the new employees had a thorough grasp of their individual mission and the unit's mission as an organization. According to Mr. Hung, each individual member of the WMU had to put tremendous effort in his/her work because the nature of the water supply system management was very complicated, especially when the WMUs managed to prevent illegal connections, water theft, as well as to reduce its high non-revenue water rates, mostly caused by water theft and physical leaks in the system.

> "It took a while for the newbie, especially the water meter reading and billing staff members to have a comprehension of what he was supposed to do. In his capacity, he had to supervise the pipe system when the pumping station was operating and water was being distributed to household users to (i) spot any leaks in the system, (ii) identify illegal behaviors from the users, such as re-adjust the speed running of the water meter, and (iii) document the users' concerns. He also had to demonstrate that he completed billing and collecting money from household users in his designated area, and then submitted the collected money to the cashier, the monthly records notebook to the WMU chief for double-examination." (Key informant interview, case 4)

What is more, the WMU billing staff of 2004-2008, reported by water users and heads of the communal population clusters, failed to fulfill their work monthly, which is to read water meter in designated population clusters and to attend routine meetings. Of the 14 staff members during the aforementioned period, 10 were retirees. They were could not keep up with monitoring the pipe network during water distribution hours to spot illegal connections or leaks everyday. Some were very unprofessional by not wearing a nametag while working with customers. As they missed attending weekly meetings, they also failed to communicate and update the WMU leader on their work progress. Although the WMU chief and his staff never admitted, heads of the local population clusters supposed that they should have been responsible for the constant high proportion of non-revenue water and high percentage of the water arrears among the local water users.

Another important issue that emerged from in-depth interviews was the WMU's poor enforcement of its rules and sanctions applied to households/cases that committed illegal connection and/or delayed to pay back the consumed water cases. The WMU staff members failed to use sanctions to address violations caused by the client. The WMU did not take action when the water user failed to comply terms listed in the contract signed between them, such as failed to pay bill for several months, committed illegal connection, damaged the WMU's property including water meters and the pipe network. In 2007, two cases of the WMU's money embezzlement were brought to the Co Nhue CPC's meeting for an official warning of their false commitments. According to the two

WMU chiefs, their staff members, in many situations, intentionally ignored violations of users to whom they were blood related.

> "A staff member of the unit that I found out purposely did not punish his nephew who damaged his water meter. Two others also purposely did not adequately collect water bills from their brothers for months." (Key informant interview, case 2)

Respondents of the research usually linked their discussion of the WMU staff members' performance to their responsibilities and benefits. The fact is all WMU billing staff members were assigned to carry out the mission of providing piped water service to the local residents and maintain the pipe network which was invested by the local government of Co Nhue. These staff members were compensated for their work with a fixed monthly salary and a small commission, which was calculated based on the total of the water bills they collected from water users monthly. Their failure in accomplishing their mission showed not only their professional irresponsibility, but also personal opportunistic behaviors. More importantly, their action was detrimental to weakening the strictness of the WMU rules and sanctions that ensure the fairness for its users and its vitality in a long run. Referring to this issue, a member of the WMU expressed his disappointment towards his convicted co-workers:

> "We agreed to serve in the unit, thus we should not have complained about the compensation for our work. We should not do anything to affect its efficiency, especially we were asked by the [Co Nhue Commune] People's Committee to monitor the system and self-sustain our activities. VND 180,000/month was what we – the water meter reading and billing person – all received. On top of that, every billing staff member was given five percent of the total amount of water tariff s/he collected from users. For example, if I had many clients and all of them used services of the system, I might end up receiving relatively large amount of money (VND 1.5 million, for instance). I just could not believe Mr. A and B corrupted. They never shared with us their financial hardship. It was not worth doing it. What they did actually damaged our image in the eyes of the local leaders and made the operation of the local [water supply] system even less and less efficient." (Key informant interview, case13)

The success or failure of a management unit like the WMU of the Co Nhue commune water supply system could be attributable to the capacity of its leader. The WMU was under the leadership of two persons. The first leader of the unit during 1999-2003, Mr. Hung, was appraised as an experienced, smart, and dedicated manager. He was also commented by the local government representatives, local residents, and his business partner – the Cau Giay Water Supply Factory director – as being upwardly accountable to the local government and downwardly accountable to water users, and professionally reliable to business partner, provided his responsiveness and transparency in providing the water service, leading the management unit, and managing as well as sustaining its finance. Like Mr. Hung, the second leader of the WMU during 2003-2008, Mr. Thuan, was evaluated as enthusiastic. He, however, was regarded as being passive, lacking in creativeness, decisiveness, and professionalism due to his limited technical knowledge and managerial experience. Respondents of the research mentioned his flaws because during his leadership, the water service was badly delivered to the local users, the WMU business was inefficiently operated and in serious financial crisis, and ultimately, the water supply system was deteriorated and terminated. The local water users and government supposed that Mr. Thuan and his staff should be partially responsible for the deterioration and demise of the local water supply system and the amount of around $US10,000 the unit indebted to the Cau Giay Water Supply Factory when the system was terminated.

> "Instead of being strict to his staff, he [Mr. Thuan] was very easy-going person. He tolerated the late financial submission from the billing staff. Sometimes, we did not know if he wholeheartedly trusted his staff, or he showed his irresponsibility in leading the management unit and monitoring the local water system." (Key informant interview, case 7)

> "He [Mr. Thuan] was horrible…[raising voices with anger]. He ordered his staff to close a valve in the water system that stops the service delivery to our population cluster without noticing us. We had no idea why the service was suddenly disrupted, until we interrogate him in person. We were his clients, but he just did not treat us right." (Household interview, case 25)

> "He [Mr. Thuan] should have reported to us right away when he found out a big loss of the unit's revenues. He thought he himself could address issues facing the unit and his staff. He also covered his staff members' violations in financial management. He was soft, not strict enough. Given his limited capability, he just could not do too much." (Key informant interview, case 10)

> "Mr. Thuan could not keep his promises to us. Since early 2005, he was always behind the payment schedule. He missed three payments in a row. We had no choice but sending the local government and the WMU three warnings before we stopped delivering water to their system. We still keep several commitments Mr. Thuan wrote to us on behalf of his unit and the Co Nhue People's Committee. As he was not reliable partner, it was extremely hard for us to work with him. We have no idea what sort of business they [the Co Nhue People's Committee and the Water Management Unit] have been doing. They charge their clients almost three time more expensive than the price we charge, and they still complain about their inefficient business." (Key informant interview, case 31)

When being asked about his plan to pay back the water arrears the WMU was indebted to the Cau Giay Water Supply Factory, Thuan stated that the WMU was unable to cover its debt and that the local government (Co Nhue CPC) should find ways to address the arrears. Talking about Thuan's irresponsibility for his unit ineffective and inefficient performance as well as his incapability in the local water system management, a representative of the Co Nhue CPC expressed his angry attitude:

> " We asked the unit to report to us causes of its revenue loss and its debt to the Cau Giay Water Supply Factory, Thuan and other staff complained about the deteriorated water pipe system, leakages, but never admitted his unit incapacity and ill performance. He even proposed to us that he would step down from the unit leadership and that the local government should take over the system, he just could not manage it. The chairman of the People's Committee was very frustrated. He did not approve of Thuan's resignation. Moreover, he asked that Thuan and his staff had to be responsible for the debt." (Key informant interview, case 17)

In summary, this section has just analyzed the incapacity of the WMU which, ultimately, affected their operation and maintenance of the locally piped water system.

Technical incompetence, professional irresponsibility, socially (upward and downward) unaccountability, and lastly, incapability to produce financial transparency, and a lack of communication with the local government were all contributory causes to the demise of the water system of Co Nhue commune. Acting as a gate keeper that steered the performance of the WMU unit, it was intriguing to comprehend as to what extent the Co Nhue local government (Co Nhue CPC) was responsible for the poor performance of the unit and the decline of the locally built piped water network.

### *6.3.4 The Role of the Local Government*

The local government of Co Nhue commune initiated and financially invested in building a piped water supply project and therefore, it should be in charge of the sustainability and vitality of the system. Establishing the Water Management Unit and self-selecting, assigning local people to operate and manage the water system, the local government was supposed to closely steer the performance of the unit staff. Nonetheless, the ultimate demise of the water supply system implied that the local government did not successfully accomplish its mission. The major concern was to what extent the local government of Co Nhue overlooked its mission and how wrongly it did.

Because the local government invested in building the local water supply system to serve its local residents, social responsibility is the foremost incentive for the Co Nhue CPC to monitor the performance of the WMU. The fact is that the local government failed to closely monitor the performance of the WMU. The local government leaders did not notice when was the first time the WMU's operation of the water supply system was inefficient. When the unit was so deeply indebted to its business partner- the Cau Giay Water Supply Factory, - that the latter had to terminate water delivery several times, the local government stepped in to coordinate dialogues between the WMU and its business partner. Because the Co Nhue CPC directly signed the service contract with the mother company of the CWSF – Hanoi Wate Business Company, – the local government was legally responsible for the failure of the WMU's performance and its debt. This reality

was beyond the expectations of the local leaders. The chairman of the commune had to seek for financial aid from the city government as indicated in the excerpt below:

> "Making an initial investment in constructing the [water supply] network was all we could do. As we handed the network in the hand of the WMU, its staff members had to operate and sustain it for the sake of the local residents. They had to be creative and responsible for its vitality, so that they could be self-sustained. Thus, we just could not cover their debt caused by their failure of running the business. All the unit members, especially the chief, have to be responsible for paying back the debt. Financially, the local government does not have any funding for this. On one hand, we continued asking Mr. Thuan [the WMU chief] to pay back the unit debt to the Cau Giay Water Supply Factory. On the other hand, we asked for a mercy from the Hanoi People's Committee. Because the Hanoi Water Business Company is under the stewardship of the Hanoi People's Committee, we have proposed that the Company could clear the debt." (Key informant interview, case 17)

The Co Nhue CPC was also criticized by its residents because it failed to choose the technically and managerially capable leader for the WMU. It did not provide a legal framework and a financial plan for the WMU to operate. The WMU members were given economic incentives to run the local water supply system. They, however, were not tied to any legal responsibilities when the system was deteriorated and terminated. Even though when the WMU members committed corrupted behaviors, the local government did not punish them. This is the management defect.

In addition, although the water supply system was constructed for the local people and later given to the WMU for its monitoring, the local government of Co Nhue did not create any platform for either the beneficiary or the unit members to participate in the design and construction processes of the system. The government also did not consult with the Hanoi Water Business Company and conduct preliminary need assessment to design and construct an optimal system which could better reflect the actual demand for service of local residents as well as changes in the community, i.e. population growth, the decline of alternative water sources, and increased demand for clean water service. This flaw, in my opinion, significantly caused the ineffectiveness of the project, exemplified through the low percentage of service utilization, the deterioration of the pipe network,

and high rate of non-revenue water. As a result, the local government wasted its investment and did not achieve its social objective, which is to provide clean water to the residents of Co Nhue commune.

### *6.3.5 Sustainability of the Project*

After eight years of incubating and transferring an initiative into practice, and another nine years of operation and management, the Co Nhue's community-based piped water supply system fell apart in late 2008. More than two-third of the piped network did not function. The management unit failed to pay itswater arrears to the service provider – Cau Giay Water Supply Factory; and the factory thus not only stopped distributing water to the Co Nhue community, but also threatened to bring the case to the city court. In other words, the community-managed water supply system in Co Nhue did not sustain anymore after the public water utility terminated the service contract. Local users did not obtain water. The water management unit staff members stopped checking the piped network and meeting one another at the headquarters. While the local inhabitants adaptively sought to access to another water source, i.e. drilled well, the WMU chief still had to work with the Co Nhue CPC and the CWSF to find a solution to pay back the WMU's water arrears to the CWSF. Although there was no announcement and/or decision issued from the local government – the Co Nhue CPC - regarding the dismissal of the WMU, the Co Nhue residents and leaders understood that the local water supply system ultimately ended and the local governance initiative in water provision cannot not sustain beyond nine years of operation.

The system failed to provide sufficient and reliable service to the Co Nhue inhabitants; and the failure of the water management unit in monitoring and administering the implementation of the piped system wasted the financial investment of the local government. Within nine years of operation, the actual users of this piped water source were 50 percent less than the registered numbers. The percentage of non- revenue water due to leakage and illegal connections was exceptionally high (ranging from 40 to 75 percent). The water management unit was lacking of managerial skills, technical

expertise, and also did not possess a good financial plan to sustain the system. The Co Nhue CPC was not held accountable for its WMU's performanc, adversely affecting people whose water services were terminated due to WMU'S arrears to the CWSF.

The literature review of community-managed service provision studies highlights various factors contributing to the effectiveness and sustainability of community-managed service provision. These include the role of active participation of users in decision-making on service design and operation (Carter, Tyrrel, and Howsam 1999, Narayan 1995, Isham and Kähkonem 1999, Doe and Khan 2004, Prokopy 2005, and Commins 2007), the establishment of transparent decision-making rules and capacity of the local water committees (Isham and Kähkonem 1999), the relationship among the management committee of the infrastructure system, users, and the local government (Das 2009), and the application of demand-responsive approach (Sara and Katz 1998, Gross, van Wijk and Mukherjee 2001), the sense of ownership of local communities over the service project (Commins 2007). Lowry, White, and Courtney (2005), in addition, pointed out challenges to effective institutional design and implementation resting on management authority (exemplified via lack of clarity about the scope of authority, inconsistency and conflict between plans, programs, and legislation within and between local and national government, and lack of enforcement), management capacity (exemplified via capacity building efforts), and resources issues.

In the case of the Co Nhue piped water supply, the following major causes affecting the sustainability of the system; and these causes are consistent with findings of other studies on this topic:

First, capacity of the water management unit staff members affects the sustainability of the system. The water management unit staff members were technically incompetence. Monitoring and managing an environmental service provision system like piped water certainly requires technical expertise and management know-how of the management unit members, but the case of Co Nhue water supply system was operated without such expertise or knowledge. None of the WMU leaders had experience in running a business and/or technical expertise in piped water supply system management.

Their inexperience and weak capacity were translated into ineffective service coverage, inefficient business practices, and poor relationships with clients. Specifically, due to its lack of expertise in operating the piped water system, the WMU failed to identify leaks that largely caused the system's high non-revenue water loss. Technically, members of the WMU were unable to check if the installed water meters had any defect. Some failed to enforce the rules and regulations of the institution to fine illegal water theft and other forms of violation that were significantly detrimental to the high rate of non-revenue water of the system, as well. Poor billing and communication skills with clients of the communal water supply system not only reflected the weak capacity but also the unprofessional nature of the WMU members. Several annual financial reports of the unit, which reflected the effectiveness and efficiency of water service provision of the WMU, were hand-written and lacked transparency. In addition, corruption, exemplified via the embezzment of the unit fund, and opportunistic behaviors of the WMU members subsequently led to a brakedown of trust between the local inhabitants and the WMU members.

Second, although the WMU set up rules that regulated the function, operation of the unit as well as the system management, enforcement of rules applied to the WMU members and water users was poorly and inconsistently executed. This seriously affected the institutionalization of the water management unit and the efficiency and effectiveness of the piped water supply system. Two members of the unit embezzled the unit funds, but there was no punishment for their ethical violations. The user signed an economic contract with the WMU in which there were terms of references that regulated the responsibilities, liability, and punishment. However, no violation cases were revealed to the public. In fact, several members of the unit even covered the user's violations.

Third, the role of the local government has been highlighted as an important impetus for the effectiness and vitality of a community-managed infrastructure development project, as widely recognized in the literature review. In this case, the failure of the water piped supply system partially caused by the irresponsibility of the Co Nhue CPC. Although the local authority built the piped network and established the water management unit, but failed to steer and oversee the performance of the unit over

the years. The local authority did not routinely monitor whether the water supply system was economically sound and sustained and the service was socially equitable to all its residents. Every year the WMU held a meeting at the Co Nhue commune headquarters to report its annual performance to the Co Nhue CPC learders. The WMU, however, received no steering from above with regard to how to strategically reduce the high rate of non-revenue water. The leaders of the Co Nhue PCP failed to face questions and give explanations to its poor residents whose water connection to the communal system was terminated because of the high percentage of non-revenue water, when confronted. While enjoying a number of summer vacations held and sponsored by the WMU via its revenues, the Co Nhue CPC leaders and other staff of the local authority did not hold any accountability to its residents (i) who received no water accessibility due to the poor design of the system, (ii) who lost water accessibility due to the high proportion of non-revenue water of the system, and (iii) who received intermittent access and unreliable quality of water due to the technical incapability of the WMU staff.

The Co Nhue CPC was also irresponsible for the debt that WMU was indebted to the Cau Giay water supply factory. Even though this governmental institution signed a contract with the CWSF in 1998, it was not economically and socially responsible for paying the debt. The main argument given by the Committee was that as the WMU operated and managed the communal water supply system, the unit had to bear the responsibility for paying back the debt. Ironically, this arrangement had led the WMU to increase the water tariff, which was approved by the Co Nhue CPC, and directly charged the water users, several times. Ultimately, the residents of Co Nhue who subscribed and utilized piped water from the local system had to indirectly pay for the poor performance and weak capacity of the WMU and the irresponsibility of their local government. This finding, again, confirms what has been highlighted in the literature on basic service delivery that the local government's irresponsibility has an impact on the efficiency and sustainability of the community-based model.

The WMU and Co Nhue government authority did not develop any institutional adaptive strategy to contextual changes in the community. More specifically, they failed to coordinate with other infrastructural development companies to protect the local water

network from being broken. They also failed to develop a more effective supervision of the network to cope with a pervasiness of spontaneous housing construction among local residents. They did not seriously consider the necessity to change institutional rules, i.e., sufficient and capable staff, and operational regulations of the piped water network to address inefficient issues caused by constant high percentage of non-revenue water.

Lastly, there was lacking of need assessment among prospective user groups prior to the development of the piped water network. The local authority designed, planned and constructed the network without considering the need of clients in the future and the competing water sources such as groundwater. Additionally, while the ultimate goal of the Co Nhue CPC was to bring clean drinking water to its residents, the implementation of this unconventional method of water supply leads to contrary results. Because economic efficiency was the guiding principle for the operation and maintenance of the system, the WMU had constantly set up high water tariff, first to gain its revenue, and then to compensate for its debts to the CWSF. Therefore, a socially equitable distribution of the water service was not upheld as a guiding principle and poor people and other inhabitants of the commune suffered from paying the highest water tariff.

### 6.4 The Shift of Entitlements to Water

The emergence of this piped water network as depicted in section 6.3 reflects strong political support and effort of the local government in institutionalizing a locally-based water service provision in the face of rapid urbanization. Making this water source available and accessible required capital intensive for both the provider and the user. The Co Nhue commune CPC had institutionalized and commercialized water access for its residents by adopting the financial principle “full-cost recovery.” In other words, users had to pay for all operational, marketing, distribution, and maintenance costs associated with water service they received. They also had to sign an economic contract with the operators/managers of the local system to become legally liable for their water accessibility.

What has been learnt through the case of water accessibility in Co Nhue under its rapid urbanization is: water has transformed itself from raw water to service water that could be more hygienic, but also more economically expensive. The transformation process of water, in an urbanized setting like Co Nhue commune, has been from a free of charge appropriation of natural resources, e.g. surface water, to monetary-based service accessibility, from being embedded into reciprocal kinships and community relations to being liable to the terms which were legally regulated in an economic contract, from independently accessible to dependence on service providers. This transformation process entails the requirement of technical knowledge, capital intensive, and institutional managerial skills for the provider and capital possession for the user. Residents of ubanized settings have to develop multiple adaptive strategies to secure water for life. When the natural water resources are becoming depleted and no longer reliable for appropriation due to rapid urbanization process, theoretically, these residents can rely on three options. First, they can rely on themselves by using their human capital to earn wages to pay for water services. Second, they also can rely on the support of other members in the community. If they are bonded to each other, mutual reciprocity could help them secure water. Lastly, they could probably be benefited from the accountability of the local government.

Water accessibility of Co Nhue residents, exemplified via their individual houshouse's strategies and the local government's initiative in creating a community-managed institution, illustrates that with limited mutual support from other members in the community and unaccountable of the local People's Committee, one has to possess assets, capital or convert his/her human capital into wages to afford water service. For many, this is a major change, and the change has imposed more economic vulnerability to the poor and less affluent households because these groups do not have regular and reliable income sources to rely on, limited government support, and eroded kinship-based assistance. In that context, the emergence of community-managed piped water supply system could be seen as an adaptive institutional solution to the provision of water supply in an urbanized setting like Co Nhue.

# CHAPTER 7
# CONCLUSIONS

The city of Hanoi is growing outwardly, and the city growth at its edge has created tremendous impacts on peri-urban communes physically, socio-economically, and ecologically. In the water sector, since the formal public water supply company lacks of motivation in extending its service coverage to these areas, peri-urban dwellers of Hanoi have strategically appropriated various water resources to meet their daily needs. The following findings of water accessibility of the inhabitants of Co Nhue, one of the most rapidly urbanized communes at the edge of Hanoi, could genuinely reflect the complexity of water governance and contentious issues associated with water accessibility in the peri-urban setting of the growing Hanoi.

## 7.1 Summary of Key Findings

First, being consistent with other studies on water governance in peri-urban areas of the developing countries, this study finds that the co-existence of diverse sources of water supply under intensive urbanization showed complex water governance and water accessibility in peri-urban Co Nhue. That also means there is no reliable source on which peri-urban inhabitants can rely. Spatially, access to water could be very contentious. While rural residents can rely on surface/groundwater, urban residents can receive piped water services, dwellers of a rapidly urbanized commune like Co Nhue have to access to various sources of water for life in the face of unavailability of the public piped water. In this sense, the water governance of Co Nhue is somewhat similar to elsewhere in Gresik, Surbaya, Indonesia (Guzinsky 2007), Mexico City (Mexico,) Chennai (India,) Dar es Salaam (Tanzania,) Caro-Giza (Egypt,) and Caracas (Venezuala) (Allen, Davilla, and Hofmann 2006a).

Since the 1994, the commune of Co Nhue has undergone a rapid transformation process, exemplified by the emergence of spontaneous and planned housing construction

and urban development projects, land transactions amongst the local inhabitants and/or between the local and in-migrants, a shift in the communal economic structure from the reduction of agricultural production activities to increased share of construction and services into the communal economic gross. Embedded in this process is the degradation of surface water sources (lakes, ponds, river water), the unmanaged exploitation of local residents on groundwater (shallow wells and drill wells), the increasing demand for clean drinking water, (bottled water, piped water), the strategic uses of rainwater, and the emergence of a communal water supply system that was initiated and developed by the Co Nhue communal authority. These water sources were rendered available for the demand of approximately 55,000 inhabitants, recorded on April 1, 2009, of the commune.

Although Hanoi Water Business Company (HWBC) has its branch water supply factory (Cau Giay Water Supply Factory – CWSF) in the Tu Liem district, to which Co Nhue commune administratively belongs, the majority of Co Nhue inhabitants were not directly served by the CWSF because Co Nhue simply is not administratively classified as an urban residence, which HWBC has no obligation to serve. Even though rainwater and some shallow wells, 7-10 meter-wells dug by hand (*Giếng Đào*), which were very widely used in the late 1980s and early the 1990s of the last century, were still utilized as part of few households' strategy, these sources were less and less preferred by the majority of the Co Nhue residents because of its unreliable quality. As drilled well technique and technology came along and a drilled well offered a relatively greater abundance of water compared to the shallow dug well, the latter was gradually replaced with the former in the 1990s and still pervasive in usage almost every household in Co Nhue.

None of the Co Nhue inhabitants appropriated surface water sources for their daily needs simply because surface water area has been rapidly depleted and/or polluted under the impact of the local population growth. Almost all of the ponds and lakes of the commune were reclaimed to meet the increasing demand for housing construction of the local residents and the Hanoi city's expansion.

Second, in the face of no reliable water provision, various strategies for water accessibility have been generally employed by the Co Nhue inhabitants at the household level. The differential in economic status significantly influences water accessibility practices of households. Both poor and more affluant families were provided the same opportunity to access the local water supply system when this was developed and operated. However, when the operation of the system was economically inefficient and financially unstable, the reduction of the system's service coverage in several population clusters seriously affected the poor and rendered this group immediately vulnerable. There is no differential between the better-off and the poor in water utilization for domestic purposes. Both groups made the best use of various water sources for different purposes of a household. Clean and improved water sources (piped water and filtered water from drilled wells) were used for drinking, food preparation, and cooking, while unimproved sources, surface water and raw groundwater, if used, were for washing, bathing and cleaning purposes. Regardless of socio-economic status, both groups deployed this strategy as a means to save costs on water.

Due to financial constraints, poor households had more difficulty in finding alternative sources when changes happened to jeopadize their access to a reliable source. For example, when the piped water source, initiated and distributed by the Co Nhue authority, was out of service, for many poor households gaining access to groundwater was challenging because that requires financial investment in installation and water filtration/treatment. In contrast, the affluent could easily have made an investment in drilling a well or purchasing bottled water to respond to the contextual changes. While the affluent group could build two separate piped water systems inside their house to serve diverse household purposes i.e., investing in a pump for groundwater extraction and purchasing filter equipment and machines to meet their daily needs, the former had to either appropriate raw groundwater or completely rely on mutual assistance from other inhabitants in the commune. These notably different coping strategies, determined by economic status as a form of entilement endowment on which one could rely for water accessibility, demonstrated that the poor were more likely to subject to health risks and higher financial vulnerability when facing changes in water resources and services, i.e., their chances of appropriating water free of charge had been drastically restrained, as

surface water resources were depleted under the commune's rapid urbanization. Their well-being were severely affected when they no longer relied on kinships-based support of mutual assistance or received no help from the local government to secure water accessibility.

Third, the emergence of the communal water supply system in Co Nhue demonstrates strong determination of the local authority in valuing a clean drinking water source to its residents in the early 1990s. During this time, when inhabitants of many urban wards in Hanoi still intermittently had access to piped water, the Co Nhue CPC took the initiative to negotiate with a branch of the Hanoi Water Business Company and used its own revenue to invest in a local piped water system and to bring clean water to its villagers. Although the process of implementation and operation of the communal water supply system had many flaws, which were ultimately detrimental to the system existence, the initiative indicated a timely response of a local government to the call of the Central Government of Vietnam and the Hanoi municipal authority for the socialization of drinking water provision among various actors, including community institutions. Practically, the initiative illustrates the Co Nhue CPC's effort to address the needs of its residents for clean drinking water in the face of Hanoi city's pressure on outward growth.

Forth, the arrangement and operation of the Co Nhue communal water supply system reflects the leading role of the local government and the top-down planning principle. This unconventional method of water delivery in the context of Vietnam - to some degree – had met the demand of and provided lived experience in using piped water for a large number of Co Nhue residents. However, some major defects, including ineffective institutional design principles, inefficiency and incapability of the system management unit, failure in institutional adaptation to contextual changes including the prevalence in users' utilization of competing sources, a shortage of collaboration among the engaged stakeholders, and the local authority's irresponsibility for its staff performance and unaccountability to its residents detrimentally affected the operation and sustainability of the system as well as the existence of the community institution.

Specifically, the Co Nhue commune People's Committee and People's Council made all decisions with regard to the scale and coverage of the system, the determination of who would inclusively be the beneficiaries, the establishment and selection of the management unit to operate, monitor, and maintain the system, water tariff, and general regulations for the operation and management of the system with limited consultation with local residents including the users. The construction of a pipel water supply should have entailed the participation of technical experts of the sector; however, the Co Nhue CPC neither invited the Cau Giay Water Supply Factory staff nor relevant experts to be involed in the design and construction stage of the system. When the system was put into use, the residents were not invited to participate in the maintenance process either. From Co Nhue CPC's perspective, the residents were the service recipients and the system should be operated, monitored, and managed by an independent unit, selected and appointed by the authority. In other words, the way in which the community institution was formed did not entail the participation of the whole group of users. As a result, there were no reciprocal relationships successfully developed between among the engaged stakeholders, i.e., users-the water management unit, the water supplier – CWSF- and the local authority relations, the water management unit and the communal authority relations, during various stages of the system design, development, operation, and maintenance.

The water management unit, formed and selected by the Co Nhue local authority, was composed of staff members, who were technically incompetent and managerially inexperienced. Because of the incapability and incapacity of the water management unit, the piped water supply system was deteriorated, insufficiently managed and monitored which resulted in poor service coverage and high cost of service distribution. In addition, the quality of customer services was also low while the discipline to violations of its members was poorly enforced.

Financially, the institution applied a full cost recovery principle to operate and maintain the service because the Co Nhue local authority intentionally did not provide any further support to the system after it was constructed. Also, the government intentionally considered the creation of this unconventional method of water supply as an

economic opportunity and employment generation for several members of its staff and local residents. When the operational and mainenance costs were so high, mostly caused by the incapacity of the water management unit staff members, that the management unit had to increase the water tariff several times to fully compensate for those costs, the local piped water service became exceptionally expensive to Co Nhue users.

The relationship between the Co Nhue CPC and the Cau Giay Water Supply Factory was purely a business partnership. In essence, the latter sold water in bulk to the former and did not intervene in the business activities of the former, such as formulating the water tariff, controlling non-revenue water, billing, installing water meters, and maintaining the water supply network. The factory charged its client – the Co Nhue CPC - based on the consumed amount of water recorded in a master water meter and was responsible for no other businesses. Because the Co Nhue CPC took the lead in constructing and operating its own piped water system without any technical consultation with the CWSF, the CWSF refused to help explore potential leaks in the piped network, later claimed by the Co Nhue CPC. Under the intervention of the Hanoi Municipal Department of Transportation and Public Works and HWBC, CWSF had to help the Co Nhue CPC check the defect of all the water meters installed in the pipeline system. That was the only technical intervention the factory did for its client. It was obvious that the factory held no responsibility for the assets that it does not possess, but it was far from easy to understand the reason the CWSF cared free for its client even in the circumstance that it client's business was on the verge of failure. When the Co Nhue CPC failed to pay for the consumed water, the service was ceased and the factory threatened to bring its client to the city court. Inevitably, there was no reciprocity that would possibly sustain the relationship between these two agencies. The involvement of a district government and the Hanoi Municipal Department of Transportation and Public Works was only to mediate the tension between the CGWF and Co Nhue CPC over the debt.

In the business partnership with the CWSF, the Co Nhue CPC did not notice that the conditions of the contract it signed with CWSF were more advantageous to the latter. The factory sold water in a bulk, charged its client 85 percent of the total pumped water to the area because it subtracted 10 percent of a non-revenue water rate and 5 percent of

the management fee. The factory, in essence, sought its own convenience in doing business with the Co Nhue CPC because it held no responsibility for the water system and service management of the contractor while loosing only 15 percent of its revenue/month, which was far lowered compared with its widely claimed 40-45 percentage of non-revenue water/month.

The uniform interest and cultural background amongst the Co Nhue residents might have facilitated their wide agreement and acceptance of the system when it was initiated and developed, but did not generate the prospects and sustainability of the system as indicated in the literature on community-based adaptation in basic service provision. The general recognition in the literature review on the basic service provision and community-based natural resource management is that a community, which is comprised of homogeneous populations and shared cultural norms and backgrounds, tends to more successfully arrange and sustain its own institution. The case of Co Nhue's piped water supply system does not support that recognition. The villagers of Co Nhue, who shared a thousand years of the village's tradition, well accepted services provided by the communal water supply system exclusively designated to them because they held a uniform desire for cleaning piped water. However, the homogeneity of the Co Nhue population with a shared cultural background did not help the local water delivery system sustain after almost nine years of operation. The reason was that the relationship between the local residents/water users and the water management unit (the WMU) surrounding water accessibility and water service delivery, was not culturally, but economically defined, constructed, and regulated. When the residents' accessibility was disrupted, jeopardized, and financially vulnerable at the expense of their high payment for service (due to the WMU's closure of some pipeline in the sytem and WMU's decision in increasing water tariffs), they had demonstrated less enthusiasm, support, and more confrontation towards the WMU and the Co Nhue CPC.

Inequitable access to and provision of water entail tensions between water users and providers. In this case, tensions and confrontations occurred between the worst-off and the local authority when dialogues over the shortage of water supply from the communal system, the decline in water resource, limited accessibility to water of a large

number of disadvantaged Co Nhue residents were overlooked. Under-served inhabitants of Co Nhue confronted the WMU and the Co Nhue CPC leader when the coverage of service from the local system was terminated without notices, explanations, and assistance. As described and analyzed in chapter 6, the water service, managed by the WMU, for around a half of the household users was ceased because the WMU was incapable of exploring the leaks in the pipeline system and therefore the unit ended up with closing the valve that directed water to the suspicious leakage area. What made the decision of the WMU, supported by the chairman of the Co Nhue CPC, unacceptable to the afflicted households was that the WMU had not consulted with its clients prior to making that decision. While the better-off households easily developed adaptive strategies to cope with the service termination, the worst-off in the affected area faced severe struggles in water accessibility, especially those who neither owned a shallow nor drilled well and were unable to afford a new one. They verbally confronted the WMU staff members and the president of the Co Nhue CPC at the committee headquarters. The reality was that the local government was not able to provide any assistance to the poor who failed to cope with this contextual change. Neither the Co Nhue CPC nor the WMU was accountable to their residents and clients. They, in actuality, were more deeply concerned about how to generate additional revenues from selling water to pay back the debt they owed to the CWSF compared to their social objective of service provision that they were supposed to uphold and achieve for their residents.

The local authority's irresponsibility for its staff performance and unaccountability to its residents detrimentally affected the existence of the local piped water system. The authority did not fulfill its patronage over the performance of the water management unit, even when the latter poorly operated and managed the local water system. When the accessibility of the poor was affected, the authority could not take any measures to assist. When the CWSF terminated the water distribution to the residents due to exponential increase in the management unit's water arrears, the local authority was not actually be able to mediate and resolve. Except taking the initiative in financing and constructing the local water system, the local government did not play it role as a gate-keeper in overseeing and patronizing the overall operation and maintenance of the system as well as the equitable access of its inhabitants.

Mutual assistance, used to be a social norm complied to by residents across socio-economic status in the Co Nhue village to support disadvantaged residents in many aspects including water accessibility, now seem to have ocurred only among those (i) being afflicted by the inefficiency of the communal water supply system and the decline in water resource or (ii) experiencing similar hardship in water accessibility, regardless of residence status. The local residents of Co Nhue revealed that the Co Nhue village's urbanization and modernization had generated wealth for families that possessed an abundance of land and others who successfully captured economic opportunities while significantly affected the livelihoods of those being solely dependent on agricultural productions. Reciprocity and kinship-based social relations, once being predominant in the commune, had faded and eroded since the commune has undergone the intensified processes of modernization and urbanization since the late 1990s. Co Nhue commune was no longer a purely homogenous village because it had become a destination of numerous migrants over the years. Additionally, new housing development projects had taken place in the commune, leading to its land value being significantly increased. Land-based conflicts and disputes between neighbors and even amongst family members unprecedentedly happened in the commune. Everyday social interactions between residents were less frequent due to diverse livelihood strategies people rely on to cope with the increasing loss of agricultural land. People less and less paid a visit to each other to share joys and sorrows, weal and woe since houses had been separated from one another by solid walls and gates. The social relations amongst villagers of Co Nhue have been strongly influenced and driven by economic ties. When a poor household asked for a share of water from a neighbor's drilled well, the poor household was expected to pay back the electricity cost entailed in pumping groundwater. That happened not only between neighbors, but also among kinship-based relationships.

However, people who experienced similar hardship in water accessibility, regardless of residency status, tend to feel sympathetic toward another. A story of a female-headed household who freely used well water from her neighbor to take a bath for several months was such a good illustration. It is possible to say that this finding partially revealed an angle of fragmentation in social organization of the long-established community of Co Nhue. This finding also challenges assumptions that people residing in

a long-established resettlement and homogeneous village/community like Co Nhue are more inclined to support and bond with one another compared to people living in a non-homogeneous community.

## 7.2 Synthesis of the Findings

As the Co Nhue commune continues to be absorbed into the urban fabric of Hanoi city, its residents continue experiencing a water accessibility transition: from resource reliance into service dependence, and from free of charge direct appropriation to monetary-based access. This transitioning process is vigorously determined by conditions of water resources, the shit in local economic structure which in turn influences local people's livelihood strategies, the role of the local state, and social relations shaped within the community and these determining factors have been significantly changed due to rapid urbanization process of the Hanoi city.

The urbanization process has imposed the shrinking of surface water resources in Co Nhue commune. Many small ponds and lakes, which surrounded the residential areas of the commune, were completely recalaimed for housing construction. When Hanoi Water Business Company was not able to extend its piped water service coverage to the Co Nhue village, groundwater had become the natural assets for the residents to rely on and the villagers had to strategically appropriate this source along with purchasing bottled water.

The Co Nhue communal piped water supply system was intentionally developed by the local authority, and directly controlled by a water management unit, which was appointed by the local authority. The system was constructed, operated, and maintained with a limited consideration of technological aspects, financial sustainability principles, and local residents' engagement in the system's management and monitoring. Although the Co Nhue CPC's social objective of establishing this locally-based water delivery system was to bring clean/piped water to the commune inhabitants, its means to achieve the objective, which relied on the economic efficiency principle and full-cost recovery strategy, ultimately destroyed the system and the objective it upheld.

The emergence of the Co Nhue communal piped water supply system, in essence, was an institutional response to the physical setting and ecological transformations of the commune under its rapid urbanization. This recalls one of the re-appearances of the Co Nhue residents' collective operation and management of their village's common wells in the past. However, the institutional building process embedded in the formation of the piped water supply system was strongly influenced by the top-down stewardship of the Co Nhue CPC, while the management of the common wells in the past mainly relied on social norms, customs and the collective efforts of the villagers. Thus, the institutional building and management principle of the water piped system did not relate to the traditional form of water accessibility and water management of the village that had been once successful in the past.

While the emergence of the Co Nhue's locally-based water supply system in the face of unavailable and unreliable water provision sources in peri-urban settings, plants a new and promising water supply method, its demise demonstrates the contentiousness of water accessibility and the complexity of water governance that are embedded in these areas. When the local government and social networks were incapable of assisting and improving water accessibility for peri-urban inhabitants, they would have to rely on their own skills and resources to secure water. Under these circumstances, poor and disadvantaged segments suffer the most.

## 7.3 Conclusions

The study constructed a framework that shows its spatial element in describing and analyzing water accessibility and water governance issues. More specifically, it focused on the complexity of water governance which was ecologically influenced and socially, economically, and politically constructed by the decline in surface water resources, low levels of state involvemenets, lack of interest from the transnational corporation, individual opportunistic behaviors, the emergence of small-scale private providers, prevalence of unmanaged access to groundwater, and the emergence of community-based institutions, in peri-urban areas. The framework is also helpful in

examining the degree to which direct appropriation of water resources is being reduced along with urbanization process of a rural setting, and the level of increased dependence on monetary-based water services when a peri-urban setting is incorporated into the city.

The urbanization of water concept, in essence, reflects the economic, environmental and social relations transformations that significantly influence the way in which water resources and services are rendered accessible to inhabitants of peri-urban areas. When being elaborated through concepts of entitlements as a question of soci-political organization and the appropriation of nature as a form of establishing property regimes, the urbanization of water framework highlights the gradual incorporation of a diverse and complex water governance in peri-urban settings into a market-driven urban world, where water accessibility is predominantly monetary-based.

The study describes and analyzes the complex governance of water and insights into how ecological, physical and social transformations in particular geographical settings could influence water appropriation and accessibility of the inhabitants and stimulate the emergence of new institutions as an adaptive response. Specifically, the study also reveals contextualized adaptation and coping strategies of the Co Nhue residents and government in the face of its on-going changes and impacts caused by the intensive urbanization process of Hanoi city in Vietnam.

Some of my findings confirm what is recognized in the literature of water service provision in peri-urban areas, i.e. the availability of non-state water supply sources and diverse accessibility of peri-urban inhabitants to these sources. Like other peri-urban areas in Cairo (DPU 2004a), Chennai (DPU 2004b), Dar es Salaam (DPU 2004c), Caracas (Cariola and Lacabana 2004), the Co Nhue commune of Hanoi has undergone its transformation in land use, exemplified via agricultural land acquisition for urban development, the diverse likelihood strategies of local residents, the depletion of surface water bodies, and unmanaged and poorly enforced underground water exploitation. What made Co Nhue different from other peri-urban communities in the studies of DPU (2004, 2004a, 2004b) and Cariola and Lacabana (2004) is its intensive and rapid urbanization. Within the past decade, the community population has exponentially

increased. The thousand years-old community's population was doubled in number from 1999 to 2009. To accommodate the needs of the additional inhabitants, the housing and renting market emerged along with diverse social service development. The commune has been incorporated into the city of Hanoi under its rapid urban expansion at a high pace. The manifestations of this incorporation process are revealed through the replacement of traditional/countryside housing style with modern/urban housing forms, the pervasiveness of tele-communication services, beauty salons, and many other services that once could only be found in the city, and the transition in the local economic structure from heavy dependence on agricultural production to construction and service. Although the population of Co Nhue is no longer homogenous, the majority of its inhabitants secure land ownership. This differentiates Co Nhue's contextualization from other sites in the DPU research project.

Sharing with Guzinsky (2007), Spencer, Meng, Nguyen, Guzinsky (2008), this research confirms that the unavailability of public utilities for water services generates opportunities for the emergence of other unconventional pathways of water provisioning, including local entrepreneurs, community based institutions, and other forms of innovative financing for water services. In the case of Co Nhue, the piped water supply network was top-down initiated and construced by the local government. Although the management of the system was devoted to an independent unit which was directly selected by the local government with limited public consultation, the emergence of this water supply system, in essence, was not demand-driven by the community. The water management unit, as presented in the study findings, was composed by a group of local residents and many of them turned out to be staff members of the local Commune People's Committee. Lack of ownership of the system, incapacity of the management unit, and lack of collaboration between engaged stakeholders – the management unit, the local government, the water supply company, and the user – among other dertmining factors significantly affect the efficience, effectiveness of services provided by this unconventional pathway, and its ultimate sustainability, as theoretically discussed by scholars (Ostrom 1990, Ostrom, Schroeder, and Wynne 1993) and empirically concluded by a number of studies (Isham and Kähkonem 1999, Gross, van Wijk and Mukherjee 2001, Commins 2007, Das 2009, Madrigal Róger, Alpízar, and Schlüter 2010).

The collapse and demise of the Co Nhue piped water supply system after nine years of operation could have been caused by community participation limitations because the system was created and operated without any consultation, collaboration, and participation of users. There was no direct correlation clearly shown between this factor and the failure of the Co Nhue system; however, lack of community participation affected the high percentage of non-revenue water, which was also detrimentally to the service efficiency and institutional sustainability. Although the case of Co Nhue is unique, the detailed descriptions and analysis of this study provide implications for research and policy.

## 7.4 Policy Implications

The study findings lead us to fundamental questions in planning, which are: Is drinking water a public good? What is the role of the state in securing public good provision? Why should community people be concerned about water services? Can the role of public utilities be replaceable? What should the public policy respond to the emergence of community institutional adaptation to the unavailability of public utilities in the water supply sector? These questions are also relevant to contemporary debates about decentralized service provising and implications for equitable service access and local governance. In Vietnam even though water is considered as a public good, one is not entitled to piped water, provided by the public utilitiy, if s/he does not inhabit in an urban administrative unit. Because of this administrative division in the water sector, inhabitants of peri-urban areas are not entitled to public piped water supply, either. As indicated in one of the study findings, they had to rely on various sources to meet their household purposes as well as to save costs associated with water consumption. Economically vulnerable group and those who fail to adatively respond to the communal changes in its economic structure, environment, social relations should be assisted by the government.

Public policies on the water supply sector should consider the geographical differences and contextual changes faced by inhabitants in the planning design and

implementation and investment in the water supply sector. The economically vulnerable groups living in urbanized areas need to be particularly subsidized by the state and non-state providers given their least resilient capacity and low opportunities to improve their economic status. Local authorities could have been more responsive and accountable to their residents through interacting with and providing support for the underprivileged ones. For example, the local authority of Co Nhue could have been applied cross-subsidization in its financial regulations to reduce the cost of water accessibility of its poor residents or covered the cost of drilling a well to help poor and underpriviledged households to have a long-term water accessibility when the local piped water system failed.

As long as the operation of public water utilities is economically inefficient, the likelihood of obtaining piped water for peri-urban inhibitants is deeply depended on the political will of the city administration as well as the dedication and accountability of governmental officials. From the governance perspective, it is very important to identify what source of provision will work for a short-term and what would be viable for a long-term to meet the urgent needs of peri-urban dwellers. Peri-urban areas ultimately will be incorporated into the city; however, the pace of incorporation significantly depends on the process of urbanization, which is possibly planned and facilitated by the central government, as exemplified in the case of Vietnam, or evolves spontaneously. Local initiatives, i.e. the community-managed institution, and other non-conventional pathways of service provisioning could be a temporary solution to the absence of the public sector, and therefore, these initiatives need to be closely assessed and supported throughout the design, operation, and maintenance stages, both legally and financially. A successful system could be incorporated into an effectively functioning city water supply system under the government or a government-regulated private water utility.

The appearance of community-based initiatives, regardless of its nature, i.e. whether it is a self-help program or the one predominantly set up by governmental institutions or the local authority, actually shows the potential of community capacity and their willingness to take part in collective action in water service management. However, the case of Co Nhue commune piped water supply system indicates that communities are

in need of capacity building and technical support from service providers (either the public or private sectors) to be able to self-sustain and manage the local system in the most effective and efficient manner. Because operating and managing an infrastructure system like the piped water network requires technical competence and managerial experience and knowledge, building and strengthening capacity for the management unit members are a must.

At the city level, under the stewardship of the city government, the public water supply company can provide technical support and various forms of training/re-training to management unit staff members. Technicians of the public utility can consult with the management unit on construction material and equipment during the design and construction process so that an optimal system can be built. Training courses on how to apply technology in designing the system and monitoring grand meters and distribution meters, and how to protect the piped system from illegal connections will certainly help the local institution reduce its non-revenue water rate. This capacity building process is essential because the unit staff members daily operate, monitor, and manage the local water supply system. Thanks to such trainings and technical support, the operational and distribution costs will be minimal, resulting in a low water tariff charged to users.

Community-based institutions as a governance form for service delivery at neighborhoods, once arranged, need greater attention from local authorities because this form unifies people across socio-economic status with divided interests, contributes to the cohesiveness in the community, and potentially generates good local governance at the locality. However, on the contrary to theoretical assumptions, the case of Co Nhue did not sustain because the Co Nhue Commune CPC did not fulfill its responsibility in overseeing and patronizing the performance of the management unit, the efficience of the system and failed to set up a collaborative mechanism with the Cau Giay Water Supply Company. Firstly, in its capacity, the local government broadly and publicly consults with its general residents, including potential users, in selecting members of the water management unit. Secondly, as a gate - keeper, the local government needs to ensure that sanctions and rules applicable to all users of the local system must be enforceable. To minimize illegal connections, all violations must be punished. If the management unit

staff members violate any management rules and financial principles, they must be punished, as well. Thirdly, even though the local government devotes autonomous authority to the management unit, it examines and supervises the transparence in monthly, quarterly, and annually financial reports. Fourthly, in Co Nhue case, the local government could have facilitated the collaboration between the CWSF and the WMU more effectively to avoid several terminations of services that substantially affected everyday life of the Co Nhue users. Fifthly, if a local water supply system is financially invested and constructed by the local government as an adaptive response to changes in the local water resources, like the case of Co Nhue, the processes of construction, operation, and management must entail the participation of users. Their active participation gives them a sense of ownership and protection of the system. Lastly, prior to initiating a new infrastructure system, there must be a need evaluation among the prospective users. A lesson from the case of Co Nhue implies that if the construction of a local water system is not based on actual demands of potential users, the system tends not to be sustained in a long-term. In addition, as peri-urban communities tend to be enpanded because of its population increase, the system capacity must be allocate increased demands of users in near future.

### 7.5 Limitations of the Study and Future Research

This study was designed for the examination of how socio-economic and ecological transformations influenced the way in which water was provided and rendered accessible to peri-urban inhabitants. In order to reveal transformations of an urbanized community over the time and the impacts of the transformations on water governance and water accessibility, I realized that a longitudinal study should have been conducted. Although I had been embedded in the Co Nhue community from May 2007 to October 2010 to initiate and conduct the study and witness its changes, it could have been better if a longitudinal study was implemented, so that it could provide a more thorough descriptions of changes in the local economic structure, ecological, and social relations among the community members. Because limited resources and time constraint did not allow for such a research, some limitations of the study are:

(i) In order to analyze changes in water resources, especially the surface water bodies, the study had to rely on secondary data, i.e, maps to reveal the status of water resources 10-20 years prior to the study time, achival pictures, and oral stories from respondents.

(ii) Indepth-interviews, focus group discussions, and participant observations allowed the study to reflect the status of social relations among community members. However, what happened back to ten or twenty years prior to the study time was only documented via story telling and interviews.

(iii) Information on physical landscapes of the site prior to the arrival of some mega infrastructure projects were only collected by achival photos, maps, and stories of respondents.

Despite of the limitations, the study findings open possibilitieis for future research. First of all, thick and detailed descriptions of case studies in diverse developing countries, including the case of Co Nhue commune, have discussed and concluded that the impacts of institutional arrangement, compliance of members to the institutional rules, relationship among the members of the institution with the local government and service providers on the efficiency and sustainability of the service system, as well as the institution. However, it is equally important to examine the impact of a broader social-political environment on the development, evolution and sustainability of this unconventional form of service provision and to what extent the local political culture – democratic versus top-down – may facilitate or determine the efficiency of service provision and sustainability of the institution.

Secondly, a future research can exclusively focuses on the transition in water entitlements and entitlement relations in peri-urban poor communities to reveal constraints facing the poor and their coping strategies for water accessibility.

Finally, more studies are needed on the arrangement, performance and maintenance of community-based institution for service provision and its impact on local

community cacpacity building and community development.  It would be compelling to examine how the local government and local inhabitants, who possibly are diverse in background and divided in interest, could build their relationship through working together to secure water service, to create positive changes, and more importantly to create a better governance at the locality.

# APPENDIX A

## TYPES OF WATER SOURCES AVAILABLE AND USED BY CO NHUE INHABITANTS IN 2009

There are various drinking water sources available in Co Nhue commune: (i) piped water directly supplied and managed by public utility (Cau Giay water supply company), (ii) piped water supplied by public utility, distributed and maintained by commune, (iii) household own drilled shallow (borehole) with electric operated pump, (iv) collective deep wells, and (v) bottle water. These are considered as major drinking water sources in the commune since they are used by the majority of the communal residents. Additionally, several households harvest rainwater and/or use water from their own shallow open well in combination with one of the aforementioned sources.

*(1) Piped water, directly supplied and managed by Cau Giay water supply Factory*

Around one-fourth of Co Nhue population of Hoang 4, Hoang 5, Hoang 6 clusters (around 1500 households) has in-house piped water, directly supplied and managed by Cau Giay Water Supply Company. This area of the commune is bordered with Nghia Tan ward – an urban ward of Cau Giay district-where water piped network is available. Majority of population of the area are not original Co Nhue residents. Some bought land to build house. Many others are given house by their enterprises (situated in Co Nhue commune).

Because of the availability of a piped-water system in the areas, people of the three clusters can register with Cau Giay water supply company for in-house connection. Through surveying and interviewing people in the area, I have learned that people pay for water at the price regulated by Hanoi People's Committee (3,000 VND/$m^3$ ~ 20cent/$m^3$). Billing and other customer services are relatively good. They did not complain anything about water quality or water pressure, number of pumping times. Generally, this group of users satisfies with the service.

*(2) Piped water supplied by Cau Giay water supply company, but re-distributed and maintained by commune through its piped network*

In 1997, a water piped network was built in partial area of Co Nhue commune (where there is a high concentration of original Co Nhue native people) as a compensation of Hanoi People Committee for local lands taken for the city development projects. The Hanoi Department of Public Work and Transportation was assigned to invest and monitor the network in collaboration with Co Nhue People's Committee (CPC). In the late 1997, piped water was delivered to Co Nhue people (only native people were eligible to connect to the system almost free of charge) by Cau Giay water supply company. The company, however, does not directly control, manage and maintain the piped system because it did not get involved in the construction stage and did not know how the system was designed, according to a representative of the company. The CPC assigned a person in the community to manage the system. This person, in turn, recommended several other community residents to the CPC to form the Co Nhue water management unit (WMU), which is directly under the guidance and leadership of the CPC.

Cau Giay water supply company has provided water in bulk to the area through a master water meter. The WMU is responsible for operating, maintaining the water supply network, selling water to customers, and installing new connections within the commune area. The WMU is also in charge of repairing leaks and protecting the water system to avoid water loss, billing and collecting revenues, then paying to Cau Giay Water Supply Company the value of water pumped in bulk to the commune area. The WMU pays HWBC 85 percent of the total pumped water to the area because HWBC subtracts 10 percent of a non-revenue water rate and five percent of the management fee. The water tariff charged by HWBC to WMU is at the lowest level in the standard block water tariff list (2800 Vietnam Dong = 17.5 cents per cubic meter). WMU activities are under the supervision of the CPC.

The collaboration among the Cau Giay water supply company, Co Nhue CPC and WMU went along very well for around eight years (from 1997 to May 2005) until the

WMU informed the CPC of a high non-revenue water rate and loss in revenue practically. Due to the constant high percentage of water loss (42 ~ 45 percent in 2005 and up to 59 percent in 2006), caused by the WMU staff's incapacity and poor management, the deterioration of water supply network, many connected households have no piped water. According to the WMU head, of around 3,315 registered households in the commune (by December 2006) and around 3,500 households by July 2007, only 1,500 households intermittently have access to piped water. Also due to the high non-revenue water rate, WMU charges Co Nhue water users (domestic use) 6000 VND (37.5 cents) /cubic meter, which is more than double times compared to the one they pay HWBC.

Tensions have been accumulated among the three entities when the Co Nhue CPC was unable to pay Cau Giay Water Supply Company the revenue of water volumes recorded in a master meter since May 2005, and the CPC cannot find any source of funding to pay back the debt. By the end of 2005, the CPC was indebted to the company around 4,000 USD. The debt gradually increased up to 150 millions VND, equivalent to US$10,000 by end of July 2007. The Co Nhue CPC and WMU have requested the company to provide technical assistance to find out the leaks in their piped network and to increase the percentage of non-revenue water rate subtraction (the existing rate is 10 percent). These two parties suppose that if the company actively collaborates with the WMU to explore all leaks in the network, the non-revenue water percentage will go down dramatically and the debt will be regularly paid.

The company, nonetheless, only provided technicians to check the quality of water meters used by Co Nhue WMU, but has not had any further actions, i.e., searching for any leaks in the system. Results of the water meter check revealed that all the checked master waters were not reliable. Additionally, the company has requested the Co Nhue CPC to pay the debt and warned to stop supplying water to Co Nhue residents if the request is not complied. The company even threatens to bring the Co Nhue CPC to the court if the debt cannot be paid. In practice, the company cut off from supplying water to the area several times, and the WMU paid part of the debt responsively.

The Co Nhue WMU has been under pressures from both CPC and local water users. Since WMU directly manages and carries out water business with customers, the Co Nhue People's Committee has asked the WMU to pay for the debt. Users are obviously unsatisfied with the system. They complained about low quality of water, intermittence of services, high water tariffs. Many households reported that their pipeline has been dried for years. Majority of users have to drill shallow well to secure water for drinking and for other purposes. Households, which absolutely rely on this piped water source, have rigorous criticism again both the system and the WMU. When one branch of the piped network was cut off by the WMU as a means to reduce non-revenue water, representatives of these households went to the headquarters of CPC to question community leaders.

Meetings among the engaged entities have been organized with the participation of representatives from Tu Liem People's Committee and HWBC; however, there have not any solutions given to this case so far. For the time being, users of this water source are still suffering from paying a high cost for water.

*(3) Households' shallow wells with electric operated pump (drilled well)*

This is the main water source, chosen by more than 50 percent of families in Co Nhue to secure drinking water because of low-cost installation and relative convenience. It is not expensive to have a drilled well inside the house. It costs approximately US$100 to have this kind of well. Basically, Co Nhue residents hire individuals who specialize in drilling wells and providing necessary equipments and installation services for domestic water system. These individuals have private stores in the locality, which is easily accessible for Co Nhue residents to buy equipment (pipes) and request for services (drilling wells). Having conversations with several well drillers, I found that they have busy and good business with many requests from customers. They told me that on average it takes about three hours to drill a 30 meter-deep well. Given that low cost and convenience of having a well inside the house, almost every household has one well to secure drinking water. Some have more than one. This type of water source, however,

greatly relies on the geology of the areas. In certain geographical areas of Co Nhue, people do not want to drill own well because of a high concentration of iron in water. According to the statistics provided by the Department of Environment of Tu liem district, there are more than 4,000 shallow drilled wells in Co Nhue. However, people do not have to pay for the underground water they use.

*(4) Collective/neighborhood deep wells*

In Co Nhue, collective deep wells basically were drilled and have been managed by a university (Police Training Academy; University of Mining and Geology) or a company/enterprise in the area to secure water for its students and staff. A water management unit is assigned by each university/enterprise to manage and maintain the system. Subscribers to this source have to pay for water tariff, however, the cost is cheaper than the standard one, regulated and applied by Hanoi People's Committee for the water supplied by the city water supply system (2,000 VND/$m^3$ compared to 3,000VND/$m^3$, responsively). In essence, this is the way the university/enterprise takes accountability for providing water service for its staff. The capacity of the water source (with 100-150 meter deep well) also allows local residents living in the areas to connect to the system. They, nevertheless, pay a little higher compared to designated (primary) users.

Water quality: of this source is not reliable to many users. Solicited feedbacks of users reveal that there is a high concentration of iron in water. Many showed me a thick layer of sediments left over in their pot. These people are concerned with the possibility of getting cancer due to using the water with high concentration of iron, although they are told that the water quality is reliable.

*(5) Bottle water*

There is a relatively low percentage of Co Nhue residents buying bottle water (0.5 liter bottle/1-liter bottle/5-liter bottle and 20-liter bottle) for drinking purpose. Those users still doubt about the quality of this water source because they do not know where and how water bottles are produced and bottled. There is one enterprise, located inside the commune, producing and bottling 20-liter bottle water. Co Nhue residents understand that water from this enterprise is exploited from underground, but do not know whether the biological and chemical treatment process of underground water and bottling are reliable.

*(6) Rainwater*

The percentage of using rain water in Co Nhue is quite low. I surveyed and interviewed one household using this water source. This family has recently built a big catchment inside the house for collecting rainwater. This is a better off family, mainly uses water from deep-well water system (described above). The owner reported that the family built a new, big catchment because they believe using rainwater is still better than the one supplied by the deep well because the latter contains a high concentration of iron.

*(7) Household shallow open wells*

This type of well was so popular in peri urban Hanoi during 1980s-mid 1990s. Wells were not drilled but dug by hands. A well could be 10-15 meter deep. Users must use a bucket manually to get water from the well. This type of well has been gradually replaced by drilled well operated by electric pumps since the later outweighs the former perceptibly based on time saving, convenience, and more cleanliness. I was amazed at the fact that it is so hard to find these shallow wells in Co Nhue. Only two out of around 7,000 households still maintain and use water from shallow wells.

## APPENDIX B
## LIST OF SEMI-STRUCTURED INTERVIEWS

| Description of Informants | Number of informants |
|---|---|
| Local community: Chairman and vice chairman of the commune people's committee | 4 |
| Head of the commune population cluster which as been provided water by the local water management unit | 7 |
| Head of the commune cluster in which the majority of households use well water | 1 |
| Water management unit (the head and other members of the unit) | 7 |
| Household was using well water | 1 |
| Household relied on the local system, from different population clusters. | 12 |
| Household used to appropriate water from the local water management system, but had been cut off the service recently | 6 |
| Household is waiting for being connected to the system (already submitted application to the local water management system) | 2 |
| Household was heavily relying on agricultural production | 2 |
| Household was primarily relying on drilled well | 5 |
| Poor households | 8 |
| Better off households | 6 |

| | |
|---|---|
| Elderly persons (regardless of their socio-economic status and gender) | 5 |
| Migrant households (those connected and have not connected to the local water supply system) | 4 |
| The representative of other water supply sources available at the locality (the small-scale private, a person who run well drilling business…) | 1 |
| A representative of the public water supply company, if relevant | 5 |
| A representative of the district authority | 1 |
| A representative of the district department of environmental management (Hydrologists) | 1 |

## REFERENCES


Adcom Consulting Company (Adcom) (2003). *Maps of investment in urban water supply and sanitation over last 10 years*. (unpublished report). Hanoi: Author.

Adhikari, Bhim (2001). *Property Rights and Natural Resources: Impact of Common Property Institutions on Community-Based Resource Management*. A proposal presented at "Third Annual Global Development Network Conference" Rio de Janeiro, Brazil. December 9-12, 2001.

Agrawal, Arun and Gautam N. Yadam (1997). "How Do Local Institutions Mediate Market and Population Pressures on Resources? Forest Panchayats in Kumaon, India," *Development and Change* 28: 435-465.

Agrawal, Arun (2001). "Common Property Institutions and Sustainable Governance of Resources," *World Development* 29(10): 1649-1672.

Agrawal, Arun (2002). "Common Resources and Institutional Sustainability," in Elinor Ostrom, Thomas Dietz, Nives Dolsak, Paul C. Stern, Susan Stonich, and Elke U.Weber, eds., *The Dramas of the Commons: Committee on the Human Dimensions of Global Change*. Pp. 41-86. Washington DC.: National Academy Press.

Agrawal, Arun (2003). Sustainable Governance of Common-Pool Resources: Context, Methods, and Politics. *Annual Review of Anthropology* 32: 243-262.

Agrawal, Arun (2008). Sustainable Governance of Common-pool Resources: Context, Method, and Politics' in Pranab Bardhan and Isha Ray, (Eds.), *The Contested Commons: Conversations between Economists and Anthropologist.* Pp. 46-65. Malden, MA: Blackwell Publishing Ltd.

Akbar, H.M. Delwar, John R. Minnery, Basil van Horen, and Phil Smith (2007). "Community Water Supply for the Urban Poor in Developing Countries: The Case of Dhaka, Bangladesh" Habiat International 31: 24-35.

Allen, Adriana, Julio D. Dávilla and Pascale Hofmann (2004) "*Governance and Access to Water and Sanitation in the Metropolitan Fringe: An Overview of Five Case Studies*," Paper presented at N-Earus Annual Conference on Urban Governance, Diversity and Social Action in Cities of the South, 15-16 September 2004, Barcelona (Spain).

Allen, Andriana, Julio D. Dávilla and Pascale Hofmann (2006a). *Governance of Water and Sanitation Services for the Peri-urban Poor: A Framework for Understanding and Action in Metropolitan Regions.* The Department Planning Unit. University College London. Tiptree, Esses, United Kingdom: Jenner City Print Ltd. Available from http://www.ucl.ac.uk/dpu/pui/publications/DPU%20PUI%20WSS_Book.pdf

Allen, Andriana, Julio D. Dávilla and Pascale Hofmann (2006b). "The Peri-Urban Water Poor: Citizens or Consumers?" *Environment & Urbanization*.18(2): 333-351. International Institute for Environment and Development.

Allen, Andriana, Julio D. Dávilla and Pascale Hofmann (2006c). *So Close to the City, so far from the Pipes: The Governance of Water & Sanitation and the Peri-Urban Poor.* Development Planning Unit, UCL. London. Available from http://www.ucl.ac.uk/dpu/pui/publications/DPU%20PUI%20WSS%20Brochure.pdf

Amansi, Florencia, Ana Hardoy, Gustavo Pandiella, Ricardo Schusterman, Gaston Urquiza, and Eric Gutierrez. (2003). *Everyday Water Struggles in Buenos Aires: The Problem of Land Tenure in the Expansion of Potable Water and Sanitation Service to Informal Settlements*. London: WaterAid and Tearfund.

Anand, P.B. (2007) *Scarcity, Entitlements and the Economics of Water in Developing Countries*. Cheltenham, UK: Edward Elgar.

Angueletou, Anastasia (2006) "*Water Poverty in the Peri-urban Territories of Mumbai, India*," Paper presented at the conference "The Multidimensions of Urban Poverty in India," IGIDR, Indira Ganghi Institute of Development Research, CSH, Centre de Sciences Humaines, Mumbai, India.

Baker, Mark J. (2005) *The Kuhls of Kangra: Community-Managed Irrigation in the Western Himalay*. Seattle and London: University of Washington Press.

Bakker, Karen (2003). “From Archipelago to Network: Urbanization and Water Privatization in the South” The Geographical Journal 169(4): 328-341.

Bakker, Karen (2006) “Conflicts over Water Supply in Jakarta, Indonesia,” in UNESCO (2006) *Urban Water Conflicts: An Analysis of the Origins and Nature of Water-Related Unrest and Conflicts in the Urban Context*. Paris: UNESCO. Pp: 113-138.

Bakker, Karen (2010) *Privatizing Water: Governance Failure and the World’s Urban Water Crisis.* Ithaca: Cornell University Press.

Baland, Jean-Marie and Jean-Phillipe Platteau (1999). *Halting Degradation of Natural Resources: Is There a Role for Rural Communities*? Oxford: Clarendon Press.

Becker, Howard S., (2001). “The Epistemology of Qualitative Research,” in Robert M. Emerson, ed., *Contemporary Field Research: Perspectives and Formulations*. Pp.317-330. Los Angeles: Waveland Press, Inc.

Berg, Michael, Tran Hong Con, Nguyen Thi Chuyen, Pham Viet Hung, Schertenleib Roland, and Walter Giger (2001) “Arsenic Contamination of Groundwater and Drinking Water in Vietnam: A Human Health Threat,” *Environmental Science & Technology*, 35 (13): 2621-2626

Berry, Brian J. L. (2008). “Urbanization” in Marziuff, John M and Erich Shulenberger, Wilfried Endlicher, Marina Alberti, Gordon Bradley, Clare Rryan, Ute Simon and Craig ZumBrunnen (Eds.) *Urban Ecology: An International Perspective on the Interaction between Humans and Nature*. Springer.

Bess, Randall and Michael Harte (2000). The Role of Property Rights in the Development of New Zealand’s Seafood Industry. *Marine Policy* 24: 331-339.

Blomquist, William and Elinor Ostrom (1985). Institutional Capacity and the Resolution of a Commons Dilemma. Policy Studies Review 5(2): 383-393.

Briggs, J. (1991). ‘The Peri-urban Zone of Dar es Salaam, Tanzania: Recent Trends and Changes in Agricultural Land Use’, *Transactions of the Institute of British Geographers,* 16(3): 319-331.

Brook, Robert, Sangeetha Purushothaman and Simone Purohit (2003). (Eds.) *Changing Frontiers: The Peri-Urban Interface Hubli-Dharwad, India*. India: Books for Change.

Botton, Sarah and Gabriella Merlinsky (2007). "Urban Water Conflicts in Buenos Aires, Argentina: Voices Questioning the Economic, Social and Environmental Sustainability of the Water and Sewerage Concession,"

Bouwer, Herman (1993) Urban and Agricultural Competition for Water, and Water Reuse," *Water Resources Development*, 9(1): 13-24.

Brannstrom, Christian, James Clarke, and Mariana Newport (2004). Civil Society Participation in the Decentralization of Brazil's Water Resources Assessing Participation in Three States. *Singapore Journal of Tropical Geography* 25(3): 304-321.

Briggs, J. (1991) 'The Peri-urban Zone of Dar es Salaam, Tanzania: Recent Trends and Changes in Agricultural Land Use', *Transactions of the Institute of British Geographers,* 16.3: 319-331.

Bromley, Daniel W. (1989). "Property Relations and Economic Development: The other Land Reform," *World Development*. 17 (6): 867-877

Bromley, Daniel W. (Ed.) (1992). *Making the Commons Work: Theory, Practice, and Policy*. San Francisco: ICS Press.

Bruns, Bryan R. and Ruth S. Meinzen-Dick (Eds.). 2000. *Negotiating Water Rights.* New Delhi: Vistaar Publications.

Bryman, Alan (2004). *Social Research Methods* (2nd ed.). Oxford, New York: Oxford University Press.

Budds, Jessica and Gordon McGranahan (2003). "Are the Debates on Water Privatization Missing the Point? Experiences from Africa, Asia and Latin America," *Environment and Urbanization*, 15(2), October 2003. United Kingdom.

Center for Environmental Monitoring and Projection of Water Resources (2011) *Kết Quả Quan Trắc Tài Nguyên Nước Dưới Đất Năm 2011, [Results of an Environemntal Monitoring Survey Study on Groundwater in 2011]*. Unpublished report. Retrieved on April 15, 2012, from http://hgeo.forumotion.net/t1620-topic

Co Nhue CPC (Commune People's Committee) (2009). *Report No. 59/BC-UBND*, dated on 7th May 2009. Unpublished report.

Collignon, Bernard and Marc Verina (2000). *Independent Water and Sanitation Providers in African Cities. Full reort of a Ten-Country Study.* Washington D.C.: International water and sanitation centre and Hydroconseil.

Dao Ngoc Nghiem (2012). *Đô Thị Hóa và Môi Trường Hà Nội* [Hanoi Urbanization and Environment]. Retrieved on April 6, 2012, from http://www.husta.org.vn/Husta.aspx?Module=News&Id=58

Doan Loan (18 December 2009). *Hà Nội Tăng Giá Nước Sạch Từ 1/1/2010, [Hanoi Piped Water Tariffs Will Increase Since 1/1/2010]*. Tin Nhanh Việt Nam. Retrieved on April 15, 2012, from http://vnexpress.net/gl/xa-hoi/2009/12/3ba16d03/

Bui Van Mat (1998). *"Tham Luận Quy Hoạch Cấp Nước Hà Nội và Những Kết Quả Bước Đầu Công Tác Chống Thất Thoát, Thất Thu Tại Hà Nội."* Paper presented at the 3rd National Urban Supply Non-revenue Water and Unaccounted for Water Prevention, 15-15 October 1998.

Butterworth, John, Raphaèle Ducrot, Nicolas Faysse, and S. Janakarajan (2007) *Peri-Urban Water Conflicts: Supporting Dialogue and Negotiation*. The Netherlands: IRC International Water and Sanitation Centre.

Cadène, P. (2005). 'Dynamics of Peri-Urban Areas: From the French Case to the Developing Countries', in Dupont, Veronique. (ed.), *Peri-Urban Dynamics: Population, Habitat and Environment on the Peripheries of Large Indian Metropolises. A Review of Concepts and General Issues,* New Delhi: Centre de Sciences Humaines

Cain, Allan and Martin Mulenga (2009) *Water Service Provision for the Peri-urban Poor in Post-Conflict Angola*. London: International Institute for Environment and Development.

Carino, B.V. 2002. "The Role of Government in the Provision of Sustainable Urban Services." In G. Dubois-Taine (Ed.) *Sustainable Urban Services*. Santiago de Chile Seminar 10-11 July 2002. Pacific Economic Cooperation Council. Sustainable Cities Task Forces, Chilpec, Chile Pacific Foundation.

Cariola, Cecilia and Miguel Lacabana (2004). WSS Practices and Living Conditions in the Peri-Urban Interface of Metropolitan Caracas: The Cases of Bachaquero and Paso Real. Unpublish report prepared for the Research Project Service Provision Governance in the Peri-Urban Interface of Metropolitan Areas, Development Planning Unit. London: University College London.

Carter, Richard C., Sean F. Tyrrel, and Peter Howsam (1999). "Impact and Sustainability of Community Water System and Sanitation Programmes in Developing Countries," *Journal of the Chartered Institution of Water and Environmental Management*, Vol. 13: 292-296.

CCSC (Central Census Steering Committee) (2000). *Population and Housing Census Vietnam 1999: Sample Results*. The Gioi Publishers: Hanoi.

Cerise, Emmanuel and Rene de Maximy (2006). *Đường Sá và Quy Hoạch Đô Thị ở Hà Nội [Roads and Urban Planning in Ha Noi]* in in Nguyen Thi Thieng, Pham Thuy Huong, Patrict Gubry, Franck Cátiglioni, and Jean-Michel Cusset (Eds.) Đô Thị Việt Nam Trong Thời Kỳ Quá Độ [Cities in Vietnam in Transition]. Hanoi: Thế Giới Publishing House.

Charmaz, Kathy (2001). "Grounded Theory," in Robert M. Emerson, ed., *Contemporary Field Research: Perspectives and Formulations*. Pp. 361-382. Los Angeles: Waveland Press, Inc.

Chen, Sulan (2008). "From Community-based Management to Transboundary Watershed Governance" *Development.* 51:83-88.

Chng, Nai Rui (2008). "Privatization and Citizenship: Local Politics of Water in the Philippines," *Development.* 51:42-48.

Choe, Jaesong (1992). The Organization of Urban Common-Property Institutions: The Case of Apartment Communities in Seoul. A dissertation submitted to the faculty of the Graduate School in partial fulfillment of the requirements for the degree Doctor of Philosophy in the Department of Political Science Indiana University. Michigan: UMI Disertation Services.

Choe, Jaesong (1992). *The Organization of Urban Common-Property Institutions: The Case of Apartment Communities in Seoul.* Doctor of Philosophy Dissertation, Department of Political Science, Indiana University.

Christen, K. (2001). The arsenic threat worsens. In *Environmental Science and Technology*, Vol 35, issue 13, p. 286-291. Retrieved October 22, 2004, from http://www.pubs.acs.org/isubcribe/journals/esthag-a/35/i13/htnl/13christen.html

Cleaver, Fances (2000). Moral Ecological Rationality, Institutions and the Management of Common Property Resources. *Development and Change* 31: 361-383.

Commins, Stephen (2007). Community Participation in Service Delivery and Accountability. Governance and Social Development Resource Centre. School of Public Affairs, University of California, Los Angeles.

Conan, Herve and Maria Paniagua (2003). *The Role of Small Scale Private Water Providers in Serving the Poor. Summary Paper and Recommendations.*

Co Nhue CPC (Commune People's Committee) (2002). *The First 6 Month Report of the Water Management Unit's Business Activities*. Unpublished document.

_____ (1999). A Five Year Actitivies of the Co Nhue Commune People's Committee during 1994-1999. Unpublished document.

Cresswell, John W. (1998). *Qualitative Inquiry and Research Design Choosing among Give Traditions.* Thousand Oaks: Sage.

Coulthart, Alan, Quang Nguyen, and Henry Sharpe (2006). *Vietnam's Infrastructure Challenge – Urban Development Strategies: Meeting the Challenges of Rapid Urbanization and the Transition to a Market Oriented Economy*. Hanoi: The World Bank in Vietnam.

Dang, Anh N. (1997). *The Role of Rural-to-Urban Migration in the Cause of Rural Development*, Sociological Review 4(60): 15-19.

Dao, Tap (1990). *Tình Hình Chính Sách và Triển Vọng Kinh Tế Việt Nam [The Vietnam's Economy Status and Future Prospects] in 45 Năm Kinh Tế Việt Nam (1945-1990) [45 Years of Vietnam's Economy (1945-1990)]. Hanoi: Nhà Xuất Bản Khoa Học Xã Hội.*

Dardenne, Bertrand (2006). *The Role of the Private Sector in Peri-urban or Rural Water Services in Emerging Countries*. Retrieved July 14, 2008 from http://aspa-utilities.com/Dardene_OECD.pdf

Dau, Anh Tuan (2008). *Xu Hướng Không Đều trong Thu Hút ĐTNN Tại Các Tỉnh Thành ở Việt Nam* [Uneven Foreign Direct Investment in Vietnam] in Phan Hữu Thắng, Mai Thanh Hải, Nguyễn Cao Cương, Hoàng Anh Minh, Trương Văn Bảo, and Phạm Mỹ Giang (2008) *20 Năm Đầu Tư Nước Ngoài Nhìn Lại và Hướng Tới [20 –Year of Foreign Direct Development: Looking Back and Looking Ahead]*. Hanoi: Trí Thức Publishing House.

Das, Priyam (2009) *Promise or Compromise? Community Managed Water Supply for the Urban Poor in Madhya Pradesh, India.* A dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy in Urban Planning. University of California, Los Angeles.

Davis, Jennifer (2005). "Private-Sector Participation in the Water and Sanitation Sector," *Annual Review Environmental Resources* 30: 145-183.

De Loddis, Christian P. (2006). *Diễn Biến và Chủ Thể Của Thời Kỳ Quá Độ Đô Thị ở Việt Nam,* in Nguyen Thi Thieng, Pham Thuy Huong, Patrict Gubry, Franck Cátiglioni, and Jean-Michel Cusset (Eds.) Đô Thị Việt Nam Trong Thời Kỳ Quá Độ [Cities in Vietnam in Transition]. Hanoi: Thế Giới Publishing House.

Denzin, Normam K. and Yonna S. Lincoln (1st Eds.) (1994). *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage

Denzin, Normam K. and Yonna S. Lincoln (2nd Eds.) (2000). *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage

Development Planning Unit (DPU) (2004a). *WSS Practices and Living Conditions in the Peri-Urban Interface of Metropolitan Chennai: The Cases of Valasaravakkam Group and Kottivakkam Group.* Unpublished report prepared for the Research Project Service Provision Governance in the Peri-Urban Interface of Metropolitan Areas, Development Planning Unit. London: University College London.

Development Planning Unit (DPU) (2004b). *WSS Practices and Living Conditions in the Peri-Urban Interface of Metropolitan Dar Es Salaam: The Cases of Tungi and Stakishari*. Unpublished report prepared for the Research Project Service Provision Governance in the Peri-Urban Interface of Metropolitan Areas, Development Planning Unit. London: University College London.

Development Planning Unit (DPU) (2004c). *WSS Practices and Living Conditions in the Peri-Urban Interface of Metropolitan Cairo: The Cases Abu El Numrous and Abu El Gheitt*. Unpublished report prepared for the Research Project Service Provision Governance in the Peri-Urban Interface of Metropolitan Areas, Development Planning Unit. London: University College London.

Dhakal, Shobhakar (2002). Comprehensive Kampung Improvement Program in Surabaya as a Model of Community Participation. Working Paper. Kitakyushu, Japan: Institute for Global Environmental Strategies. Retrieved on November 22, 2008, from www.apfed.net/ki/database/doc/BPP131.pdf?PHPSESSID=10c8274186ad78a8743984674f979c54

DiGregorio, Michael (2011) "Into the Land Rush: Facing the Urban Transition in Hanoi's Western Suburbs," International *Development Planning Review*, 33(3): 293-319.

Do, T. N. (2003). Private sector participation: The case of Hanoi, Vietnam. In J. J. Hukka and T. S. Katko, *Water privatization revisited: Panacea or Pancake?* pp. 82-89 The Netherlands: IRC International Water and Sanitation Center, Delft.

Doe, Steve R. and M. Sohail Khan (2004) "The Boundaries and Limits of Community Management: Lessons from the Water Sector in Ghana," *Community Development Journal* 39(4): 360-371.

Douglass, Mike (2001) *Urbanization and Socio-Economic Development in a Global Era: Options and Agenda for Vietnam's Urban Transition,* paper presented at the Urban Forum on Monday 21 May 2011, Hanoi.

Douglass, Mike (2009) *Deterritorializing the City at the Edge- Assessing the Social Impacts of Mega New Towns in Peri-Urban Vietnam*. Paper presented at the 39th Urban Affairs Association conference. Chicago, Illinois, March 4-7, 2009.

Douglass et al., (2002). *Urban Transition in Vietnam*, UNCHS/UNDP and University of Hawaii, Department of Urban and Regional Planning. Unpublished report.

Douglass, Mike (undated) *The Urban Entitlement Transition*. Unpublished document.

Douglass, Mike, Orathai Ard-am, and Ik Ki Kim (2002) "Urban Poverty and the Environment: Social Capital and State-Community Synergy in Seoul and Bangkok," in Peter Evans, ed., *Livable Cities? Urban Struggles for Livelihood and Sustainability*. Pp.31-66. Berkeley: University of California Press.

Dupont, Veronique (2005) "Peri-urban Dynamics: Population, Habitat and Environment on the Peripheries of Large Indian Metropolises: An Introduction," in Dupont V. (Ed.), *Peri-urban Dynamics: Habitat and Environment on the Peripheries of Large Indian Metropolises. A Review of Concepts and General Issues*, New Delhi: Centre de Sciences Humaines.

Earle, A. (2001). *Public private partnerships in water and sanitation*. Retrieved September 22nd, 2004, from http://www.thewaterpage.com/ppp_new_main.htm

Economy and Urban Newspaper (2008). *Hà Nội Phát Triển Xứng Đáng Với Tầm Vóc Thủ Đô Ngàn Tuổi*.

Esguerra, Jude (2003). *The Corporate Muddle of Manila's Water Concessions.* WaterAid and Tearfund.

Faysse, Nicolas, Rocio Bustamante, Alfredo D. N. Prado, Pablo Cuba, Raul G. A. Alcoba, Valadimir C. Rojas, Jorge A. I. Terrazas, Alberto Lizarraga, Bernardo P. Betancourt, Ronald G. P. Caprirolo, Franz Quiroz, Eigel F. R. Lopez, Daniel V. Barbato, and John Butterworth( 2007). "Supporting Local Organizations in Peri-Urban Cochabamba, Bolivia," in John Butterworh, Raphaele Ducrot, Nicolas Faysse, and S. Janakarajan, (Eds.,) *Peri-Urban Water Conflicts: Supporting Dialogue and Negotiation.* Netherlands: IRC International Water and Sanitation Centre.

Fontenelle, J, P. (2001). Water management decentralization in the Red River Delta,, Vietnam an uncompleted transition process toward local government. In *International Journal of Water* (IJW). Vol 1, Issue 3/4, pp. 380-396.

Friedberg, S. (2001). 'Gardening on the Edge: The Social Conditions of Unsustainability on an African Urban Periphery', *Annals of the Association of American Geographers,* 91(2): 349-369.

Geertman, Stephanie (2007). *The Self-Organizing City in Vietnam: Processes of Change and Transformation in Housing in Hanoi.* The Neithelands: Bouwstenen Publicatieburo.

Geertz, Clifford (1973). *The Interpretation of Cultures*: *Selected Essays*. New York: Basic Books, pp. 3-30.

Gibson, Clark C., (1999). *Politicians and Poachers: The Political Economy of Wildlife Policy.* New York: Cambridge University Press.

Giger, W., Berg, M., Pham, V. H., Duong, H. A., Tran, H, C., Cao, T. H, and Scherenleib, R. (2003). Environmental analytical research in Northern Vietnam-A Swiss-Vietnamese cooperation focusing on arsenic and organic contaminants in aquatic environments and drinking water. In *CHIMIA*, 57 (9), pp. 529-536.

GKW CONSULT (1994). *Business Opportunities in Vietnam in the Water Supply and Sanitation Sector - Final Report*. Unpublished report.

Gonsalves, Julian; Thomas Becker, Ann Braun, Dindo Campilan, Hidelisa De Chavez, Elizabeth Fajber, Monica Kapiriri, Joy Rivaca-Caminnade and Ronnie Vernooy (2005). *Participatory Research and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook*. Ottawa, ON: International Development Research Centre.

Goetz, J. P., & LeCompte, M. D. (1981). Ethnographic research and the problem of data reduction. *Anthropology & Education Quarterly, 12*(1), 51-70.

Greif, Avner (1994). Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies. *Journal of Political Economy* 102(5): 912-950.

Gross, Bruce, Christine van Wijk, and Nilanjana Mukherjee (2000) *Linking Sustainability with Demand, Gender and Poverty: A Study in Community-Managed Water Supply Projects in 15 Countries*. Water and Sanitation Program. IRC.

Grusky, Sara (*undated*) *The IMF, the World Bank and the global companies: A shared agenda*. Retrieve August 20th, 2007, from http://www.citizen.org/documents/sharedagenda.pdf

Gutierrez, Eric (2003a). *Privatization and the Failed Promise of Free Market Theory in Water Services Provision: Towards Developing an Alternative Theoretical Framework*. Paper presented at Mexico City Conference, April 2-3, 2003. Retrieved September 22nd, 2004, from http://users.ox.ac.uk/~prinwass/PDFs/Gutierrez1.PDF

Gutierrez, Eric (2003b). *Private sector participation in water supply: too fast, too soon?* Retrieved August 22nd, 2007, from http://www.id21.org/society/s8aeg1g1.html

Guzinsky, Craig (2007). *Governing Water in an Accelerated Urban Transition: State, Community, and Private Sector Innovations in a Peri-Urban Setting, Gresik, Indonesia.* Unpublished Manuscript, Honolulu, Hawaii: University of Hawaii, Manoa's Department of Urban and Regional Planning Area of Concentration Paper.

Halkatti, M., Purushothaman, S. and Brook, R. (2003). 'Participatory Action Planning in the Peri-Urban Interface: the Twin City Experience, Hubli-Dharwad, India', *Environment and Urbanization,* 15(1): 149-158.

Hall, David (2001). *Water in Public Hands: Public Sector Water Management - A Necessary Option*. United Kingdom: Public Services International. http://www.psiru.org/reports/2002-08-W-dmae.pdf

Hall, David, Enmanuele Lobina, Odete Viero, and Helio Maltz (2002). Water in Porto Alegre, Brazil: Accountable, Effective, Sustainable, and Democratic. A PSIRU and DMAI Paper. Available:

Hanoi Architecture and Urban Planning Department (undated) *Quyết Định Phê Duyệt Quy Hoạch Chung Xây Dựng Thủ Đô Hà Nội Đến Năm 2030 và Tầm Nhìn Đến Năm 2050 [The Prime Minister of Vietnam's Decision No. 1259/QĐ-TTg on the approval of the Master Plan of Hanoi to 2030 and a vision of 2050]*. Retrieved on 5 April 2012 from http://qhkthn.gov.vn/index.php/kho-du-lieu-so/finish/9-chinh-ph/33-quyt-dnh-s-490qd-ttg-ngay-0552008.html

HAIDEP (The Coomprehensive Urban Development Programme in Hanoi Capital City) (2005) *Hanoi Urban Environment Fact Book*. HAIDEP Study Team. Unpublished reoprt.

HAIDEP (The Coomprehensive Urban Development Programme in Hanoi Capital City) (2006). *HAIDEP Exhibit*. 4-13 August at 45 Trang Tien Street, Hanoi. Unpublished document.

Hanoi Department of Urban Management and Planning (2007). *Proposed and Approved Urban Development Project in Hanoi in 1997-2006*. Unpublished document.

Hanoi Institute of Socio-economic Studies (1999). *Đào Tạo Nghề, Giải Quyết Việc Làm Cho Lao Động Trong Diện Nhà Nước Thu Hồi Đất Nông Nghiệp Tại Phường Phú Thượng, Quận Tây Hồ, Hà Nội, [Jobs Training and Securing Livelihood for Households Whose Agricultural Land Were Acquired in Phu Thuong Ward, Tay Ho District, Hanoi.]* Unpublished report.

Hanoi Statistical Office (2011). *Hanoi Statistical Yearbook 2010-2011*. Hanoi: Hanoi Publishing House.

Hardoy, Jorge E., Diana Mitlin, and David Satterthwaite (2001). *Environmental Problems in an Urbanizing World: Finding Solutions for Cities in Africa, Asia, and Latin America*. Earthscan.

Harms, Erick (2011). *Saigon's Edge: On the Margins of Ho Chi Minh City*. Minneapolis: University of Minnesota Press.

Heynen, Nik, Maria Kaika, and Erick Swyngedouw (Eds.) (2006). In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism. London and New York: Routledge.

HCMC People's Committee (2004). *Feasibility Study Report on the 300,000 $m^3$/day Sai Gon River Water Supply System Project – The Second Stage*. Unpublished project report.

Hofmann, Pascale (2011). "Falling through the Net: Access to Water and Sanitation by the Peri-urban Poor," *International Journal of Urban Sustainable Development,* Vol. 3(1): 40-55.

Hudalah, Delik, Haryo Winarso and Johan Woltjer (2007). "Peri-urbanization in East Asia: A new challenge for planning?" *IDPR,* 29(4), 504-519.

HWBC (Hanoi Water Business Company) (2003). *Hệ Thông Cấp Nước Thành Phố Hà Nội: Báo cáo nghiên cứu tiền khả thi dự án xây dựng nhà máy nước sử dụng nguồn nước mặt công suất đợt I (2005)" 150,000m3/ng.* Hanoi. Unpublished document.

HWBC (Hanoi Water Business Company) (2005). *Đề Án: Chuyển công ty kinh doanh nước sạch Hà Nội thành tổng công ty cấp nước Hà Nội hoạt động theo mô hình công ty mẹ- công ty con.* Hanoi. Unpublished document.

HWBC (Hanoi Water Business Company) (2006). Báo Cáo Tổng Kết Công Tác Năm 2005 và Phương Hướng, Nhiệm Vụ Năm 2006. Unpublished document.

HWBC (Hanoi Water Business Company) (2007). Báo Cáo Tổng Kết Công Tác Năm 2006 và Phương Hướng, Nhiệm Vụ Năm 2007. Unpublished document.

HWBC (Hanoi Water Business Company) (2008). Báo Cáo Tổng Kết Công Tác Năm 2007 và Phương Hướng, Nhiệm Vụ Năm 2008. Unpublished document.

Idelovitch, Emanuel and Klas Ringskog (1995). *Private Sector Participation in Water Supply and Sanitation in Latin America*. Washington D.C.: The World Bank.

Imperial, Mark T., and Tracy Yandle (2005). Taking Institutions Seriously: Using the IAD Framework to Analyze Fisheries Policy. *Society and Natural Resource* 18: 493-509.

Institute of Sociology (2003). *Biến Đổi Kinh Tế - Xã Hội ở Vùng Ven Đô Hà Nội Trong Quá Trình Đô Thị Hóa, [Socioeconomi Changes in Peri-Urban Areas During Urbanization in Hanoi]*. Unpublished report.

Isham, Jonathan, Deepa Narayan, and Lant Pritchett (1995). Does Participation Improve Performance? Establishing Causality with Subjective Data. *The World Bank Economic Review* 9(2): 175-200.

Isham, Jonanthan and Satu Kähkonem (1999). *What Determines the Effectiveness of Community-Based Water Projects? Evidence from Central Java, Indonesia on Demand Responsiveness, Services Rules, and Social Capital*. The World Bank.

Jaglin, Sylvy (2002). The Right to Water Versus Cost Recovery: Participation, Urban Water Supply and the Poor in Sub-Saharan Africa. *Environment and Urbanization* 14(1): 231-245.

Janakarajan, S, Marie Llorente, Marie-Hélène Zérah (2006) "Urban Water Conflicts in Indian Cities: Man-made scarcity as a Critical Factor," in UNESCO (2006) *Urban Water Conflicts: An Analysis of the Origins and Nature of Water-related Unrest and Conflicts in the Urban Context*. Paris: United Nations Educational Scientific and Cultural Organization.

Janakarajan, S., John Butterworth, Patrick Moriarty and Charles Batchelor (2007). "Strengthened City, Marginalized Peri-Urban Villages: Stakeholder Dialogues for Inclusive Urbanization in Chennai, India," in John Butterworth, Raphaele Ducrot, Nicolas Faysse, and S. Janakarajan, eds., *Peri-Urban Water Conflicts: Supporting Dialogue and Negotiation*. Pp. 51-75. The Netherlands: IRC International Water and Sanitation Center.

Jayyousi, O. A. (2007). "Water as a human right: Towards civil society globalization," *International Journal of Water Resources Development, 23*(2), 329-339.

Japan International Cooperation Agency (JICA) (1997). *The study on Hanoi water supply systems in the Socialist Republic of Vietnam*. Hanoi: Author.

JICA (Japan International Cooperation Agency) (1999) *Privatization of Water, Sanitation & Environment-Related Services in Malaysia.* Kuala Lumpur: JICA Malaysia Office.

JICA (Japan International Cooperation Agency) (2004) *Fact-Finding Study on Water Supply Sector in Vietnam: Supporting Report*. JICA Vietnam Office. Project Document.

Justino, Patricia (2006). The Impact of Collective Action on Economic Development: Empirical Evidence from Kerala, India. *World Development* 34: 1254-1270.

Kadekodi, Gopal K. (2004). *Common Property Resource Management: Reflections on Theory and the Indian Experience.* New Delhi: Oxford University Press.

Kähkonem, Satu (1999). *Does Social Capital Matter in Water and Sanitation Delivery? A Review of Literature.* Social Capital Initaitve Working Paper No. 9. Social Development Family Environmentally and Socially Sustainable Development Network. Washington D.C.: The World Bank.

Kjellén, Marianne and Gordon McGranahan (2006). *Informal Water Vendor and the Urban Poor*. Human Settlements Discussion Paper Series. Theme Water-3. London: International Institute for Environment and Development.

Klooster, Daniel (2000). Institutional Choice, Community, and Struggle: A Case Study of Forest Co-Management in Mexico. *World Development* 28(1): 1-20.

Komalasari, Ricky (2002). *Strategies to Improve Access to Clean Water: Case Study of Kampung in Bangdung, Indonesia.* Unpublished Manuscript. Honolulu, Hawaii: University of Hawaii at Manoa's Department of Urban and Regional Planning Area of Concentration.

Koppen, Barbara, Patrick Moriarty and Eline Boelee (2006). *Multiple-use Water Service to Advance the Millennium Development Goals.* Colombo, Sri Lanka: International Water Management Institute.

Krueger, Richard A. (1988). *Focus Groups A Practical Guide for Applied Research*. Newbury Park: Sage.

Krueger, Richard A. and Mary A. Casey (2000). *Focus Groups: A practical Guide for Applied Research*. Thousand Oaks Calif.: Sage Publications.

Kumar, Suresh (2000). *Common Property, Community Interests and Environmental Concerns*. New Delhi: Manak Publications PVT. LTD.

Kumar, Yogesh (2006). "Community Initiatives in Water in a Decentralized Governance System of Madhya Pradesh," in V. Ratna Reddy and S. Mahendra Dev, eds., *Managing Water Resources: Policies, Institutions and Technologies*. Pp. 282-304. New Delhi: Oxford University Press.

Kvale, Steinar (1996). *InterViews: An Introduction to Qualitative Research Interviewing.* Thousand Oaks, Calif.: Sage.

Labbé, Danielle (2010). *Facing the Urban Transition in Hanoi: Recent Urban Planning Issues and Initiatives*. Montréal: Institut national de la recherche scientifiqua. Centre – Urbanisation Culture Société.

Lall, Somik V., Uwe Deichmann, Mattias K.A. Lundberg, and Nazmul Chaudhury (2004). Tenure, Diversity and Commitment: Community Participation for Urban Service Provision. *The Journal of Development Studies* 40(3): 1-26.

Leaf, Michael (1999). "Vietnam's Urban Edge: The Administration of Urban Development in Hanoi," Third World Planning Review, 21(3): 297-315.

Lobe, Jim (2003). *Stop privatizing water, NGOs tell developed countries*. Retrieved August 17th, 2007, from http://www.globalpolicy.org/ngos/business/2003/0528water.htm

Lobina, Emanuele, and David Hall (2003). *Problems with Private Water Concessions: A Review of Experiences in Latin America and other Regions*. United Kingdom: Public Services International Research Unit. Retrieved from http://www.psiru.org/reports/2003-06-W-over.doc

Loftus, Alexander (2005). *"A Political Ecology of Water Struggles in Durban, South Africa."* Doctor of Philosophy Disseration. University of Oxford.

Logan, William S. (2000). *Hanoi Biography of a City*. Seattle: University of Washington Press.

Lowry, Kem, Alan White, and Catherine Courtney (2005). "National and Local Agency Role in Integrated Coastal Management in the Philippines," Ocean & Coastal Management 48: 314-335.

Madrigal, Róger, Francisco Alpízar, and Achim Schlüter (2010) *Determinants of Performance of Drinking Water Community Organizations: A Comparative Analysis of Case Studies in Rural Costa Rica.* Environment for Development and Resources for the Future.

Marshall, Fiona, Linda Waldman, Hayley MacGregor, Lyla Mehta, and Pritpal Randhawa (2009). On the Edge of Sustainability: Perspectives on Peri-urban Dynamics. Brighton: STEPS Centre, University of Sussex.

Maxwell, Joseph (1996). *Qualitative Research Design: An Interactive Approach*. Thousand Oaks, Calif.: Sage Publications.

McCay, Bonnie J. (2002). "Emergence of Institutions for the Commons: Contexts, Situations, and Events," in Elinor Ostrom, Thomas Dietz, Nives Dolsak, Paul C. Stern, Susan Stonich, and Elke U.Weber, (Eds.), *The Dramas of the Commons: Committee on the Human Dimensions of Global Change*. Pp. 361-402. Washington DC.: National Academy Press.

McCay, Bonnie J., and Svein Jentoft (1998). "Market or Community Failure? Critical Perspectives on Common Property Research," *Human Organization* 57(1): 21-29.

McDonald, David and Greg Ruiters (Eds) (2005). *The Age of Commodity: Water Privatization in Southern Africa*. Sterling, VA.: Earthscan.

McGranahan, G. (2002). *Demand-side water strategies and the urban poor*. PIE Series No. 4. London: Earthprint Limited.

McGranahan, Gordon and David Lloyd Owen (2006). *Local Water Companies and the Urban Poor*. Human Settlements Discussion Paper Series. Theme Water-4. London: International Institute for Environment and Development.

McGranahan, Gordon and David Satterthwaite (2006). *Governance and Getting the Private Sector to Provide better Water and Sanitation Services to the Urban*

*Poor*. Human Settlements Discussion Paper Series. Theme Water-2. London: International Institute for Environment and Development.

McGregor, Duncan; David Simon and Donald Thompson (Eds.) (2006). *The Peri-Urban Interface: Approached to Sustainable Natural and Human Resources Use*. London, Sterling, VA: Earthscan.

McKenzie, David and Isha Ray (2005). "Household Water Delivery Options in Urban and Rural India," *Proceedings of 5th Stanford University India Conference.* Stanford Center for International Development Working Paper 224

McIntosh, Arthur C. (2003). *Asian Water Supplies: Reaching the Urban Poor*. Asian Development Bank.

McIntosh, A . C. & Yniguez, A. E. (Eds.) (1997). *Second water utilities data book: Asian and Pacific region*. Philippines: Asian Development Bank.

Mehta, L., R. Marchall, S. Movik, A. Stirling, E. Shah, A. Smith and J. Thompson (2007). *Liquid Dynamics: Challenges for Sustainability in Water and Sanitation*. STEPS Working Paper 6. Brighton: STEP Centre.

Meinzen-Dick, Ruth and Paul P. Apprasamy (undated) *Urbanization and Intersectoral Competition for Water.* Retrieved on July 20, 2011 from http://www.wilsoncenter.org/publication/urbanization-and-intersectoral-competition-for-water

Miles, Mathew B. and A. Michael Huberman (1994*). Qualitative Data Analysis: An Expanded Sourcebook* (2nd Edition). Thousand Oakes: Sage.

Ministry of Construction (MOC) (1999) *Định Hướng Phát Triển Đô Thị Việt Nam Đến Năm 2020 [General Planning Orientation for Urban Development in Vietnam to 2020]*. Hanoi: Construction Publishing House.

Mishler, Elliot G. (1986). *Research Interviewing: Context and Narrative*. Cambridge, MA: Harvard University Press.

Mortimore, M. and Wilson, J. (1965). *Land and People in the Kano Close-Settled Zone*, Occasional Paper No. 1, Department of Geography, Zaria: Ahmadu Bello University.

Mosse, David (1997). Colonial and Contemporary Ideologies of Community management: The Case of Tank Irrigation Development in South India. *Modern Asian Studies* 13.

MPI (Ministry of Planning and Investment) (2005). *Law on Investment*. Economy and Forecast Review & Legislation Department. Hanoi: Statistical Publishing House.

Nagendra, Harini, Birendra Karna, and Mukunda Karmacharya (2005). Examining Institutions Change: Social Conflict in Nepal's Leasehold Forestry Programme. *Conversation and Society* 3(1): 72-91.

Narain, Vishal and Shilpa Nischal (2007). "The Peri-urban Interface in Shahpur Khurd and Karnera, India", *Environment and Urbanization*, 19(1): 261-273.

Narayan, Deepa (1995). *The Contribution of People's Participation: Evidence from 121 Rural Water Supply Projects.* Environmentally Sustainable Development Occasional Paper Series No. 1. Washington D.C.: The World Bank.

Neuman, W. Lawrence (2003). *Social Research Methods: Qualitative and Quantitative Approaches* (5th ed.). New York: Alyn and Bacon.

Neuman, W. Lawrence (2004). *Basics of Social Research: Qualitative and Quantitative Approaches.* San Francisco: Pearson.

Ngoc Tu 30 May 2008). "Illegal Wells Damage Water Supply," *Viet Nam News*. Retrieved on 30 May 200, from http://vietnamnews.vnagency.com.vn/showarticle.php?num=03SOC300508.

Nguyen, Hao (2004) *Urban Environmental Services Management: Enhancing Water and Sanitation Services Provision in Developing Cities – The Case of Hanoi, Vietnam*. Unpublished Manuscript. Honolulu, Hawaii: University of Hawaii at Manoa's Department of Urban and Regional Planning Area of Concentration Paper.

Nguyen, Hao (2008) *Household's Strategies for Securing Water in Peri-Urban Can Tho and Ha Noi Cities in Vietnam*. Unpublished research paper. University of Hawaii at Manoa's Department of Sociology.

Nguyen, Hien T. and Thuy Thi Nghiem (2006). *Community Spaces in Low-Income Housing Areas- A Case Study of Hanoi, Vietnam*. Unpublished report. University of Hawaii, Manoa's Globalization Research Center and Ford Foundation.

Nguyen Thanh Huyen (1998). (Ed.) *Nhà Doanh Nghiệp Cần Biết: Cẩm Nang Hướng Dẫn Quản Lý Đầu Tư Xây Dựng & Đấu Thầu [Entrepreneurs Must Know: Guidelines for Managing Investment and Bidding in Construction Projects]*. Ho Chi Minh City Publishing House.

Nguyen Van Dan and Nguyen Thi Ha (2006). "Tài Nguyên Nước Dưới Đất Vùng Hà Nội Và Định Hướng Khai Thác, Sử Dụng," [Groundwater Resource in Hanoi Region: An Orientation of Usage] in *Cấp Thoát Nước* [*Water Supply and Drainage]*, January-March 2006: 41-47.

Nguyen, Ton (2000). Vietnam Urban water supply and sewerage objectives and challenges. In *Seminar cum exhibition of water supply and sanitation in provincial towns in Vietnam*, Hanoi November 30-December 3, 2000, pp. 35-41. Hanoi: Vietnam Water Supply and Sewerage Association.

Norström, A. (2007). *Planning for Drinking Water in Peri-Urban Areas.* Swedish Water House Report 21. Stockholm: SIWI.

Olson, Mancur (1965). *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge: Harvard University Press.

Ostrom, Elinor (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.

Ostrom, Elinor (1997). "Crossing the Great Divide: Coproduction, Synergy, and Development," in Peter Evans (Ed.), *State-Society Synergy: Government and Social Capital in Development*. Berkeley, Calif.: International and Area Studies, pp: 85-118.

Ostrom, Elinor, Larry Schroeder, and Susan Wynne (1993). *Institutional Incentives and Sustainable Development: Infrastructure Policies in Perspective.* Oxford: Westview Press.

Ostrom, Elinor, Roy Gardner, and James Walker (1994). *Rules, Games and Common-Pool Resources.* Ann Arbor: The University of Michigan Press.

Ostrom, Elinor (1986). "An Agenda for the Study of Institutions" *Public Choice* 48: 3-25.

Ostrom, Elinor (2004). *Collective Action and Property Rights for Sustainable Development: Understanding Collective Action.* FOCUS II. Washington D.C.: International Food Policy Research Institute.

Nguyen Si Bao (2000). Procedures for master plan preparation and implementation of drainage and wastewater treatment project using Japanese ODA in Hanoi (Tien Trinh Lap Quy Hoach Tong The Va Trien Khai Thuc Hien Du An Thoat Nuoc Va Xu Ly Nuoc Thai Bang Nguon Von ODA Cua Nhat Ban Tai Ha Noi). *In Seminar cum exhibition of water supply and sanitation in provincial towns in Vietnam*, Hanoi November 30-December 3, 2000, pp. 365-376. Hanoi: Vietnam Water Supply and Sewerage Association.

Nguyen, Trong Tin (2000). Developmental development of urban water supply and sewage in Vienam (Dau tu phat trien he thong cap nuoc, thoat nuoc do thi Viet Nam). In *Seminar cum exhibition of water supply and sanitation in provincial towns in Vietnam*, Hanoi November 30-December 3, 2000, pp. 56-66. Hanoi: Vietnam Water Supply and Sewerage Association.

Nguyen, V. D. & Nguyen, T. D. (2002). *Groundwater pollution in the Hanoi area, Vietnam*. Paper presented at the ESCAP-IWMI seminar on environmental and public health risks due to contamination of soils, crops, surface and groundwater from urban industrial and natural sources in Southeast Asia, Hanoi, Vietnam December 10-12, 2002. Retrieved October 31, 2004, from http://www.unescap.org/esd/water/publications/CD/escap-iwmi/waterquality/Groundwater%20pollution%20in%20the%20Hanoi%20area,%20Vietnam.pdf

Pandolfi, Laurent (2005). *Dự Án Quy Hoạch Hà Nội: Những Bất Ổn Trong Việc Chuyển Sang Quy Hoạch Theo Cơ Chế Thị Trường [Hanoi Planning Projects: Instability Imposed from A Shift to Market-based Urban Planning,]* in Clément, Pierre and

Nathalie Lancret (Eds.,) Hà Nội Chu Kỳ Của Những Đổi Thay Hình Thái Cấu Trúc và Đô Thị [Hanoi A Period of Changes in Urban Form and Architecture]. Hanoi: Khoa Học Và Kỹ Thuật Publishing House.

Patton, Michael Quinn (2002). *Qualitative Research & Evaluation Methods*. 3th edition. New Delhi: Sate Publication.

Perkins Eastman Architects, POSCO E&C CO., Ltd, and JINA Architects, Ltd. (2010). *The Hanoi Capital Construction Master Plan to 2030 and Vision to 2050: 3rd Report Presentation (11/2009)*. Unpublished report.

Perkins Eastman Architects, POSCO E&C CO., Ltd, and JINA Architects, Ltd. (2011). *Quy Hoạch Chung Xây Dựng Thủ Đô Hà Nội đến năm 2030 và tầm nhìn đến năm 2050 [The Hanoi Capital Construction Master Plan to 2030 and Vision to 2050]*. Unpublished report.

Pham Quoc Truong (2002). *Chiến Lược Phát Triển Giao Thông Của Thành Phố Hà Nội Đến Năm 2020, [The Transportation Development Strategy of Hanoi to 2020),* Paper presented at the "Hà Nội Thành Phố Đặc Thù và Sự Lựa Chọn cho Phát Triển," on 28 October 2002. Unpublished document.

Pham Van Tham, Do Thinh, Luong Cao Khoat, and Phan Huu Tich (Eds.) (1994). *Lịch Sử Cách Mạng Xã Cổ Nhuế (1930-1992) [Revolutionary History of Co Nhue Commune (1930-1992)]*. Ha Noi. Labour Publishing House.

Pham, X. N., Be, V. D., & Hainsworth, G. B. (2000). Rural development in Vietnam: The search for sustainable livelihoods. In P. Broothroyd & X. N. Pham (2000) (Eds.). *Socioeconomic renovation in Vietnam: The origin, evolution, and impact of Doi Moi*. Ottawa: International Development Research Centre; Singapore: Institute of Southeast Asian Studies.

Pham Sy Liem (2005) *Đổi Mới Thể Chế Ngành Cấp Thoát Nước Đô Thị [Institutional Reform in Urban Water Supply and Drainage]*. Hanoi: Vietnam Water Supply Association.

Phan Hữu Thắng, Mai Thanh Hải, Nguyễn Cao Cương, Hoàng Anh Minh, Trương Văn Bảo, and Phạm Mỹ Giang (2008) *20 Năm Đầu Tư Nước Ngoài Nhìn Lại và*

*Hướng Tới [20 –Year of Foreign Direct Development: Looking Back and Looking Ahead]*. Hanoi: Trí Thức Publishing House.

Phùng Hữu Phú (Ed.) (2005.) *Hai Mươi Năm Đổi Mới Ở Thủ Đô Hà Nội: Định Hướng Phát Triển Đến Năm 2010 [20 Years of Reform of the Capital of Hanoi: A Development Orientation to 2010]*. Hanoi: Hà Nội Publishing House.

Pírez, Pedro (2002). "Buenos Aires: Fragmentation and Privatization of the Metropolitan City," *Environment and Urbanization,* 14(1): 145-159.

Polanyi, Karl (1957). *The Great Transformation: The Political and Economic Origins of Our Time*. United States of America.

Poteete, Amy and Elinor Ostrom (2004). *An Institutional Approach to the Study of Forest Resources*. Retrieved on March 29, 2012 from http://www.indiana.edu/~workshop/papers/W01I-8.pdf

Poteete, Amy and Elinor Ostrom (2002). *An Institutional Approach to the Study of Forest Resources.* Unpublished paper. Indiana University's International Forestry Resources and Institutions Research Program.

Prokopy, Linda Stalker (2005). "The Relationship between Participation and Project Outcomes: Evidence from Rural Water Supply Projects in India," *World Development 33(11): 1801-1819*

Public Citizen (2003). *Water Privatization Fiascos: Broken Promises and Social Turmoil* – A Special Resport by Public Citizen's Water for All Program. Washington D.C.: The author.

Quang, V. (2004, June 30). Ha Noi con 9 diem thieu nuoc sach (There are around 9 areas without clean water supply in Hanoi). In *Vietnam economy electronic newspaper*. Retrieved September 27, 2004 from http://www.vneconomy.com.vn/vie/article_to_print.php?id=040630095445

Reddy, Ratna V., and S. Mahendra Dev (2006). "The Canvas: Policies, Institutions, and Technologies," in V. Ratna Reddy and S. Mhendra Dev, eds., *Managing Water*

*Resources: Policies, Institutions, and Technologies.* Pp. 1-22. New Delhi: Oxford University Press.

Regev, U., A.P. Gutierrez, S.J. Scheriber, and D. Zilberman (1998). Biological and Economic Foundations of Renewable Resource Exploitation. *Ecological Economics* 26: 227-242.

Rich, Richard. C. (Ed.) 1982. *The Politics of Urban Public Services*. Massachusetts, Toronto: LexingtonBooks.

Ruet, Joel, Marie Gambiez, and Emilie Lacour (2007) "Private Appropriation of Resource: Impact of Peri-urban Farmers Selling Water to Chennai Metropolitan Water Board," *Cities*, 24(2): 110-127.

Sara, Jennifer and Travis Katz (1998). *Making Rural Water Supply Sustainable: Report on the Impact of Power Rules.* Washington D.C.: The World Bank

Satterthwaite, David (2007). *The Transition to a Predominantly Urban World and Its Underpinning.* International Institute for Environment and Development's Human Settlements Discussion Paper Series.

Schouten, Ton and Patrick Moriarty (2003). *Community Water, Community Management: From System to Service in Rural Areas.* London: ITDG Publishing.

Sen, Amartya (1990). "Food, Economics, and Entitlements," in Eicher, Carl K. and John M. Staatz (Eds.) *Agricultural Development in the Third World*. Baltimore: Johns Hopkins University Press.

Sen, Amartya (1981). *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford: Clarendon Press.

Sengupta, Nirmal (1990). *Managing Common Property: Irrigation in India and the Philippines*. New Delhi: Sage publications.

Shah, Faisal (2007). Local Financing for Rural and Peri-urban Water Supply and Sanitation. Protos.

Shatkin, G. (2007) 'Global Cities of the South: Emerging Perspectives on Growth and Inequality', *Cities*, 24(1): 1-15

Silverman, David and Amir Marvasti (2008). *Doing Qualitative Research: A Comprehensive Guide*. Los Angeles: Sage.

Simon, D., MacGregor, D., Nsiah-Gyabaah, K. and Thompson, D. (2003) 'Poverty Elimination, North-South Research Collaboration, and the Politics of Participatory Development', *Development in Practice*, 13(1): 40-56.

Singleton, Sara (2000). Co-operation or Capture? The Paradox of Co-management and Community Participation in Natural Resource Management and Environmental Policy-Making. *Environmental Politics* 9(2): 1-11.

Sintomer, Yves, Carsten Herzbergand, and Anjia Röcke. (u/d). *From Porto Alegre to Euro: Potentials and Limitations of Participatory Budgeting.* Retrieved on November 22, 2008, from www.participatorybudgeting.org.uk/documents/From-Porto-Alegre%20-%20potential%20-%20limits%20of%20PB.pdf

Skyttä, Tauno K., Satu Ojạnperä, and James Mutero (2001) *Finland's Support to Water Supply and Sanitation 1968-2000 – Evaluation of Sector Performance*. Helsinki: The Ministry of Foreign Affairs.

Slesarenok, Svitlana (2005*). Ukraine: Women Act Against Poverty and Privatization*, in Balanya, Belen, Brid Brennan, Olivier Hoedeman, Satoko Kishimoto and Philipp Terhorst (Eds.) Reclaiming Public Water: Achievements, Struggles and Visions from around the World. Amsterdam: Corporate Europe Observatory.

Solo, Tova M. (1998). "Competition in Water and Sanitation: The Role of Small-Scale Entrepreneurs." *Public Policy for the Private Sector*. No. 165. The World Bank group.

Solo, Tova M. (1999). "Small-Scale Entrepreneurs in the Urban Market and Sanitation Market." Environment and Urbanization. Vol. 11, No. 1: 117-132.

Solo, Tova M. (2003). *Independent Water Entrepreneurs in Latin America. The other Private Sector in Water Services.* Washington D.C.: The World Bank.

Spencer, James H. (2007). "Innovative Systems to Create Peri-urban Infrastructure: Assessment of a Local Partnership to Provide Water to the Poor in Vietnam," *International Development Planning Review*, 29(1):1-22.

Spencer, James H. (2008a). "Household Strategies for Securing Clean Water: The Demand for Piped Water in Vietnam's Peri-Urban Settlements," *Journal of Planning Education and Research*, 28(2): 213-224.

Spencer, James H., Bunnarith Meng, Hao Nguyen, and Craig Guzinsky (2008) "Innovations in Local Governance: Meeting Millennium Development Goal Number 7 in Southeast Asia," *Development* 52(1): 245-251.

Spencer, James H. and Craig Guzinsky (2010). "Periurbanization, Public Finance, and Local Governance of the Environment: Lessons from Small-Scale Water Supplies in Gresik, Indonesia," *Environment and Planning* 42(9): 2121-2146.

Stake, Robert E. (1995). *The Art of Case Study Research*. Thousand Oaks: Sage.

Steward, David W. (2007). *Focus Group: Theory and Practice*. Thousand Oaks: Sage Publications.

Stone and Webster Consultants (2002) "Đổi Mới Về Cơ Chế và Chính Sách Trong Ngành Cấp Thoát Nước Đô Thị Việt Nam: Đánh Giá Sơ Bộ Sự Phát Triển Khung Pháp Chế." [*Policy Reform in Urban Water and Drainage Sector in Vietnam: A Preliminary Assessement of a Legal Framework Development.]* Unpublished report.

SUSTAIN (2004). "An Overview of the Water Supply and Sanitation System at Metropolitan and Peri-urban Level: The Case of Chennai. Unpublished report prepared for the Research project Service Provision Governance in the Peri-urban Interface of Metropolitan Areas, Development Planning Unite, University College London.

Swyngedouw, Erik (2004). *Social Power and the Urbanization of Water: Flows of Power*. New York: Oxford University Press.

Ta, X. T. (2000). The implementation of the inter-ministerial circular No, 03/1999/BXD-BVGCP dated 16.6.1999 on the method of tariff setting and the authorization in the piped water tariff stipulation. In *Seminar cum exhibition of water supply and sanitation in provincial towns in Vietnam*, Hanoi November 30-December 3, 2000, pp. 78-87. Hanoi: Vietnam Water Supply and Sewerage Association.

Thanh Niên (29 October 2007). *Ban Quản Lý Nước Sạch Cắt Nước Của Dân [ The Water Management Unit Stopped Water Service of People*]. Thanh Nien Newspaper, No. 302 (4228), Monday, 29 October 2007.

The Government of Vietnam (2010). *Quy Hoạch Chung Xây Dựng Thủ Đô Hà Nội Đến Năm 2030 Và Tầm Nhìn Đến Năm 2050 [Master Plan of Hanoi to 2030, Vision 2050]*. Unpublished Document.

Thu Lý (01 August 2011). *Dự Án Nào Bị Khai Tử Sau Quy Hoạch Hà Nội? [Which Projects Will Be Terminated After the Hanoi Master Plan Was Approved]*, Vietnamnet. Retrieved on April 7, 2012 from http://vietnamnet.vn/vn/xa-hoi/32782/du-an-nao-bi-khai-tu-sau-quy-hoach-hn-.html

Tin Tuc Vietnam (2004, February 17) *Ha Noi co tang gia nuoc sinh hoat*? (Does Hanoi increase clean water?). Retrieved September 26th, 2004, from http://www.tintucvietnam.com/sukien/2004/3/35963.ttvn

Tong, N. T. (2002) *Arsenic pollution in ground water in the red river delta*. Paper presented at the ESCAP-IWMI seminar on environmental and public health risks due to contamination of soils, crops, surface and groundwater from urban industrial and natural sources in Southeast Asia, Hanoi, Vietnam December 10-12, 2002. Retrieved October 20, 2004, from http://www.unescap.org/esd/water/publications/CD/escap-iwmi/arsenic/Arsenic%20pollution%20in%20groundwater%20in%20the%20Red%20River%20delta..pdf

Torregrosa y Armentia, María Luisa, Catalina Arteaga and Karina Kloster (2004a) *WSS Practices and Living Conditions in the Peri-urban Interface of Metropolitan Mexico City: The Case of San BartoloMe Xicolulco and San Salvador Cuauhtenco, Milpa Alta*. Unpublished Report Prepared for the Research Project Service Provision Governance in the Peri-Urban Interface of Metropolitan Areas, Development Planning Unit. London: University College London.

Torregrosa, María, Catalina Arteaga, Karina Kloster, Gabriel Cosío, and Christian Ruiz (2004b). "*An Overview of the Water Supply and Sanitation System at Metropolitan and Peri-urban Level: The Case of Mexico City*." Unpublished report prepared for the Research project Service Provision Governance in the Peri-urban Interface of Metropolitan Areas, Development Planning Unite, University College London.

Tran, T. T. (2000). Current status and solutions for clean water tariff in Vietnam. In *Seminar cum exhibition of water supply and sanitation in provincial towns in Vietnam*, Hanoi November 30-December 3, 2000, pp. 88-100. Hanoi: Vietnam Water Supply and Sewerage Association.

Triche, Thelma, Sixto Requena and Mukami Kariuki (2006). *Engaging Local Private Operators in Water Supply and Sanitation Services: Initial Lessons from Emerging Experience in Cambodia, Columbia, Paraguay, The Philippines, and Uganda.* Water Supply & Sanitation Working Notes. The World Bank.

Tuyet, M. (2004, September 18). Kinh doanh nuoc sach o Ha Noi: Van la chuyen "lai gia, lo that" (Water business in Hanoi: "Fade profit, real loss"). In *Suckhoe&Doisong*, No 715. Retrieved September 27, 2004, from http://health.vnn.vn/tintuc/chitiet.cfm?matin=22577&sobao=715&machuyenmuc=tt

UN (The United Nations) (2003). *Water for People: Water for Life*. Oxford: UNESCO and Berghahn Books.

UN (The United Nations) (2005). *Water: A Shared Responsibility*. Oxford: UNESCO and Berghahn Books.

UN-HABITAT (United Nations Center for Human Settlements Programme) (2003). *Water and Sanitation in the World's Cities: Local Action for Global Goals.* London: Earthscan.

UN-HABITAT (United Nations Center for Human Settlements Programme) (2004). *Water and Sanitation in the World's Cities*. Beyond Pilot Projects in Orangi. Retrieved September 17, 2004, from www.unhabitat.org/mediacentre/wswc.asp

UN-HABITAT (United Nations Center for Human Settlements Programme) (2006). *Meeting Development Goals in Small Urban Centres: Water and Sanitation in the World's Cities*. UN-HABITAT: Earthscan.

United Nation Development Programme (2006). Human Development Report 2006 Beyond Scarcity: Power, Poverty, and the Global Water Crisis. New York: The Author.

UNESCO (2009) *Water in a Changing World*, The United Nations World Water Development Report 3. Paris: UNESCO.

UNICEF Vietnam and GMSV (Geological and Mineral Survey of Vietnam) (2001). *Report on Investigated Results for Arsenic Groundwater Level in Hanoi City*. Unpublished report.

United Nations Viet Nam (UNVN), (2001). *Water management at provincial and district level*. Presentation by ADB at The Urban Forum, May 21, 2001, Hanoi. Vass, A. (2003). Water and sanitation: The targets and challenges. In *StudentBMJ*, Vol. 11, April 2003.

Uphoff, Norman and Jeff Langholtz (1998) "Incentives for Avoiding the Tragedy of the Commons," *Environmental Conservation* 25(3): 251-261.

Uphoff, Norman (1986). *Local Institutional Development: An Analytical Sourcebook with Cases*. West Hartford: Kumarian Press.

Uyen Thao (14 July 2010) Những Số Liệu Quan Trọng Về Dân Số Hà Nội [remarkable population statistics of Hanoi]. Retrieved on 5 April 2012, from http://www.t5g.org.vn/?u=dt&id=1154

V. Thuật (21 September 2010) *Khánh Thành Nhà Máy Nước BOO Thủ Đức, [The Inauguration of BOO Thu Duc Water Supply Company]*. Pháp Luật Newspaper Online. Retrieved on April 9, 2012, from http://phapluattp.vn/20100920115114324p0c1085/khanh-thanh-nha-may-nuoc-boo-thu-duc.htm

Van Laerhoven, Frank and Krister Andersson (u/d) http://sobek.colorado.edu/~anderssk/vanLaerhoven%20and%20Andersson%202010.pdf. Retrieved on March 29, 2012, from http://sobek.colorado.edu/~anderssk/vanLaerhoven%20and%20Andersson%202010.pdf

Varughese, George, and Elinor Ostrom (2001). The Contested Role of Heterogeneity in Collective Action: Some Evidence from Community Forestry in Nepal. *World Development* 29: 747-765.

Việt Báo (8 December 2004) Xây Dựng Nhà Máy Nước 300.000m3/ngày Bằng Vốn Trong Nước. [Constructing a 300,000m3/Day Water Supply Company by Domestic Capital.] Việt Báo Online. Retrieved on April 9, 2012, from http://vietbao.vn/Xa-hoi/Xay-dung-nha-may-nuoc-300.000-m3-ngay-bang-von-trong-nuoc/40058973/157/

Vietnam (The Socialist Republic of Vietnam) (2006) *The Five-Year Socio-Economic Development Plan 2006-2010.* Hanoi: Lao Động và Xã Hội Publishing House.

VIWASEEN (Vietnam Water Supply Sewerage and Environment Construciton Investment) (1995) *Báo Cáo Nghiên Cứu Khả Thi Dự Án Cấp Nước Hà Nội Giai Đoạn 1996-1998 (Dự Án 1A), [Feasibility Study on Hanoi Water Supply Project During 1996-1998 (1A Project)]*. Hanoi. Unpublished report.

VTC NEWS (29 October 2007) *Xã Nợ Tiền, Dân Bị Cắt Nước [The Commune People's Committee owns a Debt, Its Citizens' Water Accessibility Was Ceased].* Retrieved on April 17, 2012, from http://vtc.vn/317-166777/xa-hoi/do-thi/ha-noi-xa-no-tien-dan-bi-cat-nuoc.htm

Wade, Robert (1988). *Village Republics: Economic Conditions for Collective Action in South India.* Oakland: ICS Press.

Water Management Unit (WMU) (2006). The Annual Report for 2005 Activities. Unpublished document.

Walker, Peter A. (2006). Political Ecology: Where is the Policy. *Progress in Human Geography* 30, 3: 382-395.

World Resource Institute (WRI) (1996). *World Resources 1996-97*. Washington D.C.: Author.

White, Anderson T., and C. Ford Runge (1995). The Emergence and Evolution of Collective Action: Lessons from Watershed Management in Haiti. *World Development* 23: 1683-1698.

Whyte, William F. (1994). *Participant Observer: An Autobiography*. Ithaca, New York: ILR Press

Winayanti, Lana and Heracles C. Lang (2004). "Provision of Urban Services in an Informal Settlement: A Case Study of Kampung Pens Tanggul, Jakarta," *Habitat International* 28: 41-65.

Winkel, Lenny H. E., Pham Thi Kim Trang, Vi Mai Lan, Caroline Stengel, Manouchehr Amini, Nguyen Thi Ha, Pham Hung Viet, and Michael Berg (2011). "Arsenic Pollution of Groundwater in Vietnam Exacerbated by Deep Aquifer Exploitation for More Than a Century," *PNAS*, Vol. 108(4): 1246-1251.

World Bank (1999) *Private Solutions for Infrastructure: Opportunities for Vietnam.* Washington D.C.: The World Bank in Vietnam.

World Bank (2000). *Private Solutions for Infrastructure: Opportunities for the Philippines.* Washington D.C.: The World Bank.

World Bank (2002). *Private Solutions for Infrastructure: Opportunities for Cambodia.* Washington D.C.: The World Bank.

World Bank (2003). *World Development Report 2004: Making Services Work for Poor People*. Washington D.C.: Oxford University Press.

World Bank (2006) *Vietnam's Infrastructural Challenges - Infrastructure Strategy: Cross-sectoral Issues.* Vietnam: The World Bank in Vietnam.

World Bank (2011) V*ietnam Urbanization Review – Technical Assistance Report.* Vietnam: The World Bank.

[WHO and UNICEF] World Health Organization, United Nations Children's Fund (2010) *Progress on Sanitation and Drinking Water: 2010 Update. Joint Mornitoring Programme for Water Supply and Sanitation.* Geneva (Switzeland): WHO and New York: UNICEF.

[WHO] World Health Organization (2010) *UN-Water Global Annual Assessment of Sanitation and Drinking Water (GLAAS) 2010: Targeting Resources for Better Results*. Genera (Switzerland): World Health Organization.

Wolff, P. (1999). *Vietnam—The Incomplete Transformation*. London, Portland: Frank Cass.

X. Truong (12 Nov. 2009) Dân Số Hà Nội Tăng Thêm 200000 Người Một Năm [Additional 200,000 Person of Hanoi Population Increase Annually]. Đất Việt e-newspaper. Retrieved on April 7, 2012, from http://baodatviet.vn/Home/chinhtrixahoi/Dan-so-Ha-Noi-tang-them-200000-nguoi-mot-nam/200911/67582.datviet

Yandle, Tracy (2003). The Challenge of Building Successful Stakeholder Organizations: New Zealand's Experience in Developing a Fisheries Co-Management Regime. *Marine Policy* 27: 179-192.

Yeung, Y. M. & McGee, T. G. (1986) (Eds.). *Community Participation in delivering urban services in Asia*. Ottawa, Canada : International Development Research Centre.

Yin, Robert K. (1993) *Application of Case Study Research.* Thousand Oaks: Sage.

Yin, Robert K. (1994) *Case Study Research Design and Methods* (2nd Ed.) Thousand Oaks: Sage.

Yin, Robert K. (2009) *Case Study Research Design and Methods* (4th Ed.) Thousand Oaks: Sage.