

**KNOWLEDGE HUB FOR SANITATION
JAPAN SANITATION CONSORTIUM (JSC)
CONTACT MISSION TO INDONESIA (NOV.30-DEC.4, 2009)
MISSION REPORT**

JANUARY 18, 2010
JSC

1. INTRODUCTION

INTRODUCING JSC

The Japan Sanitation Consortium (JSC) is a newly established organization in Japan that works as the Asia Pacific Water Forum's regional hub for sanitation. This hub is part of a network of regional centers of excellence, or *KnowledgeHUBS*, committed to improving water security in the Asia-Pacific region. Together, the hubs collaborate to deliver advanced, knowledge-based products and services that meet the practical needs of water organizations like utilities, river basin organizations, ministries, and planning agencies.

The purpose of JSC activities is to generate and share information, spread knowledge and promote the improvement of sanitation in the Asia-Pacific region.

OBJECTIVES OF THE JSC MISSION TO INDONESIA

JSC selected Indonesia as its first target country for a comprehensive country sanitation survey. Sanitation has a wide impact on health, water resources and the economic activity, as poor sanitation and hygiene result in significant financial and economic costs, and also contributes greatly to water pollution. According to UN Coverage Estimates in 2006, access to improved sanitation (that is, with accessible, private, and safe place to urinate and defecate) in Indonesia was reported to be around 52% (rural 37%, urban 67%), which corresponds to 119 million people without sanitary toilets. This result is below the regional average for Southeast Asian Countries of 67% and shows the need for further improvement in this sector.

In order to prepare for the comprehensive country survey that JSC intends to conduct in the next fiscal year and to prepare two important international events on sanitation that will be organized in Indonesia in 2010: the Japan-Indonesia seminar on sanitation in Jakarta, jointly organized by the Ministry of Land, Infrastructure, Transport and Tourism in Japan (MLIT), the Japanese Embassy in Indonesia and the Ministry of Public Works of Indonesia (February 23, 2010), and the international conference and exhibition organized in Surabaya (Decentralized Wastewater Treatment Solutions in Developing Countries - DEWATS, March 23-25), JSC went on a contact mission for 4 days to Jakarta and Surabaya. There, the

mission met some of the key persons and organizations involved in sanitation and learned about the current situation and needs.

MEMBERS OF JSC MISSION

Chief of Secretariat: Takehiko Kawai, Managing Director, Sewerage Business Management Center (SBMC)

Advisor: Kazushi Hashimoto, Councilor, Japan Water Forum

On-site Wastewater Systems Expert: Akira Morita, Deputy Managing Director, Japan Environmental Sanitation Center (JESC)

Off-site Wastewater Systems Expert: Muneharu Hamada, Consultant

Survey Staff: Pierre Flamand, Consultant

VISITED AGENCIES AND CONTACT PERSONS

The mission schedule and list of visited agencies and contact persons are shown in the following table1.

2. CURRENT SITUATION OF SANITATION POLICY AND PLANNING IN INDONESIA (MISSION FINDINGS)

SANITATION IN INDONESIA

The sanitation in Indonesia is slowly developing. Only about 2% of the population in Jakarta, the capital city of Indonesia, is connected to the only available sewerage system. Eleven cities have some kind of sewerage systems but only one city, Denpasar, the capital city of the Bali province, has a full scale sewerage system. It is estimated that 50 million people, 21% of the total population, lack access to basic sanitation.

REGULATORY FRAMEWORK ON WASTEWATER MANAGEMENT IN INDONESIA (see Appendix 1 for more details)

The regulatory framework on wastewater management in Indonesia is at a very initial stage of development. The water quality control of domestic wastewater has been introduced by Decree by the Ministry of the Environment (Decree No.112, 2003) which sets the wastewater quality standards for residential areas, apartments, large restaurants, commercial complex and others.

As for industrial wastewater, the Ministry of the Environment concludes the pollution Control Agreement with industries and evaluates their environmental performance.

Evaluation results are made public once a year. However, these controls are limited to some two hundreds large-scale industries and there are no measures to control the pollution originated from a numerous number of medium and small-scale industries.

Sewerage Law or Sanitation Law has not been established yet. The administration is considering drafting such law and introducing it to the parliament in 2011.

IMPLEMENTING BODIES FOR SANITATION IN INDONESIA

The implementing bodies of sanitation are local governments (that is, provincial governments or municipal governments). The central government's role is to set the national targets, rules and distribute budgets.

Especially since the decentralization in 2001, it is ultimately the local government's responsibility to decide how much investment is to be put into sanitation. Therefore, if the local parliament's awareness on sanitation is not high enough, the investment will not materialize. For example, in the case of Surabaya City, besides the Environmental Department, there has been no specific department responsible for implementing investment in sanitation. Recently, the local Department of Public Works (CHIPTA KARYA) was designated to be the implementing body for sanitation investment in Surabaya, and made a belated start.

EFFORTS BY CENTRAL GOVERNMENT

The Department of Environmental Sanitation, General Directorate of Human Settlement (CHIPTA KARYA), Ministry of Public Works, is responsible for setting national target, rules and regulations for urban sanitation. The current major efforts by the central government in the area of sanitation are as follows:

- (1) The National Water Supply and Sanitation Working Group is established as the coordination body among the concerned ministries in the central government, which includes BAPPENAS, the Ministry of Public Works, the Ministry of Environment, the Ministry of Health, the Ministry of Home Affairs and so on.
- (2) The preparation of the Five Year Plan in the sanitation sector, which will start in 2010.
- (3) The preparation of the draft of the Sanitation Law or Sewerage Law, which should be discussed in the 2011 National Parliament.
- (4) The creation of the Association of Sanitation for Awareness. Currently, 12 governors and mayors have joined.

THE FIVE YEAR PLAN

According to CHIPTA KARYA, the major sanitation components of the Five Year Plan (2010-2014) are as follows:

- (1) The development and expansion of off-site (sewerage) systems in 16 cities (5 new developments and 11 expansions). (see Appendix 2)
- (2) SANIMAS, the Community-based On-site Sanitation and Treatment Program, in 260 cities. (see Appendix 3)
- (3) The reduction by 20% of sludge volume in the on-site systems (septic tanks). (see Appendix 4)

Each of 330 Provincial governments is required to formulate a City Sanitation Strategy. Half of 330 CSS will be implemented in the Five Year Plan period.

Table 1. Mission schedule and list of visited agencies and contact persons

Date	Location	Contact Name
Tuesday 1 December	EMBASSY OF JAPAN	Ms. Chikako Sado (Second Secretary Economic Section Public Works) <i>Embassy of Japan in Indonesia</i>
Tuesday 1 December	JICA INDONESIA	Mr. Takashi Sakamoto (Chief Representative) Mr. Shigenori Ogawa (Senior Representative) Mr. Nobuo Iwai (Representative) Ms. Keiko Kitamura (Project Formulation Advisor Assistant Resident Representative) <i>JICA-Japan International Cooperation Agency</i>
Tuesday 1 December	ADB JAKARTA	Mr. Rehan Kausar (Infrastructure Specialist Indonesia Resident Mission) <i>ADB-Asian Development Bank</i>
Tuesday 1 December	THE WORLD BANK JAKARTA	Mr. Risyana Sukarma (Water Management and Environment Consultant) <i>The World Bank</i> Ms. Isabel Blackett (Senior Sanitation Specialist) <i>WSP-Water and Sanitation Program</i>
Wednesday 2 December	MINISTRY OF PUBLIC WORKS GOI	Mr. Handy B. Legowo (Subdirector of Sanitation) <i>Ministry of Public Works</i> <i>Directorate General of Human Settlements</i>
Wednesday 2 December	PD PAL JAYA	Ms. Loedin Liliansari (President Director) Mr. Ir. Erwin Marphy Ali <i>Wastewater Management Enterprise</i> <i>City of Jakarta</i>
Thursday 3 December	SURABAYA MUNICIPAL GOVERNMENT	Mr. Togar Arifin Silaban (Chief of the Environmental Bureau) <i>City of Surabaya</i> <i>Environment Agency</i>
Friday 4 December	MINISTRY OF PUBLIC WORKS GOI	Mr. Susmono (Director) <i>Ministry of Public Works</i> <i>Directorate General of Human Settlements</i> Mr. Handy B. Legowo (Subdirector of Sanitation)
Friday 4 December	EMBASSY OF JAPAN	Ms. Chikako Sado (Second Secretary Economic Section Public Works) <i>Embassy of Japan in Indonesia</i>

Appendix 1

REGULATORY FRAMEWORK AND FINANCING FOR SANITATION IN INDONESIA

Without doubt, sanitation improvement will contribute to people through health and welfare enhancement but it will take a long time before these benefits are felt and therefore, the advantages provided by sanitation will not be acknowledged instantly by people. Even though, sanitation improvement would be greatly beneficial to the national economy with the restoration of the aquatic environment of rivers, lakes and coastal seas. However, the paradox is that, although sanitation is an essential service for the development of the nation and the society, people place a low priority in it and a weak willingness to pay for it. Consequently, it is difficult to increase sanitation investment through the market mechanism only. A 'Carrot and Stick Approach' would be needed with, on the one hand, an element of compulsion, such as a penalty for not investing in sanitation (then giving no other choice but investing), and, on the other hand, with the nation covering a certain portion of the investment cost for sanitation. By doing so, individuals' burden would be reduced and sanitation services would become affordable for them.

For example in Japan, under the Sewerage Law, people have the obligation to connect to the sewer within three years after the sewerage network becomes operational in the area. On the other hand, when a municipality constructs a sewerage system, a substantial portion of the investment cost (up to 50%) is covered by the central government through subsidy and the sewerage charge is usually set at a slightly lower level than the water tariff. If all of the capital costs and the operation and maintenance (O&M) cost were to be recovered by the sewerage charge only, the collected charge would be three times higher than the current level.

In Indonesia, since both elements of the 'Carrot and Stick Approach' are not well in place, it is difficult to increase sanitation investment dramatically. In this country, the New Environment Law was established in 2008, and the Solid Waste Law was also enacted. Under the Solid Waste Law, local governments are required to close open dumping sites and to convert them to sanitary disposal sites within five years. If local governments fail to comply with this law, they will be fined. Under the New Environment Law, industries are obligated to meet the wastewater quality standards, and in Jakarta, industries are regulated not only by the wastewater quality standards but also by the total volume of pollutants they

discharge. However, since the Sewerage Law or the Drainage Law has not been established yet, there is no regulatory framework to oblige local governments to invest in sanitation, such as sewerage and drainage.

Without a Sewerage Law, even if a municipality installs a sewerage system in the commercial district of a large city, it would be difficult to enforce the commercial institution, which has already in-house wastewater treatment facility, to connect to the public sewerage system. It would not be easier to enforce ordinary houses in residential areas, already equipped with a septic system, to connect to the sewerage system. Thus, the recovery cost for sewerage investment comes along with uncertainties, which could discourage municipalities from investing in such systems.

For sanitation purpose, most of the houses in urban area have installed septic tanks that actually are not functioning as a treatment system, since regular desludging, an essential operation to allow septic systems to work properly, is usually not done in a suitable way. As a result, untreated wastewater from septic tanks infiltrates into the ground and pollutes groundwater.

In Jakarta and Surabaya, sludge treatment facilities are owned by municipalities but the sludge collection is done by private operators, who charge residents at a higher price than in Japan. However, since residents only call sludge collection operators when they experience troubles, such as septic tank overflow, the desludging of a significant number of septic tanks has not been conducted for many years, leaving sludge treatment facilities underutilized. Municipalities understand the necessity of regular desludging but they are hesitant to promote this practice since it would be very difficult to collect the associated charge from households, as there is no existing law to enforce this operation.

The Government of Indonesia, inspired by the International Year of Sanitation 2008, has created the National Water Supply and Sanitation Working Group to tackle the sanitation problem, whose members are: BAPENAS, the Ministry of Finance, the Ministry of Public Works, the Ministry of Health, the Ministry of Home Affairs and others. BAPENAS has formulated the Urban Sanitation Development Acceleration Plan (PPSP), with a targeted volume of investment of US\$5.5 billion for 5 years, during 2010-2014. BAPENAS expressed their intention to use US\$0.5 billion from the Special Allocation Fund, which is reserved for the important projects of the nation, apart from the usual fund transfer from the central government to local governments. This magnitude of financial support from the central government may not be enough to motivate local governments to invest in sanitation.

Decentralization in 2001 had negative effects on the development of sanitation in

Indonesia. The central government's stance is that, while it will assume its role for general sanitation matters, concrete sanitation initiatives need to be decided and implemented by local governments according to their priorities. However, local governments have a different view point. Even in the case of Surabaya City, which is implementing a very innovative initiative in the area of Solid Waste Management, sanitation has been neglected by the municipal parliament and there was no department assigned for it until recently. Sanitation is a low priority on the municipal parliament's agenda and there is almost no budget allocated to sanitation.

Although the municipal government of Surabaya intends to implement 75 Community-based Sanitation projects, which are similar to SANIMAS projects, only five projects have been materialized. The reality shows that it is difficult for local governments to take initiatives in the area of sanitation without the strong support of the central government in both regulatory and financial areas.

Appendix 2

OFF-SITE WASTEWATER TREATMENT IN INDONESIA

BACKGROUND

The sewerage coverage in Indonesia is low, even in Jakarta, the capital city. Only about 2% of the population is connected to a sewerage system. Eleven cities (except Denpasar in Bali) have started sewerage projects but the coverage rate and the amount of wastewater treated in these cities remain minor.

CURRENT CONDITIONS OF OFF-SITE WASTEWATER TREATMENT IN JAKARTA

The visited wastewater treatment facility was the Setiaburi plant, which is located in the central commercial area of Jakarta. This is the only wastewater treatment plant for the sewerage system of the city and the number of connections to this facility is around 1,400 - which covers about 200,000 people. It is equipped with an aerated lagoon system. Apart from treating wastewater, the Setiabudi plant has also another function and is used as a storage facility for rain drainage and flood control.

Current conditions do not provide fully effective treatment and have a negative impact on the environment, favoring the spread of mosquitoes and flies, as well as odor and other concerns. The quality level of wastewater treatment could improve if the two following countermeasures are carried out:

- Construction of an additional stormwater overflow facility for discharge in the event of heavy rainfall
- Appropriate and regular desludging operations

In anticipation of future planning for sewerage expansion, the surrounding conditions of wastewater treatment plants, as well as the selection of suitable wastewater treatment methods, need to be well considered in order to avoid negative impacts on public hygiene.

CONDITIONS TO EXAMINE FOR SEWERAGE PROJECT PLANNING IN JAKARTA

Characteristics to consider for sewer pipeline installation in Jakarta

- Urban area is mostly flat
- Privileged residential zones are located in the hilly areas of the city, but they are not widely spread nor situated at a much higher altitude than the central area
- Soil mainly contains clay
- Continuous traffic jams occur from 6:00 am to 9:00 pm in the urban area.

Land for wastewater treatment plant

Downstream areas of rivers are suitable for wastewater treatment plants, but they are already densely populated or with slums. Therefore, it seems difficult to secure a substantial quantity of land at several locations for the construction of wastewater treatment plants.

Weaknesses of water supply system in Jakarta

Water supply system in Jakarta is weak, highlighted by the low coverage ratio (only 60% of population is served) and high non-revenue water (NRW: 45-55%). The water supply demand is expected to increase if the sewerage system expands. In that case, the capacity of the water supply system needs to increase simultaneously with the sewerage system.

CHOICE OF WASTEWATER TREATMENT METHODS

Scale of wastewater treatment areas

From the conditions previously described, the setting of numerous small-scale areas for wastewater treatment is recommended. This would provide a quick gain of performance that would facilitate further development of sewerage projects. To be advantageous, such planning should be conducted through an appropriate balance between pipeline burying cost and wastewater treatment plants construction cost, including land acquisition cost.

Wastewater treatment technology

After examining the scale of wastewater treatment areas (which also depends on the amount of wastewater to treat), the mission believes that activated sludge process, including conventional or extended aeration and oxidation process, would be suitable for Jakarta. If local conditions allow it, the extended process or oxidation ditch, which require wider land for construction in comparison to the conventional type, would be appropriate, since these systems offer more stability against irregular amounts and quality of wastewater inflow. Furthermore, oxidation ditch is the easiest process among other kinds of activated sludge processes. In addition, separate sewer system is recommended to maintain a regular wastewater treatment quality and cope with heavy rainfall.

Who should manage the sewerage system?

In Indonesia, the regulatory framework for sewerage has not been created yet and will probably take a long time to develop. In the meantime, it would be recommendable to assign the existing public corporation, PD PAL JAYA, as the implementing agency for sewerage projects and let this organization gather experience in managing sewerage systems. The accumulated experience could then be reflected in the development of a practical legal

framework for sewerage in Indonesia.

NEXT STEPS

A large-scale sewerage project is ongoing in Denpasar, Bali, under JICA loan. Furthermore, JICA is preparing a technical assistance project to review the previous Master Plan for sewerage system development in the central Jakarta area, and for the capacity building and regulatory framework development for the sewerage sector.

ADB is also developing a sanitation project including the expansion of sewerage networks in mid-size cities. JSC will coordinate its activities with JICA and ADB.

Appendix 3

THE SANIMAS PROGRAM

CONCEPT

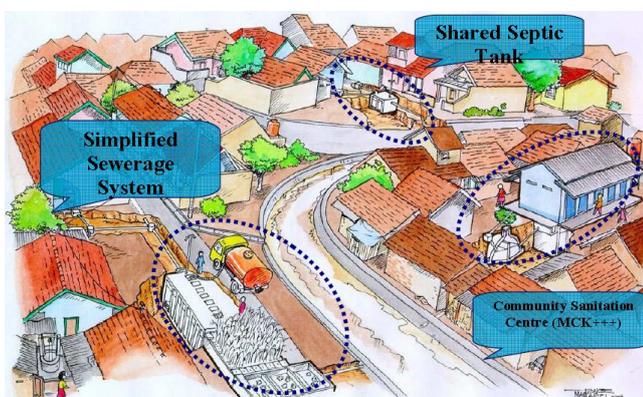
To improve sanitation conditions in disadvantaged urban areas, the Government of Indonesia has developed SANIMAS (Sanitasi Oleh Masyarakat), a Community-based Sanitation (CBS) program, and implemented projects throughout the country in collaboration with local governments and communities. SANIMAS is an alternative option for local governments to improve sanitation for communities with low income in densely populated urban areas. It aims to fill the important gap between inappropriate or non-existent on-site sanitation and conventional/less affordable sewerage systems, and promote behavior changes towards sanitation. The first projects were launched as pilot projects to draw the attention of local governments in the hope for interest and further replication.

Wastewater treatment in Indonesia is mainly done through septic tanks (on-site systems), with or without regular desludging, or frequently with no system at all in slum areas. Sanitation is a difficult issue in Indonesia. People do not seem to have much interest for it, as they cannot directly see its benefit and do not associate health problems with the lack of sanitation. They have other priorities (like getting access to drinking water) and they do not want to pay for a service that was previously free of charge. Therefore, there is a crucial need for health and hygiene practice education, behavior change and community involvement that can be improved through the SANIMAS program.

SYSTEM

In this program, three preferred technical options are proposed, based on the conditions mostly found in Indonesia's urban slums:

1. A septic tank is shared between a number of households (10 to 20 on average, or several septic tanks for more connections).
2. A community sanitation centre is built for about 100 households, known as MCK++ (Mandi Cuci Kakus). The first "+" signifies a proper wastewater treatment plant under the upper structure. The second "+"



means that biogas generated from a digester can be used for cooking in three houses or for lighting. Where it applies, the third “+” signifies a sustainable job opportunity for one operator who will have the responsibility to maintain the facility’s cleanliness.

A community sanitation centre gathers water points, toilets, bathrooms and areas dedicated for washing and laundry. It is a combination of decentralized wastewater treatment system module (the DEWATS system designed by BORDA) and an anaerobic baffled reactor enabling a small production of biogas (optional). A fee is collected for the utilization of the facilities but the collection system can vary, with a payment at each visit (Rp 100 – 1 US cent on average) or, regardless to the number of passages, on a monthly basis for local residents and for each passage of visitors not living inside the community.

3. Simplified sewerage systems in areas where households are equipped with a toilet and bathroom but without the space for an individual septic tank.

SELECTION, FINANCING AND MANAGEMENT

The selection of cities and communities depends on local conditions, specifics and the demonstrated willingness to resolve their sanitation problems. From the first few pilot projects, more cities were invited to join the program and include SANIMAS implementations in their annual budgets but in reality, financing can be a difficult issue. Consequently, SANIMAS diffusion greatly relies on the political will and financial possibilities of local governments. After considering a number of locations, the central government shortlists 3 or 4 locations and a participatory assessment is carried out. To be chosen within a city, local communities have to show an interest, demand and willingness to contribute for the improvement of sanitation services and the operation and maintenance (O&M) of the SANIMAS facilities

The selection of a technical option varies from location to location depending on available finances, physical constraints and the demand from the community. Ultimately, the community chooses its sanitation system. In 2003, 6 SANIMAS projects were launched and, according to the Ministry of Public Works of Indonesia at the end of 2009, SANIMAS coverage has grown significantly since, with 348 sites in 2009. All sites are functioning, but many of them are not used at their maximal capacity as the public consultation was not properly conducted.

SANIMAS financing comes from different sources. Key partners are central government, national agencies, local governments, local NGOs such as BEST (Bina Ekonomi Sosial Terpadu) and international NGOs such as BORDA, AUSAID, USAID, WORLD BANK (WATER AND SANITATION PROGRAM - WSP), and beneficiary communities. According to

the Ministry of Public Works in November 2009, so far SANIMAS projects have been mainly financed by municipalities (53%), then Central Government (around 30%), international and local NGOs, and communities (3.5 to 4.5%).

SANIMAS facilities are owned by local governments through a Community-based Organization (CBO). O&M is done by the CBO, which usually hires an operator chosen inside the community. The operator's training is provided through consultants by the central government, in cooperation with NGOs (like BORDA and associates). In some cases, where O&M requires higher skills, NGOs can also employ the operator and manage the service.

To implement a SANIMAS project involves:

- Training awareness on sanitation and health in the community, and creating a priority demand for sanitation through communication strategy and information campaign
- establishing a SANIMAS Community-based Organization (CBO)
- creating a capacity building (for management and financial issues, O&M and related human resources)
- choosing an appropriate sanitary system by the community
- creating new regulations and laws
- conducting O&M (by the community or by a NGO on behalf of the community)
- conducting monitoring and evaluation

The Ministry of Public Works expects the SANIMAS approach to be adopted by local governments in their City Sanitation Strategy (CSS). By 2014, 330 cities are targeted for a CSS creation.

ADVANTAGES & CHALLENGES

Advantages of SANIMAS

- Providing solutions for domestic wastewater treatment with low cost technology
- Offering access to sanitation for poor urban areas and improvement in wastewater treatment and water quality in public water bodies
- Financing from central and local governments and financing opportunity for donor inputs
- Involving local communities for the education process, selection of technology, planning, preparation, construction, O&M, and management of their project
- Improving hygiene and sanitation behavior
- Reducing health expenses by improving public health and limiting water-borne disease spread
- Providing a viable option for the Local Government's wastewater management

- Limiting water pollution by removing more than 50% of the BOD measured in wastewater, to comply with national domestic wastewater effluent standards (50 mg/L)
- Creating remunerated jobs for O&M operations
- Quick implementation (within a year), compared to centralized sewerage systems

Challenges

- Low initial cost compared to sewerage systems but only concerns a small amount of population and locations, and does not entirely respond to the sanitation needs in Indonesia (especially in large cities where citywide planning and sewerage systems are required)
- Low operation cost prevents from using electricity inputs, which does not enable aerobic treatment and limits wastewater treatment quality
- Systems requiring land to implement treatment facilities, which is often not available in densely populated areas
- “One size fits all” program with mainly the DEWATS system by BORDA, offering full wastewater treatment but only serving 300 people on average. System becoming expensive per capita, hard to afford and replicate for local governments with low budget
- SANIMAS projects including sludge treatment are costly, cannot be managed by the community nor cost-covered
- Community sanitation centre payment requirement for each passage can be disliked and not used if too expensive for low income families. The same problem can appear if facilities are badly managed (becoming dirty, smelly, lacking of water and with long queues at peak hours)
- Not always a fair system (e.g. poor and rich households pay the same fees for construction, O&M)
- O&M needs to be well organized and regularly carried out
- Systems not always used at their maximal capacity when the public consultation is not properly conducted

The SANIMAS program is one of the options to address sanitation problems in Indonesia, but not the only one. The sanitation challenges in urban areas, especially the low coverage rate to sewerage systems, require a combination of different technical solutions according to areas, identifiable through sanitation mapping and citywide sanitation strategies. This could include:

- Improved individual systems for least densely populated areas (<100 people/ha), assuming that they might not be connected to a centralized sewerage system for the

next 20 years

- Centralized systems for business districts who can afford to pay O&M fees and eventually the most densely populated areas (>250 people/ha)
- Community-based Systems (CBS, like SANIMAS), with either communal septic tank or public toilets/facilities for the intermediate areas

However, as the most densely populated areas are also the poorest, it would be politically and economically difficult to start with the implementation of centralized sewerage systems due to the investment needed for implementation and O&M. Therefore in these areas, CBS seems the best compromise before future connection to a centralized network.

The initial cost for a centralized sewerage system is now estimated at US\$250 dollars per capita, which means for an average family of 5 people US\$1,250 dollars. In comparison, a SANIMAS system costs around US\$30,000 dollars for 50 families on average, which means US\$600 dollars per family. Consequently, decentralized systems cost less considering the initial cost and O&M. Nevertheless, a sewerage system would treat wastewater for areas with 50,000 people (10,000 connections). This could be done by one centralized system, but would require about 200 SANIMAS systems, which necessitates a lot more organization, land issues, risk of failures, etc. Therefore, to choose the most appropriate sanitation strategies according to areas, the need for planning with a long-term perspective is a crucial issue.

According to the Ministry of Public Works of Indonesia, beside the political will and available finance of local governments, the problem faced to replicate the SANIMAS approach to all provinces/cities in the country is also due to the limited number of experienced facilitators to develop SANIMAS infrastructure. As for each project location, two facilitators are needed (a technical facilitator and a social facilitator), their provision and availability must be seriously considered to diffuse this program more efficiently.

DECENTRALIZED (ON-SITE) SANITATION OPTION

The decentralized domestic wastewater treatment system used in Japan - johkasou - is well known by the high officials involved in sanitation in Indonesia. It is seen as an equipment providing high treatment performance but expensive.

Appendix 4

ON-SITE WASTEWATER TREATMENT IN INDONESIA

SEPTIC TANK & SLUDGE REMOVAL

In Indonesia, on-site night soil treatment system is widely spread. In toilets, a small amount of water is used to wash away and dispose the human wastes to a septic tank for anaerobic digestion. Structural deficiencies and irregular maintenance of septic tanks are challenges to tackle, as they cause groundwater pollution or originate water contamination at close locations.

The way to use these toilets is to wash away after utilization with a small amount of water disposed nearby, to dilute night soil by few times its amount of water to allow its evacuation. Then, night soil flows by gravity to the buried septic tank, and infiltrate into the ground after digestion.

The widely diffused type of septic tank is usually built with brick walls but has no waterproof structure on the ground, allowing night soil infiltration into the soil surface. Other types of septic tank have one or two chambers with a combined system (one chamber for digestion and the second one for the infiltration of the wastewater discharged from the first chamber), or an additional tank for infiltration. Recently, an improved septic system has been developed, using a plastic body instead of bricks, and equipped with biofilters (see picture below).

The conventional type of septic tank includes a combined system with anaerobic digestion and soil infiltration through percolation into the soil, and its treatment ability depends on utilization conditions, soil characteristics, maintenance conditions and others. Therefore a certain level of wastewater treatment can be expected with proper desludging. However, the septic tank structure does not prevent from wastewater directly infiltrating into the soil and therefore, this equipment should be considered as imperfect for wastewater treatment.

When used over a long period of time, the septic tank function declines and wastewater may overflow from the tank. If hydraulic gradient is not maintained, the toilet might become out of order and then consumers are urged to clean the tank. Nevertheless, the users of toilets connected to a septic system usually neglect maintenance for an extended period of time and they view the septic tank as a convenient and cost-saving equipment.

Even if sludge removal is necessary to avoid groundwater pollution, this does not directly benefit to consumers. For that reason, septic tanks are not properly cleaned at the present time. The countermeasures to resolve this problem, on the technical side as well as on the

management side, are detailed as follows:

Technical improvement

To prevent from direct wastewater infiltration into the soil, it is necessary to replace the actual body of the tanks by a waterproof structure made of reinforced concrete or plastic, or to add another tank after the existing septic tank, allowing the partially treated wastewater to infiltrate into the soil after the anaerobic treatment and bring some improvement in comparison to the current conditions.

In order to promote such change in every household, institutional arrangement and financial support are needed. In addition, construction regulations to determine septic tank capacity according to the number of consumers are also required.

Operation and maintenance (O&M) improvement

To establish regular sludge removal, it is necessary to obtain residents cooperation, as well as the government's administrative and financial support for desludging operations and maintenance costs. These countermeasures should be taken simultaneously.

Regarding residents cooperation, it is important, as a basic measure, to raise public awareness on hygiene (education at elementary schools, residents education), and to organize the community so that they would work together to improve sanitation conditions by themselves.

Concerning desludging cost, the establishment of a system with charges is basically needed. It is realistic to conceive that part of the collection cost and sludge treatment cost would be charged to the residents and the remaining burden to the administration (local government)



Improved version of a septic tank

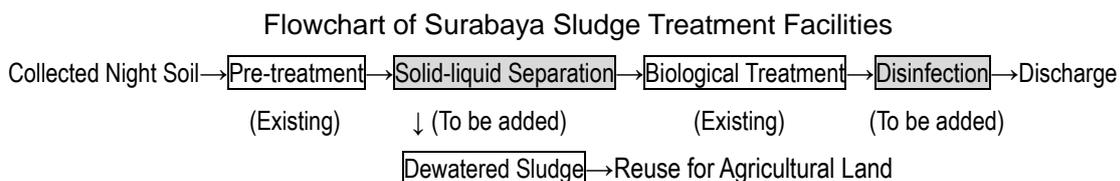
FACILITY IMPROVEMENT OF KEPUTIH SLUDGE TREATMENT PLANT - SURABAYA, INDONESIA

To resolve septic tanks issues with a long-term perspective, it may be desirable to replace the existing system by an improved version and to introduce a small-scale wastewater treatment plant for the community. Currently, there are financial limitations and the improvement is expected to take a long time. As urgent countermeasures, it is crucial to establish a proper desludging and sludge treatment system. Consequently, the construction of a centralized sludge treatment plant is also needed.

The mission visited one of the existing sludge treatment plant. The present conditions and countermeasures for the Surabaya Keputih sludge treatment facility are described below.

Firstly, this plant has been planned as a domestic wastewater treatment facility and is now used for the treatment of sludge with high concentration, which does not enable the originally expected biological treatment quality. To develop facilities efficiency, it is necessary to establish a suitable treatment process according to the characteristics of the targeted substance (sludge). As urgent countermeasure, it would be beneficial to improve the operation method, for example to utilize the unused ditch of the Surabaya Keputih Sludge Treatment Plant.

Furthermore, to improve treatment quality, it would be valuable to modify the process by adding a solid-liquid separation device between the existing pre-treatment separation equipment and the oxidation ditch, in which the water treated would be discharged after disinfection. For sludge dewatering, it is possible to do the solid-liquid separation process through a centrifuge container or a sludge dehydrator and to use the existing sludge drying beds or to reuse sludge as fertilizer for agriculture.



NEXT STEP

The mission learnt that the possibility of a technical cooperation project for the improvement of desludging and the sludge treatment system in Surabaya City is being discussed between the concerned Indonesian authorities and JICA. JSC will coordinate its activities with JICA and other donors including ADB, which is also interested in other cities of this area.