

The Existing Urban Environmental Sanitation System in Hanoi and Problems Related

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Abstract

Urbanization is a very popular phenomenon in developing countries, and Vietnam is not an exception. In Vietnam, the rapid urbanization and flow of immigrants to urban areas in two biggest cities, Hanoi and Ho Chi Minh City (HCMC), are indeed the main challenge of the infrastructure development. In these cities, the rapid urban population and economic development are accompanied with increased resource consumption and environmental degradation due to inadequate sanitation services. This paper will discuss the existing urban environmental sanitation in Hanoi, its legal framework, and the main environmental problems caused.

Key words: Developing countries; environmental pollution; groundwater exploitation; Hanoi; urban environmental sanitation system

1. Introduction

Recently published data show that world-wide 2.4 billion people do not have access to improved sanitation (UN, 2004). This global sanitation-related crisis has been recognized, and UN has put forward a Millennium Development Goal to halve the number of people without access to adequate sanitation by 2015 (UN, 2003). In order to achieve this goal, improving the already existing sanitation systems to meet the increasing demand is a must for municipalities. This paper analyzes the existing urban environmental sanitation system in Hanoi, the capital city of Vietnam. In particular, the system's infrastructure, the related legal framework, and main environmental problems caused will be discussed. The analysis is conducted with the main objective to present to relevant professionals the picture of the current urban sanitation system in Hanoi in a hope that the information will facilitate the decision making process for finding appropriate solution. It is noted that the environmental sanitation as hereby defined includes water supply, disposal of wastewater and excreta, and municipal solid waste management.

2. Brief description of the study area

Hanoi, the capital city of Vietnam, has a long history of about 1,000 years. The city's urban infrastructure also has a long history and major drainage system in the main streets was built by the French during the colonization period from 1874 - 1954. When Vietnam implemented its "open-door" policy in early 1990s, the city has witnessed rapid economic development and population growth. The city's population has increased about 30% during the period from 1995 – 2003, from 2.4 million people to about 3 millions people. The number of urban districts has

increased from 5 to 7 plusing 5 sub-urban districts with a total area of nearly 1,000 km² (Hanoi PC, 2003).

Like many other cities in developing countries, rapid urbanization, increasing immigration from rural areas, industrialisation, and economic growth have put a strong pressure on the urban infrastructure in general and environmental sanitation in particular. The urban population growth and economic development are accompanied by increased resource consumption and environmental degradation. In the last decade, the environmental pollution has become worsen because the urban environmental sanitation infrastructure is inadequate to provide the basic necessary services, like sanitary management and disposal of human waste and wastewater. This has led to severely polluted receiving water bodies in the cities (Hanoi SADCO, 1997).

3. Institutional framework related to environmental sanitation in Hanoi

In Hanoi, the urban solid waste (SW) is managed by Hanoi Urban Environment Company (URENCO), a public non-profit utility belongs to Hanoi city people's committee (Hanoi PC). Mandate of URENCO is to collect, transport and disposal of SW generated in urban districts of Hanoi. The collection and management of solid waste generated in peri-urban districts is responsibility of local authority, the people's committee at district and ward levels.

As regard to wastewater, the Hanoi Sewerage and Drainage Company (SADCO), a public utility under Hanoi PC, is responsible for treatment and disposal of both domestic and industrial wastewater. SADCO is responsible for the provision, operation and maintenance of the sewerage and drainage network in the core urban area of Hanoi. Hanoi SADCO manages the primary and secondary network (ditches, channels, city's sewers and rivers, as well as other sewerage and drainage facilities).

Water supply is implemented by Hanoi water work authority, also operating under Hanoi PC. In summary, the mandates of the different public utilities providing urban sanitation services are regulated and financed by Hanoi PC.

A recent study on legal and institutional framework related to environmental sanitation of Hanoi city has shown that the environmental law enforcement is relatively weak (Bucher, 2005). At state level, the National Assembly has ratified environmental protection law in 1993. However, when down to city and provincial levels, the environmental law enforcement is weak due to a lack of human capacity, a strong institutional framework, and commitment from people as well. Financial capital for environmental law enforcement is also a concern of relevant organizations. Hanoi People's Committee issues its own regulations following central decrees and laws, but if no expenses are made in their enforcement, those regulations are not implemented correctly and adequately. This has resulted in institutional and legal weaknesses, main obstacles to the development of a well-managed urban sanitation system.

4. Solid waste management

It is estimated that in 2005, the total amount of SW generated in Hanoi is of about 900,000 tonnes. Hanoi URENCO is responsible for SW generated in urban districts, in peri-urban districts the SW management is implemented by environmental department of the districts' people committee. Approximately, 80 % of total generated urban SW is collected and disposed of into landfill by

URENCO. The remaining 20 % is either improperly disposed of into open landfills or illegally thrown to the city's rivers and lakes. The SW is not on-site classified, and only a small portion of the organic SW is classified and used for compost production in a composting plant placed under management of Hanoi URENCO. A study on nutrient budget for Hanoi city has shown that only about 10 % of N and P contained in SW is recycled (Cau, 2003).

Collection and disposal of industrial waste is entirely responsibility of industries. However, the industries usually commission Hanoi URENCO to collect and disposal of their waste in waste collection service contracts.

5. Wastewater pollution

In Hanoi, receiving water bodies are severely polluted by discharges of untreated wastewater, in which industrial wastewater is main the pollution source, although Vietnam has ratified water resource law in 1999 strictly prohibiting the discharge of hazardous wastes, untreated wastewater or treated wastewater that does not meet the permissible standards into any water receiving bodies. The reason is that the law has not been effectively implemented due to the lack of guiding circulars and enforcement measures.

In 2003, it is estimated that every day the total amount of industrial wastewater discharged is 263,000 m³, and only 6.2 % of this amount is treated before being discharged into water receiving bodies in the city. In addition to industrial wastewater, a large amount of hospital wastewater is also discharged untreated to receiving water bodies. It is estimated that about 7,000 m³/day of hospital wastewater is discharged into the receiving water bodies, and only 30 % of this amount is treated before being discharged (Hanoi DOSTE, 2003).

The water quality monitoring data in the four main rivers and lakes in Hanoi have clearly shown that the water quality of rivers, lakes and ponds in Hanoi is worsening due to the discharge of untreated industrial wastewater, which contains toxic substances, inorganic substances and high organic content. Averagely, concentrations of BOD, COD, heavy metals and coliform in To Lich, Lu, Set and Nhue rivers are 3 – 4 times higher than standards (Hanoi DOSTE 2003).

6. Sewerage and drainage system

Hanoi SADCO is responsible for wastewater drainage at city and district levels of Hanoi. Down to ward and commune level, the wastewater drainage management is placed under management of ward people committee. The sewerage and drainage system of Hanoi is a combined one, which means that both industrial and domestic wastewater, storm water and street cleaning water are served by on drainage system. The sewerage and drainage system is working under the automatic-flowing mechanism (due to the difference of hydraulic pressure between two points of the sewerage system) (Hanoi DOSTE, 2003). Overview of the drainage system is shown in figure 1.

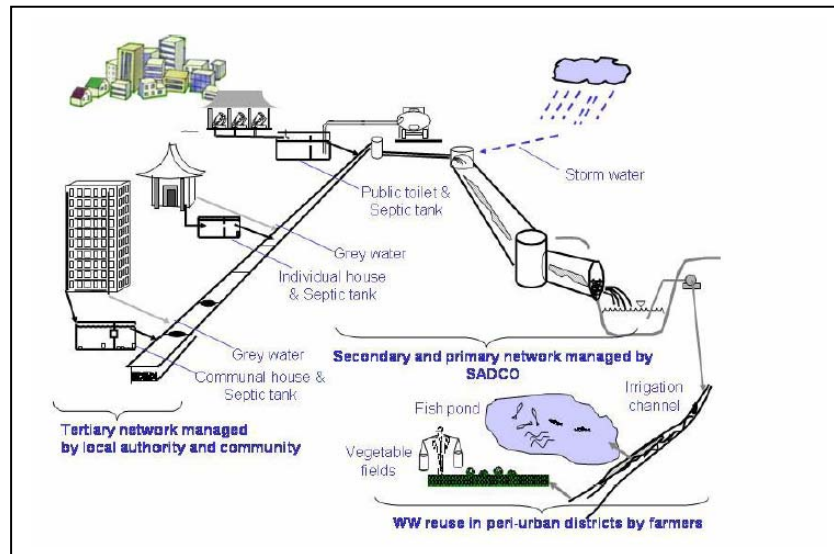


Figure 1. Overview of sewerage and drainage system in Hanoi (by courtesy of Anh et al., 2005)

Total length of the central sewerage and drainage system, which is placed under maintenance and management of SADCO, is of about 318 km, approximately of the 60 % of total transport road. It is estimated that the total coverage of the drainage system just accounts for 40 % of city's total area. Total length of local drainage in small alleys under management of ward people committee is of about 190 km. The ratio of sewer length per capita in Hanoi city is about 0.3 m/person, which is much less than average ratio in other developing countries, 2 m/person. The ratio is still much less for small sewers in alleys and living areas (the tertiary network as indicated in Fig. 1) where total length of sewers is of about 190 km, equal to 29% of 641 km of total length of the roads (with width > 2 m). Among those, only 72 km or 11% is under SADCO's enterprises. The rest part of the network is under management of local authorities such as ward/commune PCs (SADCO, 2003).

Most of the existing sewerage and drainage channels in Hanoi have a small size, low hydraulic slope, inappropriate structure, and the amount of sludge and sediment that settled in the system is relatively high. In addition, due to the fact that Hanoi's topography is relatively flat, the soil foundation is the range of between 2.5 – 10 m, decreased from northeast to southwest, which is not good for the automatic flowing sewerage system. Therefore, the wastewater receiving and transporting capacity of the existing sewerage and drainage system is still far under the demand. During rainy season, flooding happens quite often.

Another problem of the drainage system in Hanoi is that some parts of the system, especially the ones located on central districts of Ba Dinh and Hoan Kiem, which were built during French colonization period, before 1945s, are now not working properly. Wastewater leakage and ground water pollution are occurring. This problem coupled with flooding during rainy season has caused the environmental pollution worsen.

7. Groundwater exploitation

The centralized and large scale exploitation model is implemented and managed by Hanoi Water Work Authority. Currently, there are 9 wells and some water distribution stations with the total exploitation capacity in between 400,000 – 450,000 m³/day. The decentralized and small scale exploitation is implemented and managed by factories and households. According to a statistic, there are currently about 299 wells being exploited and used by factories. The exploitation capacity of these wells is in between 60,000 and 100,000 m³/day. The total number of wells that being exploited and used by the people is of about 100,000 with a total exploitation capacity of about 100,000 m³/day (Hanoi DOSTE 2003).

Totally, the amount of ground water that is currently exploited in Hanoi is in between 600,000 and 650,000 m³/day. This groundwater withdrawal rate is nearly the same with the recharge rate of approximately 700,000 m³/day (Nga, 2005).

8. Discussion

From the above-mentioned discussions, it is concluded the following key issues related to water and nutrient management of Hanoi's urban sanitation system:

- ❑ Excessive groundwater abstraction
- ❑ Serious surface water pollution due to inadequate treatment of wastewater
- ❑ Coverage of sewerage and drainage system is inadequate to provide sanitary disposal of wastewater
- ❑ Nutrients recycling is not well done

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