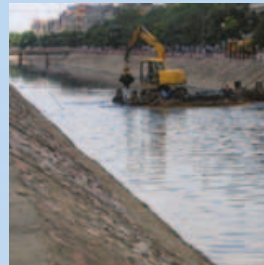


Vietnam Urban Wastewater Review

Executive Summary



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December 2013

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ABBREVIATIONS

ADB	Asian Development Bank
CAPEX	Capital Expenditure/Capital Expense
CSO	Combined Sewer Overflow (Diversion chamber)
CSS	Combined sewerage system
EAUSFS	East Asia Sanitation Flagship Study
EP	Environmental Protection
FSM	Fecal sludge (septage) management
HHs/HHC	Households/Household connection
IEC	Information, Education and Communication
IWRM	Integrated Water Resource Management
MLD	Million liters per day
MOC	Ministry of Construction
M&E	Monitoring and Evaluation
ODA	Official Development Assistance
O&M	Operation and Maintenance
OPEX	Operating Expenditure/ Operating Expense
PPP	Public-Private-Partnership
PSP	Private Sector Participation
QCVN	Vietnam (National) Technical Regulation
RBA	River basin approach
SSS	Separate sewerage system
TCVN	Vietnam National Standards
U3SAP	Sanitation Sector Strategy and Action Plan
USD	United States Dollar
VND	Vietnamese Dong
WB	The World Bank
WWTP	Wastewater Treatment Plant

Introduction

1. Vietnam is facing the challenge of trying to keep pace with increasing environmental pollution associated with rapid urbanization, especially in the larger cities. Over the past 20 years, the Government of Vietnam has made considerable effort to develop urban sanitation policies, legislations and regulations and to invest in urban sanitation including wastewater treatment systems.
2. This study is one of three country studies conducted in the emerging countries of Vietnam, the Philippines and Indonesia as part of the East Asian Urban Sanitation Review. It reviews the effectiveness of the wastewater sector in Vietnam and makes recommendations to the Government on actions to scale up the sector to improve its performance. Lessons that emerge from this study can be considered for the on-going and/or the next generation of wastewater systems.

1. Wastewater Sector Performance in Vietnam

Main Findings on Sector Performance

3. **Since 1998, the Government of Vietnam has initiated policies and provided investment to improve urban sanitation resulting in significant progress in development of the wastewater sector. Achievements are as follows:**
 - Provision of wastewater services to the urban poor has been impressive with open defecation now eliminated.
 - Access to toilets is now **94 percent**¹, with 90 percent of households using septic tanks as a means of on-site treatment.²
 - **60 percent** of households dispose of wastewater to a public sewerage system, primarily comprising combined systems.³
 - By 2012 some 17 urban wastewater systems had been constructed in Hanoi, Ho Chi Minh City and Da Nang and another five systems in provincial towns and cities with a total capacity of **530,000 cubic meters per day (m3/day)**.
 - Currently some 30 new wastewater systems, primarily comprising combined systems, are in the design/construction phase.
 - During the past decade annual sanitation sector investment has been USD 150 million or USD 2.1 billion for drainage and wastewater during the period 1995-2009. This represents **0.45 percent of GDP** annually.⁴
4. **Despite these impressive initiatives, urban sanitation continues to face critical issues that need to be urgently addressed:**
 - Although 60 percent of households dispose of wastewater to a public system, much of this is directed informally to the drainage system and only 10 percent is treated.
 - While 90 percent of households dispose of wastewater to septic tanks, only 4 percent of septage is treated. Fecal sludge management is generally poor in most cities.

1 JMP, WHO – United Nations Children’s Fund (UNICEF),2008.

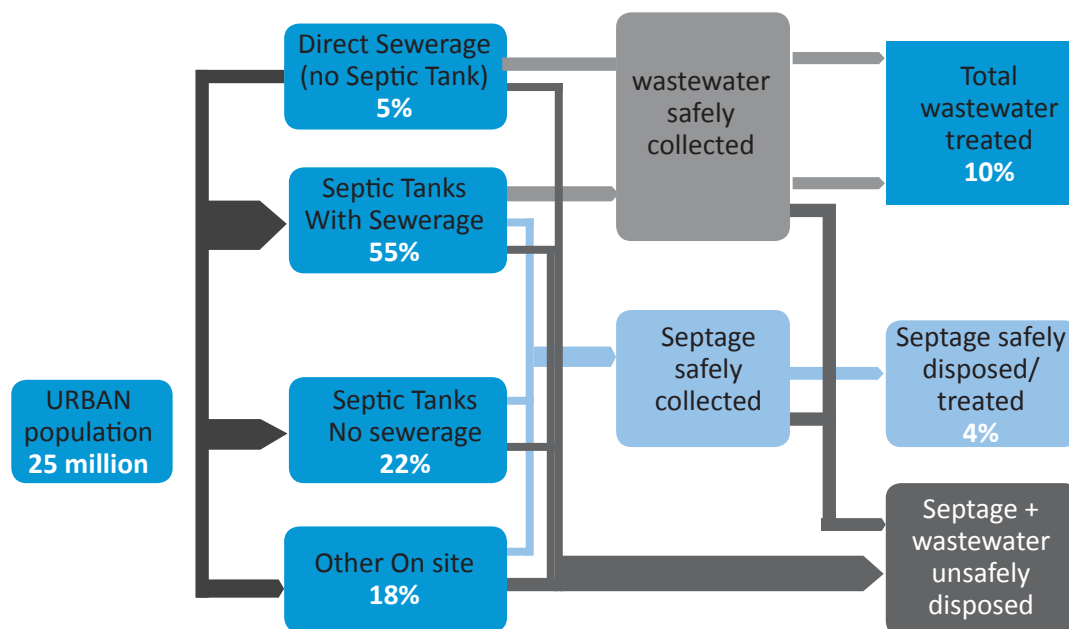
2 Nguyen V. A., 2012.

3 Nguyen V. A., 2012.

4 Grontmij – Water and Sanitation Program (WSP),2012.

- The focus of wastewater expenditure to date has been in constructing treatment facilities, but this has not always been accompanied by appropriate collection systems.
 - Despite wastewater tariffs in the order of 10 percent of water tariffs being charged, cost recovery of the capital and operations and maintenance (O&M) costs of the wastewater systems is generally low.
 - Institutional arrangements do not encourage efficient system operation with the wastewater enterprises having limited autonomy to manage operations and undertake system development.
 - Financing needs are still very high. It is estimated that USD 8.3 billion will be required to provide sewerage to the forecast 2025 urban population of 36 million. This needs to be addressed in the context of the estimated economic losses resulting from poor sanitation of USD 780 million per year or 1.3 percent of GDP (WSP, 2007).
5. The current sector performance is illustrated in Figure 1 below.

Figure 1. Status of urban wastewater management in Vietnam



Source: World Bank, 2013

Sector Performance Analysis

6. **Integrated water resource management and river basin management principles.** Although “Integrated Water Resource Management” and “River Basin Management” approaches are mentioned in the legal documents such as the Law on Water Resources (1998, revised in 2012), the Law on Environment (2005), and despite the establishment of River Basin Commissions for the three principal river basins in Vietnam, these approaches are not yet implemented in practice.
7. **Institutional arrangements and ownership.** Most urban wastewater enterprises do not own the wastewater system assets, but operate the system under the mechanism of a “work order from the city authority” and are paid directly from the city budget. The current practice of providing the enterprises with a fixed annual budget for operations does not allow the enterprises to invest in research and development or in the optimization of the wastewater system. Unplanned expenses

must be approved by different administrative bodies of the city which takes considerable time and can result in loss of sewerage services.

8. **Effluent standards.** Regulations controlling effluent standards have undergone significant change since the first standard was issued in 1995 (TCVN [Vietnam National Standards] 5945:1995) with six revisions between the years 2000 and 2011. This has created continuing uncertainty among local authorities responsible for implementing wastewater projects. It is important that the treatment technology used to meet the effluent standards should be carefully reviewed so that low cost options that do not put additional burden to increase operating expenditure (OPEX) and wastewater tariffs are considered.
9. **Wastewater treatment plant technology selection.** Despite the low concentration of influent BOD and other constituents measured in the flow to the 13 WWTPs currently being served by combined sewer systems, eight ⁵ of these are now operating based on conventional activated sludge treatment solutions. Twenty-five (of the WWTPs currently under design or construction) will be based on similar technology. The lack of household connections, partial treatment/decomposition of organic matter in septic tanks and the drainage canals, infiltration of groundwater and collection of rainwater runoff all contribute to the dilution of the collected sewage in these combined systems. Given the low organic loading at these treatment facilities, lower cost appropriate technologies could have been adopted which would allow for upgrading as the influent strength increases over time. However, a lack of understanding by decision makers of appropriate technical solutions and the limited land available for the WWTPs has resulted in a continuation of the use of more expensive, advanced technology facilities. Facilities which emphasize low power consumption, resource recovery from sludge or reuse of treated wastewater are not currently given high priority by planners in Vietnam.
10. **House connections** to public sewerage systems are an essential component to ensure most of the organic loading is conveyed to the treatment facility, no matter whether the wastewater is collected by means of a combined or separate sewerage system. However, in Vietnam, house connections are not mandated for combined sewerage systems (CSS) and are generally only employed where soil percolation is low such that discharge to the drain is the only means of disposal from the vicinity of the household. Most connections to combined systems are from the septic tank, where some pre-treatment is effected, which is one of the contributing factors for the low influent organic loading received at downstream WWTPs from combined systems.
11. **In separate sewerage systems (SSS), all households within the sewerage service area must have connections as these constitute the only source of flow into the system.** Generally, direct household connections to the SSS-based systems are mandated by local authorities and the existing septic tanks are decommissioned. This has resulted in higher concentrations of influent BOD experienced within SSS-based systems in Da Lat and in Buon Ma Thuot cities.⁶
12. **Septage management.** Currently there is no effective septage management being practiced anywhere in Vietnam with scheduled emptying of septage from septic tanks only being practiced in one city (Hai Phong). Some cities provide treatment of septage at wastewater treatment plants or at solid waste dumping sites. Poor design and operation of most household septic tanks plus uncontrolled fecal sludge emptying, transportation and dumping, mostly by private service providers, are common in Vietnamese cities contributing to a growing environmental problem.

5 The average influent BOD for these 13 WWTPs is 67.5 mg/L (see Table 1.1 of the Main Report)

6 See Table 1.1 in the Main Report.

13. **Sources of funding.** The past 10 years have seen a growing investment in urban sanitation and especially wastewater treatment in both large and medium cities primarily supported by Official Development Assistance (ODA) funding. However, the efficiency of this investment that has focused largely on provision of treatment facilities with limited development of collection systems is yet to be established. An appropriate strategic or programmatic approach that would lead to a better targeting of investment to address the particular environmental and public health deficiencies, followed by proper investment planning is needed.
14. **Financial commitment and cost recovery.** Despite being fundamental for financial sustainability, little has actually been done to achieve cost recovery. The majority of local authorities seem willing to continue to subsidize operations. The cost recovery principle is clearly stated in Decree 88, but this should be committed to and put into action by the local decision makers. Cost recovery is also impacted by operation and maintenance expenses which are a function of the level of technology selected.
15. **Participation of the private sector.** Appropriate policies and incentives are not in place to encourage private sector participation in the wastewater sector from both financial and operational perspectives. In particular, inadequate tariffs and the lack of an effective regulatory system are principal barriers for private sector entry. To date, there are few examples of wastewater projects with private sector participation initiated in Vietnam.⁷
16. **Public awareness and behavior change.** The benefits of public awareness tend to be ignored by most urban wastewater companies. Sanitation investments tend to be top-down and subsidized with limited participation by communities. This results in an inadequate understanding within the community of the environment and public health benefits of a well-designed and operated wastewater system. The outcome is less willingness to pay to achieve cost recovery and a reluctance to connect to the wastewater system.

2. Key Messages and Recommendations

Messages for the consideration of National Policy Makers

17. **Establish a national strategy applying integrated water resource management principles.** Consider developing a national strategy that applies the principles of Integrated Water Resources Management and a River Basin approach to urban sanitation in order to sustain the commitment by central government to sanitation improvement and elevate urban sanitation on the political agenda. The Law of Environment 2005 and the Law of Water Resources 2012 could form the legal basis for this approach which would include the establishment of clear regulatory mechanisms for the sector, the consolidation of service providers and an emphasis on water quality management across river basins as well as improved sector performance monitoring at the central level. This approach would allow the integration of water supply, sanitation and hygiene in order to improve coordination between government agencies, the private sector and communities. A national strategy and a National Target Program for Urban Sanitation would also ensure that the results are sustained and create a common basis for identifying priorities, developing technical and institutional capacity and establishing financial mechanisms to raise and consolidate funds to meet these priorities.

⁷ Currently only the build and transfer projects in Da Nang and Hanoi have included an element of private sector participation.

18. **Develop appropriate financing policies and mechanisms for the sanitation sector for both investment and O&M.** This may include grant finance, government bonds, appropriate tariff measures, PPP arrangements and other innovative sources of finance such as the introduction of property taxes or earmarked increases in personal income taxes. Increasing the wastewater tariff is a key tool to achieve O&M cost recovery and system sustainability and should be pursued.
19. **Develop policies to address utility reform of the sanitation sector.** The sector would benefit from the creation of an enabling environment to encourage the establishment of corporate utilities or private sector organizations delivering an integrated service including water supply, sewerage, sanitation and septage management. This would require encouraging increased autonomy of the utility companies, adopting performance management approaches for O&M, addressing tariff reform to achieve cost recovery, introducing regulatory policies including an independent regulator and providing capacity building programs for service providers.
20. **Develop policies to encourage Public-Private Partnerships (PPP) and Private Sector Participation (PSP).** Policies could be introduced encouraging private sector participation in the sanitation sector including actions to improve the business working environment such as access to loans and increases in wastewater fees to provide for O&M cost recovery. Integration of water and wastewater services would make the sector more viable. Private sector investors in land development could include wastewater collection and treatment capital expenditure within the costs of land or housing which will subsequently be sold to the customers at market prices, thereby reducing government expenditure. There are several potential PSP modalities that could be applied. In selecting PSP options it is critical that investments from the private sector and Government result in complete wastewater systems incorporating connections as well as network and treatment facilities. It is important that infrastructure developed by the private sector is aligned with the city's Master Plan. Encouraging private sector involvement in septage management would particularly benefit the sector given the limited capacity of public service providers.
21. **Allow some flexibility in effluent discharge quality based on receiving waters.** The assimilation capacity of receiving waters as well as the influent quality should be considered in the design of treatment facilities. Current effluent standards require that wastewater be treated to high levels to achieve low concentrations of ammonia and total nitrogen which effectively precludes the use of simpler technologies, such as wastewater stabilization ponds or trickling filters. The outcome is unaffordable operation and maintenance costs. Some affordable wastewater collection and treatment options that are potentially applicable for decentralized wastewater treatment systems are simplified sewerage, baffled septic tanks with anaerobic filters and constructed wetlands and public sanitation facilities with biogas recovery. However, these treatment systems may not comply with the current effluent standards. A potential approach is to start out with lower (or no) limits for nutrient levels (for non-sensitive receiving waters) and gradually introduce more stringent standards over a period of time, during which the sanitation sector has had time to develop and financial resources have been mobilized.

Messages for the consideration of Local Government and Local Sanitation Service Providers

22. **Sanitation planning needs to adopt a strategic sanitation planning approach at the city level.** This approach would engage with the social, technical, institutional and economic factors that impact on the potential for sustainable service provision for all sectors of the urban community. Sanitation planning would benefit from being demand responsive to the needs of the users; considering incentives

that improve performance of the stakeholders related to sound facility management; separating management of neighborhood facilities from downstream collection, treatment and disposal; and allowing choices between a range of technical and financial management options depending on the particular situation. It is recommended that sanitation planning and service delivery considers the neighborhood or the community as the first level of demand expression and develops appropriate infrastructure at that level.

- 23. Promote efficient institutional and regulatory arrangements at the local level.** The institutional arrangements in each City/Province are critical to effective project preparation, implementation and operation. To improve the effectiveness of service delivery, the current relationship between the wastewater service utility and the urban government - which used to be based on an annual order approved by the local government -- could be replaced by alternative arrangements such as a management contract for operation and maintenance of the wastewater system. A regulatory body with participation of provincial authorities and the public could be established with a mandate that includes approving unit prices and tariffs for wastewater services. Regulations issued by the local authority regarding wastewater should include the design and construction of septic tanks, mandatory de-sludging and authorized disposal of septage.
- 24. Adopt centralized or decentralized wastewater systems depending on the local situation.** Centralized wastewater systems are not considered as an appropriate solution for all of Vietnam's sanitation problems. Decentralized systems could be considered as an option for areas that cannot be economically serviced by a centralized network. Over time, these decentralized systems may become part of an expanded centralized network as population density increases. The citywide sanitation strategy developed at the master planning stage should consider identifying a staged strategy for the development of both centralized and decentralized systems. Decisions on project phasing and the selection of prioritized areas of investment would benefit from being based on comprehensive analysis, with least cost analysis and affordability being key to decision making.
- 25. Select appropriate wastewater treatment technologies.** The scaling up of the sanitation sector in Vietnam would benefit from greater emphasis on the selection of treatment technology. It is important that the technology selected suits the influent wastewater characteristics, the performance requirements based on effluent standards, the specific site conditions and the receiving waters. Decision makers at all levels could be encouraged to participate in the selection of those technologies and designs that not only successfully capture the financial and economic benefits of sanitation, but that do so at an affordable cost. Septic tanks will continue to play an important pre-treatment role for existing urban areas having combined sewer systems. Septic tanks and septage management should be considered as an integral component of the sewerage and drainage system.
- 26. Ensure house connections are an integral part of wastewater system development.** House connections are vital to the successful implementation of any wastewater project and their full integration within the planning and funding of the program should be considered. Improvements to both the quantity and quality of house connections to piped sewerage systems, whether they are CSS- or SSS-based, would allow the most effective use of public wastewater infrastructure. It is recommended that this process should be started through the establishment of enforceable regulations which mandate that all households, commercial establishments and institutions within a constructed sewerage collection network service area be connected to the system.
- 27. Prepare a roadmap to increase revenue and achieve cost recovery.** It is recommended that the management and O&M of the wastewater collection and treatment systems is funded through

wastewater tariffs paid by households. Willingness to charge customers to recover costs should be considered as a part of local authority wastewater policy. Increased cost recovery would ensure better compliance with the “polluter pays” principle and improve financial sustainability. Operating authorities in conjunction with local provincial governments should consider increasing revenue to support operation costs. This may be achieved through a gradual increase in tariff over time so as not to cause social and economic hardship to the community. Financial support for poor households’ sanitation needs could be provided through tariff cross subsidies or through micro-financing programs such as micro-credits and revolving funds.

- 28. Develop the capacity of local stakeholders.** Capacity building is recommended at all levels throughout the urban sanitation sector, from the central government level down to the decision-makers at the local authority level. This would include activities to build capacity among service providers and owners of sanitation services. Increased capacity, coupled with improved coordination, would create improved performance efficiency in project implementation. It is recommended that engineered facilities be designed together with “soft interventions” such as capacity building, and improvements to institutional and financial arrangements. Local authorities are advised to ensure that all stakeholders, from the decision makers to those employed by public utilities and service providers, have a greater awareness of the broad range of knowledge and skills required in the areas of engineering, environment and management as well as the institutional and social aspects needed for successful project development and service provision.
- 29. Increase awareness of sanitation service customers.** Information, Education and Communication (IEC) programs to promote behavior change should be implemented to increase public awareness and appreciation of the benefits of environmental sanitation. Whereas it is important for the local authorities to have the necessary “tools” for charging customers for sanitation services, it is equally important that the customers themselves be aware of the benefits and be willing to pay for those services. It is recommended that an IEC campaign be included in the development of every wastewater project to increase awareness of sanitation issues in general, but more specifically to inform people of the benefits provided by the system. This would encourage customer support for connecting their household sanitary piping to the public sewerage system, increase their willingness to pay, and result in an increased level of fees collected with consequent improvement to cost recovery. Awareness campaigns could also be utilized to promote user awareness of wastewater regulations including those relating to the design and construction of septic tanks, mandatory de-sludging and authorized disposal of septage.

