

INFORMATION PAGE OF NOVEL CONTRIBUTIONS IN TERMS OF
ACADEMY AND THEORY OF DOCTORAL THESIS

1. Title of thesis: Economic analysis of water demand management: case study in Hanoi

- Code: 62850101

- Major: Natural Resources and Environment Management

2. PhD candidate: Hoang Thi Hue

Supervisor: Assoc. Prof. Dr. Le Thu Hoa

Assoc. Prof. Dr. Duong Hong Son

Training institution: Viet Nam Institute of Meteorology, Hydrology and Climate Change

3. Introduction of the thesis

With a rapid urbanization rate, Vietnam in general and Hanoi in particular are facing many challenges in the field of urban water supply. According to the report on the current state of national environment in 2016, the percentage of people receiving clean water in Vietnamese urban areas is only 82%. There are many shortcomings in the current situation of water use in many urban areas including Hanoi, for example water loss in many places, lack of awareness of saving water, illegally destroying pipelines etc. These issues make the water resources more and more exhausted, while the demand for clean water in urban areas is increasing in quantity and demanding in terms of quality. The demand for clean drinking water to 2030 is averagely 150-100 l / person / day; therefore, it is a great challenge for cities especially Hanoi. Many measures to manage urban water demand (UWD management) have been initially applied in Hanoi, such as increasing water tariffs and managing water loss. However, there is no study to evaluate the effectiveness of this management program. Therefore, economic performance needs to be evaluated based on comparing benefits and costs of UWD management plans at present and in the future.

Wishing to provide scientific references to state management agencies in the formulation of policies to ensure sustainable management and water use, and economic efficiency, PhD candidate has selected the thesis title "*Economic analysis of water demand management: case study in Hanoi*".

The thesis focuses on the following research objectives: (1) to clarify theoretical and practical issues on UWD management and economic analysis of UWD management; (2) propose models and procedures for economic analysis to assess the effectiveness of UWD management in Vietnamese conditions; (3) assess application conditions of UWD management in Hanoi and analyze the economic efficiency of those management plans; (4) Proposing some solutions and policies for UWD management which is suitable to Hanoi in the current period and forecast to 2025.

PhD candidate has used method of sociological survey, CVM, and function of UWD management to determine urban water demand in Hanoi and estimated willingness to pay for clean water use. Candidate also used market valuation, value transfer (BTM), and cost-benefit analysis (CBA) to assess the effectiveness of the QLCa options in Hanoi.

4. List of novel contributions of the thesis

From a theoretical perspective: The thesis has developed a detailed framework to clarify the rationale and practicality of the UWD management; built a model and 6-step economic analysis process for UWD management in Vietnam, contributed to fill the gaps in urban water management study.

From a practical perspective: Thesis analyzes, evaluates scientifically and objectively of UWD management; applies the model and economic analysis for UWD management to assess the economic effectiveness of UWD in Hanoi, and provides information for the city's water management in the coming period 2025.

Specific contributions from research results:

1. Survey results of average water use in inner city of Hanoi is 3.8 m³/person/month; the average cost of drinking water per household is 110,107.69 VND/month; the number of households using water from 10 m³/month to 20 m³/month accounts for the highest rate of 46.15%; estimated ratio of UWD for essential and non-essential purposes in Hanoi households is 94.76% and 5.24%, respectively, compared to total UWD. The UWD for non-essential needs is about 0.78 m³/household/month.

2. The average household willingness to pay for clean water use in urban Hanoi was WTPTB = 9,534.88 VND/m³. The results of multivariate regression analysis with dependent variables are the willingness to pay WTP and independent variables (age, sex, education, income, and water use). This analysis indicates that the independent variables in the model have accounted for 62.34% of WTP variation. In particular, income variables and water use are strongly correlated with the WTP variable.

3. Estimated amount of water saved when implementing UWD management until 2025 is 6.98 million m³ (equivalent to 17.1%) compared with the expected increase in water demand 40.92 million m³ of the basic scenario (BAU).

Implementing UWD management also contributes to saving the cost of construction and operation of the water supply and wastewater treatment system, while also contributing to environmental and social benefits. Applying a discount rate of 0.08 in the cost-benefit analysis of Hanoi UWD management until 2025 showed that NPV = 734,597.01 (million VND, 2013), proving a clear effect and the need of UWD management application.

Supervisor

PhD. Student



Assoc. Prof. Dr. Le Thu Hoa

Assoc. Prof. Dr. Duong Hong Son

Hoang Thi Hue