

DEVELOPMENT PLANNING POLICY UNDER CHANGING CLIMATE CONDITIONS



A policy research proposal
Group IV

*'Water security
for sustainable
development in a
changing
climate'*

Ratna Farwati (Universitas Pendidikan Indonesia)

Huong Giang Pham (RMIT University)

Helen Corney (RMIT University)

Velautham Daksiya (Nanyang Technological University)

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1. Title

How can the illegal use of groundwater in Ho Chi Minh City be terminated?

2. Background

Groundwater use is a common practice throughout Vietnam. Nationally, Vietnam has a potential of 63,000 million m³/year from 134 aquifers across 8 regions (Pham, 2011).

Groundwater is one of the main domestic water supplies in Vietnam, providing water for almost 55% of people nationally, with 34% of the urban population and 65% of the rural population dependent on groundwater (Asian Development Bank – ADB, 2009; Pham, 2011).

However, areas of concentrated groundwater extraction are experiencing problems related to depletion of ground water, land subsidence, contamination from arsenic and other heavy metals, and salt intrusion. Specifically, the ADB (2009) reports that due to over-exploitation of groundwater, the water level declines are significant in some big cities such as Hanoi (1 meter per year) and parts of Ho Chi Minh city (as much as 30 meters/yr). In addition, Vietnam also faces major challenges associated with contamination of shallow groundwater by industries, agricultural pesticides and fertilizer use, aquaculture activities, mining, and waste disposal. The pollution of groundwater can pose major threats to public health, ecosystems, economy, and society. Therefore, managing groundwater use in Vietnam is important, especially in areas where illegal water use occurs.

Ho Chi Minh City, located in the South of Vietnam, is the biggest city in Vietnam with a population of 8.1 million people (General Statistic Office – GSO, 2015; World Atlas, 2017). The city covers about 2,095 km² and accounts for approximately 22% of the entire country's Gross Domestic Product (GDP) and 28% of Vietnam's industrial output (World Atlas, 2016). GSO (2009) forecasts that the population of Ho Chi Minh City will reach 11.6 million people in 2025. The International Union for the Conservation of Nature (IUCN) states that while fresh water demand increases as the result of dense populations in big cities (including Ho Chi Minh City) the supply of clean surface water is low, leading to significant exploitation of groundwater resources in big cities (IUCN, 2010).

Ho Chi Minh City sits within a region with a limited sources of groundwater (about 2% of Vietnam's groundwater potential), however, the ground water abstracted is the highest in the country, at approximately 800,000 m³/day (Pham, 2011). Water demand in urban areas, including Ho Chi Minh City, is expected to increase significantly, from 165 litres/person/day in 2010 to about 250 litres/person/day in 2050 along the Dong Nai river basin (Department of Natural Resource and Environment - Ho Chi Minh City, 2013). To meet this demand, illegal extraction of ground water is likely to increase in both the domestic and industrial sectors.

Until 2011, groundwater management and groundwater resource protection received minimal attention in relation to water resource planning in Vietnam (Phuc, 2008). Under the 1999 Law on Water Resources, permits are required for both groundwater supply units and industrial wells. Local authorities are responsible for the implementation of these regulations, however, their capacity to do so is limited and enforcement is inconsistent (Danh, 2008; Phuc, 2008; IUCN, 2010).

The construction standards for groundwater wells are also cited as poor, without adequate prevention of cross-contamination and pollution between aquifers or between aquifers and the surface (Phuc, 2008). In November of 2010, in response to dwindling supplies and a deteriorating quality of extracted groundwater, the Vietnamese government issued Decision 2065. This decision approves water supply planning in the key economic zones of the delta and includes step-by-step reductions in groundwater use, with cessation of groundwater exploitation in key zones by 2020. However, regulation related to management of domestic groundwater use is still limited, especially for illegal ground water use in big cities such as Ho Chi Minh City.

Research has yet to be conducted on the economic, social, and technical feasibility of terminating the illegal use of groundwater and the adoption of treated tap water. This proposal sits within a framework of water security for sustainable development in a changing climate and aims to develop planning policy to strengthen policies and enforcement around illegal groundwater use in Ho Chi Minh City.

3. Purpose

To phase out illegal groundwater use in Ho Chi Minh City by 2050.

4. Aim

To investigate the reasons for illegal use of groundwater in Ho Chi Minh City and explore effective ways to terminate illegal groundwater extraction.

5. Research question

How can the illegal use of groundwater in Ho Chi Minh City be terminated?

6. Objectives

Ho Chi Minh City obtains on average 50% of its water from groundwater sources (HCMC-NRE, 2013). Rural areas extract more ground water compared to urban areas. Not only does the illegal use of groundwater lead to land subsidence and increased flooding risk, it is also polluted with various pollutants, including lead. Terminating the use of groundwater will raise a number of issues regarding alternative water sources for people's day to day lives. It requires research to highlight the economic, social, and technical implications of these issues. The results will instruct politicians and policy makers aiming to phase out groundwater use in rural provinces of the Ho Chi Minh City by 2050.

In understanding the research question, the research intends to gain a clearer understanding of the reasons behind illegal ground water extraction and effective means to modifying this behaviour. There are number of stakeholders from different sectors (e.g. community, industry, and service) that are involved in illegal groundwater extraction. The impacts of groundwater extraction should be analysed in each of the sectors respectively to yield sector specific solutions. The objectives of the proposed research are:

1. To identify which sectors illegally access groundwater, including specific ways and proportion of extraction
2. To identify volume/quantity of extraction per sector
3. To identify the specific reasons for illegal use of groundwater for each sector
4. To explore possible mechanism to address economic, technical political and social drivers of illegal groundwater use

The specific research questions are given in Table 1.

Table 1: *Objectives and specific research questions for the project*

Objective 1	
Specific research questions:	What proportion of the community is illegally using groundwater?
	What proportion of industry is illegally using groundwater?
	What proportion of the service sector is illegally using groundwater?
Objective 2	
Specific research questions:	What quantity of groundwater is being illegal accessed by the community?
	What quantity of groundwater is being illegal accessed by industry?
	What quantity of groundwater is being illegal accessed by the service sector?
Objective 3	
Specific research questions:	Why do community, industry and service sector members prefer groundwater over tap-water?
Objective 4	
Specific research questions:	What are the most appropriate mechanisms to address technical drivers?
	What are the most appropriate mechanisms to address political drivers?
	What are the most appropriate mechanisms to address social drivers?

7. Specific Research and Research Methodology

7.1 Literature Review

A literature review is required to provide a summary of the state of illegal ground water use within Ho Chi Minh City, including current government policy, legislation, and enforcement

mechanisms. It is important to identify the various stakeholders in illegal ground water use, along with a clear understanding of both formal and informal governance structures within the community, industry, and service sectors.

Identifying others who have worked in this area and their analysis of the situation will be a valuable way of understanding the political processes within Vietnam, which are difficult to navigate. Decision making is influenced by Vietnam's turbulent history, protectionist values, and conventional rules of political behaviour (Lucius, 2009). Understanding the relationship of governance with illegal ground water use will be vital in this research project. Ensuring that this proposal represents a significant gap in the research and is based on previous work of other scholars is also essential.

A literature review will also be beneficial in gaining insights into the behaviour and attitudes of the citizens of Vietnam. This will include their attitudes to the law and its enforcement, water availability, and sustainability. Unpacking social structures and norms at a community level will be important for understanding how residents view groundwater and its use. Overall, a thorough literature review will provide a strong foundation for the research proposal.

7.2 Mixed method approach

This research requires in-depth information about the use of ground water by the community, industry, and service sectors of Ho Chi Minh City. It requires an understanding of public perceptions and experiences whilst looking to quantify the amount of ground water extraction in different sectors. Due to the anticipated difficulties with researching an illegal activity, a mixed method approach, using both quantitative and qualitative methodology should be adopted (Creswell, 2003). A mixed method approach will assist in validating quantitative data with the subjective experiences of members of the Vietnamese community. Having a clearer understanding of both the metrics of illegal ground water use and the attitudes and behaviours underpinning such use will also assist with the development of targeted policy appropriate for each sector.

An outline of the methodology is provided in Table 2, below:

Table 2: *Objectives and methodology*

Objective	Mode	Context	Methods
To identify which sectors of the community illegally access groundwater.	Exploratory	Public recruited for the research	Literature review Interviewing leaders in each community
To identify the volume of illegal ground water extraction per sector.	Quantitative		Comparing the water demand and the measurement of quantities used in legal water sources
To identify the specific reasons for illegal use of ground water per sector.	Qualitative and Quantitative		Interviews, focus groups Survey
To explore possible mechanisms to address economic, technical, political and social drivers of illegal groundwater use.	Exploratory		Literature Review, Interviews with community members and academics, Governmental documents.

7.3 Surveys

Quantitative surveys should be developed to maximise participation by the targeted sectors of this research proposal. Given the delicate nature of illegal use and the dynamics of Vietnamese culture, the use of a survey expert is proposed to develop an appropriate survey tool as well as the most efficient way of disseminating the survey. A pilot survey is recommended to test the survey tool before it is fully implemented.

7.4 Interviews

Interviews should be conducted with government officials, academics, community leaders, and enforcement officers. Interview techniques will require an understanding of cultural norms and sensitivities within Vietnam to maximise data collection potential.

7.5 The Focus Group Discussion Method

The focus group discussion (FGD) is a rapid assessment, semi-structured data gathering method in which a purposively selected set of participants gather to discuss issues and concerns based on a list of key themes drawn up by the researchers (Kumar, 1987). FGD is one of the methods as a qualitative approach. This research method can gather data on how far the knowledge of the users of the ground water and their reason use ground water. Thus, we will get in-depth information from a variety of viewpoints about the problem of ground water use.

Escalada and Heong (1997) formulate the steps of FGD as follows:

1. After a brief introduction, the purpose and scope of the discussion are explained.
2. Participants are asked to give their names and short background information about themselves.
3. The discussion is structured around the key themes using the probe questions prepared in advance.
4. During the discussion, all participants are given the opportunity to participate.
5. Use a variety of moderating tactics to facilitate the group. Among these tactics that the moderator can use include:
 - Stimulate the participants to talk to each other, not necessarily to the moderator.
 - Encourage shy participants to speak.
 - Discourage dominant participants through verbal and nonverbal cues. The following may be used when the situation permits:
 - Call on other participants
 - Politely intervene by saying, "Maybe we can discuss that in another occasion..."
 - Look in another direction
 - Take advantage of a pause and suggest that the subject can be discussed in detail in another session
 - Pay close attention to what is said in order to encourage that behavior in other participants.
 - Use in-depth probing without leading the participant.

7.6 GIS Mapping of ground wells

GIS mapping techniques are proposed to map ground water use within Ho Chi Minh City.

Given that most ground well use is illegal, remote sensing provides a non-invasive method of building detailed spatial maps of the current status of ground wells. This will assist in identifying use of illegal ground water in different sectors and allow comparisons of ground water density to be made in the future. Changes in illegal ground water use identified by remote sensing will help to evaluate of the effectiveness of policy instruments.

8. Limitations

This project, faces several limitations related to both the political and social environment in Vietnam, and the nature of the research. The management of water resources in Vietnam is complex, fluid, and suffering from poor coordination and a lack of political will (Ho, 2006; Annalia, 2015). There are several organisations and different levels of ministries at both national and provincial levels, which are responsible for water supply, enforcement, and treatment. Unfortunately, coordination and communication between these different organisations and levels is often poor. At the same time, these organisations suffer from a severe shortage of specialised staff (Annalia, 2015). Understanding and navigating water governance is likely to be difficult and may take a considerable amount of time and effort within the research timeframe.

Although the Vietnamese government has legislation banning the use of groundwater, it is unclear how this legislation is enforced (Thanh Nien News, 2014). Uncontrolled exploitation of groundwater by industry is unable to be monitored by the environment department and although fines are legislated, it is argued that enforcement is weak (Thanh Nien News, 2014). In conjunction with these issues are the difficulties faced when investigating illegal activities. It is recognised that different sectors and members of the public will be reticent about being candid about illegal consumption of ground water. There is also the question of whether government officials will want to report it. However, sourcing academic reports that refer to illegal extraction may be an effective point of entry into further knowledge on the issue.

Establishing a sound understanding of social norms regarding water use within the different sectors of society will be crucial to this study. Investigations into public perceptions of water sanitation in Vietnam found that answers to surveys did not always match interview and focus group responses, and that people have different perceptions of water use and sanitation within different communities (Herbst et al., 2009). In semi-rural Vietnam, the responsibility of water collection and treatment is primarily that of women (Herbst et al., 2009), and whether this trend continues in Ho Chi Minh City will need to be determined. However, interviewing women may be an effective way of illuminating normative behaviour. Annalia (2015) raises the issues of behaviour to water being influenced by a predominant attitude that water is supplied by God in an endless manner. As such the

protection of water is not highly regarded and is likely to influence attitudes towards ground water extraction.

Considering these limitations, it is recommended that this proposal take an interdisciplinary approach, drawing on the expertise of several specialists from political, social science, economic, geographic, and environmental disciplines.

9. Assumptions

The proposal outlines several assumptions regarding the research which should be considered within the research:

- Every individual uses the legislated level of water at 180 litre/day.
- Current baseline data on illegal ground water use is accurate and not politically influenced.
- Access to government data is unrestricted.
- Academics, media, and water sector employees will be willing to discuss this issue.

10. Ethics Application

An ethics application will be required to conduct this study as it deals with the collection of data from people via questionnaire and interviews. Interviews will include written and drawn data and so invasion of privacy is a concern. Data will be limited to research staff; however, the topic is unlikely to present any major ethical issues.

11. Outputs/Products

The findings of the research will provide a foundation for the development of policy and include:

- An improved understanding of the economic, political, and social influences around illegal use of groundwater in Ho Chi Minh City.
- The identification of patterns of illegal use across different sectors supported by GIS maps.
- Quantification of the amount of illegal ground water extracted in Ho Chi Minh City.

The findings will be used to develop several outputs:

- The development of appropriate economic, educational, and social policy instruments to

mitigate the illegal use of groundwater.

- Academic publications:

Identifying drivers of illegal ground water extraction in Ho Chi Minh City, Vietnam.

Proposed mechanism to address economic, technical, political, and social drivers of illegal ground water use in Ho Chi Minh City, Vietnam.

12. Timeline

To accomplish this research a research timeline has been developed. Table 3 presents the different stages of this research and their duration.

Table 3: *Timeline of proposed project*

Project component	Time (e.g. Month)	Planned submission: Feb 2021					Expected time to complete the project: 3 years							
		3	6	9	12	15	18	21	24	27	30	33	36	
Literature review														
Data collection														
Data analysis/ model development														
Write up														
Policy recommendation														
Final thesis write up														

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