URBAN SANITATION AND SEWERAGE

SANITATION AND SEWERAGE

The indiscriminate disposal of domestic wastewater is the main reason for degradation of water quality in urban areas. Unlike the agricultural and industrial sources, where the cost of water pollution control may be passed on to the owners, the off-site domestic wastewater collection, treatment and disposal system is considered a basic service and is a major investment.

Infrastructure development for sanitation and sewerage in the Philippines began more than a century ago (see Table 16). In the early 1980s, Metro Manila provided sewerage collection and treatment facilities in a few areas through MWSS. While there were programs to upgrade sewerage and sanitation facilities, its implementation was postponed due to a lack of funds. Privatization in the 1990s further delayed the implementation of sewerage and sanitation projects for Metro Manila. Only the Makati Sewage Treatment Plant (STP) has been upgraded and the proposed six to eight STPs are in the bidding process. Each STP will have a capacity of .002 to .004 MCM / day or a total of .012 to 0.048 MCM. To date, about 0.06 - 0.08 MCM / day is covered by the existing facilities of MWCI and MWSI. To cover the MWSS area, a capacity of more than 2.4 MCM / day is necessary.

Table 16 Inventory of Domestic Sewerage Experiences and Practices

Location / Age of the System	Population Served	Technology Legend: STP- sewage treatment plant CST- communal septic tank	Performance Legend: M - Manage O- Oversight
Metro Manila 100 + years (undergoing rehabilitation in the '80s up to the present)	1,010,000 (8% of the system coverage)	Collection- conventional Treatment- several levels (STP) / partial treatment (CST / Imhoff tank) Disposal- Marine Outfall (Box 11)	Environmental Performance: On-going rehabilitation & meeting the standards for effluent quality; CSTs being upgraded to STPs. Institutional Performance: O & M by private concessionaires (MWCI & MWSI); collection rate is about 97% (50% of the water bill).
Baguio City 75 years (rehabilitated in 1994)	5,300 (2% of the system coverage)	Collection- conventional Treatment- STP (oxidation ditch & sludge drying beds) Effluent Disposal- River Outfall (Balili River); sludge disposal- agricultural use	Environmental Performance: Treatment- 94% BOD removal (but with low load), with effluent testing prior to discharge. Institutional Performance: LGU (M / O); 45 staff; collection rate = 22% of the connected households (flat rate).
Zamboanga City 70 years (not much improvements)	3,700 (1% of the system coverage1)	Collection- conventional Treatment- None Disposal- effluent by marine outfall (Basilan Strait); sludge- none	Environmental Performance: Raw sewage discharged 40 m. offshore & no effluent testing. Institutional Performance: Water District (M) / LWUA (O); 14 staff; collection rate= 99% of the connected households (50% of the water bill).
Vigan City 70 + years (not many improvements)	1,360 (3% of the system coverage)	Collection - conventional Treatment- 5 CSTs Disposal- effluent to rivers / fields; sludge is not collected	Environmental Performance: Partially treated effluent prior to river / field disposal & no sludge treatment & disposal (No effluent testing). Institutional Performance: Water District (M) / LWUA (O); no devoted staff; collection rate= 96% of the connected households (percentage billed to water supply varies according to category).
Bacolod City 39 years in Brgys. 29 & 20 years in Montevista (built by National Health Administration)	2,020 (less than 1% of the system coverage)	Collection- conventional Treatment- individual CSTs Disposal- effluent to public drain (Brgy. 29) & creek (Montevista)	Environmental Performance: Partially treated effluent prior to creek / public drain & no sludge treatment & disposal (No effluent testing). Institutional Performance: Brgy. LGU (M) / City LGU(O); no devoted staff; collection rate= no user's fee.
Cauayan, Isabela 14 years (built by DPWH)	4,000 (2% of the system coverage)	Collection- small bore sewer Treatment- stabilization pond Disposal-effluent to field	Non-operational. System failed due to lack of funds for operation and maintenance.
Davao City 29 years	1,161 (less than 1% of the system coverage)	Collection- conventional Treatment- STP Disposal- unknown	Non-operational. System failed due to lack of funds for operation and maintenance.

Sources: 1. A. Robinson/EDCOP, Water and Sanitation Program's WPEP: Urban Sewerage and Sanitation in the Philippines, March 2003.
2. C. Ancheta, Water and Sanitation Program's WPEP: Urban Sewerage & Sanitation, 30 years of experience and lessons, September 2000.

Most water supply and sanitation systems outside Metro Manila were given the option to form semi-autonomous water districts in 1973. Authority was granted to the water district to operate and administer water supply and wastewater disposal systems in the local communities, with support and financing from LWUA. More than 200 water districts are operational, but their focus is water supply, with no provision for sanitation services. This leaves Local Government Units (LGUs) to provide for sanitation services.

Some attempts to provide low-cost technologies in the LGUs were initiated as early as the '70s, through clustered household and low-cost collection systems, which led to a communal septic tank for partial treatment. Most of these facilities have fallen into disrepair. The 1998 National Domestic and Housing Survey (NDHS) estimated that only about 7 percent of the country's total population is connected to sewers, out of which very few households actually maintain adequate on-site sanitation facilities. Due to insufficient sewage treatment and disposal, more than 90 percent of the sewage generated in the Philippines is not disposed or treated in an environmentally acceptable manner.

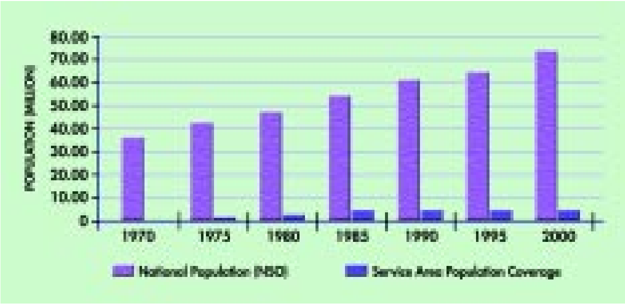
Domestic Wastewater Treatment Today

At LGUs, investments in sewerage collection and treatment facilities receive low priority compared to income-generating projects such as water supply. This is due to the high cost of constructing sewer networks, poor technical capacity, and low demand or willingness-to-pay (WTP) for sanitation services (see Figure 21). The problem has been further exacerbated by the restricted space available for such facilities in the low-income urban areas, where most of the generated sewage is disposed of indiscriminately.

Wastewater generation based on the water demand shows that of the total of 7.2 MCM generated daily, 5.2 MCM/day is from the urbanized areas (2.4 MCM/day from Metro Manila alone) (see Table 17).

Based on the LGUs limited financial resources, low-cost sewerage alternatives are being explored. Technical alternatives with costs comparable to individual on-site systems are available. Among others, the experiences in Pakistan, Indonesia, Brazil, and Bolivia in reducing the cost of the sewer network through simplified sewerage (small-bore and/or condominial systems) reveal that cost of the collection pipes is 40-74 percent less than the conventional system. The Palawan experience in Table 18, which using these technologies, is under construction. Likewise, a participatory approach in implementing demand-driven pollution control sub-projects was found to have worked in several areas. Most of the projects developed under these innovative approaches are presently under construction (see Table 18). To date, other LGUs are duplicating the same approach, i.e., seven barangays in Panabo City. Yet compared with its neighboring cities, Metro Manila is seriously behind in providing piped sewerage systems (Figure 22).

Figure 21 Population Growth and Sewerage Service Coverage



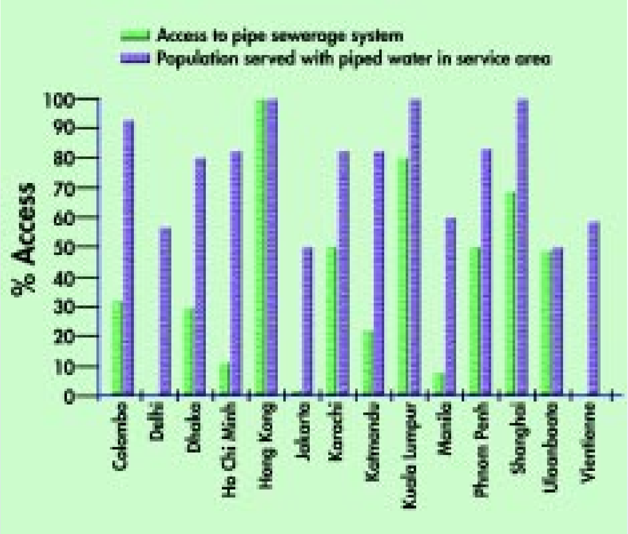
Source: National Statistics Office.

Table 17 Domestic Water Demand and Wastewater Generated

Items	Urban	Rural	Total
	(in million)		
Population[1]	43.6 (57%)	32.9 (43%)	76.5 (100%)
Per capita Water Consumption[2], l/d	150	75	-
Water Demand, m^3/d	6.54	2.47	9.0
Wastewater Generated3, m^3/d	5.2	2.0	7.2

1/ 2000 NSO ; 2/ LWUA Methodology Manual ; 3/ 80% of water demand.

Figure 22 Sewerage Coverage Around the World



Sources: Various World Bank and other reports.

Available and Adaptable Technologies

Scaling-up of sanitation facilities or phased implementation strategies could be adopted to reduce the lag in developing pollution control facilities (Box 12).

Even with highly urbanized cities, the implementation of a conventional sewerage project cannot be realized in the short term because of other environmental concerns facing the LGUs such as solid waste management, drainage, water supply, etc. An example is the proposed Cabanatuan City's storm drainage project in Table 18, which replaces the earthquake-damaged system in order to eliminate the flooding and stagnating wastewater problems in the central business district. Realizing the implication of the transfer of wastewater, including septic tank effluent into the Pampanga River, the city included a dry-weather flow interceptor at the outfalls that will be connected to a sewage treatment plant (Step 2 in Box 12). The cost per capita of the combined system is relatively high. Yet through this phased system, the city is able to address the perennial flooding problem and improve the quality of effluent through its dry weather flow interceptor system and sewage treatment plant.

Another example is the Palawan Province Barangay Environmental Sanitation Project (BESP) which provides low-cost sanitation facilities to 4th to 6th class municipalities. The sub-projects include a simplified sewer network among clustered houses, which conveys the sewage through combination of small-bore and a condominial sewer system into a communal septic tank with sand filter beds or soak-a-way pits.

Both communities participated in the planning and agreed on the type of sewerage system based on their WTP for its operation and maintenance. This shows that there is a real demand for appropriate sanitation services in poor and middle-income communities. The estimated capital cost of sewerage and sanitation is presented in Table 19.

In the semi-urban areas in low-income countries, conventional centralized approaches to wastewater management have generally failed to address the needs of the communities in collecting and disposing of domestic wastewater and fecal sludges from on-site sanitation. Implementation based on a decentralized approach may offer opportunities for wastewater reuse and resource recovery, as well as improvements in local environmental health conditions[18]. This approach could ease the implementation barrier due to the unavailability of land for the sewer network and treatment facilities, as well as socio-political conflicts. The concept also encourages more community participation that would allow the selection of low-cost sewer networks and treatment alternatives according to their WTP. Experience in Indonesia and Palawan reveals that this approach allowed connection of sewage at the nearest connection point (backyards), which reduced the cost of connection by 20 percent from that of the conventional system.

In Japan, nightsoil treatment plants have been introduced in many cities, whereas piped sewerage systems are not yet implemented. Septage collection from individual households or buildings is collected by vacuum tankers and disposed into the treatment plants for appropriate treatment. This option can be considered as an intermediate measure between on-site treatment and a piped system in a high-density area.

Table 19 Capital Cost per Beneficiary (in PhP)

Item	1994 NUSSBP[1]/		Projected 2003 Prices[2]/	
	Capital Cost	Annual Operating Cost	Capital Cost	Annual Operating Cost
Sanitation Facilities	1,370	173	2,850	355
Piped Sewerage	2,760	195	5,700	400

1/ 1994 National Urban Sanitation and Sewerage Strategy Plan (NUSSSP), prices in 5 highly urban cities. The base unit cost was also used in the Provincial Water Supply, Sewerage and Sanitation Sector Plan (August 2000) by JICA in 30 provinces.
2/ Adjusted rates by inflation factor of 1.08.
3/ MWSS (MWCI) figures (2002) are within the projected 2003 capital cost at PhP 4,950 for piped sewerage and PhP 1,043 for sanitation facilities.

[18] Jonathan Parkinson & Kevin Tayler, Decentralized Wastewater Management in Peri-urban Areas in Low Income Countries.

Table 18 THE LGUs CAN DO IT!

Location / Age of the System	Population Served	Technology	Performance
Cabanatuan City (Construction is on-going; 2004- target completion date)	25,201	Collection: combined drainage system Treatment: DWF with STP Disposal: septage effluent to Pampanga River; sludge to be collected and treated for agricultural reuse	Environmental: Septage effluent is treated prior to river disposal & desludging by vacuum tanker to drying bed prior to agricultural use (EMP requires effluent testing). The STP operates only during the dry season or when the effluent quality concentration is high. Institutional: WD (M) / LGU (O); Users Fee (under negotiation) Capital Cost per beneficiary: PhP16,993 (for the whole combined system) and PhP 2,200 (for the DWF interceptor and STP).
Palawan Province (Construction is on-going; Q4 2003- target completion date)	12,750 (9 sub-projects in the municipalities of San Vicente, Roxas, Quezon, Dumaran, Taytay & El Nido	Collection: simplified / condominial sewer network Treatment: CST Disposal: sand filter / soakaway	Environmental: Septage effluent is treated prior to land disposal & desludging will be done by vacuum tanker to a drying bed prior to agricultural use (EMP requires effluent testing). Institutional: Association / Cooperative (M) / LGU (O); User Fee= Fixed rates varies from PhP 1.30 to PhP 10.50 to cover O&M cost (No full-cost recovery; Capital investment was provided by Provincial Government) Capital Cost per beneficiary: PhP 2,000 - P 3,500.

Source: Water District Development Project (WDDP), LBP, May 2003.

Box 12 Sewerage System Options for Scaling Up