Viet Nam Urban Environment Program

Urban Sanitation Issues in Viet Nam

ADB

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EXECUTIVE SUMMARY

This paper summarizes the factors affecting the realization of the Government of Viet Nam's urban wastewater program.[1] It identifies and analyzes issues that affect performance and achievements. It highlights policy implications and choices that will determine future progress toward the government's environmental objectives and targets.

The legal and policy framework for the sector is guided by the commitment to protection of the environment as stated in the Socio-economic Development Plan 2011–2015. The new Law on Water Resources places further emphasis on protection of the quality of national water resources. Gradual decentralization during the past decade has resulted in transferring the responsibility for planning and management of urban infrastructure to subnational government. Decree 80/2014/ND-CP enables water and sewerage companies to charge for the provision of wastewater services to cost-recovery levels. The related Decision 1930/2009 formulates a long-term vision on sector coverage and defines detailed targets.

Currently, most urban households use inadequately maintained on-site sanitation, such as septic tanks. These provide only partial treatment and contaminate groundwater and surface water. The continued discharge of untreated and partially treated municipal and industrial wastewater is a threat to public health, to dwindling freshwater resources, and thereby to national water security.

The construction of centralized wastewater treatment plants for urban areas in Viet Nam started in 2004. At present, it is estimated that about 700,000 cubic meters per day (m^3/day) of urban wastewater is being treated, in some 40 wastewater treatment plants. The installed drinking water supply capacity is 7 million m^3/day. Thus, only about 10% of the domestic wastewater is adequately treated before discharge to the environment.

The factors affecting performance and coverage of the government's urban wastewater program are as follows:

Financial Issues. Provincial governments are responsible for planning and budgeting for urban wastewater management programs in order to meet government targets. They are ultimately the owners of any infrastructure assets. Responsibility for management can be delegated by contract, e.g., to water and sewerage companies. However, provincial governments cannot afford the capital costs of such schemes without substantial subsidy from central government, official development assistance, or both. The wastewater charges that can be levied from users are rarely sufficient to cover the cost of operation and maintenance, and cannot meet the cost of financing or replacement.

1 Written by Jelle van Gijn, Water Policy Advisor, and Hubert Jenny, Principal Urban Development Specialist, Asian Development Bank

Household Connections and Connection Charges. Past wastewater projects have experienced resistance from households not wanting to be connected in newly sewered areas. Obstacles appeared to be the cost of the connection and the disruption caused by the construction process within domestic premises. Reaching the full public health and environmental objectives is compromised if not all households are connected to a new sewer system. The new Decree 80/2014 makes connection to a street sewer system compulsory. The cost of connection is expected to be incorporated in the wastewater charges.

Decentralization, Corporatization, and Accountability. Planning and management of urban infrastructure is a devolved responsibility. Relevant for the water and sanitation sector is the transfer of responsibility to Provincial People's Committees and to water and sewerage companies or urban environmental companies. These are gradually being corporatized and equitized. With such fundamental institutional changes, it is unknown whether these agencies are capable of effectively fulfilling their devolved role, and whether effective regulatory instruments are in place to hold them accountable to deliver the services assigned to them. In a monopoly situation, the consumer needs protection through some form of independent regulation.

Private Sector Participation. Investment by the (international) private sector is often quoted as a means of funding part of the urban wastewater management program, to fill the financing gap. However, the sector has failed to attract significant private finance interest. This may be attributed to the (i) uncertainty about ownership and condition of assets, (ii) lack of confidence in the regulatory framework to protect investment, (iii) ongoing ambiguity on responsibilities, and (iv) lack of confidence in the sources of revenue from charges. Private sector involvement to date has usually been by invitation or as an unsolicited bid, followed by a negotiated contract without competition or full transparency.

Training and Education. The increasing sophistication and expansion of wastewater management facilities place new requirements on skills for business planning, finance, and contract management, as well as for operation and maintenance of new facilities. Work has recently started on an inventory of training needs as perceived by water companies. Continued effort is required to assess training and education opportunities for the sector, together with the establishment of a unified system of certification.

Technology Issues. An evaluation of the performance of the sector to date suggests that most current wastewater treatment plants treat sewage of low concentration, probably due to the prevalence of combined sewer systems, groundwater infiltration into sewers, some pretreatment of sewage in household septic tanks, and long detention times in oversized collector mains. Most treatment systems are of the activated sludge type with high energy requirements. Water quality standards for the discharge of treated effluent are demanding and are not related to the nature or use of receiving waters.

Septic Tanks. Septic tanks are currently the predominant form of wastewater management in urban areas. The septic tanks will remain in place for many more years, while wastewater projects are implemented throughout the country. In the meantime, these septic tanks need to be maintained and their sludge treated before final disposal. Projects have struggled with clear policies on connection or bypassing existing septic tanks when installing wastewater collection systems.

Programs to help government reach their target. Reaching the 2025 government targets implies an estimated investment of $10 billion–$20 billion, depending on choice of technologies for collection and treatment. Reaching this target requires a considerable scaling-up of the existing annual sector expenditure, from some $200 million annually to at least $1 billion. In reality, this indicates the need to prioritize selected cities and areas within cities. Prioritization needs to consider population density as well as the availability of freshwater at risk because of deteriorating water quality.

Together with other development partners, ADB is considering expansion of its proposed urban wastewater management program into a 10-year multidonor urban environment program, incorporating climate change resilience into the urban planning and governance legislative and institutional structure. Such an investment framework would be guided by a policy matrix and a set of project selection criteria, through which the priority considerations described above would be applied.

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Constructing a centralized wastewater treatment facility in Thanh Hoa, Viet Nam

INTRODUCTION AND OVERVIEW

A. PURPOSE OF THIS PAPER

This document is part of the preparatory policy dialogue toward a proposed program of support to the Government of Viet Nam by the Asian Development Bank (ADB) for improving urban sanitation and wastewater management in Viet Nam.[2] The paper describes the financial, institutional, and technical conditions that determine the performance and efficiency of the present program, in order to prepare recommendations for the government and ADB on changes needed. Proposed changes in the policy framework should aim at enabling a prioritized and targeted realization of the government's program of expanding the wastewater collection, treatment, and disposal systems for urban centers in Viet Nam.

The issues described in this paper represent the combined experience of various current and recent relevant programs in the sector, many funded by development partners.[3] The issues described may not be new or original. They represent a selective summary of knowledge gained in the sector. The Appendix lists the main sources of information used in the compilation of this paper.

2 Project number 44002-012; Approved September 2011. TA commenced October 2012. Inception Report approved by Ministry of Construction September 2013.

3 In particular, the recent World Bank sector assessment: *Vietnam - Performance of the wastewater sector in urban areas* (Final report presented January 2014); and the documentation generated by the GIZ/KfW project *Wastewater and Solid Waste Management in Provincial Centres*, accessible on http://www. wastewater-vietnam.org/en/publications/programme-publications.html

B. SANITATION NEEDS

Less than 10% of urban wastewater in Viet Nam is centrally treated. The majority of urban households use inadequately maintained on-site sanitation, such as septic tanks. These provide only partial treatment and cause contamination of groundwater and surface water. The continued discharge of untreated and partially treated municipal and industrial wastewater is a threat to the dwindling freshwater resources in the country. The reliable availability of good quality freshwater in several of Viet Nam's river basins is already at risk, especially in the dry season. In a country with about 3,000 kilometers of coastline and growing pressure from climate change, coastal areas and coastal cities are particularly sensitive. Shortages of freshwater during the dry season are already apparent, and will become more severe in some river basins.[4] Shortages of water, or of water of adequate quality, will contribute to food and energy shortages and rising food prices. Many areas rely on groundwater as a source of water for irrigation and for domestic or commercial use, with growing likelihood that such sources are contaminated by on-site sanitation systems or by increasing salinity.

The urban population of Viet Nam is growing at one of the fastest rates in Asia, fuelled by an expanding economy that is largely built on industrialization. In such rapidly developing urban areas with increasing population density and increasing per capita water consumption, more environmentally sustainable means of wastewater disposal are required, together with effective operation and maintenance of on-site and off-site wastewater facilities. With Viet Nam's transition into middle-income status, both central and local government will need to invest in order to protect the health of the population, now and in the future, and to guard in particular against the destruction of freshwater resources.

C. GOVERNMENT RESPONSE: POLICY, TARGETS, AND IMPLICATIONS

In recognition of the growing threat to health and environment, the government has formulated ambitious targets, aiming to install wastewater collection and treatment to cover 70% of the urban population by 2025, under the Prime Minister's Decision 1930/2009. These objectives are consistent with the current Socio-economic Development Plan 2011–2015, which places considerable emphasis on better performance by the government in reducing the environmental impact of municipal and industrial waste discharge. The capital cost to meet this target is estimated at up to $20 billion.

As a consequence of the government's cornerstone policy of decentralization, the responsibility for urban infrastructure (planning, implementation, operation, and maintenance) now rests with subnational governments. Government remains

4 In particular the Red River, Kone, Ma, Ba, Huong, Dong Nai, Tra Khuc and the Southeast River cluster. Source: ADB *Country Water Assessment Viet Nam (2014).*

responsible for the financing of capital investment, as defined in Decree 80/2014.[5] Water and sewerage companies are encouraged by law to operate on commercial principles, enabling local governments and utility companies to raise tariffs for wastewater to cost recovery levels, with an allowance for matching subsidies from the local governments. However, most local governments generate very little of their own revenue. Only a few cities generate funds for investment in infrastructure by issuing bonds or by accessing credit from local government investment funds. Furthermore, local government rarely has the financial and technical capacity to manage the scale, complexity, and cost of urban environment programs. Many of the urban environmental companies (URENCOs) or water supply and sewerage companies are not yet fully prepared to operate on commercial principles and to attract private sector financing and expertise. Neither do these utility companies have access to capital markets. A sustained capacity building effort of these decentralized institutions and agencies is therefore required.

D. INTERNATIONAL COMMUNITY RESPONSE: TECHNICAL ASSISTANCE AND FINANCE

Development partners are assisting government through technical assistance and by financing individual urban wastewater management programs on the basis of concessional lending and grant funding.

- The Japan International Cooperation Agency (JICA) has been a pioneer in financing large-scale sewerage projects in Binh Duong, Ha Noi, Hai Phong, Ho Chi Minh City, Hue, and Vinh Phuc.

- The World Bank recently assessed the sector and in January 2014 presented the results in the comprehensive Viet Nam Wastewater Review in Urban Areas. Investment programs include financing sewerage projects in Ho Chi Minh City and several coastal cities and the Urban Environment Upgrading Program. The Da Nang Priority Infrastructure Investment Project included significant wastewater management components. A $200 million International Development Association loan for the Urban Water Supply and Wastewater Project was approved in 2011, including $113 million for the wastewater component, for seven towns (Ninh Binh, Bim Son, Dong Ha, Thai Hoa, Tam Ky, Da Lat, and Dong Xoai) with a total population of approximately 800,000 (2010 data).

- The World Bank's Water and Sanitation Program assisted the Government of Viet Nam in formulating a cross-sector, interministerial Unified Sanitation Sector Strategy and Action Plan, followed by a pilot exercise in implementing a city-wide sanitation

5 Government of Viet Nam. 2014. *Decree No. 80/2014/ND-CP: On Drainage, Sewerage and Wastewater Treatment.* Ha Noi, Viet Nam.

plan for Can Tho. Under its regional Service Delivery Assessment program, a landmark sector performance review was recently published. [6]

- The first examples of central sewerage systems with separate networks are in Da Lat and Buon Ma Thuot, supported by a Danish International Development Agency (Danida) grant (2001–2006). These projects have served as an example for the development of the sector. Current support to the sector by Denmark is through its Business Finance Program, with projects under preparation in Buon Ma Thuot, Ba Don, Ha Giang, Vi Thanh, and Cao Bang.

- Germany is supporting a long-term integrated waste management program (Wastewater and Solid Waste Management in Provincial Centers or WMP) in nine provinces (Lang Son, Son La, Hoa Binh, Bac Ninh, and Hai Duong in the north; Vinh in the center; and Tra Vinh, Soc Trang, and Can Tho in the Mekong Delta), with considerable emphasis on subnational institutional strengthening and capacity building. Technical assistance is provided by GIZ and investment by KfW. Significantly, the last phase of the program shifted its institutional focus to provincial government, working with local stakeholders on critical issues, such as ownership of wastewater management assets, establishment of cost norms for the actual cost of operation and maintenance, and updated technical standards for operation and maintenance.

- A cofinanced mixed credit program (KfW of Germany and NORAD of Norway) for urban water supply and wastewater and solid waste management in 12 provinces began in 2013. Construction started in the six Phase 1 provinces during 2013 and in the six Phase 2 provinces in 2014. Capacity building of the main executing agencies started in late 2013.

- Finland is supporting water supply and sewerage projects in small towns in the northern provinces. A third and final phase started in November 2013, expected to be completed in 2016/17.

- The Australian Agency for International Development in 2009 financed the University of Technology, Sydney, to investigate the economics of different sanitation options, resulting in a demonstrated cost-effectiveness of decentralized solutions.

- Belgian Technical Cooperation has funded wastewater collection and treatment in two coastal towns in Binh Thuan Province. In Ho Chi Minh City, the Tan Hoa – Lo Gom Canal Sanitation and Urban Upgrading (1994–2007) serves as an early example of a successful integrated urban environmental upgrading project.

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6 WSP World Bank. 2014. *Water and Sanitation in Viet Nam. Turning finance into services for the future.*

- Under the ADB Central Region Small and Medium Towns Development project, waste stabilization ponds have been built in Tuy Hoa, Cam Ranh, and Phan Thiet. The Central Region Urban Environmental Improvement Project built a sewage collection and treatment system for Lang Co, with a household sanitation program that included sanitation credit schemes in other project locations. The Thanh Hoa Comprehensive Socio-economic Development project included a wastewater collection network and treatment facility using a low-energy waste stabilization pond system.

This considerable and broad ranging support by development partners to urban sanitation and wastewater management is testimony to the importance attached by the international community to improving the urban environment in Viet Nam. Active donor coordination for this sector has been in place since March 2011, chaired by ADB, with the objective of avoiding overlap of effort and to agree on a common strategic approach. Donor coordination has been effective e.g., in a united dialogue with government on the revision of key legislation related to urban wastewater management. This paper reflects the combined experience of the donor group.

ADB AND THE URBAN WATER SECTOR IN VIET NAM

A. ADB'S WATER PROGRAM IN VIET NAM

ADB involvement in the water and sanitation sector in Viet Nam commenced in the early 1990s. Initial involvement focused on institutional and planning support to Ho Chi Minh City, followed by a first loan aimed at the rehabilitation of the water supply and sanitation systems. Sequential loans for water supply and sanitation in three provincial towns provided the basis for improving essential infrastructure in more than 30 provincial towns. Consistent with the government's policy to encourage economic growth away from the major cities, two subsequent loans supported the integrated development of environmental infrastructure and services in small to medium towns in provinces of the Central Region. A loan on Rural Water Supply and Sanitation for the Central Region was approved in November 2009.

B. WATER SUPPLY LOAN FRAMEWORK

ADB's strategy for the water supply and sanitation sector was guided by the aims of the Water Financing Partnership Facility since its start in 2006, in which Viet Nam was a target country for doubling investment lending in water and sanitation by 2010. The ADB Water Operational Plan 2011-2020 is ADB's key guideline on water policy. Its strategic thrusts include increased water-use efficiencies and expansion of wastewater management and reuse, including sanitation. In 2008, ADB launched the preparation of four urban water supply projects, in Da Nang, Hai Phong, Ho Chi Minh City, and Thua Thien Hue, respectively. As a result, a

multitranche finance facility (MFF) for $1 billion was approved in February 2011.[7] The first three tranches under Periodic Financing Requests (PFRs)[8, 9, 10] have been approved for these four main cities, as well as for a range of smaller urban centers that channeled their requests for funding to ADB through the Ministry of Planning and Investment. PFR4 is in preparation.

C. FUTURE LOAN FRAMEWORK FOR URBAN WASTEWATER MANAGEMENT

A loan program similar to the water supply MFF is now being considered for urban wastewater management to support the government's environmental targets. A policy dialogue between government and development partners is in process, aimed at creating a more flexible and responsive institutional, financial, and technical framework for the subsector; more responsive urban governance; encouraging innovation; and generating pragmatic local solutions. Finance by official development assistance will not be sufficient to fund government targets in the urban wastewater sector. Apart from increasing local government revenues, policy and regulatory changes are being proposed that are explicitly intended to encourage and enable greater private sector involvement, initially in advisory and management roles, and eventually through direct investment.

CRITICAL SECTOR ISSUES AND POLICY IMPLICATIONS

A. SECTOR EXPERIENCE

The future investment program will be formulated and shaped based on the experience gained in planning and delivery of comparable urban environment programs in the recent past, as summarized above. In particular, any future program must be pragmatic in its design; it needs to reflect the actual capacity for budgeting, planning, and implementation by subnational government, while working with central government on policy changes in urban governance. Experience of the WMP in preparing local authorities at provincial and city level to assume management responsibility for wastewater assets has been well documented and serves as a guide for the sector. Given the constraints on financing, program planning needs to be based on realistic sources of funding from central government, development partners, and users. Planning must also take into account the capacity, skills, and capability of the local consultancy and construction industry.

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7 ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to the Socialist Republic of Viet Nam for the Water Sector Investment Program.* Manila.
8 ADB. 2011. L2754-VIE Ho Chi Minh City Water Supply Project. Manila.
9 ADB. 2012. L2961-VIE Water Sector Investment Program – Tranche 2. Manila. PFR2 towns: Binh Duong, Buon Ma Thuot, Da Nang, Haiphong, Hue, Quang Tri.
10 ADB. 2014. L3251-VIE Water Sector Investment Program – Tranche 3. Manila. PFR3 towns: Bac Giang, Cua Lo, Thanh Hoa, Quang Nam, Thai Hoa, Thai Nguyen and Vinh

B. POLICY AND LEGAL SETTING

The government's current economic objectives are formulated in the Socio-economic Development Plan (SEDP) 2011–2015.[11] This SEDP, ratified by the National Assembly in 2011, places greater emphasis on environmental protection and the management of waste from urban and industrial areas. The SEDP demands more effective management of water resources, consistent with the recommendations of the ADB 2009 Water Sector Review. This ultimately led to the acceptance in 2012 of a new Law on Water Resources.[12] Some specific directives relevant to the urban environment are (i) to improve relevant aspects of the legal framework, with environment protection issues to feature in master plans; (ii) to develop environmental protection infrastructure, such as for wastewater treatment; and (iii) to strengthen (national) monitoring systems. The SEDP for 2016–2020 is likely to continue the theme of environmental protection to enable sustainable development and further growth.

Key Legislation. The key legislation on urban water supply is Decree 117/2007/ND-CP, demanding that water supply companies are fully equitized and that they operate on the basis of full cost recovery with a reasonable profit. Similarly, the new Decree 80/2014/ND-CP for wastewater regulates drainage and sewerage in urban and industrial areas, and sets a framework for the calculation of wastewater charges.[13] These decrees combined provide the basis for setting realistic tariffs for water services. Supporting circulars provide implementation guidelines and specify water quality requirements. Further decisions add targets for water supply coverage (100% by 2025 for all urban areas, with 24-hour continuous supplies), for the reduction of nonrevenue water to 15% by 2025, and for coverage by wastewater collection and treatment (70% for provincial towns and higher by 2025).

Ownership and Delegation. Decree 80/2014 specifies that Provincial People's Committees are the "owners" of drainage and sewerage infrastructure. The responsibility for operation and maintenance of these assets can be delegated by contract to another party, termed the "drainage and sewerage entity" (i.e., an operator). In practice, the local water and sewerage companies or the URENCOs are usually responsible for operation and maintenance. However, formal maintenance contracts are not yet in place for every province.[14] Circular 09/2009/TT-BXD defines details on the implementation of the previous Decree 88/2007, including an appendix with guidance on the contents of a management contract for operation and maintenance of a sewerage system.[15] Decision 1930/2009 provides further detailed quantitative targets for 2025 and a vision for 2050 on domestic sanitation and industrial wastewater.[16] It emphasizes the application of the

11 Ministry of Planning and Investment. 2011. *The Five-Year Socio Economic Development Plan 2011–2015.* Ha Noi.
12 Law No: 17/2012/QH13 Law on Water Resources, passed by National Assembly on June 21, 2012; effective 1 January 2013.
13 *Decree 80/2014/ND-CP. Decree of the Drainage and Treatment of Wastewater.*
14 Management contracts are being piloted under the WMP in its nine provinces.
15 Ministry of Construction. 2009. *Urban and Industrial Parks Water Drainage.* Ha Noi, Viet Nam. Circulars for the new Decree 80/2014 are yet to be formulated and adopted.
16 Prime Minister, 2009. *Decision 1930/2009/QD-TTg. Approval of Orientation for Drainage Development in Viet Nam Urban and Industrial Zones toward 2025 and Vision toward 2050*. Ha Noi, Viet Nam

"polluter pays" principle, especially for industry, and moving toward cost recovery for drainage in general. Applying this "polluter-pays" principle to domestic wastewater, however, may suggest that households should be made to pay for the capital costs of a sewerage system as well, which is not realistic or sustainable (see below, section D).

In discussions about the application of wastewater fees or charges for wastewater systems in urban areas in Viet Nam, frequent reference is made to alleged confusion or overlap between two items of legislation, the old Decree 88/2007 and Decree 25/2013.[17] The issuing of Decree 80/2014 should clear some of the ambiguity but some level of confusion may still continue among local governments (Box 1).

Box 1: Environmental Charges or Payment for a Service?

In recent years, decrees issued by two different ministries have caused confusion and appeared to include some overlap: Decree 67/2003 issued by the Ministry of Natural Resources and Environment, jointly with the Ministry of Finance; and Decree 88/2007, issued by the Ministry of Construction. Although both of these have been replaced by revised decrees (Decree 25/2013 and 80/2014, respectively) removing some of the ambiguity, confusion persists amongst local government decision makers.

The two pieces of legislation have different origins and different purposes. Decree 80/2014 simply allows a city to charge for a service that it provides. Local government or its agencies can apply a charge for the actual provision of a municipal service, in this case the service of removing wastewater from the premises or the plot. The intention of the decree is to regulate the provision of such services, and to cover the costs that are incurred in providing such a service, entirely or partially.

Decree 25/2013 is effectively a penalty for causing environmental pollution. Its strategic objective is to reduce pollution. The environmental fee or penalty is based on a measure for pollution, being the mass of pollutants discharged to the environment. For small polluters, such as households, a minimum default charge is set, based on the water bill for convenience, with a maximum set at 10% of the water bill.

The proceeds from the fees under Decree 25/2013 constitute state budget revenue. After deducting permitted collection and management charges, proceeds should supplement the Provincial Environmental Protection Fund, which local enforcing agencies (Department of Natural Resources and Environment) can use to fund their environmental monitoring and protection work.

17 Ministry of Finance, 2013. *Decree 25/2013/ND-CP. Environmental Protection Charges for Wastewater*. Ha Noi, Viet Nam. Dated March 29, 2013, effective July 1, 2013. Supporting Joint Circular 63/2013/TTLT-BTC-BTNMT). This Decree replaced Decree 67/2007/ND-CP *Environmental Charge for Wastewater*.

The intention is to provide an incentive for polluters (chiefly industries) to treat their wastewater prior to discharge into the environment instead of incurring the penalty. Through inflation and lack of enforcement, the impact of the previous Decree 67/2003 on industry was negligible—very few industries install or operate wastewater treatment facilities in order to avoid the penalty. Changes in the current Decree 25/2013 include a significant simplification of the basis for charging, by (i) focusing on those industries that have been shown to contribute most to environmental damage, (ii) reducing the number of water quality parameters on which fees are calculated to one or two (chemical oxygen demand and total suspended solids), (iii) introducing a fixed fee for the very large number of small industries, and (iv) an obligation for self-declaration.

The new Decree 80/2014 explicitly states that households that pay for a sewerage service are exempt from paying the environmental fee.

Provincial regulations in the form of resolutions and decisions on wastewater, based on Decree 80/2014 and forthcoming subsidiary instructions, will need to be issued and accepted locally to establish the legal basis for planning and implementing any urban wastewater improvement program. The new Decree has introduced decentralized approaches to wastewater collection and treatment, the reuse of rainwater and treated effluent, and an emphasis on including sludge management in scheme design. These new concepts need to be fully understood and their value recognized and reflected in provincial regulations (see Box 2).

Water Quality Standards. Standards for treated effluent (before discharge into the environment) are laid down in "technical regulations," or QCVN, which are compulsory. Currently, these standards may be too ambitious and too inflexible for the current phase of development. Standards are not linked to the self-purification capacity of receiving water. Frequent changes in these standards have contributed to uncertainty among local governments on their application. For some wastewater treatment facilities now in operation, an intermediate standard aimed at providing partial treatment and reduction of pollution load may act as a stronger incentive for local government to embark on a wastewater treatment program. Evolving effluent standards should encourage a phased introduction of treatment, gradually enforcing more demanding standards as technologies evolve, while financing opportunities and available skills increase and expand. In addition, the present regulations refer to water quality parameters that currently cannot be readily monitored because of the absence of reliable sampling and analysis facilities at local institutions. The impact of regulations in protecting water quality is therefore compromised.

C. INSTITUTIONAL AND GOVERNANCE ISSUES

Decentralization and Accountability. One of the dominant governance features of Viet Nam's economic reform program over past decades has been the process of devolving responsibilities to decentralized agencies. Relevant for the water and sanitation sector is the devolution to subnational government (i.e., Provincial and City People's Committees) and to administrative and service delivery units, such as water and sewerage companies. The key question is whether such increased autonomy is matched with accountability: upward accountability in terms of compliance to agreed policies, regulations, and standards; and downward accountability, delivering an adequate service to an assigned group of users or consumers faced with a monopoly situation. The core issue for the sector is whether subnational government is capable of fulfilling its devolved role in planning, implementation, management, and operation of essential services. A further critical issue is whether regulatory instruments are in place to hold service providers accountable and whether such instruments are being applied.

Accountability in the delivery of water and sewerage services requires transparency and public access to performance data. A strong asymmetry of information inevitably exists between the water service provider (which holds all the information) and the consumer (who has very little access to relevant data). Achieving greater access to information will require a gradual culture change within the management of water supply and sewerage companies, as well as considerable support in introducing revised processes and acquiring new skills.[18]

Ownership and Private Sector Participation. Decision No. 38/2007/QD-TTg compelled water and wastewater companies to equitize, in other words to operate on modern business principles, as a transition toward full privatization. Effective equitization requires a formal management contract between the owners of the water infrastructure (provincial government) and the water operators. Such a contract specifies standards of service delivery, using performance indicators. An essential part of the management contract has to be an "asset inventory," a description and valuation of the infrastructure assets. An accurate asset inventory is critical for the effective operation and maintenance of the facilities and service. Any ambiguity will lead to a gradual deterioration in the value of the assets. Before water companies were equitized and were an integral part of provincial government, the ownership of assets was of little consequence.[19] A lack of clear definition of ownership and management responsibility, and an absence of a reliable asset inventory, will deter private sector operators—in particular, international ones—from seeking involvement in the sector in Viet Nam, such as in potential service management contracts.

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18 A succession of World Bank technical assistance projects with the Ministry of Construction aimed to improve public access to performance data of water and wastewater utilities, through the establishment of a water sector database, which can be accessed on http://www.vnw.gov.vn or http://www.vnwd.vn/.

19 In its nine project provinces, WMP works with subnational government agencies to explicitly define the issue of ownership of the wastewater assets for the purpose of assigning management responsibility. In practice, ownership is retained by the Provincial People's Committee until project implementation is completed. After that, ownership is expected to be "transferred" in some cases to the City People's Committee.

Box 2: A New Decree: Key Changes in Decree 80/2014

The Ministry of Construction has conducted a long and thorough consultative review process of the central item of legislation that governed urban drainage and wastewater management, Decree 88/2007. This review process was supported by GIZ, encouraging comments from provincial governments and wastewater management agencies, and representing the collective views of development partners involved in the sector. The results of the consultations suggested that the changes required were such that a new decree had to be formulated, rather than just a revision. The new decree 80/2014 was issued by the Prime Minister on 6 August 2014 and took effect on 1 January 2015.

Some of the fundamental changes in the new decree are as follows:

- New clauses that distinguish different standards for effluent discharges depending on the nature of the wastewater, where it is being discharged, and whether treatment is by a decentralized treatment plant. Standards are referred to (which may still need to be defined) for discharge into the environment, centralized treatment plants, other sewer systems, or to irrigation (Article 4).
- Recognizing wastewater as a resource: encouragement to reuse storm water (Article 20) and treated effluent from wastewater treatment plants (Article 24).
- Recognition of the need for active sludge management (Article 25), in terms of the obligation to remove and treat sludge, and to encourage recovery of energy and nutrients from sludge.
- Explicit reference to decentralized systems for collection and treatment of wastewater (Article 23), with provisions for adjusted effluent standards (Article 4).
- All dischargers (i.e., households) within a service area are obliged to connect to the sewerage system (Article 30). The concept of a connection box at the plot boundary is defined (Article 31), upstream of which (within the plot and the dwelling) the householder is responsible for internal plumbing consistent with "applicable standards and regulation." From the connection box downstream, the owner of the sewerage system is responsible.
- Procedures are provided to allow financial support to selected categories of disadvan-taged households to ensure all will be connected (Article 34). This support, or subsidy, can be paid from state budget or from any investment project.
- A distinction is made between the "costs" of operating a wastewater service (i.e., the full cost to the operator for running the service, which has to be established in detail) and the "price" or user tariff, which is to be approved by provincial government, taking into account affordability (Chapter V). Any shortfall between the total revenue from user tariffs and the full costs has to be subsidized by the project owner.
- The new decree removes some of the ambiguity (see also Box 1) that existed on the possibility of dischargers being charged twice (under environmental charges and wastewater services charges), by stating explicitly (Article 43) that those who pay drainage or sewerage service charges are exempt from payment of environment protection duties as under Decree 25/2013.

The water and sanitation sector so far has failed to attract significant private sector interest, as described above. Contributing factors are:

(i) Fundamental uncertainty about the ownership and condition of assets.

(ii) Lack of reliable information about the location, functioning, and present value of infrastructure assets.

(iii) Ongoing ambiguity on responsibilities for operation and maintenance in the regulatory environment.

(iv) Accounts or accounting procedures that are not consistent with international accounting standards; no ring-fenced accounts separating water service operations from other business interests.

(v) The recognition that force majeure and changes in legislation can always overrule contractual terms in Viet Nam. Water companies may have little experience in dealing with (or respecting) international-style contracts, including management contracts or performance-based contracts.

(vi) Lack of confidence in the sources of income because of delays to enforce increases in the charges for water and wastewater charges within a reasonable timeframe.

Government will need to promote and enforce governance models for water utilities that strengthen the regulatory environment and require an unambiguous definition of assets and service obligations, regulated through a clear management contract.[20] A new decree aimed at improving the transparency of private sector investment in infrastructure project development was issued in February 2015.[21]

Water and Wastewater Combined or Not. Experience in the sector internationally indicates that there are compelling reasons to encourage urban water and wastewater services to remain within one corporate entity, in particular for small and medium-size towns. These reasons, which include reduced operational cost and greater efficiency in maintaining customer records, as well as maintaining the management of the water cycle in an urban area within a single agency, will provide greater opportunity for strong institutions and financial sustainability of wastewater operations. Other observers point to different technologies involved in water supply and wastewater operations, and question the benefits of a combined entity for water and sewerage. To achieve efficiency and impact in institutional transformation and strengthening, development partners may consider requiring that water and wastewater companies be combined as a condition for receiving financial and technical assistance.

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20 In the 2011 *Infrascope* (published by the Economic Intelligence Unit, for ADB), Viet Nam scored 18.8% of a possible 100% on its legal and regulatory framework for the public-private partnership environment.

21 *Decree 15/2015/ND-CP, on Public Private Partnership Investment Form.* issued 15 February 2015. For a discussion of the new decree, see http://www.bold-frontier.com/vietnams-new-ppp-decree.html

Industrial Wastewater. Only a small fraction of wastewater generated by industry is adequately treated. In its review of the implementation of the objectives of the SEDP 2006–2010, the government recognized that its target of having central wastewater treatment plants for all industrial zones was only achieved in 45% of cases. Many of the central treatment plants that are installed are not being used: lack of enforcement of receiving-water standards means there is little incentive for industries or for industrial zone operators to invest in treating wastewater. Industrial wastewater can present the most severe environmental problems, because of very high organic loading (e.g., from the food processing industry), and because of the likely presence of toxic and refractory substances that create lasting environmental damage. Investment in the treatment of industrial wastewater can therefore lead to considerable economic benefit in terms of long-term environmental improvement. When compared to the costs of urban wastewater systems, little investment is required in a wastewater collection network because of the limited number of discharge points. Costs can and should be recovered directly from the industries concerned. In designing urban wastewater management programs, industrial wastewater should be considered simultaneously, as far as practical, to achieve greater environmental and public health benefit. Accepting industrial wastewater into public sewer system may be practical in some cases where pretreatment can be effectively enforced. In addition to the environmental benefits, this option can improve the financial sustainability of the public sewer system because higher fees can often be expected from processing industrial wastewater.

Training and Education. Policy changes advocated by the government in the management and ownership structure of water and sanitation utilities will place fundamentally new demands on the range and depth of staff skills. Working with the private sector, whether in service, management, or ownership roles, will call for greater experience in such concepts as contract management, use of performance indicators, and involvement with capital markets. In parallel, the increasing sophistication and expansion of wastewater management facilities will place new requirements on the nature of system management and skills in operating and maintaining new technology. As a result, wastewater sector personnel will require considerable and continuous retraining as well as new recruitment. To achieve any significant impact, a sustained program for a gradual but planned and targeted transformation of human resources for all utilities will be required at technical, diploma, and other academic levels. Enabling such a transformation requires central planning, coordination, and guidance. It may be argued that the Ministry of Construction, in its overall responsibility for policy and the strategic direction of the sector, should assume such a central role, possibly to be delegated to a key national institution, such as the Viet Nam Water Supply and Sewerage Association (VWSA).

Realizing government targets on wastewater treatment coverage will require a considerable scaling-up of construction activities in the urban wastewater sector—conservatively estimated at a fivefold increase in terms of annual disbursement compared to current levels of implementation. Experience with ongoing projects suggests that the key constraint in scaling-up is more likely to be subnational implementation capacity rather than shortage of funding. Delays are particularly prominent in decision making at provincial level and with procurement

of civil works contracts.[22] A further practical obstacle is in the capacity of contractors to undertake sewerage construction works in existing urban settings, effectively and without excessive disruption.

Capacity building, training, and education at all levels therefore deserve priority attention from government and development partners alike, when planning long-term and large-scale urban wastewater management programs for Viet Nam. A permanent infrastructure for training and education for the sector will need to be established, coordinated, and sustained.[23]

In this regard, supply consists of the existing public or private sector institutions for training and education throughout the country, which can be used to deliver the essential short and long-term courses. Supply equally consists of the opportunities for funding or providing training and education offered, for example, by development partners, private sector partners and suppliers, and water operators partnerships, or "twinning."

Demand for training and education needs to be determined through a comprehensive training needs assessment for the water sector. This needs to cover technical, financial, management, and operational skills. The VWSA has conducted an initial survey of its members as a start of a national training needs assessment, with support from the German Water Partnership.

Coordination and matching of this supply and demand should rest with the Ministry of Construction, preferably delegated to, e.g., the VWSA. Central coordination must involve the definition of competency requirements and recognition of training certificates and diplomas within—or at least consistent with—the national education framework beyond the sector. This would provide additional incentive for trainees to apply themselves to further training and skills development, and would permit an interchange of skilled staff between regions and water facilities.

D. FINANCIAL ISSUES

Earlier legislation, regulation, and resultant discussion created unrealistic expectations (primarily within local government) on the potential for full cost recovery for water services through user charges. The principle of a gradual increase of charges for water and sewerage services within household affordability limits is essential for sustainable functioning of the sector. For water supply in urban areas, full cost recovery from user charges will be feasible and affordable, with consumers willing to pay more for a service that gradually improves, becomes more reliable, and delivers a better quality product. In the near future (2020), the government expects urban water supply companies to be self-financing, and obtain their capital for investment needs from commercial loans and through public–private partnerships.

22 See e.g. Katsurai, T. 2011. *Urban Sanitation in Viet Nam: Challenges Ahead.* Paper presented at ADB, June 2011; and Finnish Consulting Group. 2011. *Mid Term Review of Water and Sanitation Programme for Small Towns, Phase II, in Viet Nam*. November 2011. Ha Noi.

23 JICA is planning to start, in 2015, a technical assistance project for the establishment of a sewerage training center to be modeled after the Japan Sewage Works Agency.

For wastewater, Decree 80/2014 permits charging households to cover some of the recurrent costs associated with providing a wastewater collection service, as a surcharge to the water bill (Box 3). However, few provincial governments have approved surcharges to full cost-recovery levels, even if a sewerage system is in place, due to concerns of sociopolitical acceptance. Important progress has been achieved in the WMP provinces following intensive advocacy and consultation. In general, households as well as political leaders still need to understand the benefits of a piped sewerage system and to be convinced of such benefits before charges can be increased substantially.

Wastewater Program Investment. Investment in (new) urban wastewater programs is capital intensive. The initial costs are very high. The economic gains that will accrue from these investments are in the realm of improved public health (with both short and long-term benefits) and better quality groundwater and surface water, which will mainly benefit future generations. Protection of a strategic national resource, such as freshwater, represents a high-value benefit, but the full economic impact will mainly be experienced in the long term. It is government's responsibility to provide a bridge between costs now and benefits in the future, in the form of a targeted subsidy. Subsidies will be essential for the capital investments, and initially also for operational costs, as a transitional measure. These subsidies will have to come from a combination of national and provincial sources, depending on the financial strength of the province concerned. It is not realistic to expect the private sector to bridge this financing gap to a substantial degree.

Setting Charges. The process of setting charges for receiving a wastewater service (a surcharge to the water bill) under the old Decree 88/2007 was complex.[24] Calculating the costs eligible for cost recovery and the definition of cost categories and consumers to be included in the calculation, followed by getting such charges approved, took considerable time in the few cities where the exercise was conducted. In practice, the charges that are actually applied (by the Provincial People's Committee) are determined by political acceptability and perceived household affordability considerations.[25] It may be more realistic and effective to base the tariffs for wastewater services initially on affordability and acceptability only, accepting that the income from tariffs will contribute something to cost recovery of operating costs—the principle of cost sharing. However, it is critical that charges for a wastewater service (under Decree 80/2014) should only be applied when consumers can perceive an improvement in service or in the quality of their direct living environment following the introduction of wastewater service charges.

Household Connections and Connection Charges. Past wastewater improvement projects experienced resistance from households unwilling to be connected in newly sewered areas. Obstacles were the cost of the connection charges, combined with

24 Under Decree 25/2013, households that discharge their wastewater untreated to the environment are, or can be, charged a maximum of 10% of their water bill as an environmental fee.

25 In Soc Trang, the Provincial People's Committee approved wastewater tariffs in July 2011 that approached cost recovery for operation and maintenance cost, at VND1,700/m^3. Two other towns within the GIZ/ KfW/ Ministry of Construction "Wastewater and solid waste management in Provincial Centres" project (Bac Ninh and Vinh) have gained similar approval.

uncertainty about the personal benefit of being connected. The new Decree 80/2014 unambiguously obliges households (and other dischargers of wastewater) to connect to the collection network in any sewered area, because the full public health and environmental objectives of investments in a sewage collection and treatment system will only be achieved if all dischargers of wastewater are connected.[26]

Box 3: "Costs and Price" under the New Decree

The new Decree 80/2014 makes a distinction in Chapter V between (i) the costs for wastewater services and (ii) wastewater service price or tariff.

- Wastewater service costs are the actual production costs incurred by the system operators to fulfill their responsibility in providing the service and in conducting operation and maintenance, including depreciation of all assets.
- Consumption tariffs are what consumers (such as households) will be charged by the operator in exchange for the provision of a wastewater management service. It is made clear that the asset owner shall provide a subsidy if the revenue from tariffs does not match the costs.
- Article 40 in Chapter V refers to determining the chemical oxygen demand (COD) of wastewater for nondomestic discharges. However, it does not specify how the COD level affects the charges. This will be further elaborated in the Joint Circular (MoC/MoF), which is now being prepared under guidance of the Ministry of Planning and Investment.

The owners of the wastewater system (usually the provincial government) instruct water and wastewater companies to propose wastewater tariffs. The provincial Department of Finance assesses these proposals in coordination with the Department of Construction. The Provincial People's Committee makes the final decision on the level of the tariffs.

Local Government Revenues. Currently, local government relies on user charges and transfers from central government to fund the operation of urban services, including urban wastewater management programs. As part of the process of decentralization, cities will need to increase the range of their sources of local revenue and become less dependent on central government transfers. One of the most appropriate and equitable forms of local revenue to fund the improvement of urban infrastructure, services, and urban environment is the concept of property tax. Property owners will benefit from the investments made by local government in improved access, drainage, and environmental improvement, such as wastewater management. These improvements may reflect in higher property (land and building) values, which accrue to the property owner. In exchange, local government should be authorized to raise an annual tax related to the value of the property, through periodic assessment.

26 The Buon Ma Thuot Sanitation Project (funded by DANIDA) achieved full household coverage within its area, following extensive public awareness campaigns and subsidies to support connection charges.

E. TECHNOLOGY ISSUES

From recent studies and government reports, the current status of coverage by urban wastewater management services in Viet Nam nationwide can be characterized as follows: (i) around 700,000 m^3/day, representing about 10% of the urban wastewater produced, is being treated by wastewater treatment plants, although some of this wastewater is of low organic concentration; (ii) 90% of urban households have a septic tank, but very few are actively maintained; (iii) 92% of wastewater being conveyed to sewage treatment plants is from combined sewerage systems and only 8% from separate systems that convey sewage only; (iv) 40 sewage treatment plants are currently operating in urban areas in Viet Nam; and (v) most treatment plants are based on activated sludge processes and are energy intensive.[27]

The factors affecting the technology and design choices in urban wastewater management projects in Viet Nam are many and complex. Given the ambitious government targets for 2025 on coverage by sewerage services, the limited financial resources, and—probably more importantly—the limitations on implementation capacity, the key strategy is informed prioritization. "Informed" in this context refers to accurate knowledge of the present status of service provision and the real impact of not treating wastewater—destruction of available strategic water sources and threats to public health. "Informed" equally refers to knowledge and awareness among decision makers of internationally available technologies that can assist in dealing with the issues facing Viet Nam in this sector.

Approaches to wastewater management in urban areas are changing globally. The strategy for cities in Viet Nam should reflect these global trends. In particular, in coastal zones in Asia, the future for cities is characterized by uncertain impacts of climate change, the unpredictable evolution of urban shape and rate of urbanization, and increases in energy costs, partly due to the inevitable need to phase out energy subsidies. More emphasis will be needed in the near future on the conservation and the recovery of resources, including energy, water, and such nutrients as nitrogen and phosphorus. Systems that will allow the localized reuse of (partially) treated wastewater without conveying the water over considerable distances therefore deserve serious consideration.

Against these global trends, planning for major infrastructure, such as wastewater collection systems, in Viet Nam needs to be flexible, adaptable, and with low resource impact. These considerations will influence decisions on the optimum configuration of infrastructure and are likely to point toward combinations of decentralized and centralized systems as a phased process. Legislation will have to be changed to support the need for greater flexibility, such as regulations on the quality of effluents and receiving water, the required clearance around sewage treatment plants and pumping stations, and various building codes and design standards.

27 Sources: MOC statistics; World Bank. 2013. *Viet Nam Urban Wastewater Review*. Ha Noi; *Third Draft Unified Sanitation Sector Strategy and Action Plan.* Ha Noi. November 2012.

Key Technology Issue. The key technology issue confronting Viet Nam's determination to accelerate its urban wastewater management program in existing urban areas is the ubiquitous presence of combined sewer systems (CSS) and their impact on the nature of the wastewater being conveyed. Experience has shown that the biological oxygen demand (BOD) of the wastewater carried in CSS and reaching the wastewater treatment plant can be as low as 50 milligrams per liter, equivalent to effluent discharge standard.[28] In effect, this wastewater does not need treatment prior to discharge. There has been much speculation on the causes of the low BOD: (i) dilution by rainwater as a result of the combined nature of the sewer system; (ii) dilution by infiltration of groundwater into sewer pipes aggravated by badly constructed networks and house connections, in particular; (iii) pretreatment by household septic tanks, removing organic matter through processes of sedimentation (resulting in sludge) and decomposition; and (iv) further settling and decomposition of organic matter in the sewerage system because of low flow velocities and long retention times. The last two factors indicate that polluting matter has not been fully removed from the environment; it is still present in the form of septic sludge.

Certain policy conclusions can be drawn from these general findings. A phased approach should be used when treating sewage from CSS, which is likely to be low-strength wastewater. A low energy demanding process may be planned at first, such as primary treatment only, with low investment and running costs. As a long-term objective, urban local government should aim to install separate sewer systems with an appropriate wastewater treatment, in particular for high-density population areas. In new urban developments (such as urban expansion areas), separate sewerage systems should be aimed for, with direct connections from households' internal drainage systems, without intermediate septic tanks. Research into suitable and affordable technologies that either connect septic tank overflows to a sewer system or bypass septic tanks as part of an upgrading program without creating undue disruption for households, will be very relevant and potentially rewarding for urban conditions in Viet Nam and elsewhere in Asia.

It is critical that building regulations are enforced to compel new urban areas to be designed with separate sewerage systems, with full wastewater treatment facilities. New developments provide opportunities to apply and showcase new technologies, including the recycling of used water. Failure to enforce such regulations at project design will unnecessarily aggravate environmental problems and imply higher costs when retrofitting appropriate wastewater collection and treatment systems.

Septic Tank Maintenance and Sludge Management. Septic tanks are currently the predominant means of wastewater management in urban areas in Viet Nam and will remain in place for many more years. These tanks need to be maintained and the sludge needs to be treated before final disposal. This requires considerable expansion of desludging services, integrated with transport to sites for full and final treatment, including options for the recovery of energy from the sludge (and other beneficial reuse).

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28 World Bank. 2013. *Vietnam Urban Wastewater Review. Executive Summary*. December 2013. Ha Noi.

▲ Laying pipes for a wastewater collection network brings excavation and road closures, disrupting urban life

To encourage an understanding for the need for septic tank maintenance among home owners, emptying services will need to be subsidized initially, supported by awareness programs. Acceptable operating practices for household desludging and in particular for the final disposal of the sludge need to be defined and monitored. Lessons can be learned from the few cities where successful desludging services are in operation—and where these have failed. The experience gained in Hai Phong with septic tank maintenance, funded directly from wastewater charges, is an important guiding example for other urban areas.

Conventional Centralized Sewerage. Introducing a centralized sewerage system in an existing urban area, whether combined or separated, is a complex, expensive, and time-consuming process. Sewerage installation brings excavation and road closures; it disrupts traffic and local everyday life. The cost of such prolonged disruption to the urban economy needs to be added to the economic cost of the program. In particular, in flat (coastal) areas without a natural gradient, sewage collectors need to be constructed at increasing depths, with a sequence of pumping stations. Sewage pumping stations consume large amounts of energy and require intensive maintenance—the capital and operating costs may not be dissimilar to those of a small decentralized treatment plant. Large centralized treatment plants may offer economies of scale, but will be increasingly difficult to locate in urban areas with high land value.

Decentralized Systems. Decentralized wastewater systems in this context can be defined as stand-alone sewage collection and treatment systems that serve a defined catchment in a larger urban area. Typically, a decentralized system serves a population of up to

50,000–100,000 people. In smaller cities, this number may be considerably lower. The characteristic advantages of these systems are that they reduce the need for sewage pumping stations and large-diameter sewage collectors at great depth, and that they may be planned, phased, and implemented with less hindrance than large centralized systems with large infrastructure. It is usually more manageable to identify and procure several small plots of land than one single large plot.

Decentralized systems can be designed as shallow sewers or small-diameter sewers, further reducing the need for excavation of deep trenches. In Brazil and South Africa, they are known as condominium or neighborhood sewer systems. Practical problems with introducing sewage collection systems in existing high-density urban areas of Viet Nam may be reduced by using advanced trenchless technologies. The higher cost of using specialized construction techniques will be offset by the economic benefits of reduced excavation and resultant disruption. When energy costs increase significantly, as can be expected when subsidies are phased out, the relative benefits of decentralized options will become more pronounced.

The term "decentralized wastewater systems" for some has become synonymous with simple technology and low-maintenance systems, often known as DEWATS.[29] These systems are characterized by low installed power, low energy use, low maintenance, no complex controls, and claims of climate change resilience. The sequence of treatment processes usually involves (i) primary treatment through simple sedimentation, (ii) secondary anaerobic treatment in fixed bed filters or baffled septic tanks, and (iii) secondary and tertiary aerobic-anaerobic treatment in constructed wetlands or ponds, or both. However, in high-density urban conditions in many Vietnamese cities, the large areas required for DEWATS systems would be prohibitive. Adaptations of these principles, such as using underground treatment stations, have been applied in densely populated urban areas of Bangladesh and the Philippines, and deserve consideration.

The high population densities of many Vietnamese urban settings point to small footprint (i.e., high flow rate) solutions. This will generally require mechanized, high-technology processes. In the current stage of development of Viet Nam, this may appear to present a considerable challenge. However, it is not a prohibitive condition. It may be argued that it will be more economical to invest in the training of skilled operators than it will be to find and acquire land in urban areas, with often resulting resettlement needs.

Treatment Options. Urban local government needs to be well informed and flexible on the range of available treatment options for specific demo-geographic conditions and financial circumstances. Choices should not be constrained by restrictive guidelines but based on best available, affordable, and suitable technology to suit local social and environmental conditions. Recent reviews of current practice in wastewater treatment projects in Viet Nam have highlighted the choice of unsuitable high-technology and high-energy treatment

29 Decentralized Wastewater Treatment in Developing Countries. The DEWATS concept championed in particular by Bremen Overseas Research and Development Association (BORDA).

options, where a phased introduction of treatment could have been a more sustainable alternative. The recent World Bank sector review pointed to the frequent use of activated sludge based solutions, even in small-town settings where available space would have allowed less energy-demanding treatment processes. The lessons learnt on these and other technology choices during ADB's current program of City Sanitation Strategy studies are summarized in Box 4.

Box 4: Lessons from City Sanitation Strategies

To inform preparatory dialogue between the Asian Development Bank and government, city sanitation strategies are being conducted in a number of medium-sized towns. These are rapid assessments of urban environmental conditions, needs, and preparedness in order to arrive at initial conclusions on the type of affordable and high-impact sanitation improvements suitable for the conditions encountered. Similar rapid assessments have been conducted recently in two coastal cities and four small towns in Thua Thien Hue Province. Further analysis is under process, but a pattern of findings from interviews and surveys is becoming apparent and is raising policy issues, with predictable regional variations. The main findings are as follows:

Unsuitable Planning Process. Most urban centers have some form of construction master plan—often out of date—that includes drainage and sewerage schemes. Where wastewater treatment plants are included, they are usually overdesigned in numbers and in terms of hydraulic capacity and treatment technology. The master plan does not set any priority. Financing plans are absent.

Unrealistic Effluent Standards. The recent regulatory changes in approaches to more flexible discharge standards have clearly not yet resulted in the acceptance of lower and more pragmatic standards by provincial and city departments of natural resources and environment. The concept of a phased and affordable introduction of treatment technology, with the probable impact on effluent quality, will become a crucial point of discussion, in particular for the larger capacity treatment units (> 5,000 m3/day), which require approval by the central Ministry of Natural Resources and Environment.

Need for Advocacy for Sanitation. Many city engineers place drainage and flood control high on their list of priorities. In the Mekong Delta in particular, salinity intrusion is a major concern and creates a threat to raw water intakes of drinking water services. Wastewater management as a separate subsector is seen as desirable but not generally recognized as a high priority, including by the general population. In some instances, this appears to be more the result of a lack of experience or awareness on what could constitute a suitable wastewater management strategy. The absence of ready access to informed technical advice to discuss such options appears to create a barrier to adopting a proactive position on advancing wastewater management.

Lack of Enforcement. Pollution of rivers by industries is regularly cited as a serious concern and recognized as a threat to family health and to the economic growth potential of the city. Farmers see it as a threat to water they need for irrigation. Such recognition can be found among city managers and civil society alike, an impression reinforced in regular features in all news media. However, often it appears that such (industrial) pollution is considered as an inevitable consequence of progress rather than a manageable impact that falls within the responsibility and control of local government.

Planning and Implementing Solid Waste Management. Solid waste management is not a direct objective of these rapid assessments. However, with its obvious relevance to effective functioning of the urban drainage network, it is frequently cited by city engineers and planners. The collection and disposal of domestic solid waste is often delegated to a private operator. Most problems appear to arise at the point of transfer or final disposal—beyond the urban boundaries and therefore apparently beyond the area of interest or active control.

Need for Capacity Development. Urban local government needs access to realistic and pragmatic advice in the formulation of an affordable approach to environmental threats. Such an approach will need to combine the management of storm water and wastewater, including industrial wastewater in as far as it affects the catchment of the urban area.

F. CONSUMER AND SOCIAL ISSUES

Urbanization is a relatively new concept for Viet Nam. The consequences of urban living and the risks posed to family health by untreated human and household waste in high-density surroundings are not yet fully ingrained in individual or community consciousness. Central or collective systems for conveying and treating domestic wastewater are still not common. The need to connect to such a system and to pay for such services are not always immediately understood or accepted by many households and local decision makers. Acceptance of the system, and of wastewater charges in particular, may increase if households recognize both the immediate and long-term benefits to family health, as well as the benefits to the urban environment and economy, and ultimately to national water security.

Septic tanks present an issue that needs to be recognized in program design, of both civil works and any supporting awareness campaign. Septic tanks in some form are fitted in most homes, although many will not be aware of their existence, location or purpose, or of any need for maintenance. The cost and disruption involved in retrofitting separate sewerage systems in old high-density residential areas will be such that these septic tanks are likely to be a dominant feature of domestic wastewater management for many years to come. Any

city sanitation strategy should include a component aimed at improving the functioning of septic tanks, which will generally require the introduction of a supply-led desludging service. Considerable understanding and collaboration from householders are required for such a service to be successful. Desludging operators need to obtain access to private quarters, find the septic tank, and create access if no manhole is available, as appears to be the most common condition. Households will need to pay for such a service, either directly or indirectly, as part of the wastewater tariff—which may be the preferable option. In either case, the value of a septic tank maintenance service needs to be understood and accepted.

Valuable experience has been gained and is available on suitable means to conduct information, education, and awareness campaigns in support of urban wastewater management and sanitation programs. So far, these have been aimed predominantly at households, but also at provincial and city authorities. Programs have included initial assessments of suitable means of communication and the design of awareness-raising materials, and have targeted broad related areas, including hygiene behavior beyond the home, such as at school and the workplace.

G. ADVOCACY

Investing in wastewater management in order to protect public health and strategic natural resources has not reached high political priority in Viet Nam, either at national or local level. Despite the emphasis given to the need for environmental protection in the current SEDP, active interventions and local budget allocations remain sporadic, incidental, and usually initiated by international development partners.

Reluctance in dealing proactively with waste is particularly striking in the industrial sector, where most wastewater is discharged untreated. Installed central treatment facilities are not being used, to avoid incurring operating expenses. For industries, the legal framework is in place, the cost of treatment is affordable as it can be recovered through allocating cost to the price of the product, and the technology required for the infrastructure to collect wastewater is manageable. In addition, the environmental benefit of treatment is usually considerable.

A fundamental obstacle in the allocation of political capital and priority budgets to the management of urban wastewater is that the benefits are not immediate, not clearly visible or tangible, and do not necessarily accrue to those who have to make the investment. Enforcing regulations on environmental protection and making the necessary investment therefore carry political risk and require vision and courage.

Advocacy amongst decision makers on the critical importance of waste management and environmental protection should therefore constitute the central component of a wastewater management program, rather than merely a subsidiary activity to infrastructure planning and design. Sustained advocacy should emphasize and demonstrate the long-term cost of failing to act, the irrevocable damage incurred in allowing untreated waste to accumulate in water and

soil, and the threat to sustainable economic growth by the destruction of a strategic resource—freshwater. Concepts of national water security need to be introduced and explained, as part of the process of explaining the obligation to invest in appropriate wastewater management. Planning, designing, and applying such advocacy programs require specialized professional skills, consistency, and a long-term commitment. The challenge becomes how such an advocacy process can be incorporated in an investment program supported by development partners.

INVESTMENT PROGRAM

There is a clear and growing need for active intervention—and a supporting legal framework—to assist the government in meeting the targets of its urban wastewater program. However, there is a considerable financing gap that cannot be filled by bilateral and multilateral funding sources alone, as well as a fiduciary gap that has to date prevented large-scale access to international finance and interest from the international water industry, and a skills and technology gap.

Estimates of the resources required to meet government targets for 2025, depending on the mix of treatment technology, are roughly $6 billion–$20 billion (Box 5), or an annual average investment and disbursement of about $1 billion. Current annual expenditure for the sector is probably about $150 million.[30] The scaling-up required is very large and the consequences for decision making and implementation capacity should not be underestimated, bearing in mind in particular the reality of significant delays experienced in recent urban wastewater programs. Targets can only be achieved if (i) the planning and decision-making process, including master plan procedures, is simplified and streamlined; and (ii) construction techniques and choice of technology for collection and treatment are amended to allow for an accelerated and staged implementation.

In practice, effort needs to be placed first on high-priority areas where investment will bring early economic returns in terms of noticeable gains in public health and water quality. This in turn requires prioritization of cities and areas within cities. In the absence of suitably disaggregated public health data, population density is a suitable proxy for selecting priority areas. An additional consideration will be a focus on those river basins where the availability of freshwater will soon be at risk because of deteriorating water quality.

Together with other development partners, ADB is considering expansion of its proposed urban wastewater management program into a 10-year multidonor urban environment program, incorporating climate change resilience into the urban planning and governance legislative and institutional structure. Such an investment framework will be guided by a policy matrix and a set of project selection criteria, through which the priority considerations described above would be applied.

30 World Bank. 2013. *Vietnam Urban Wastewater Review. Executive Summary*. December 2013. Ha Noi.

Box 5: Cost of the Urban Environment Program

The government's aim is to have 70% of the urban population in 2025, or a projected 35 million people, connected to a wastewater collection and treatment system.

Currently, it is estimated that between 2.5 and 3.0 million people are connected to a central sewerage system with treatment. Thus, about 32 million persons will still need to be connected. The average per capita cost to connect to a new wastewater collection system with treatment ranges is presently $200–$600.

As an "order of magnitude" estimate, meeting the government's target will require an investment of $6 billion–$20 billion during 2014–2025.

This estimate is comparable to that of the World Bank's Water and Sanitation Program "Service Delivery Assessment," which estimated a cost of $771 million per year to reach 2020 government targets for sanitation. The report calculated an anticipated spending of $205 million, implying a deficit of nearly three quarters of the required investment.

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