
Decentralised wastewater management in Vietnam – a Hanoi case study



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Preface

This report documents the findings from research activities undertaken in Hanoi, Vietnam that were carried out as part of a project funded by the UK Government's Department for International Development (DFID) entitled "Capacity-building for Effective Decentralised Wastewater Management (DWWM)". The project was managed by GHK International and also involved a similar set of research activities in Bangladesh.

The aim of the research was to analyse decentralised approaches towards wastewater and faecal sludge management and to assess the impacts of these schemes at the local level and their potential implications at the policy level. The research focused on the experiences from two areas in Hanoi to gain greater insight into key features of decentralisation related to:

- Participatory planning and community involvement in decision-making.
- Decentralised management arrangements for operation and maintenance.
- Application and operation of decentralised technologies.
- Financing arrangements and economics of decentralised initiatives.

Initially, the study set out to review existing policy and practices related to wastewater management in Vietnam and to consider the potential opportunities and constraints for decentralisation. Subsequently, in relation to the case studies, more in-depth research activities were undertaken related to the technologies and their operation, management arrangements, financial and economic assessment, and perceptions from local stakeholders of the relative merits of these systems. As well as a collation of technical data, these research activities included semi-structured interviews and focus group discussions with a range of local stakeholders.

Authors

The synthesis report is based upon various project reports produced at different stages of the research prepared by Dr. Nguyen Viet Anh from the Center for Environmental Engineering of Towns and Industrial Areas (CEETIA) at Hanoi University of Civil Engineering. Wilfrido Barreiro (independent consultant) also contributed towards the development of research methodology, analysis and documentation of the research findings. The study was supervised by Dr. Jonathan Parkinson who worked with GHK as an independent consultant and assisted in the management and co-ordination of the fieldwork activities related to the project.

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Abbreviations

DTUPW	Department of Transport and Urban Public Works
DWWM	Decentralised wastewater management
MARD	Ministry of Agriculture & Rural Development
MoC	Ministry of Construction
MoSTE	Ministry of Science, Technology and Environment
SADCO	Sewerage and Drainage Company
URENCO	Urban Environment Company

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Executive summary

In Hanoi, the Sewerage and Drainage Company (SADCO) is the centralised agency with official responsibility for wastewater management, which focuses mainly on the provision and maintenance of drains and sewers. Approximately 60% of the city's area is fully served by SADCO. The rest part is taken care by local authorities or under self-government by local people and it is in these areas that some innovative approaches to wastewater management are observed. These depict promising options for improved delivery of wastewater services.

The Hai Ba Trung case study highlights the potential role of local community stakeholders and actors in the provision and management of tertiary sewerage and drainage systems, whereas Hoang Mai case study typifies community-based wastewater reuse where the local community members participate in decision-making and a range of different wastewater management activities in their locality.

Building on a long tradition of decentralised provision of public services, these arrangements highlight new possibilities for expanding decentralised approaches to wastewater management services in Hanoi and possibly other parts of Vietnam. The case studies demonstrate how decentralised initiatives can capitalise on the availability of local resources, which can compliment those offered by the centralised service provider. The experiences from Hanoi also demonstrate how these can form part of an overall strategy for service provision which bridges the gap in deficiencies in service delivery and bring about much need improvements in wastewater management.

This report draws from these case studies to discuss the institutional framework for the provision of services and infrastructure for wastewater management and discusses opportunities for decentralisation in Vietnam. These decentralised management approaches are potentially viable for many other urban areas of Vietnam when the capacity of the public service utilities is still limited. Cities in other countries in the Asia region are also facing and dealing with similar problems, but Vietnam provides interesting lessons related to the way that different levels of government and their agencies react, in collaboration with local communities, to the impacts of environmental degradation and their approach towards wastewater management.

These two examples of wastewater management illustrate aspects of decentralisation in decision-making processes and management arrangements at the local level. The case studies highlight the need to improve wastewater management, linked to a wider programme for public administration reform towards decentralisation and public participation. In particular, the role of the peoples' committees (PC's) at various levels in service provision and their relationship with the agency directly responsible for provision of large-scale centralized services for the city are highlighted. The report describes how these relationships may be strengthened to improve the quality of service provision and promote greater sustainability, and explores opportunities and constraints to wider replication.

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1.0 SOCIAL-ECONOMIC AND POLITICAL CONTEXT

1.1 Population growth and urbanisation

Vietnam is a country with over 80 million inhabitants and the urban population currently amounts for approximately 20 million. This number is projected to reach 30 million by the year 2010. In 1950, the percentage of the total population living in urban areas in Vietnam was only 11.6% but since then, it has reached approximately 25% and is estimated to continue to rise and reach 30% by 2025¹. The population in the core Hanoi urban area has risen dramatically from 300,000 in 1954 to more than 1.7 million at present and is predicted to rise to 2.5 million by 2020. The current core Hanoi population comprises about 60% of the total population of the greater Hanoi area. The latter is estimated to become 4.5 million by 2020. As shown in Figure 1, urbanisation has resulted in significant environmental pressures and loss of agricultural land in peri-urban areas, which are rapidly becoming increasingly populated.



Figure 1 Environmental pressures caused by urbanisation – stress on traditional farming practices

1.2 Socio-economic and political context

Rapid political change has accompanied the pace of urbanisation. Over the past fifteen years, Vietnam has undergone dramatic economic and social transformation from a centrally-planned economy to a socialist-oriented market economy under state management. Central Government holds the key political power and makes most of the important decisions related to the allocation of fiscal resources. However, Vietnam has embarked on an ongoing effort to reformulate policies and legislation affecting regional and local government administration, which has significantly changed the authority and decision-making structure for governance. Key reforms have included an “open door” policy (known as Doi Moi) with respect to foreign investment, enabling private sector activities in commerce and industry, and rationalisation of state-owned enterprises.

As a result, Vietnam has progressed from being a rice importer to the world's second largest rice exporter. In addition, the reforms have led to improvements in the overall well-being of many Vietnamese people and one of the country's outstanding social achievements has been the reduction of poverty from an estimated 70% in the mid-1980s to 36 % in 2001. However, although Real GDP per capita growth averaged more than 6% annually over the past decade, Vietnam remains a poor country, with an average GDP per capita of US\$ 441 in 2002. In addition, the income distribution gap between the poor and the rich is increasing and the disparity between urban and rural welfare is also widening².

1.3 Local government administration and service provision

The structure of government comprises the central government in Hanoi and various deconcentrated governmental entities at the provincial, city, district and commune levels. The Budget Law (1996 and 1998) formalized the fiscal arrangements among the various levels, assigning key budget responsibilities to local authorities, especially at the provincial level. The basic legal framework for local government organisation and operation lies in the 1992 Constitution, the Law on Organisation of the People's Council and the People's Committee (1994) and the Ordinance on the Tasks and Powers of the People's Council and People's Committee at Each Level (1996). The 1992 Constitution provides that the popularly elected People's Council is "the local organ of State power". This Council, in turn, elects the People's Committee as its executing body.

At the provincial level, the People's Committees implement and enforce state legislation. There are 64 provinces, including two special-category cities (Hanoi and Ho Chi Minh) and two 1st-category cities (Hai Phong and Da Nang). In total, there are more than 700 districts and small towns, with 10,330 communes and 3000 townlets. Each locality at all of these levels has a representative body (People's Council) and an executive body (People's Committee - PC). Deconcentration of management responsibilities to lower levels of administration forms an important part of Vietnam's decentralisation process. This devolves power down to the districts and wards and promotes the implementation of democratic processes at local level. However, there are several impediments to the effective functioning of People's Councils at the decentralised level. While their tasks and duties progressively increase, many continue to be poorly equipped with basic skills and resources.

The most innovative financial aspect in the delivery of urban environmental infrastructure and services in Vietnam is the 'Labour Fund for Public Interest', which is established through annual contributions from the residents and contributes directly to the Ward PC budget. Two-thirds of the fund collected is retained at the ward PC, while the remaining portion is remitted to the district and city authority. A Government Decision in September 16th 1999 requires every citizen to contribute 10 days each year of labour in the public interest. The contribution is used for upgrading of roads, irrigation and drainage networks, flood prevention and protection, reconstruction and upgrading of clinics, schools and other facilities or activities of public interest. If a resident is not able to provide manual work, he/she can pay the money instead, to the local authority (ward PC). The average amount of money collected by the PC varies considerably depending on its population, but is generally in the range of US\$3200 – US\$6400 per annum.

1.4 The role of peoples communities and NGOs at the commune level

The communes are the lowest formal administrative level represented by People's Committees. They have been well established for centuries and historically were a form of collective economy in rural areas in Vietnam. Farmers contributed their resources and shared their produce and all assets necessary for agricultural production belonged to the commune, which had its own facilities, working tools, machinery and other equipment.

As the country moved towards a market economy, farmers were given the right to continue using the land and more freedom to decide how to use the land. In recent years, due to the economic reforms described above, the influence of the commune has gradually waned and, as a result, some communes have transformed into cooperatives and service providers for farmers. However, commune leaders are still active within the Ward PC structure and there are some basic rules that need to be observed, particularly in relation to decisions about land use. The Ward PC also plays an important role in providing information and awareness raising about issues of communal interest.

In urban areas, the people's committees are the administrative institution that governs all aspects of the commune, including socio-economic development, health care, education and police. The commune authorities carry out most of the government support functions, in association with individual users, user groups, mass organisations (particularly the Women's union), advisory centres and banks. In addition, the District People's Committee makes decisions about land conversion e.g. rice fields to fishponds and other issues related to land development.

Within the wards themselves, networks of about 50 households each act as bridges between local authorities and the households. These household representatives are nominated in community meetings. Women are most often nominated as chairmen or vice-chairmen of the Ward PCs. One of the tasks of these community representatives is to visit households to inform and raise awareness on local issues, to provide assistance in addressing neighbourhood issues, etc. Households can also discuss their interests or raise concerns about inadequacies in public services. The Commune PC is responsible for implementing and co-ordinating the water supply and sanitation projects in collaboration with the district administration. The representatives also lead and mobilize local resources from local citizens for various campaigns, such as sanitation or cleaning campaigns.

Non-governmental organisations (NGOs) are traditionally attached to the Patriotic Front (Mat Tran To Quoc), which is part of the elaborate structure of government and the communist party in Vietnam. The Vietnamese Women's Union is very active at all levels, but particularly at the ward level. As well as promoting anti-littering campaigns, women are involved through the Women's Union to mobilize households and to raise funds for construction. In the environment sector, some of the important NGOs are the Scientific and Technology Union and also the recently established community-based Education for Nature-Vietnam (ENV)³. Public participation in environmental issues occurs through public campaigns organised by groups such as the Youth Union with support from the local government. There is also a volunteer network in each commune, consisting of various NGO organisations including the Farmer's Union, Youth Union and War Veterans Union.

2.0 POLICIES AND INSTITUTIONAL FRAMEWORK FOR WASTEWATER MANAGEMENT IN VIETNAM

2.1 Sector goals and policies related to wastewater management

The national policy framework for environment management including wastewater management was created by the law of "Environmental Protection" in 1994 and the 'Law on National Water Resources (LWR)', which came into effect from 1999, regulates the overall development of the sector. However, there is no overall strategy and action plan in Vietnam for sanitation although a 'Rural Urban Water Supply and Sanitation Strategy' was adopted in August 2000. Earlier in 1998, a 'National Urban Water Supply and Sanitation Strategy' was also proposed but not ratified.

A number of water related objectives are provided in the "Socio-economic Development Strategy for 2001-2010". Furthermore, there is a target to ensure that all urban wastewater is treated by 2010 under Vietnam Development Goals. These are based on the Millennium Development Goals under the framework of a Comprehensive Poverty Reduction and Growth Strategy. The "Orientation of Urban Sewerage Development" issued in 1999 envisages an enlarged catchment area for urban sewerage in Hanoi from 30-40% to 80-90% by 2020 and proper financial mechanisms to ensure sustainable urban sewerage through public urban sewerage companies. These arrangements are to be based upon a step-by-step reduction of subsidies through the collection of sewerage fees as well as introducing appropriate forms of taxation.

The National Law on Environment Protection stipulates that wastewater must be properly treated before discharge. Vietnamese Building Regulations (Ministry of Construction, 1999) require that houses and apartment buildings in cities should be equipped with a septic tank. The WHO guidelines on allowable limits of nematode eggs and faecal coliforms in wastewater reuse in agriculture and aquaculture have not been incorporated into national standards, as they could not be met without prior appropriate wastewater treatment.

2.2 Institutional framework for wastewater management at a national level

In 1993, the National Environment Agency (NEA) was established under the Ministry of Science, Technology and Environment (MOSTE) in order to exercise nation-wide the state management of environmental protection activities. The Environment Management Divisions attached to the provincial Departments of Science, Technology and Environment (DOSTE) were established. Some districts and towns also have certain cadre for environmental management. In addition, functional units for environmental management have been established in some line ministries and economic sectors.

Subsequently, in 2002, the Ministry of Natural Resources and Environment (MONRE) has been established. Environmental management authorities are under re-organization process for more effective operation. However, generally speaking, the capacity of environmental management institutions in Vietnam remains weak and disproportionate to their tasks.

Traditionally, the Department of Transport Communication and Public Works is the city government body in charge of planning of the water supply network and other infrastructure throughout the urban centres in Vietnam. However, the move to a market economy has strengthened the role of provincial governments. They are responsible for the operation and maintenance of wastewater and sanitation facilities, and increasingly for capital financing for expansion. The annual budget is approved by the central government, but all operational funding and limited capital funds are supplied through collection fees and tax sources available to provinces.

Under regulations introduced in 1989 as part of *Doi Moi*, all drainage and sanitation companies are to cover their operation and maintenance costs, but the central government will contribute to new capital expansion in the cities in association with the People's Committee. In practice, the waste companies rely heavily on the People's Committees' contributions to their operating budgets and, because of financial constraints at the central government level, little capital expansion has taken place.

Presently there exists some lack of clarity and therefore misunderstanding in relation to the 'wastewater fee' set by the Government. The wastewater fee includes 2 parts: drainage fee and wastewater treatment fee. The first part of fee should be collected from everybody who is connected to the sewerage system and the compulsory fee should be charge and collected money by the sewerage company. The second part is considered as pollution control fee that could be given to the MONRE but often this is overlooked by decision-makers responsible for investments in the sector.

All 64 provinces have established different forms of urban sewerage or environmental companies. In the last years, sewerage and urban environmental companies have provided public utility services. The local authorities allocate funds to them through the city budget. The public utility enterprise is responsible for operation and maintenance activities only. Major capital improvements, if any, are managed by a separately-created Project Management Unit. In most cases the capital funding and plans have already been worked out and there is no need, nor incentive, to explore alternative decentralised and less capital intensive ways of operating and upgrading of the system.

The water sector in Vietnam, in common with many other countries, suffers from fragmentation among several line ministries. The fragmentation was significantly reduced with the concentration of the most important functions within MARD, when the ministry was formed in 1995. However, the concentration was not accompanied by sufficient consolidation to facilitate integrated approaches to resource management and protection. There is also concern over the potential conflict of interests in the ministry having the joint responsibility as a regulatory and enforcing agency for water resources management as well as responsibility for water supply and sanitation delivery in rural areas³.

Table 1 Government agencies and divisions of responsibility relevant to the wastewater management sector

Ministry	Function
MOSTE	Wastewater discharge quality standards
MONRE	Natural water resources management Wastewater discharge control
MARD	Rural water supply and sanitation
MOC	Urban water supply Urban drainage and sanitation

Although water resources in Vietnam are publicly owned, the State is officially responsible for their management. As result of the system of governance and hierarchy of administrative structures described above, the urban water supply and sanitation sector is highly decentralised and exhibits a vast variety of systems in different stages of development, depending on the region, province, and even on the individual city and town.

However, in the Vietnamese context, decentralisation generally takes the form of *deconcentration* in which involves transfer of resources, responsibilities and authority from central offices of government to a 'lower-level' administrative unit, local administrative offices of the same administrative structure. Although powers are 'decentralised' to peripheral units, staff remain bound by a common bureaucracy and ultimately are subservient to the centralised decision-makers. There is also scope for *delegation* which shifts responsibility and authority to a semi-autonomous organisation or agency which remain formally attached to central ministries, but are autonomous in terms of management.

The majority of provincial capitals have launched or completed projects to rehabilitate and upgrade basic water supply systems (most of them supported with external aid), but relatively few have included sewerage and/or drainage elements. In small towns there is even less consideration of wastewater management with the majority of programmes focussing on improvements in water supply (Water and Sanitation Programme for Small Towns in Vietnam - Programme Document November 2003).

With regards to organisational issues, there are still number of institutional barriers and difficulties to DWWM. There are very different organisational structures of organisations in water sector in different cities. In big cities of Hanoi, HCMC, Hai Phong, and Vung Tau (recently separated), there are separate drainage and sewerage companies (SADCOs) taking care of wastewater management and belonging to the Department of Transport and Public works of the city authority. In the other cities, the state-own companies of urban environment or civil works take care of water supply, wastewater and solid wastes in the city. It is necessary to uniform the organisational structure for water and sanitation utility management in provinces

3.0 EXISTING APPROACHES TO WASTEWATER MANAGEMENT IN HANOI

3.1 Institutional framework for wastewater management in Hanoi

The Sewerage and Drainage Company (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). It is one of several public utility enterprises under the Department of Transport and Urban Public Works (DTUPW), which has overall responsibility for the management and implementation of capital development projects.

In general, SADCO enterprises have clear organisational structures and well-established work procedures set by internal and Company's regulations for development of plans, and for regular maintenance and emergency activities for flood prevention. SADCO is divided into 4 operational units (enterprises), each with a responsibility for operation and maintenance of the sewer network in different districts. Figure 2 shows these enterprises and how these are involved in the provision of drainage and sewerage services in the city and their relationship with SADCO.

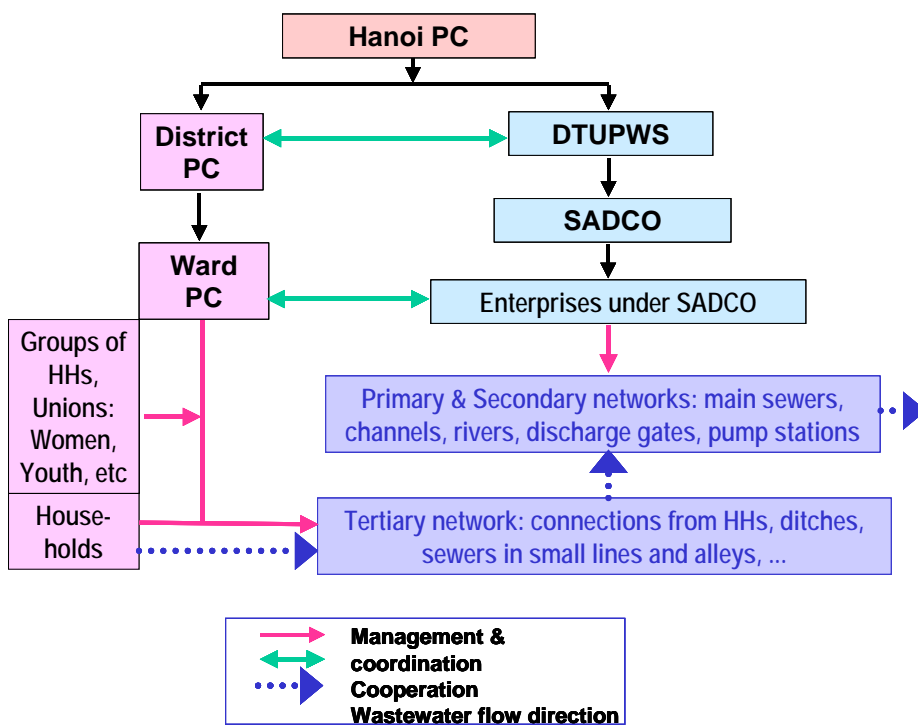


Figure 2 The relationship between SADCO and other stakeholders in wastewater management

Each enterprise operates as a line department under SADC0 and the main tasks of each enterprise are:

- i. To maintain assets and facilities for sewerage and drainage, reduce flood incidents and ensure wastewater drainage in the area under its management.
- ii. To develop and to propose plans and measures for effective management of sewerage and drainage system.
- iii. To repair and rehabilitate the existing sewerage and drainage system under its maintenance budget.
- iv. To organise and provide services in wastewater and environmental sanitation for individuals and organisations.
- v. To cooperate with local (wards, districts) authorities to raise public awareness in participation in management and protection of sewerage and drainage system.

Maintenance and cleaning of the drainage systems is the major task of SADC0, which is conducted throughout the year, but is most intensive before the rainy season. A special enterprise within SADC0 uses sewer jettors and vacuum trucks for major sewer cleaning operations. However, to maintain small channels and sewers in the alleys and lanes, SADC0 workers use manual methods. The mechanical cleaning is carried out around the year (about 15 km per month), while the manual cleaning is generally undertaken on a quarterly basis and the SADC0 pays the workers for the work carried out based on the volume of sludge and garbage collected.

The sludge and solid wastes are collected and transferred to tankers, from where the collecting vehicles deliver the waste to the landfills. About 70% sludge is collected mechanically, and 30% manually. The amount of solid waste disposed to the sewers, channels and lakes is estimated to be about 30% of total solid waste generated from the city.

However, SADC0 does not have the resources or capacity to cover all parts of the city and currently serves only about 60% of the city. In 1995, the City PC decided to transfer the management responsibility for the tertiary network to the local authorities due to limited capacity of SADC0 to provide adequate services for new developments and urban expansion in peri-urban areas. These are provided through special service contracts with local authorities that are required to cooperate with SADC0 to ensure that planned developments in infrastructure are coordinated⁴.

3.2 Financial situation

In Hanoi, as well as in some other cities, a 10% minimum surcharge on the production cost of water has been introduced to pay for wastewater services. SADC0 receives the majority, but local authorities also secure a portion of the wastewater surcharge. Each household pays approximately US\$ 0.15 per m³ of water for which 10% goes to sanitation and drainage. This is seen at least as a move towards cost recovery for wastewater services. But, the household fee has no relation to the actual cost and the low price of water supply leads to wasteful use and generates inadequate revenues for the operation and maintenance and upgrading of facilities.

As a result, there is still a large gap between the revenue generated from the surcharge and operating expenditure and only 25% of SADCO operation and maintenance expenses are covered by the surcharge. Therefore, the operating budget of SADCO and its enterprises remain heavily subsidized by the city government. SADCO operates with a yearly (government) budget allocation of US\$ 375000 for operation and maintenance. Its additional source of revenue at the commune/ward level operation includes: labour fee based revenue and revenue from lease of ponds for fish farming.

In Hanoi, state-owned public service enterprises are being transformed to gradually eliminate subsidies and promote cost recovery of operation and maintenance costs. The concept aims to move away from the traditional approach of approving budget requests to fund service provision to an approach that involves a contractual agreement and obligation between the city authorities and SADCO.

In addition, the Government recently took the first step towards implementing the "polluter pays principle" as defined by Circular No. 63/ND-CP in 2003 which is being implemented gradually starting with the industrial sector. Polluting enterprises have to pay for their pollution loads, and have to implement mitigation measures, to be relocated, or, in some cases, to close down. The financing plan is based upon the volume of works expected to be carried out in the next year, using the fixed norms and price. The financial clearance is made after completion of works, which is normally checked and taken over by the respective boards³.

The major cost components of the central sewerage and drainage facilities and services in Hanoi are for project implementation (> 95 %). Of the implementation cost, construction cost accounts for almost 85% of which almost 90% comes from international investment and the rest comes from government sources. Besides frequent operation and maintenance expenditures, which are predominantly regular maintenance including cleaning activities, sludge and waste transport and treatment activities, pumping station management, there are also expenditures of unexpected flooding elimination, operation for the Yen So pumping station, expenses for clearance of illegal land occupation along drainage channels and rivers as well as debt and interest repayments.

3.3 Types of sanitation system and service coverage

In the past decade, investment in the wastewater sector in Vietnam has been low with the majority of funds being directed to the water supply sector. The original sewerage system in Hanoi was constructed prior to 1945 during the French colonial period and covers 30% of the existing population in the central part of the old city. It is old and in disrepair and its hydraulic capacity is significantly impeded by solid wastes. The network has been expanded over the years and at present, out of the total population of greater Hanoi, it is believed that 65% have access to sewerage services.

The ratio of sewer length per capita in Hanoi city is about 0.3 m/person. The ratio is still much less for small sewers in alleys and living areas (the tertiary network) where total length of sewers is 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 whilst the rest of the network is under management of local authorities such as ward/commune Peoples Committees (SADCO, 2002).

Inner parts of the city have an underground drainage network, while outer parts still rely entirely on open drains. Three types of systems for domestic wastewater disposal at the household level exist in Hanoi. On-site systems include double vault, bucket and hanging latrines. About 32% of Hanoi's population is served by septic tank, 21% by double vault latrines and 23% by on-site systems. The remaining 24% are not served by any system at all⁴. Wastewater from toilets, where possible, passes through septic tanks before disposal into sewer. If these are properly maintained the water is treated before conveyance. Wastewater from kitchens and bathrooms is removed either by septic tank or disposed directly into the sewers.

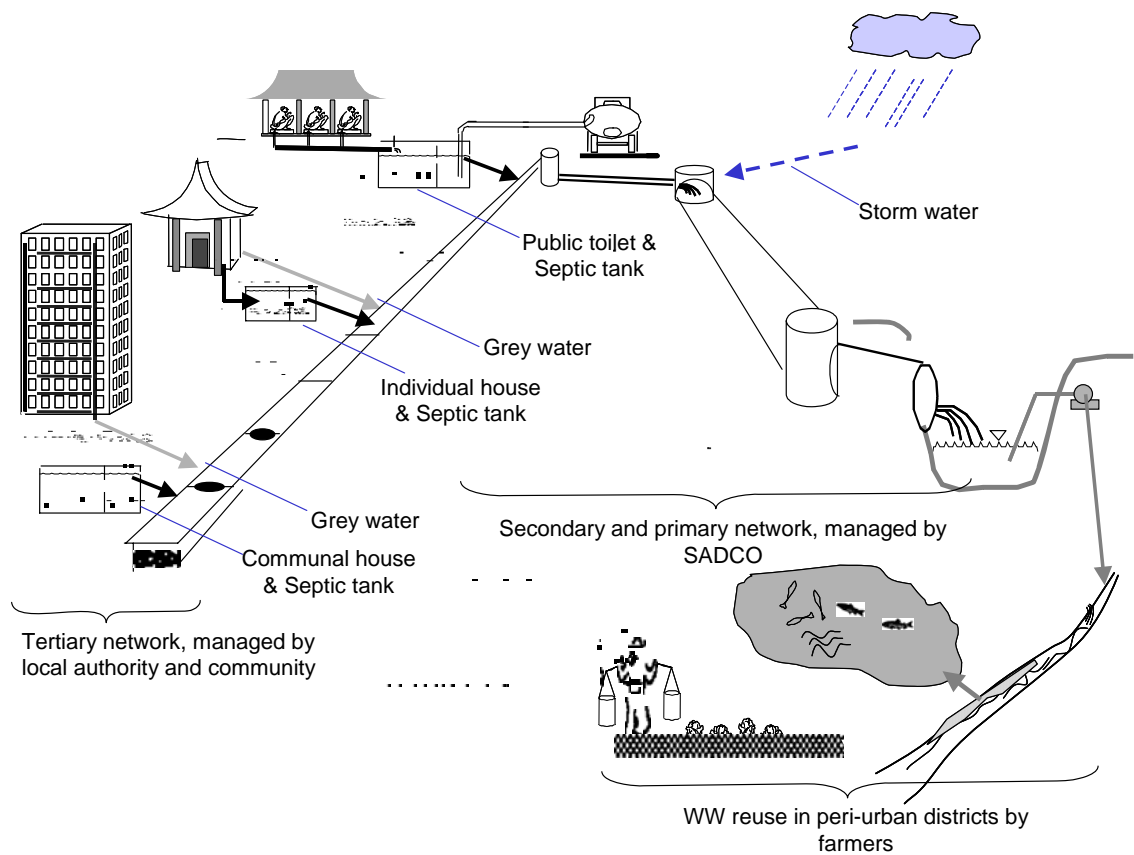


Figure 3 Sources and flows of wastewater in Hanoi

In urban areas, most wastewater discharged from householders passes through a septic tank before being discharged to the drains. For a 5-member household, the construction cost of a septic tank of 1 m³ is about \$200. Additional capital cost is to connect septic tank to the sewerage system, often with PVC pipe of 100-150 mm diameter, which cost about \$10-20. The operational and maintenance cost of a septic tank is essentially emptying cost in the order of \$20-30 every five years. Residents rely on private companies or the Urban Environment Company (URENCO) to provide septic tank cleaning services.

Except for domestic black wastewater (about 20% of total), which is treated in septic tanks, and a limited amount of industrial and hospital wastewater that passes through preliminary treatment, all wastewaters are discharged untreated into surface water bodies that drain towards the Nhue and Red rivers.

The effluents drain to the south of Hanoi to settling ponds in the Than Tri district before eventually discharging to the Red River. Drainage and sewerage form a combined system that flows by gravity into lakes, ponds and rivers. The canals and rivers play an important role in draining household, industrial and storm water. In the urban areas, stormwater and wastewater is discharged into rivers, regulating lakes and ponds through combined sewers and channels. There are big lakes and ponds, which are interconnected with the Kim Nguu and Set rivers. These water bodies help regulate drainage and wastewater flow, provide water for agriculture use and enable ground water recharge.

At present, Hanoi is completing first phase of the Master plan for sewerage, drainage and environment improvement project implemented from 1996 to 2004. The core objective of this phase is to improve the drainage capacity of the sewerage and drainage system and to prevent Hanoi from flooding. The next phase, which is currently under appraisal, will consider the wastewater treatment works.

Due to the sums needed in this sector, the local municipality is heavily dependent on foreign assistance. Currently Hanoi is completing the first phase of the Master Plan for Sewerage, Drainage and Environment Improvement Project implemented from 1996 to 2004, which is under the loan of approximately US\$ 200 million from the Japanese Bank for International Cooperation (JBIC). The core objective of the project phase is to improve the drainage capacity of the sewerage and drainage system and to prevent Hanoi citadel from flooding. The next phase, which is currently under appraisal, will consider the wastewater treatment works.

A study undertaken with assistance from the Japan International Cooperation Agency (JICA) proposes ambitious plans for the future. These include the separation of the drainage system for the To Lich and Nhue River Basin, construction of a network of new drainage pipes and increasing the capacity to pump stormwater into the Red River. The total cost of construction is estimated to be US\$ 1.16 billion. In addition to this, there is an annual operation and maintenance cost of US\$ 10.5 million.

3.4 Existing environmental sanitation situation and wastewater reuse

Currently, as there is no centralised wastewater treatment facility, the only form of treatment of domestic wastewater is provided by on-site septic tanks. The amount of wastewater in Hanoi is estimated to be about 460,000 m³/day and this is discharged through several large drainage channels that flow away from the city. The sources of the waste are domestic (67%), industrial (30%) and hospital (3%).

Hanoi is divided into two drainage basins, Nhue and To Lich river basins. The Nhue river basin covers peri-urban districts west of the city. All wastewater and storm water flow to those rivers fed by a network of sewers, open channels and ditches. A big challenge for wastewater management now in the city is unclear regulations for responsibility of dischargers to follow effluent standards. It is very difficult for city's authority to reward and punish people. Hence, the wastewater treatment before discharge is not obligatory for most of stakeholders. This situation should be improved by more strict regulations and control measures.

Lack of wastewater treatment makes water contamination a major health threat and aquatic ecosystems are threatened by the high amounts of untreated sewage and industrial wastewater generated in urban centres. The flood regulation ponds are extensively used for aquaculture especially in the larger cities and in peri-urban areas, practices of wastewater reuse are facing big problem of contaminants in wastewaters, causing a high risk for farmers and agro-product users as well as environment. There are number of cases of poisonings due to use of wastewater-fed fishes in Thanh Tri district.

Raschid-Sally *et al* (2004) found that 75% of domestic wastewater in large cities and 45% in smaller cities are discharged into sewers. Wastewater is used for agriculture or aquaculture in 93% of the cities⁵. On average, wastewater is used in at least 2% of the agricultural land around most cities, predominantly to grow rice. The nation-wide total of such irrigation is conservatively estimated at around 9,000 ha. Wastewater aquaculture is carried out in natural ponds which serve the dual purpose of inundation control and as collection sinks for city wastewater. Wastewater agriculture provides a primary or secondary source of income to 1% of the urban population. The corresponding figure for wastewater aquaculture is 0.1%.

As illustrated in Figure 4, Hanoi's water bodies, surface and groundwater, are being polluted by untreated wastewater discharged from both domestic and industrial sources. Less than half of the household black water is treated by septic tanks and the remainder, as well as the entire volume of grey water, is discharged untreated into the canal waters. A lack of management of sewage and nightsoil/septage causes serious health impacts due to poor construction maintenance and disposal facilities of the toilets. Most sludge, sewage and rubbish is discharged into the pipelines together with the wastewater. Even in the major cities, the storm water drainage is combined with wastewater and at times when the system gets clogged up, waste including human excreta, overflows into streets. Nearly, two thirds of the poor suffer from flooding in the rainy season and half of these stand in floodwaters for long periods of time. Faecal pollution and transmission of waterborne diseases is therefore a particular concern during flood events.



Figure 4 The stormwater drainage system in Hanoi is heavily polluted

4.0 PROVISION OF TERTIARY SEWERAGE INFRASTRUCTURE IN HAI BA TRUNG

Hai Ba Trung district is one of nine inner city districts, located in the South-East of Hanoi. To the east, it is adjacent to the Red river and in the south, Hai Ba Trung district border is adjacent to Hoang Mai District. The land area of the district is approximately 1040 ha. Hai Ba Trung District is low-lying compared with the other inner city districts and the slope of the land is quite flat.

Hai Ba Trung is the junction point of sewers conveying wastewater from the northern and central parts of the city to the south. The existing combined sewerage and drainage system in Hai Ba Trung district receives wastewater generated from within the district itself as well as wastewater transported from Hoan Kiem district. Due to age and inadequate maintenance, the drainage capacity of the sewer lines is severely limited and localised flooding (water depth of 0.3 – 0.5 m) occurs in some places for a period of several hours when rainfall of about 50 – 100 mm occurs.

There are several open drains with surface widths of 3 – 10 m draining to the Set and Kim Nguu rivers. Hai Ba Trung has 5 main lakes with a total area of 41.3 ha and some small lakes and ponds to the South which are used mainly for storm water regulation. These lakes are connected with the sewerage and drainage system, and are mainly used for regulating storm water flow by Hanoi SADCO, which controls the water level in the lakes. The lakes also provide for amenity and recreation and in some cases, aquaculture.

In the district, about 80% households have toilets with septic tanks. The remaining 20% use public or other private toilets. There are 91 public toilets in the district, including 8 double-vault toilets and 83 toilets with septic tanks. About half of these facilities are very polluted and unhygienic, without electricity and water.

4.1 Institutional arrangements for wastewater management

SADCO Sewerage and Drainage Enterprise No. 3 is responsible for management of the primary sewerage and drainage system in the Hai Ba Trung. SADCO remains responsible for the main primary sewers, ditches and channels, while secondary and tertiary sewerage and drainage network with sewer branches is under the local authorities' responsibility. However, local communities participate in small projects for upgrading or construction of tertiary sewer lines in the lanes and alleys of their local area. The management function rests with the ward People Committees (PCs) who have the responsibility for coordination. Local contractors generally implement construction, but local community leaders play a vital role in motivating public participation who assist in planning and monitoring construction.

SADCO's participation in tertiary level sewerage is limited to matters related to the interconnection of the drains with the primary sewerage system. When the local sewerage and drainage upgrading project includes connections to the central sewerage and drainage network, a written agreement is made with SADCO. The ward PC is responsible for submitting the technical design and all other related documents to SADCO for approval.

Figure 5 illustrates the procedure for the implementation of the tertiary sewerage and drainage network.

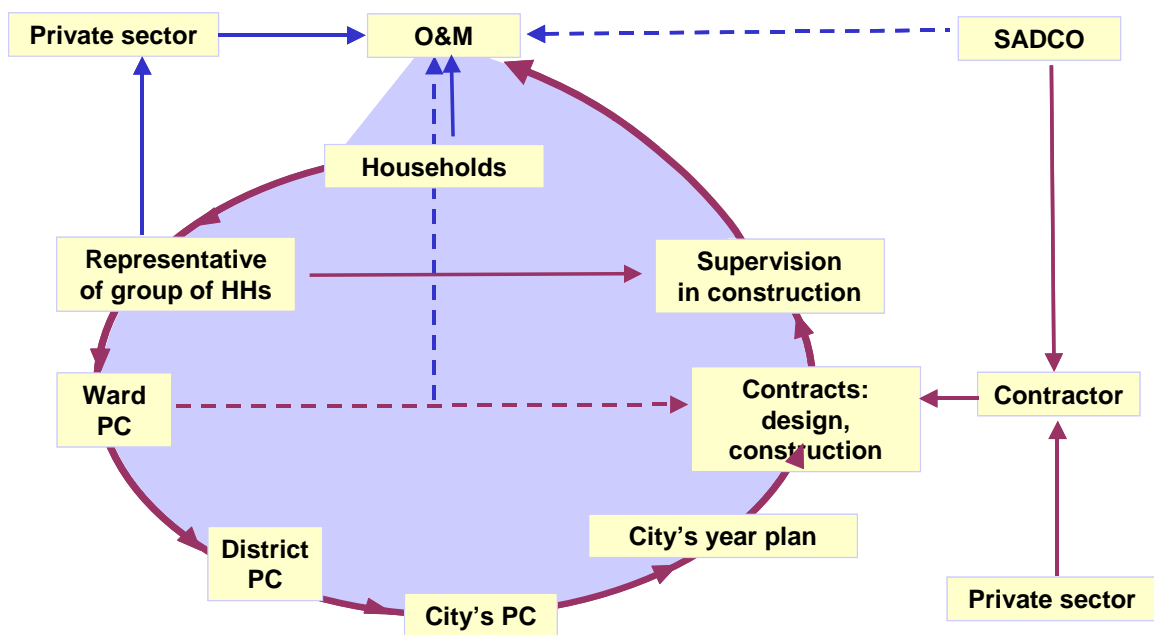


Figure 5 Procedure for tertiary sewerage and drainage network management

Figure 5 shows a typical example of tertiary drainage improvements in Hai Ba Trung district, which is managed by Hai Ba Trung district which were implemented in the context of a larger alley improvement program.



Figure 6 Upgrading of sewerage in Quynh alley, Quynh Loi ward, Hai Ba Trung district

4.2 Financing arrangements

Projects for upgrading and construction of new main sewerage lines that play an important role in drainage for the area are normally paid for by the city's budget only. Those projects are included in the Master plan for sewerage and drainage for the whole area. The sources of finance for construction of different levels of drainage infrastructure are illustrated in Figure 7. Financing of wastewater system upgrading and construction projects at the community level is divided into the following levels:

i) > US\$1250 and < US\$6250

Projects for upgrading and construction of secondary sewers and drainage lines in main roads and alleys in the community are normally funded partially from the annual city government budget. For the construction of lines along the main roads of the ward and with budget estimates above US\$1250 and below US\$6250, the improvement plans are discussed with local residents, then proposed by the Commune's PC and submitted to the District People's Committee. The Planning Division of the District PC reviews the proposal and approves the ward PC's proposed design and allocates budget for the construction. Operation of these lines is the responsibility of the ward.

ii) < US\$1250

For sewerage and drainage network in small roads and alleys, where the estimate of projects cost is less than US\$1250, the community proposes the project and can secure up to between 33 - 50% of the capital requirement from the ward PC, which can be in the form of construction materials. The ward PC may take the full decision without referring to the District authority for authorisation and the project costs are paid directly from ward PC account, which includes the annual state subsidy budget and the local Labour Fund for Public Interest. The local community is expected to raise the required fund balance and the household contribution can be in the form of labour in kind instead of cash.

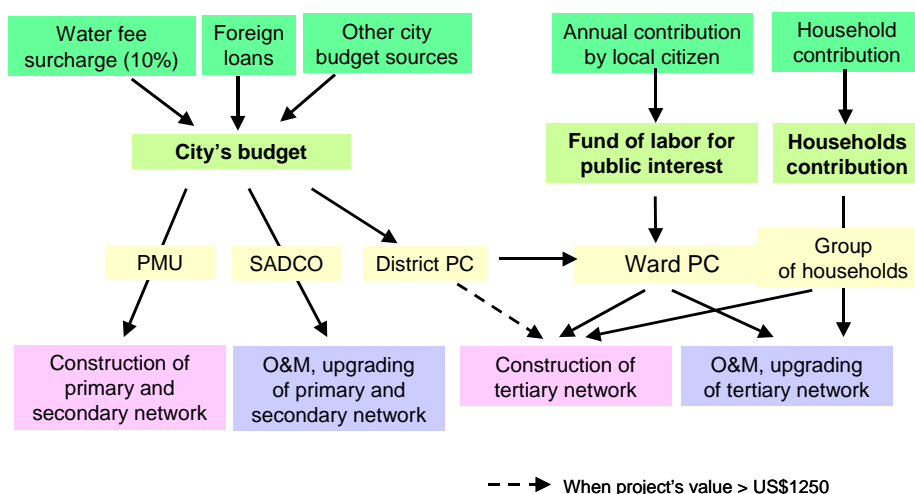


Figure 7 Sources of finance for wastewater management activities in Hanoi

4.3 Operation and maintenance of facilities

Operation and maintenance costs for secondary and primary sewers are normally taken from the ward PC's budget and by local citizen's contribution in the form of local fund of labour for public interest. In addition, local community leaders play a vital role in mobilizing public participation in management of the facilities and, partially as a consequence of this, communities can be motivated to conduct sewer cleaning, site clearance, etc. In many cases, the drainage network is maintained (cleaned, wastes clearance, dredging etc.) by local people involved as volunteers in the Environment and Health and Sanitation campaigns, which are organised weekly in most urban areas of Vietnam.

In situations where operation and maintenance requires special skills or equipment, the services are procured through small private entrepreneurs. Those workers are normally either unemployed or staff from SADCO and URENCO who provide the service for extra income. The negotiations with the contractors are made by representatives of community or group of households in the alley.

All residents, regardless of income level and level of participation, benefit from improved drainage and cleaner alleyways. Due to the improvements in the drainage systems, households have been motivated to upgrade their household latrines and most of the pit latrines have been upgraded and the use of septic tanks has increased. Septic tank construction is now mandatory for house construction or upgrading. The system also contributes to health improvements by reducing, if not eliminating, wastewater puddles and making alleyways more sanitary. The presence of rodents and insects along the public alleyways is reduced and spread of diseases is curtailed. There also are fewer areas that are prone to flooding and flood events are less prolonged during big storms.

In Hai Ba Trung, the primary and secondary drainage system was well maintained and functioning reasonably. However, the interconnection of the tertiary system with the central system is observed to cause local problems for operation due to a lack of clarity of where the division between tertiary and secondary system lies.

5.0 Wastewater reuse in Hoang Mai

Hoang Mai is a peri-urban district in the south of Hanoi, which is undergoing intensive urbanisation. A large part of the city's wastewater flows through the district prior to discharge into the Nhue and Red rivers, but the wastewater that flows from the city is widely used by farmers living on the edge of the city.

The sewerage and drainage system in Hoang Mai was built to receive a mix of domestic wastewater and runoff and the flow is directed to the irrigation network on the fields. With increased urbanisation, several canals, formerly used for irrigation, have become sewerage and drainage canals. As the urban-based activities intensify the demands on existing water resources increase and, at the same time, local watercourses become increasingly polluted.

This results in increased use of wastewater for aquaculture and irrigation – either directly or indirectly. In some wards of Hoang Mai district (such as Yen So, Hoang Liet, Thinh Liet, Tran Phu, Linh Nam), wastewater is extracted from drainage channels and reused for irrigation or rice paddy fields and vegetable production, which is a traditional livelihoods activity and a major income source in Yen So Ward, Hoang Mai district. There are 20 ponds with a total area of 185 hectares using wastewater for feeding.

5.1 Provision and management of drainage infrastructure

Before the establishment of Hoang Mai district in November 2003, there was an organisational arrangement for sewerage, drainage and irrigation service in wards of the peri-urban district of Thanh Tri – an area not served by Hanoi SADCO. The inter-commune sewerage and drainage service was provided by an agency responsible for water resources management under the Department of Rural and Agricultural Development (DARD) of Hanoi. The Division for Planning and Rural Development of the District PC participates in co-ordination of drainage and irrigation works and takes care of planning, immediate upgrading, repairs and maintenance of the network.

The Commune PC is responsible for management of small communal drainage and irrigation systems. Small repairs, network upgrading and sewers and channels cleaning to address localized flooding are often carried out by local people's labour force. These irrigation canals, including the main canal, should have been transferred to SADCO's responsibility. However, this has not happened yet and therefore local farmers clean up the canals and sewers and provide minor operation and maintenance work by themselves.

After establishment of Hoang Mai district, the sewerage and drainage service in the area was put under the responsibility of Hanoi SADCO. However SADCO is still unable to fully serve this newly urbanised district, especially in the wards formerly belonging to Thanh Tri district. Therefore, SADCO is responsible for main sewers, ditches and channels, while the secondary and tertiary collection and drainage works remain a local authority responsibility.

As in Hai Ba Trung district, SADCO Enterprise No. 3 also maintains all the main sewer lines and channels in Hoang Mai district. The responsibility for tertiary drainage and sewerage network belongs to the local authority, whereas community, through its ward PC, is responsible for smaller collector drains in alleys and household connections. Capital improvements for the tertiary works are funded either entirely from local resources or with some co-financing from the city, and in some cases, central authorities.

The local district authority plays a key role in many areas affecting the environment, organising and leading environmental awareness campaigns with the active participation of the ward PCs. The weekly "clean-up campaign" is organised with active involvement of Youth's and Women's Unions of the wards in coordination with all private commercial companies located in the district. The collected solid waste or sludge dredged from channels and sewers are brought to the disposal place by the Thang Long Ltd., the private company providing environmental service in the area. The company charges the fee for solid waste collection at the rate US\$0.125 per household per month, while the households engaged in commercial activities and generating more wastes pay more, based on agreement.

5.2 Demands for water for irrigation and wastewater reuse practices

In Vietnam, it has traditionally been common practice to use untreated human excreta as fertilizer and faecal sludge and septage from septic tanks and bucket latrines are collected and used by private farmers. Nightsoil and faecal sludge from vaults were originally used but the extensive system of wastewater reuse in Hoang Mai was developed over the past 50 years. Wastewater reuse in aquaculture and agriculture is a traditional practice developed by farmers and local communities. Wastewater reuse reduces expenses required for production and vegetables which are traditionally grown in Hoang Mai district and are mostly sold in the city centre. However, much less nightsoil is used on vegetables as most houses now have septic tanks and septage is more likely to be used in fishponds.

From a former single aquaculture business years ago, many farmers in Hoang Mai now use the land for rice growing for 6 months and as fishponds for the other 6 months. Short-term vegetables are also cultivated in between. After harvesting the fish, the land is rich in nutrients for crops. However, there are still areas where specialized ponds are used for aquaculture exclusively. In addition to owner-operated fishponds, some businessmen have leased ponds from the farmers. Lease payments are usually in the form of produce-sharing with landowners.



Figure 9 Cultivation using wastewater and selling of vegetables

The responsibility for coordination of wastewater irrigation service and the drainage network rests with the local authority. The commune provides the wastewater pumping service to the farmlands and fishponds. There is an internal agreement that the farmer or fishpond owner pays for the pumping expenses provided by the company to bring wastewater to the paddy fields or to individual fishponds.

In Yen So, as well as in another wards, fishpond areas were originally intended as rice fields, but since the shift to a market economy, farmers were given the choice to engage in rice production, or to shift to other economic activities. A number of big ponds are shared by a group of farmers and leased to contractors. The reuse of wastewater makes it possible to feed the fish, which potentially adds to income generated through rice cultivation, often even exceeding the latter.

In Hoang Mai, men are more involved in fish culture, whereas women are more active in farming aquatic vegetables. Men tend to be more involved in transportation and wholesale marketing of fish than women, although women are more involved with transportation of aquatic and terrestrial vegetables on bicycles and motor cycles. Women dominate retail and purchase of produce in retail markets. In Yen So, 10% of workers involved in aquaculture activities are women while this ratio is 85% in rice cultivation. The ratio is even higher in vegetable production where 95% of workers are women.

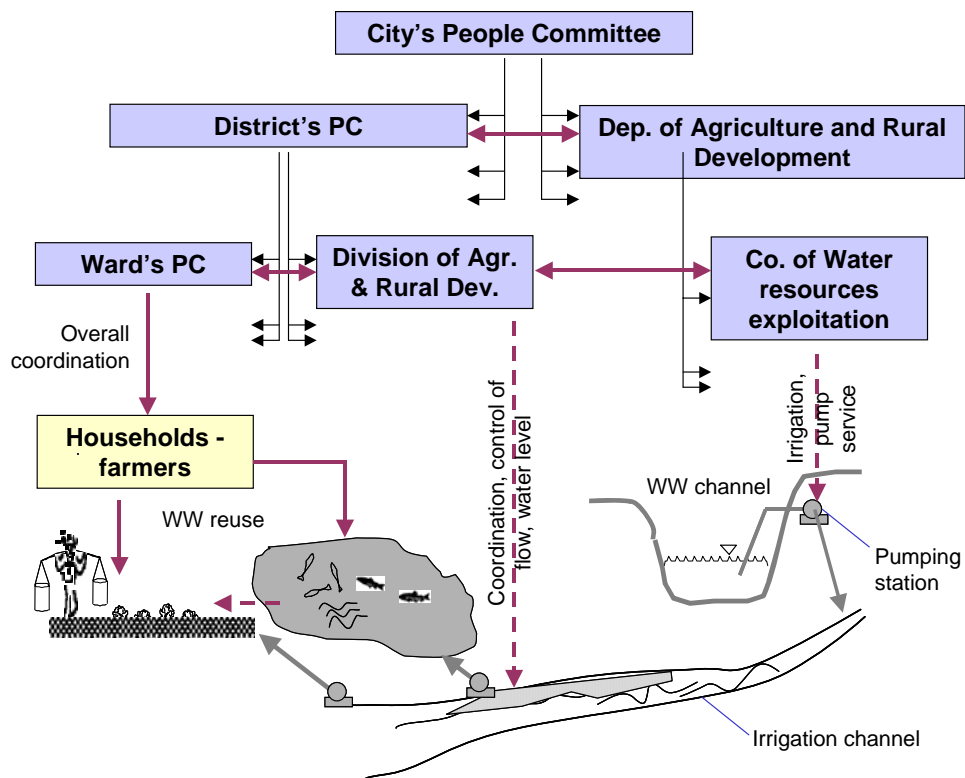


Figure 10 Management arrangements for wastewater management in peri-urban areas



Figure 11 Pumping wastewater to the fishponds in Think Liet Ward, Hoang Mai District

With increasing demand for cleaner vegetables production due to the increasing awareness of the users about the health risks, reuse of untreated wastewater is not considered to be a suitable water source for many types of vegetables. Looking for alternative water sources for cleaner vegetable production, local authorities and farmers in some wards of Hoang Mai are trying with ground water extraction for installation of the net field for vegetable growth. The ward of Linh Nam is one case where ground water is used for vegetable production, which brings about significant economic benefit for the farmers, as their product can be sold easier and at higher prices than vegetables fed by wastewater. However, as discussed below, this does not provide a sustainable solution as it uses groundwater at a faster rate than replenishment.



Figure 12. Irrigation using groundwater in a vegetable field in Linh Nam Ward, Hoang Mai district, Hanoi city.

5.3 Tangible benefits and factors affecting sustainability of wastewater reuse

In Yen So commune in Hoang Mai district, the major farming activities depend on wastewater. There are significant benefits from wastewater fed agriculture and aquaculture for part or full-time farmers and households gain direct economic benefits by working on the farms (mainly aquatic and terrestrial vegetables and rice). Some are hired as labourers on fish farms where others share in the benefits through leasing of their land to fish farmers (especially rice farmers who would then take up alternative employment).

Average productivity of fish from ponds in Yen So is estimated to be between 800 – 1000 tons per year. Aquaculture contributes 30% of total income of the community, while rice and vegetable cultivation brings in another 30%. A fishpond operator spends about US\$9375 annually for land rent, labour cost, utility bills and taxes. A kilogram of fish sells for approximately US\$1 but prices vary according to availability and quality. Thus, the profit from this investment is about 4-5 times the expense and income from fish sale is about US\$37,500 - US\$50,000.

The reuse of wastewater increases production in farms and fishponds and most of wastewater-fed fishponds are highly productive. Vegetable sales generate an income of about US\$500 - US\$625 with a crop of 5 tons per hectare per year, although some vegetables are for "own consumption" and therefore are not accounted in this estimation. Hoang Mai district income from wastewater reuse amounted to US\$6250 in six months of 2004.

However, there are hygiene risks in this traditional practice and possible negative impacts on human health that are of concern to public health. There is no regulation of wastewater reuse in Hoang Mai and the practices are left to market forces with no provision for consumer protection. Higher market prices can be gained for the "cleaner crops". Although there are minimum standards, enforcement and monitoring has been difficult. The city authorities have called the attention of the farmers to observe safe and hygienic production practices, but the enforcement of regulations is still limited.

Due to an increasing amount of contaminants in untreated wastewater, mostly from industrial and service activities in fast growing city, the wastewater reuse in aquaculture has been declining. Use of untreated wastewater for aquaculture and irrigation of crops is a big concern not only for users, but also for farmers. Toxins in the wastewater have killed fish and some cases of poisoning due to consumption of unsafe vegetable have been reported.

Both the availability and quality of wastewater for reuse in aquaculture and irrigation, which has been traditionally practiced in the district, is therefore a particular issue of concern to most of the residents. Many consumers are aware of the origin of products that they consume, but seem confident of their ability to clean the vegetables adequately for household consumption. As a result, sales of wastewater-irrigated vegetables, which are also cheaper than those irrigated with clean water, are not seen to be adversely affected. In fact, peri-urban vegetables are still considered by consumers to have the advantage of freshness. Buyers seldom ask the seller for the food product origin at the time of the transaction and, in general, they consider that it is the seller's responsibility. However, customers are aware that there are risks and generally the higher income families can afford the produce from areas that are recognised to produce the best quality vegetables. As a result, it is generally poor people who cannot afford the inflated prices or those who look for the lowest prices who are most at risk from infection⁶.

Land cost is a major cost component for wastewater treatment/reuse, particularly pond-based ones (which allow reuse of wastewater for aquaculture and irrigation). In Vietnam, land can be obtained from the State/Government. 'Land price' per square meter is US\$1875 - US\$2500 in central part of Hanoi. In other parts, the price is about US\$625 per square meter. The market price of land is much higher than in most other cities in Asia.

A new sewer line is to be built with capital investment under the JICA-funded master plan. Its impact on the current reuse is not immediately clear and not even considered in the project impact assessment. In Hoang Mai, those who lose agricultural will be paid US\$0.825 per m² and those who become unemployed because of land acquisition will be

assisted in vocational training. No compensation or restitution is envisaged for the loss of livelihoods associated with wastewater reuse.

Groundwater irrigation is also not a sustainable solution for Hoang Mai agriculture, since groundwater is a limited source. Currently Hanoi city is almost reaching its limit in available groundwater source what is a single water source for its domestic and industrial water supplies. Increasing soil subsidence and water pollution are also being recorded in some areas near groundwater production wells.

However, wastewater-fed aquaculture in Hanoi is constrained by the increasing content of industrial wastes in the wastewater stream. Whereas wastewater was mainly domestic previously, there now is a high content of industrial and hospital wastewater. Wastewater-fed ponds can now use only 10-30% wastewater in ponds, which is a considerable reduction from 10 years ago.

Nevertheless, there is still a demand for wastewater and new wastewater-fed fishponds have been developed recently to the south of Hoang Mai in the remaining part of Thanh Tri district after it was created. The city assisted farmers to convert their rice fields, which are leased from the government, to fishponds for lease to fish farmers. In the initial situation in Hoang Mai, the quality of the wastewater delivered was viable for its intended use, i.e., industrial wastewater is reasonably controlled.

6.0 OPPORTUNITIES AND CONSTRAINTS FOR REPLICATION

There are a number of key issues that need to be considered in relation to the opportunities and constraints for replication of DWWM in Vietnam, which are discussed below.

6.1 Local level participation

It is widely recognised that an important requirement for the success of local environmental management initiatives is the participation of local stakeholders. The commune is the ideal vehicle for local environmental management activities and the village authorities are a vital link between the formal commune PC and the users. Where user groups are interested in improved water supply and sanitation or improved water resource management, the village is the channel through which information is delivered to the commune PC.

In many cases, existing community structures form a good basis for village user groups. The effectiveness of grass roots organisations and associations is crucial in the process of stimulating demand, and for local authorities to respond to their demand. Gender has been an important element in environment sanitation. Women have been active in all the stakeholder groups and as a unified pressure group and catalyst via the Women's Union.

Increasing awareness of environmental issues, including water pollution, is slowly having an influence on environment management and policy and there is an emerging trend, which focuses on public participation in the environmental review and planning

processes. The role of environmental NGOs in relation to the current framework of local governance is evolving, especially in relation to the interactive process between government agencies, business enterprises and the public. Therefore, of interest in Vietnam are the emerging roles of non-government organisations (NGO) and of public participation in environment issues, especially in a traditionally government-controlled society⁸.

Some flexible and innovative measures for wastewater management have been initiated by local authorities in partnership with civil society. An example is the overseeing by local neighbourhood community groups of sewerage construction as described in the case study from Hong Mai, which enables regulation of the private sector and greater accountability to local government expenditure.

The demand for these initiatives were driven primarily by local needs in which the primary demand and the willingness to participate in wastewater management activities arose from the residents themselves. This demand seems to be driven by social and economic interests rather than health or environmental concerns. In the case of Hai Ba Trong, there was a need to improve alleys and pathways, which the residents use daily and in the case of Hoang Mai, the demand for wastewater reuse is high. The profits earned from the livelihood activities related to wastewater reuse have, no doubt, strengthened the resolve of the residents to sustain the system.

6.2 Decentralisation of management responsibilities

In addition to the city's infrastructure upgrading and expansion program, one of key reasons cited for a significant improvement in the city's sanitation is the transfer in 1996 of the management responsibility for the tertiary network from SADCO to the local authority (Ward PC) and local community. The shift has enable SADCO to fill the gap in coverage in inner city areas and has played a deciding role in service provision in peri-urban areas. Thus, DWWM has been achieved effectively by deconcentration of responsibilities along administrative or governance units in the existing established institutional framework.

DWWM provides the traditional centralised service provider (in this case SADCO) with the opportunity to focus on the core operating issues of the central system. It reduces their need for capital funds as it places greater emphasis on securing funding from local resources. This institutional change provides an opportunity for SADCO to earn revenues by bidding for these local contracts. Earned profits effectively convert capital funds (which are more readily available) into operating funds for its other activities.

While decentralisation of management to local administrations has been an achievement of public administration reform, complicated arrangements suggest that a strategy for a more effective devolution of power and decision-making authority still needs to be developed. A further issue that needs to be addressed is that current funding available for localities, especially at lower levels, often does not meet the public service responsibilities of these bodies.

Government will be much better able to fulfil its strategic leadership role as framework-provider and policymaker if it delegates the responsibility and authority for certain tasks to local levels of Government and to other, non-Governmental actors, such as the private

sector and civil society. For this process to be effective and to reap benefits it will involve strengthening political belief in, and further commitment to, decentralisation and devolution as the most effective ways to manage public affairs and the responsibility for development.

However, the problem of the central level control over decentralisation is partially due to the insufficient capacity among local authorities to act as public service providers. Problems with efficiency and accountability can be traced to the generally low morale of underpaid local officials and a lack of training, as well as the absence of proper structure of local government. There are strong incentives for government agencies to maintain current modes of operation as a shift to more decentralised approaches would involve:

- loss of control of construction contracts;
- more accountability to local authorities; and
- a major change of attitude of staff.

6.3 Regulatory issues and national policy issues

In a number of respects, there is still no real "management" of domestic or urban wastewater in Vietnam. Only the requirements or effluent standards for industrial wastewater discharges are followed to a certain extent, especially for new, foreign and joint-venture industrial enterprises. The effluent standards set for domestic wastewater are only official, but wastewaters from residential areas are often not treated at all and discharged without control. Apart from effluent standards, there are limited appropriate policies and as well as limited effectiveness of existing legislative documents.

In addition a lack of effective instruments to implement policies for wastewater management system in urban areas in Vietnam. It is widely acknowledged that wastewater management is important, but what should be done and how to pay for it is not paid adequate attention by decision makers, including top levels. Therefore, an important area is the establishment of a viable regulatory arrangement and operating standards to be followed by decentralised system operators.

Decentralisation cannot proceed in an ad hoc and unstructured manner. It still requires a lead central body to set policy, coordinate and monitor a planned and orderly decentralisation of function, authority and resources. However, many weaknesses remain in the current structure of government in Vietnam in the area of enforcement of the environment law. Various agencies are responsible and there is a lack of coordination at different levels of governments and between different regions. However, attempts to control pollution focus on the industrial sector and not on domestic wastewater production is complex and politically sensitive.

Planning and implementation of sanitation lack holism and are seldom based on any sector plan or strategic framework. Appropriate steps in this direction have been taken only for Hanoi and Ho Chi Minh City, but these are largely top-down, supply-driven and target oriented in terms of infrastructure only. In contrast, bottom-up, demand-driven, user-input is required for effective planning, implementation and management of DWWM.

The advantages of a decentralised approach will be most pronounced in peri-urban areas and small provincial towns where there is no centralized sanitation system and integration with agriculture activities is still an option. Decentralisation is pursued within the entire governance structure as part of a wider public administration reform policy of Government. The cases described above can in some measure be ascribed to some reforms in shifting resource allocation decision authority.

6.4 Financing issues and resource mobilisation

Politicians and decision-makers at central (and provincial levels) should promote and support more effectively the introduction of adequate and appropriate water and sewerage charges in order to build-up financially viable and high standard urban services. In recent years, new tools for resource mobilisation have been created and encouraged by Government, including revolving funds, mobilisation from community, water bill surcharge, credit funds, favourable tax policies and incentives for public utility enterprises.

Cost recovery is central to the sustainability of the decentralised systems. Although most communes are self-financed, the local authorities continue to assist them, particularly in the early stages of their transformation. Investment and operating costs for infrastructure provision are provided from city's budget and from the local fund of labour for public interest, which is raised through annual contributions from the residents

It is therefore necessary to mobilise local community resources and to explore the possibility of public-private partnerships involving government agencies, community based organisms, NGOs and the private sector. Property taxes are potentially the most productive form of mobilisation of local resources but mechanisms are required to implement and collect them.

There is also a need to consider subsidies for low-income households to benefit from improved sanitation, but the poor who need them the most, often benefit from the subsidies least. This implies a need to specifically target the poor in DWWM schemes. However, to some extent this already exists through the Labour Fund, which mobilizes a contribution from people for public services. This Fund is a form of peoples' participation, as well as, a payment for local public services received. This system that can be basis for wider replication in providing environmental services on a cost recovery basis and that involves local people in service delivery processes.

6.5 Capacity building requirements

It is important to raise awareness about wastewater management and promote a positive attitude towards opportunities presented by decentralised approaches. This needs to be followed through with the inclusion of decentralised approaches within existing capacity building programs of the institutions and stakeholders. The delegation of services to sub-provincial level will thus require a major capacity building and strengthening effort. In addition, central system operators have major capacity building needs and it is necessary to develop appropriate training courses for managers and staff of project management units of SADCO and URENCO.

In general, the link between technical and managerial aspects of environmental sanitation are still very weak or missing in the teaching programs at universities. There is still big gap between teaching program at universities and practical knowledge needed in the field. Closer co-operation interaction between university academics and researchers and field practitioners is needed. Changes in education curricula should be implemented to equip students to recognise design options with smaller-scale decentralised projects and not be averse to (or not develop negative attitude towards) such options; to be equally concerned with operation and maintenance; to recognize the importance of stakeholder participation and social criteria in decision-making processes. Training is at the centre of institutional and organisational changes and reform. Human resource development programs are needed to advance awareness, knowledge and skills of different target groups at all levels in DWWM. These should cover relevant technologies and their management, including adequate sewerage charges and other financing mechanisms. In addition, there is an important need to provide engineers and planners from a technology bias with social orientation.

Local governments must be empowered and the capacity of local authorities needs to be improved to effectively carry out increased tasks arising from decentralisation. There are important needs for capacity building in wastewater management in Vietnam, especially for the specialised local public utility organisations providing this service. The capacity of local administrators needs to be improved to effectively carry out increased tasks arising from decentralisation.

There is a need to strengthen the representation system at local levels to incorporate the needs and aspirations of local people in deciding public resource allocation and ensuring accountability. Government needs to build appropriate institutions to respond to user demand. During planning and implementation of urban sanitation projects there is a need to put more emphasis on efficiency in design and construction supervision rather than on static planning targets and over-built systems. Design and technical specifications should be tailored to meet specific and projected needs. There is a need to move away from rigid and overestimated designs, norms and standards. In general there is a need to design more optimal systems with emphasis on achieving higher efficiency.

7.0 CONCLUSIONS

There is increasing investments directed towards improving water supply provision and concurrent interest in management models appropriate for small towns in Vietnam for water supply. There has been less interest in wastewater management, but the issues described above will become of increasing concern. Thus, the experiences from Hanoi provide guidance towards development of wastewater management strategies in smaller urban centres, which currently have only 30% coverage of water supply.

The research focussed on DWWM activities in peri-urban areas in Vietnam. Although the presence of centralised agencies in these areas is observed to be weaker than in the core urban area, there remains considerably more influence from organisations such as SADCO in these areas than in the small towns throughout the country. However, there is quite a lot in common between peri-urban areas and small towns and there is considerable potential for application of DWWM throughout the country.

The initiatives in Hanoi's inner city and peri-urban areas provide confirmation of the potential for decentralised delivery of wastewater services, which has considerable scope for replication in other parts of Vietnam as well as elsewhere in Asia where cities face similar problems. DWWM opens up opportunities for greater flexibility and innovation in service provision.

The Hai Ba Trung case study highlights the potential role of local community stakeholders and actors in the provision and management of tertiary sewerage and drainage systems. This approach offers an initial, immediate response before the infrastructure gets incorporated into the central system. In Hoang Mai, community-based wastewater reuse and community participation opened several opportunities for the involvement of local stakeholders in planning and decision-making for environmental management.

These initiatives provide interesting lessons about how different levels of government and agencies can collaborate with local communities to deal with environmental degradation. This offers important lessons for institutional development and it is crucial though to link new approaches to wastewater management to a wider program for public administration reform, involving decentralisation and public participation.

One of the most important aspects arising from an analysis of these case studies relates to the importance of the highly structured nature of society and how this is conducive to the initiation and implementation of DWWM. This effects all levels of society and due to a general tradition for abiding by governmental rules and regulations, there is considerable potential for a workable model of decentralisation in which the Ward PC is instrumental in co-ordinating wastewater management activities the local level.

Although centralised systems continue to get the main share of capital investments, a high percentage of the urban and peri-urban populations in Vietnam live in areas that are outside of areas served by the official service provider. The mobilisation of local resources for construction and operation of sanitation systems is one feasible option to solve the financial deficiencies in Government coffers, including an argument for donors to provide only a part of the required investment or require a financial potential for repayment before they decide to give a loan.

There are several good models for community involvement in Vietnam in water supply and solid waste management in small communities, as well as some models of DWWM at different levels. Although there exist differences between these models, the common feature is the mobilisation of community resources (including both human and financial resources) for infrastructure upgrading and management.

DWWM in Vietnam is already taking place through the delivery of at least part of the responsibility for planning, construction and maintenance of local sewerage and drainage networks; and farming of fish, rice and aquatic and terrestrial vegetables through wastewater reuse. Traditional wastewater reuse in agriculture for irrigation and aquaculture in peri-urban areas creates great opportunities to involve community in management of wastewater systems. The technologies and methods used lend themselves readily to operation and maintenance by the residents.

The experience from Vietnam highlight the need for all drainage system parts (or sub-systems) to be reasonably functioning for DWWM to operate effectively. Different entities can be responsible for different parts of the system. Although it is not considered to be so important to define the “boundary” or interface between what is considered the central system and a decentralised system, it is important to consider further the process for defining and agreeing upon where this interface should lie.

Therefore, DWWM requires strong coordination amongst multiple agencies at different levels in order to adequately respond to demands. At present in Vietnam, responsibilities for wastewater management are commonly diffused into drainage, sewerage sanitation, and even solid waste management framework or mandates. This results in complex arrangements and competing priorities in the face of the ever-present inadequacy of financial resources. Thus, realignments in district policies and regulations play an important role in the management wastewater systems.

It is clear that a more integrated approach towards wastewater management involving economics and social issues and policies is required, involving a city level People's Committee with links to government agencies and strong representation from all stakeholders (residents, farmers, industry etc). It is also clear that decentralised service provision – such as in DWWM – needs to be located in citywide planning. A holistic approach to the river basin management is also more appropriate for managing water resources and an integrated water resource management strategy will benefit the people in these areas in the long run rather than separate plans and actions at different areas in the catchment.

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