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Urban Sewer Planning in Developing Countries and “The Neighborhood Deal”:

A Case Study of Semarang, Indonesia

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These Urban Environmental Sanitation Working Papers have not been formally published and this is an opportunity to share this information more widely to:

- stimulate discussion and to broaden thinking within the sector, and in particular, to encourage dialogue within and among our clients in developing countries; and
- build more awareness of the Program among UES clients.

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Human waste management is a burgeoning issue that is given insufficient attention by municipal governments in most cities in Indonesia, as well as higher level authorities. Current national policy is not clearly defined in this sector. However, it is evident that for most urban areas, on-site sanitation options such as septic tanks or pour-flush latrines, in large part financed by the families and communities being served, are preferred. Public investment in off-site services, ranging from communal septic tanks to conventional sewerage, must be weighed against the near-term benefits of investments in other infrastructure, such as housing and roads. Nonetheless, off-site alternatives with increased allocations of government resources will, in the foreseeable future, become a necessity. Tentative guidelines, currently loosely applied, are being established. For example, The Ministry of Public Works recommends that sewerage systems be considered for areas with population densities higher than 300 people per hectare ¹.

Investment in sewerage is generally considered to be expensive, and conventional approaches typically cost in the range of US\$1,500 per household². However, global experience suggests that a demand-focused, process-oriented approach that attempts to address the needs of all stakeholders can lead to significant cost savings and a balanced sharing of financial responsibility for both capital investment and operation and maintenance.

The World Bank has encouraged investment in human waste management in most of the integrated urban development projects it has supported. The Semarang-Surakarta Urban Development Project initially included financing for a pilot sewerage component that envisaged construction of a trunk sewer for part of the city, a

treatment plant, and a feeder sewer network in one pilot sub-district ³. Further dialogue between the Bank and the Municipal and Provincial Governments led to the conclusion that the pilot component must demonstrate a viable strategy for the gradual development of improved human waste management for the entire city. A fundamental step in this process was to assess current demand for improved sanitation among service consumers in order to help determine who would pay for what portions of sanitation services, and to prioritize areas of the city for different levels of service on the basis of demand.

The feasibility study described in this report was conducted to test a contingent valuation methodology for assessing consumer demand for sewer services. In essence, households and neighborhood groups were offered different theoretical pricing arrangements for house connections and feeder sewer networks, and the results analyzed to determine the deal preferred by each of the three sub-districts included in the study. While not a comprehensive assessment of willingness to pay for sanitation systems and services in Semarang, the data do provide some interesting and useful insights into consumer priorities for public and private investment in sanitation infrastructure. Although sanitation presents a more complicated mix of public and private responsibilities for households and communities than does drinking water supply, the study demonstrates that contingent valuation can be an effective approach for assessing demand for sanitation services.

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Richard Pollard, Jakarta, September, 1997

¹Ref. Sasaran Lima Tahun (SARLITA) for Repelita V, Min. Public Works, and BAPPENAS, Govt. of Indonesia.

²Water Supply, Sanitation, and Environmental Sustainability: The Financing Challenge, Ismail Serageldin, The World Bank, 1994

³Staff Appraisal Report: Semarang-Surakarta Urban Development Project, Report No. 12656-IND, The World Bank

1. Introduction

In most large cities in developing countries, only a small minority of households are connected to a sewer system. A tiny fraction of the wastewater from those households connected to sewers is treated effectively at primary or secondary wastewater treatment plants. The reality, then, is that cities in developing countries are awash in human sewage. Groundwater is contaminated from pit latrines and septic tanks; drainage ditches and canals are full of human waste; and surface water bodies such as lakes, streams, rivers, and nearby bays are heavily polluted.

Many observers assume that, because conventional technological solutions to these problems are well understood (e.g., water-sealed toilets, sewerage systems, and wastewater treatment plants), what is needed is simply more money. There is great uncertainty, however, regarding how to spend more on effective solutions to urban sanitation problems in developing countries. The first step toward a solution is not higher levels of externally-supplied funding, but rather a new policy framework that will ensure that available funds are used wisely.

Sanitation planning in developing countries has all the characteristics of what policy analysts have termed "wicked problems." There are several reasons why improving sanitation service poses such a complicated policy and planning problem. First, the costs of conventional water-borne sewerage solutions (e.g., on-site facilities such as water-sealed toilets, sewerage networks, and wastewater treatment) are expensive—on the order of US\$25-35 per household per month (Lauria et al, 1995). This is equal to the total monthly income of many poor households in urban areas of some developing countries. Because the capital investments required for sewers and wastewater treatment facilities are so large, implementation of construction plans takes a long time and almost always involves cities in capital financing arrangements with higher-level government authorities and capital markets. Such long-term planning is problematic in low-income countries because poor households typically have high rates of time preference (McClelland et al, 1994).

Second, sanitation improvements result in public health benefits that have a public goods character: the benefits received by one individual do not diminish the benefits available to another. Standard public goods theory indicates that collective action is often required for the efficient provision of such goods in order to avoid free riding. But household sanitation improvements such as the installation of water-sealed toilets are not pure public goods; they also yield important private benefits, including convenience, time savings, and aesthetics. If housing markets are functioning reasonably well, the value of such improvements will be capitalized into housing and rental values. Households respond to these market prices and often sort themselves into neighborhoods by preferences for environmental quality, including neighborhood sanitation.

A third challenge to effective sanitation planning is the lack of public awareness of the benefits of sanitation services. Despite the fact that public health benefits ensue from collective solutions to urban sanitation problems, the public may not fully understand or perceive the magnitude of these benefits. In this sense, sanitation improvements resemble what economists term "merit goods," and social marketing and political leadership may be required to implement a socially optimal investment program. This line of argument, however, has often led public health specialists, planners, and engineers to rely solely on their expert opinion and to ignore the presumably uninformed wishes of households. One manifestation of this attitude is the response of water and sanitation engineers to the problem of low household connection rates to new sewer lines: "We'll make them connect!" Such professional arrogance has resulted in many spectacular sanitation planning failures.

Fourth, planners attempting to increase user fees in order to finance sanitation improvements often face a dilemma. Poor households are unable and unwilling to pay for sewer connections or wastewater treatment, while many richer households have already invested in individual solutions to their immediate problems. Thus it is likely that neither group will be inclined to participate in a collective agreement to improve

public health conditions. Many poor households may not even have water-sealed toilets or effective on-site sanitation systems (such as VIP latrines). Quite reasonably, such households are generally unwilling to address community-wide problems until they have met their immediate household needs and have obtained the private benefits associated with improved household sanitation. There is less justification for the public sector to subsidize private housing improvements such as the construction of water-sealed toilets, yet without such investments neighborhood and city-wide plans must wait.

Fifth, sewer network design, construction, and operation are subject to a variety of economies of scale. Design engineers thus prefer to lay sewer pipe throughout a city and hope that households and businesses will connect. This approach requires that care must be taken to estimate demand for connections, something that is rarely done. If connection rates are low, this has several implications. First, public health and environmental objectives may not be fully achieved. Second, revenues will be lower than expected. Third, the network design task itself will become much more complicated in terms of sizing and location of interceptor and trunk sewers. A conventional sewer system may not function properly because of insufficient flows.

Finally, large amounts of money are at stake in the way water and sanitation projects are now constructed and financed. A new policy framework for sewer planning will likely threaten established financial relationships and will meet strenuous opposition from some stakeholders in the current system (Lovei and Whittington, 1993).

Despite these formidable challenges, policy analysts, planners, and government officials have become increasingly aware of the need for a new policy and planning framework in confronting the urban sanitation planning and implementation problem in developing countries. In this paper we argue that this new planning paradigm requires that neighborhood organizations and households be involved in an active partnership with government, donors, and technical staff. The problem is simply too complex to be left to planners and engineers working in government agencies, or to the

consulting engineers that work for them. The essence of our argument is that government officials and technical staff must re-orient their thinking toward a new scale; rather than attempting to find an "optimal solution" to a city's sanitation problem, they should focus on structuring what we term the "neighborhood deal." This reorientation requires that government officials study household and neighborhood demand for improved water and sanitation services in order to design a "deal" that municipal and higher-level governments can afford, that is technically feasible, that is attractive to households, and that has public health and environmental benefits. Pricing sanitation services involves finding a set of prices (e.g., assessment fees, monthly tariffs, and connection charges) to be offered in the neighborhood deal. A sewer network designed under this approach will evolve over time in response to the incentives that government has incorporated in the neighborhood deal. If the incentives are well designed, then both the government and city residents should be satisfied with the dynamic evolution of the sanitation network. If not, then the deal may be modified as experience is gained.

There are two principal advantages of thinking about the sewer planning problem as a deal between neighborhoods, households, and government. First, sewers will be built where people actually want them, resulting in high connection rates and thus in substantial public health benefits. Second, with relatively high connection rates among neighborhoods participating in the deal, increased revenues will be available for the government to finance its part of the deal in other neighborhoods. A faster expansion of the sewer network will occur than if some neighborhoods received a disproportionate share of available subsidies. On the other hand, disadvantages of this deal making approach to sanitation planning include the complexity of network design for interceptor and trunk sewers and the slower progress in improving surface water quality.

This partnership between neighborhoods and government will not, however, be easy to achieve. It will require that planners and engineers relinquish some of the responsibilities

and privileges they typically assume for shaping and designing urban sanitation policy. They will also have to consider households as their clients, not merely passive beneficiaries of a sewer project. Considerable time and effort will have to be spent working with local communities and neighborhoods before construction can begin. Moreover, the agencies responsible for water and sewer planning will need new staff with very different skills than the individuals they currently employ, or they will have to hire private consulting firms to provide them with such services.

In the next section of this paper we discuss the components of the "neighborhood deal." In Sections 3-9 we present a case study of the sanitation situation in Semarang, Indonesia, that develops our concept of a partnership between neighborhoods and city government in more detail. Section 10 summarizes our findings and conclusions. Our vision of a community-oriented sanitation planning process is contrasted with current investment strategies for expanding or initiating the construction of urban sewer networks in developing countries in Appendix A.

2. A New Sanitation Planning Approach: The Neighborhood Deal

It is our contention that the exclusion of neighborhood organizations and households from active participation in the planning process lies at the heart of the current sanitation planning crisis in many cities in developing countries. To appreciate why this is so, it is necessary to consider (1) what information planners and municipal governments need before committing to lay sewer pipe in a neighborhood and (2) what information households need before deciding whether they want a connection to a sewer line. Sound sewer planning requires that planners know both the number of households that will connect if sewer lines are installed, as well as the costs of sewerage a particular neighborhood, including the implications for the entire sewerage network.

If it can be assumed that all households in a particular neighborhood will freely connect or can be forced to connect to new sewer lines, then this part of the planning problem is simple. If this

cannot be safely assumed, as is typically the case, then the agency or authority responsible for the sewerage system needs assurance that, if sewer pipe is laid in a neighborhood, households will pay a predetermined amount for this infrastructure improvement. Simply put, a fiscally responsible authority cannot bear the financial risk of installing such expensive infrastructure without some form of payment guarantee. From the agency's financial perspective, each household in the neighborhood should be required to pay some share of the sewer network installation costs—whether or not that household obtains a connection—because the value of its property increases simply by having the option to connect in the future.

In practice, there are two principal means by which an agency could receive such assurance. First, individual households could sign a legally binding agreement with the agency which obligated them to pay a specified amount for the installation of the sewer lines. Under this approach, however, transaction costs for the agency are very high. Although 100% of households would not necessarily need to agree to participate, a minority of households could hold out, refusing to sign the contract with the agency, and delay the project for others. Moreover, once the lines were installed, the agency would have the difficult task of enforcing numerous contracts with individual households.

Second, the agency could require a financial commitment from the neighborhood as a collective unit before installing the sewer lines. A neighborhood organization would "assess" (i.e., tax) each household a certain fee for the installation of the sewer pipes in the neighborhood. Either the neighborhood organization or the agency could determine the amount of the assessment for each household. Such an assessment could take the form of an increase or surcharge on local property taxes or on local community improvement taxes. The key point is that the neighborhood as a collective unit would be required to make a decision about whether or not to have sewer lines installed. If a neighborhood decided to proceed with the installation, then every household would have to

pay—even those against the plan.⁴

The neighborhood organization would be responsible for financial transactions with the agency and for enforcing its collective decision on its members. This approach has the important advantages of (1) substantially reducing transaction costs to the agency, and (2) leaving the responsibility for a collective decision at the lowest possible administrative and political level, thus increasing the probability that the decision is responsive to local needs and desires.

Regardless of which of these two approaches is used to arrange for household financing of the neighborhood sewer network installation, there is still a household decision about whether or not to connect to the new sewer line. Clearly the collective, neighborhood-level decision regarding the installation of sewer lines and the household-level decision regarding a private sewer connection are interdependent. If a household does not want to connect to the sewer line, it may not want to pay for its neighborhood to have sewer lines installed. Then again, it may. By having sewer lines installed in the neighborhood, a household receives two benefits even if it does not know whether it will connect. First, it purchases the option to connect at some time in the future; this option will increase the value of its property whether or not it chooses to connect. Second, other households will likely connect, thus improving environmental quality in the neighborhood.

It is, however, certainly true that a household would need to know the costs of connecting to and using the sewerage system before it made a decision about whether or not it wanted its neighborhood to have sewer lines installed. In fact, there are many costs a household must consider when deciding whether or not its neighborhood should have sewer lines installed and whether it should connect to a sewer line if one were installed. First, it must consider the amount of, and financial arrangements available for, the assessment fee for the sewer line installation. Second, a connection fee must typically be paid to the water and sanitation authority by each household wanting to connect.

Third, additional plumbing costs are associated with actually connecting the water-sealed toilet (and perhaps household "gray water" discharges) to the sewer pipe. The latter costs are likely to vary significantly from household to household. Fourth, if a household does not already have a water-sealed toilet, it must incur the costs of installing one. Finally, households with a sewer connection must typically pay a monthly tariff. For those who already have a metered private water connection, this tariff may be a surcharge on a monthly water bill. For those without service, the monthly charge may simply be a fixed fee.

The different costs and prices that the household faces, along with the financial arrangements for paying them, can be influenced by policies of the municipal government and the water and sanitation authority. We refer to the bundle of all such policies as the "neighborhood deal" because it is useful to consider how the whole package of government policies appears to the neighborhood and to the household. There are thus many alternative deal structures" that the agency(ies) responsible for sewerage could offer neighborhoods and households. Each must somehow specify, however, the relationship between the collective decision necessary at the neighborhood level and the individual connection decision to be made by households.

In this context, it is perhaps easier to understand why investment strategies that exclude neighborhoods and households from the sanitation planning process have had such a high rate of failure. First, such approaches preclude neighborhood organizations and households from providing the water and sanitation agency with essential feedback about household demand for infrastructure improvements before sewer lines are installed and investment mistakes are made. Second, current investment strategies do not ask neighborhood organizations to bear the transactions costs associated with achieving collective agreements among households, and it has proven too difficult and expensive for government to shoulder this responsibility. Third, existing investment strategies utilize relatively simplistic "deal structures" without any empirical information about what households and neighborhoods actually prefer. In other words, government deals are frequently offered without

⁴ Neighborhood organizations could, however, agree to make special arrangements for the poor and other special cases.

any consultation or negotiations with neighborhoods or households. It is hardly surprising, then, that such deals are commonly rejected.⁵

3. Operationalizing The Neighborhood Deal Approach In Semarang, Indonesia

3.1 Introduction and historical perspective

We recently explored the potential for introducing this new sanitation planning approach in the rapidly industrializing Republic of Indonesia. Despite strong economic growth and urbanization, Indonesia remains underserved with sanitation facilities in both urban and rural areas.⁶ Fewer than one million of Indonesia's 190 million citizens have access to sewer service nationwide.

Private investment in on-site sanitation systems, primarily in septic tanks/leaching pits, has been substantial. In Jakarta alone there are an estimated 927,000 septic tanks, the vast majority of which have been privately financed and constructed. These systems may be effective in removing human waste from the immediate household environment, but little progress has been made in improving neighborhood sanitation conditions. Moreover, because such on-site systems are frequently poorly designed, constructed or maintained, they often contribute to human pathogen and BOD loadings in surface and groundwater.

The current policy of the Government of Indonesia (GOI) is that sanitation is a household responsibility. At same time, recognition of the need for public intervention is increasing; the GOI is aware that on-site systems are

increasingly inappropriate in high density communities. Pilot sewerage investments have been included (for a limited number of cities) in the most recent Five Year Development Plan. There is also growing awareness that a revised strategy is required for addressing urban sanitation, but as yet no consensus exists regarding an overall approach, including financing strategies or technology selection. The prevailing view is that (1) consumer demand for off-site sanitation will very low, (2) the technology options will likely be very expensive, and (3) capital costs will need to be borne largely by central government. Hence, the requirement for large subsidies is implicit in the pilot sewerage schemes planned thus far.

None of the strategies for providing off-site sanitation service proposed to date has considered alternative approaches to achieving residential coverage, especially in low-income areas. Nor has a "strategic sanitation planning" approach been proposed that is demand-responsive, that presents a range of technology options, and that develops an institutional and financial framework allowing for costs and responsibilities to be distributed between beneficiaries, local governments and provincial/central government. Our work in the city of Semarang represents one effort to assess the feasibility of such a demand-driven planning approach.

3.2 Study site

The city of Semarang is the provincial capital of Central Java (see Figure 1) and is located approximately 540 kilometers east of Indonesia's capital, Jakarta. More than 1.3 million residents make Semarang Indonesia's fifth largest city (US Central Intelligence Agency, 1995), and population density in the city varies between 35 and 200 persons per km.² Semarang continues to grow at a rate of approximately 2% each year.

Semarang is a coastal city, facing the Java Sea to the north. Annual rainfall averages 2,100 millimeters. The region around Semarang has several teak forests and rubber plantations; these commodities, along with shellfish, coffee,

⁵ The neighborhood deal may also be rejected because households may not understand how the technology of sewer pipes and waste water treatment works, nor the public health benefits likely to ensue. This may require that government initiate a proactive education and social marketing program to provide households such information.

⁶ According to a recent WHO assessment, Indonesia had the lowest percentage in Asia of urban households with adequate sanitation (40%, compared to 84% in Thailand and 98% in the Philippines).

hardware, chemicals, and textiles comprise the principal products of the city. In addition, Semarang's port facilities make it an important transportation and shipping center. The city's economy, like that of Indonesia, is growing rapidly (averaging 7% annually during the period 1984-1994). Per capita gross domestic regional product for 1993 was estimated as US\$560. Prices for most goods and services in Semarang are now close to international levels (Table 1).

Table 1: Average prices of goods/services in Semarang (July 1995)

Item	Average cost (Rp.)	Average cost (US\$) ⁷
1 kilogram rice	920	0.41
1 liter cooking oil	1,700	0.76
1 kilogram fish	6,200	2.76
McDonald's Big Mac	4,000	1.78
1 liter gasoline	700	0.31
One-way bus fare (local)	250	0.11
Cross-town taxi fare	13,000	5.78
Cigarettes (12)	1,000	0.44

Indonesia is divided into 27 provinces, each of which is further organized into six operational levels of government: provincial, district/municipal, sub-district, village, community, and neighborhood (see Table 2). As the capital of the Central Java Province, Semarang plays an important role in each of these government levels. The Provincial Development Planning Board (or Bappeda) oversees infrastructure development projects such as water supply and sanitation programs and is located here.

Within Semarang, communities are organized on several different levels. Between 10 and 120 households comprise an "RT" (Rukun Tetangga, or neighborhood association) which is headed by an unpaid, elected Chairman. Roughly 10 RTs are grouped into each RW (Rukun Warga, or community association). RWs, in turn, are grouped into kelurahans, headed by appointed lurahs; there are roughly 20 kelurahans in each kecamatan.

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During July 1995, US\$1 = 2250 Rp.

Table 2: Organization of local government in Indonesia

⁸ Government level	Head	Composition	Agencies with influence over development projects
Provincial	Assistant governor	Indonesia=27 provinces; 1 province=10-15 districts	Central government department offices; Provincial Development Planning Board (Bappeda); Development Bureau; Bureau of Finance
District	District head	1 district=5-10 kecamatans	Central government representative offices; Provincial Technical Offices; District Development Planning Board; Development Bureau; Bureau of Finance
Sub-district (Kecamatan)	Sub-district head (Camat)	1 kecamatan≅20 kelurahans	Sub-district Development Coordinating Unit; Sub-district Technical Offices
Village (Kelurahan)	Village head (Lurah)	1 kelurahan≅20 RWs	None
Community (RW)	RW Chairman	1 RW≅10 RTs	None
Neighborhood (RT)	RT Chairman	1 RT=10-120 households	None

4. Field Work

The objectives of this study were to begin to assist the Government of Indonesia and the World Bank East Asian Infrastructure Division responsible for Indonesia (EA3IN) in thinking strategically about new sewer and wastewater treatment investments in Semarang. The work of this mission was designated as Phase I of a two-phase project. The purpose of this two and one-half week mission was essentially reconnaissance. Our terms of reference included the following tasks:

1. To determine whether it was possible to implement a large-scale contingent valuation (willingness-to-pay) survey in Semarang to estimate household demand for improved services;
2. To determine whether it was feasible to use local enumerators and computer data entry and management resources;
3. To develop and pretest a household questionnaire; and
4. To determine whether and how a rigorous household sampling protocol could be implemented.

⁸ Adapted from Naur, M. (1995). Indonesia: Urban Upgrading Project, SSUDP loan 3749/IND, Bandarhargo (Semarang) and Mojosong (Surakarta); Participatory and institutional aspects. Report to the World Bank, EA3IN.

Due to a series of fortuitous events, we were able to accomplish more than anticipated during this Phase I mission.

As a first step, we needed to gain an understanding of current water supply and sanitation practices in selected neighborhoods of Semarang and to assess residents' demand for improved water supply and sanitation services. Over a period of two and one-half weeks in July-August, 1995, we conducted both a household survey and a series of participatory community meetings in Semarang. As noted, these data collection efforts were designed and executed as pretests for a larger, more comprehensive study to be carried out in the future.

4.1 Sampling and training of enumerators and community organizers

Time and resource constraints precluded our drawing a rigorous random sample of Semarang households for the study. Instead, three kelurahans were selected purposively, with the intent of representing the range of residents' existing water supply and sanitation services and socioeconomic characteristics. The kelurahan Bugangan (see Figure 2) is a low-lying area near the coast; many residents of Bugangan rent their homes and do not currently have a private water connection. One of the two open canals that channel waste from the city to the ocean forms one of the boundaries of the kelurahan. The kelurahan Sekayu is located in a relatively affluent downtown district with a mix of high density, low- and middle-income housing and some business/office areas. Sekayu has been under consideration as the pilot area for planned improvements to the water supply and sanitation system under a World Bank-financed urban renewal and sanitation upgrading project. Dadapsari is a middle- to low-income kelurahan in the eastern part of Semarang.

A total of forty-two RTs—fourteen in each kelurahan—were selected for the study.⁹ In each kelurahan, nine RTs were randomly assigned for inclusion in the household survey, and five for participatory community meetings. Household

interviews were conducted by fifteen college-educated enumerators from Semarang (6 women and 9 men) over a six-day period. Half of the enumerators were students, and the rest were staff from the water supply utility, PDAM, the public works department, and Bappeda. Each community meeting was facilitated by one of three pairs of college-educated community organizers.

Intensive enumerator and community organizer training was carried out over a six-day period. This training was especially important to ensure that our study objectives and methodology were well understood. Regional and local governments in Indonesia often use household surveys and community meetings not to elicit information about attitudes and preferences from citizens, but to educate people toward a particular point of view. We thus used lectures, role plays, and practice presentations to ensure that enumerators and community organizers understood their responsibility to provide and gather information in an objective, professional manner.

4.2 Data collection techniques

Twenty different versions of a household questionnaire were developed over a one-week period of intensive pre-testing and revision. The four sections of each version were designed to collect information about respondents' existing water supply and sanitation situation; priorities and perceptions; willingness to pay for improved water supply and sanitation; and socioeconomic characteristics.¹⁰ The survey was written and administered in Bahasa Indonesia, the most widely used language in Semarang.

Each questionnaire was administered to a head of household (and occasionally to both heads of household). Interviews lasted between 30 and 70 minutes and were conducted in respondents' homes. A total of 319 questionnaires were completed.

⁹ The sample design for the study is presented in Appendix C.

¹⁰ A copy of one version of the household questionnaire is presented in Appendix B.

A series of fifteen participatory community meetings was also convened during the study period. As with the household survey, these meetings were designed to learn how individuals in these neighborhoods perceive their existing water and sanitation situation and how they feel about possible improvements. Each meeting was convened by an RT chairman and facilitated by a two-person team of community organizers. The meetings lasted one to two hours, and attendance varied from 10 to 31 people.

5. Socioeconomic profile of sample

Of the 319 respondents interviewed in the household survey, 125 (39%) are female and 194 (61%) male.¹¹ Among survey respondents, the average number of persons per household is 5.7, and 15% of the sample households are headed by females. The mean age of respondents is 49 years. Five percent of respondents have earned a college degree, 41% have graduated from high school, and 12% have not completed primary school. Three quarters of the respondents are Moslems, while another 21% are Christians and 4% are Buddhists.

Three quarters of the survey respondents and 55% of community meeting participants own their homes; almost 90% of those interviewed live in single-family dwellings. Among survey respondents, houses have an average of 4.6 rooms, and all receive electric service. The average household monthly electric bill is 15,500 rupiah (US\$7.20). When asked to estimate the current market value of their homes, survey respondents provided values ranging from 1,000,000 to 100,000,000 Rp., with a mean of roughly 26,500,000 rupiah (US\$12,320). The average market rental prices for homes is 32,245 rupiah (US\$15.35)¹².

Survey respondents reported household monthly

incomes ranging between 3,000 and 2,000,000 Rp. with a mean of 305,421 rupiah (US\$142). More than 80% of households interviewed own a television, and 22% have a telephone. Motorcycles are a popular mode of transportation in Semarang; almost one half of the respondents own a motorcycle (10% own an automobile).

6. Existing water supply

A piped water system operated by the public water supply utility, PDAM (Perusahaan Daerah Air Minum) delivers water to roughly 25% of Semarang households. Among the 319 persons interviewed in the household survey, 88 (28%) reported having a working private water connection in their homes.¹³ Virtually all of these respondents also have working water meters at their homes. Average monthly water bills range from 5,000 to 55,000 Rp., with an overall mean of 14,139 Rp. (US\$6.28). Only one respondent reported selling water to neighbors. Almost all respondents with connections use the water for drinking and cooking (see Figure 3); every household reported boiling its water prior to consuming or cooking with it. In general, respondents rated the quality of water from their connections highly (see Table 3). Only 8% felt it had a bad odor and 1% thought it appeared dark or dirty. Nineteen percent reported a strong chlorine taste in their water, while 78% considered it "normal" or "fine."

¹¹ A significantly higher proportion (79%) of males participated in the community meetings (men frequently represent their households in community events in Semarang). The format of the community meetings was not conducive to the collection of many additional socioeconomic data.

¹² This average includes only those respondents living in non-subsidized housing. More than one third of the respondents who rent their homes, however, live in subsidized rental units and pay less than 5000 Rp. (US\$2.40) per month in rent.

¹³ Twenty-one percent of community meeting participants reported having a household water connection.

Table 3: Perceptions of water quality from private connections

Percent of respondents with connection who give good rating to wates...	Odor	Color	Taste
	89%	96%	78%
Percent of respondents who boil water from connection prior to consuming	100%		

Approximately half of survey respondents' households have a private well; another 20% of respondents reported collecting water at least occasionally from a public well in their neighborhood. Half of these pay an average charge of 150 rupiah (US\$.07) per 50-liter pikul, and the other half pay an average monthly fee of 9,500 rupiah (US\$4.22) for unlimited access to the public well. Well water is used primarily for bathing and washing; only 3% of those using private wells and 14% of those using public wells utilize the water they fetch for drinking or cooking. Although respondents using well water generally consider its odor to be acceptable, 22% feel its taste is "salty" and 25% that it appears "dark" or "dirty."

Reliance on vended water varies dramatically among the three kelurahans. Eighty-one percent of respondents in the Bugangan district reported purchasing vended water at least occasionally, whereas only 12% of the Sekayu respondents use vended water. Among all respondents, 11% reported obtaining "all or almost all" of the water their households use from vendors. These households purchase, on average, between four and five jerricans daily. With an average price for a jerrican (20 liters) of water of 295 rupiah (US\$.13), these households are thus spending roughly US\$18 for vended water each month.

Vended water is primarily used for drinking or cooking, although 10% of respondents also reported using water from vendors to wash clothes and dishes and to bathe. As with well water, vended water was reported to have a salty taste by 20% of respondents who use it. Few respondents, however, said that vended water has a poor odor or appearance.

7. Existing sanitation service

Semarang currently has no sanitary sewer system, and wastewater overflows in open combined sewers/storm drains to the Java Sea without treatment. The majority of the city's households are served by private water-sealed toilets (see Figure 5); approximately three quarters (73%) of survey respondents reported having a toilet for the exclusive use of their household members. The waste from the vast majority of household toilets is deposited into septic tanks without septic fields. Fifty-eight percent of respondents with a private toilet and septic tank reported having emptied the tank at least once; 15% have replaced their septic tank or installed an additional tank (Figure 6).

Public latrines are the primary form of sanitation service for almost all other respondents, primarily residents of the relatively lower income kelurahan Dadapsari. Approximately half of users are required to pay a contribution fee to visit the public latrine. A fixed monthly fee is the most common payment arrangement, with an average fee of 1,040 rupiah (US\$.46). Another 40% of respondents who use public latrines regularly reported paying a charge per visit; the average price was 85 rupiah (US\$.04).

8. Priorities And Perceptions

Respondents in the household survey were provided a list of social and environmental priorities facing Semarang and asked to select the issue they felt was the most important to resolve. As shown in Table 4, one third of all respondents were concerned foremost about flood water drainage. Almost half of those living in the Bugangan kelurahan—a low-lying area near the

Java Sea—chose the improvement of flood water drainage as the most important issue to resolve. Those in the center city kelurahan of Sekayu were more concerned about providing a safe and reliable water supply to residents. Overall, the

improvement of sanitation was perceived as a top priority by only eleven percent of respondents.

Table 4: Respondents' social and environmental priorities

	Percent of respondents ranking as top priority in...			
	Bugangan	Dadapsari	Sekayu	Overall
Drainage of flood waters	45	39	17	33
Safe, adequate water supply	20	29	30	27
Improved sanitation services	12	10	11	11
Solid waste collection	13	11	8	10
Improved hospitals and clinics	5	3	16	8
Quality of education and schools	3	2	12	6
Improved road conditions	2	6	6	5
TOTAL	100	100	100	100

Survey respondents were also asked about their satisfaction with the current environmental conditions in their RT. Specifically, they were asked whether their household could smell both the large, combined storm sewers/drains, as well as the smaller neighborhood drains, from their homes, and whether the odors were noisome. As shown in Table 5, approximately one quarter of respondents reported smelling the large canals from inside their homes, and one half were aware of the odors emanating from their

neighborhood drains. More than 80% of those who said that they could smell these odors also said that they were "bothersome." At the same time, when asked to rate their satisfaction with existing sanitary and environmental conditions in their RT, only 10% classified themselves as "unsatisfied." These results reinforce the findings in Table 4 indicating that sanitation is not viewed as a high priority by many residents of the kelurahans we studied.

Table 5: Survey respondents' perceptions of environmental conditions

	Bugangan	Dadapsari	Sekayu	Total sample
Can smell large canals	9%	48%	7%	23%
(If yes), is bothered by odor	87%	86%	57%	84%
Can smell local drains	38%	72%	31%	49%
(If yes), is bothered by odor	88%	87%	82%	86%
Very satisfied with environmental conditions	43%	33%	77%	51%
Somewhat satisfied with environmental conditions	55%	41%	14%	37%
Not satisfied with environmental conditions	2%	22%	4%	10%

9. The Neighborhood Deal: A Plan To Improve Water Supply And Sanitation Service In Semarang

In order to describe a feasible neighborhood deal to survey respondents and community meeting participants, we used photographs, drawings, and detailed information about the process by which an improved water and sanitation system might be installed and operated in Semarang.¹⁴ Enumerators provided this information to survey respondents in private, one-on-one interviews, while community meeting facilitators presented and discussed the deal with groups of participants in an open format.

Only 3% of survey respondents were familiar with the concept of a sewer system prior to their interview. Many respondents devoted significant time to studying the visual aids and asking questions about the system, which was described as having two components. A network of underground pipes would deliver potable water to households and would remove human wastes and waste water; a treatment plant would be constructed to treat waste water before it was discharged into the ocean. Respondents were told that such a system would provide a reliable and high quality water supply; improvements in neighborhood sanitary conditions; and a reduction in some types of water pollution and well water contamination. They were informed, however, that flood water drainage would not improve significantly as a result of the proposed improvements in water supply and sanitation service.

Once respondents understood how such a system would function in Semarang, enumerators described the process by which it would be installed and financed. Respondents were told to assume that the installation of an improved water supply and sanitation system would entail a two-stage process. First, RTs that wished to participate in the program would be required to raise the funds necessary to pay an assessment fee. Government would also contribute moneys, and these funds would be used to lay the neighborhood water and sewer lines from the

major (trunk) pipes to each participating RT. Consensus must thus be reached within an RT for participation in the project, as every household in the district would be assessed a share of the installation fee, whether or not it decided to connect to the water and sewer system.

In crafting a credible neighborhood deal for improvements in Semarang's water supply and sanitation, we drew on the tradition of "self-help" programs extant in many areas of Javanese society. As one example, an influential grass-roots organization dedicated to issues of women and children's health and education (called the "PKK") has as one of its "ten principles" the idea of *gotong-royong*, or cooperation and empowerment through self-help programs. We thus developed a hypothetical program in which RTs that were willing and able to pay for water supply and sanitation improvements could choose either a "full-service" approach or a cost-saving "self-help" strategy in which community members would participate in digging trenches, laying pipe, and performing other un- or semi-skilled tasks.

Each RT that elected to participate in the program would thus decide whether to use an engineering contractor ("full-service") or an engineering consultant ("self-help"). Under the full-service plan, the contractor would design and carry out the installation of sewers in the neighborhood. With the self-help option, residents of an RT would share the responsibilities of digging trenches, laying pipe, and other un- or semi-skilled tasks, under the supervision of an engineering consultant. The assessment fee associated with the full-service option would be twice that of the self help plan. Residents of an RT would thus have to weigh the relative advantages of expertise, cost savings, and expediency in deciding whether the full-service or self-help approach were more desirable.

Second, once arrangements for an RT's participation in the program were finalized, individual households would face a choice of their own: private water and sewer connections would be provided only to those households desiring and able to pay for them. Households with existing water connections would have the option of adding a sewer connection. Those

¹⁴ Appendix E presents copies of the photographs used by enumerators to describe the sewer system, including the wastewater treatment plant.

without water service could have both a water and sewer connection installed (a water connection without an accompanying sewer connection was not offered as an option). Respondents were told that the decision to connect to the new system would be made at the household level, unlike the installation of neighborhood lines which would have to be performed for the entire RT. Thus, a respondent might contribute to his or her RT's assessment fee but subsequently decide not to pay the additional fees associated with connecting his or her household to the system.

The different costs and prices of the project were carefully explained to survey respondents and community meeting participants (see Table 6). A fixed assessment fee—the cost per household of having neighborhood water and sewer lines installed—would be charged to each household. Under the "full service" plan, this fee varied randomly between 50,000, 150,000, 300,000, and 500,000 Rp. for different questionnaire versions; that is, each respondent received only one of these four assessment fees.¹⁵

The respondent was also told that this fee could be halved if his or her community elected to use the "self-help" approach to installing the neighborhood lines. For example, a respondent who received the full service assessment fee of 300,000 Rp. also received a self-help fee of 150,000 Rp. The fee could either be paid in full at the start of the project, or could be financed over a two-year period.

In addition, households that did not currently have indoor plumbing and who wanted to take advantage of a household sewer connection would have to purchase and install a water-sealed toilet. (These costs were estimated at 250,000 Rp. per toilet.) For those households choosing to connect to the water and sewer system, a fixed connection fee would also be assessed. Those needing both water and sewer connections would pay a fee of 500,000 Rp., and those with existing water connections would only pay 200,000 Rp. fee for a sewer connection.

¹⁵ It was not possible to vary prices among participants in each community meeting. All received a full-service assessment fee of 150,000 (and a self-help fee of 75,000).

Table 6: The proposed deals: Prices and costs for a household of improved water supply and sanitation service

Type of fee	Amount	Who pays?			
		Homeowners		Renters	
		With water connection	Without connection	With water connection	Without connection
Assessment fee*	50,000, 150,000, 300,000 or 500,000 for full service; 25,000, 75,000, 150,000 or 250,000 for self help	Yes	Yes	No	No
Connection fee	300,000 Rp. for water; 200,000 Rp. for sewer	Yes: 200,000	Yes: 500,000	Yes: 200,000	Yes: 500,000
Monthly fee	25% or 50% surcharge for HHs with existing connection; 15,000 or 25,000 Rp. average monthly charge for new connections	Yes	Yes	Yes	Yes
Water-sealed toilet	250,000 Rp.	Yes, if needed	Yes, if needed	Yes, if needed	Yes, if needed

* Could also be paid in 12 equal monthly installments with a 20% service charge.
US\$1 = 2250 Rp.

A monthly service fee, comprised of a flat rate for sewerage and a use-based water fee, would also be billed to every connected household. As the amount of this fee would depend on the quantity of water a household consumed, the questionnaire was carefully worded to convey the idea that the prices cited represented estimates for average household consumption. For households with existing water connections, the fee for the improved system was described as a surcharge on their current water bill of either 25% or 50% in different questionnaire versions. For those without a household connection, average monthly water bills were estimated at either 15,000 or 25,000 Rp. As with the assessment fee, the surcharges and average bills were randomly assigned to different survey respondents.¹⁶ A schematic of the twenty different questionnaire versions used for the household survey is presented in Appendix D.

Respondents were given several opportunities to ask for clarification of the project description and the financing requirements for the system. Once the scenario described was well understood by the respondent, the enumerator asked him or her the following question:

Suppose that your RT had the option of participating in the improved water supply and sanitation project I have just described. Would you prefer that your RT not participate in this project; that your RT participate and hire an engineering contractor to carry out the work; or that your RT participate and people here carry out the work yourselves with the supervision of an engineer?¹⁷

A unique aspect of this part of the household survey was the classification of responses to questions about respondents' willingness-to-pay for improved water supply and sanitation. During questionnaire development, enumerators

¹⁶ All community meeting participants with existing water connections received a monthly tariff equal to a 25% surcharge on their water bill. Those without connections were told that the average combined monthly bill would be 15,000 Rp.

¹⁷ Home owners would be responsible for the assessment fee and, ostensibly, for the indoor plumbing costs (i.e., renters were told they would only pay the connection and monthly service fees).

felt that some respondents would find it difficult to reject openly the improved water supply and sanitation program described in the questionnaire. Within the Javanese culture, they explained, it is common to provide an ambivalent rather than a negative response, with both the speaker and listener tacitly understanding the true intention of the comment. It was thus important for enumerators to distinguish this type of rejection from true uncertainty on the respondent's part. Working with the team of enumerators, we generated a list of ways in which residents of Semarang tell one another "No," and enumerators were asked to indicate on each questionnaire the precise manner in which a respondent provided his or her answer.

Next, respondents were asked to consider what their household would do if an improved water supply and sanitation system were installed in their RT. The costs of connecting were reviewed with the respondent, who was then asked the following question:

Now I want you to suppose that households in your RT did decide to participate in this program, and that the water and sewer pipes were installed along the street. I want you to consider whether your household would connect to the pipes or not. Please consider this question carefully. If you would not be able to afford the connection, or if you feel you would have other, more important things to spend your money on, you should tell us that you would not connect to the system.

9.2 Household survey results

The results of the first question, regarding whether or not the respondent wished for his or her neighborhood to participate in the program for an assessment fee of a specified amount, are presented in Figure 7. Assuming that our strategy for classifying responses into yes and no categories is correct, the proportion of households that wish for their neighborhood to participate is relatively low at each of the specified assessment fees. Even with a very low per household assessment fee of 50,000 Rp. (US\$22.22) for the full-service plan, only 53% of respondents favored their RT's participation in one of the two service

programs (i.e., full-service or self-help). These were relatively evenly split between the full-service plan (58%) and the self-help plan (42%). As the assessment fee increases, the proportion of respondents favoring their RT's participation in the program generally decreases (which increases our confidence that respondents are listening to the questions asked and are attempting to give honest answers).¹⁸ At the highest assessment fee of 500,000 Rp., only 10% of the respondents wanted the full-service plan, and only about 15% wanted the self-help plan.

Figure 8 shows that households that already have a private water connection were more likely to want their RT to participate than households without a private water connection. This was true at each of the four assessment fees. For example, at the lowest assessment fee of 50,000 Rp., over half of the respondents with private water connection wanted their RT to participate, whereas fewer than 20% of households without water connections supported the program. Figure 8 also shows that the effect of increasing the assessment fee is both more consistent and more pronounced for households with private connections than for households without private connections.

The data presented in Figure 8 are difficult to interpret given the small size of our sample. If it is true that, other things equal, households with private water connections have a higher demand for the neighborhood deal than do households without private water connections, this will have important implications for project design. It would suggest that the strategy of trying to get unconnected households to take both water and sewer services might result in many households taking neither, and that the attempt to bundle water and sewer services may be ill-advised. However, this result could simply be due to an income effect, i.e., households that have private connections are richer than households without private connections, and their greater wealth may

¹⁸ This is not, of course, strong evidence that respondents' answers to such hypothetical questions are accurate indications of how they would behave if faced with a real choice. A recent paper by Griffin et al (1995), however, presents a rigorous comparison of respondents' ex-ante stated intentions in contingent valuation surveys versus their ex-post actual behavior. The authors found that answers to well-designed, soundly executed contingent valuation surveys provided fairly accurate predictions of how people would actually behave.

be the reason why they exhibit stronger demand for the neighborhood deal. This result could also be caused by a price effect; households with private water connections would incur lower connection costs as compared to those of households without private water connections.

Table 7: Proportion of respondents willing to connect by monthly tariff, questionnaire version and kelurahan

	Low tariff	High tariff	Total sample
Dadapsari	39% (25/64)	42% (24/57)	40% (49/121)
Bugangan	20% (9/45)	40% (17/42)	30% (26/87)
Sekayu	32% (18/56)	26% (13/49)	30% (31/105)
Total sample	32% (52/165)	36% (54/148)	34% (106/313)

Table 7 presents the results of the second valuation questions concerning whether or not the respondents household would connect to the new water and sewer system if it were available in the neighborhood. About one third of the respondents in the total sample expressed a desire to connect. This varied from 30% in Bugangan to 40% in Dadapsari. The variation in the monthly tariff did not have a statistically significant effect on respondents demand for connections. It is important to keep in mind, however, that this is just one of many costs and prices that households must consider in making this decision, and we have no reason to believe that it is the most important one. As with the first, collective decision regarding neighborhood participation, households with existing private water connections are much more likely to say that they want to connect to a sewer line than

households without a private water connection are to indicate that they want water and sewer connections. For example, 75% of the homeowners in Sekayu with private water connections wanted to connect to sewer lines; only 15% of the homeowners without private connections wanted to connect to the water and sewer lines. In Dadapsari, 50% of the homeowners with private water connections wanted to connect to sewer lines; only 30% of the homeowners without private connections wanted to connect to the water and sewer lines.

Figure 9 shows how the results of the second valuation question regarding the household connection decision were affected by the four assessment fees used in the first (neighborhood participation) valuation question. The proportion of households indicating that they wanted to connect is lower at the highest assessment fee. Since respondents are told that they would have to pay this assessment fee regardless of whether they decided to connect, this reduction in the connection rate may be the result of an income effect.

Table 8 presents a cross-tabulation of the results of the two valuation questions. As indicated, 29% of the total sample said that they wanted their neighborhood to participate in one of the two service plans and that their household would connect (17% preferred the full-service plan and 12% the self-help plan). Fully 50% of the sample respondents said that they would vote against their neighborhood participation and, if their RT did participate, that their household would not connect. Interestingly, about one third of the respondents who voted for their neighborhood participation in one of the two service plans said that their household would, in fact, not connect to the new water and sewer lines.

Table 8: Proportion of respondents preferring no participation, full service, or self help by proportion who would connect to new system

Would your household connect to the new water/sewer system?	Would you want your RT to use the full-service plan, to use the self-help plan, or not to participate in the program to install water and sewer lines?			
	Full-service plan	Self-help plan	No participation	Don't know / Not sure
Yes, would connect	17% (n=54)	12% (n=37)	5% (n=15)	0% (n=0)
No, would not connect	6% (n=19)	9% (n=28)	50% (n=158)	0% (n=1)
Don't know	0% (n=0)	0% (n=1)	0% (n=2)	1% (n=4)

These results would seem to suggest that demand for improved water and sewer services is low, and that there is little household interest in sewer connections in Semarang. We believe, however, that such a conclusion is premature, and that the policy message from these preliminary survey results is more complex. The problem arises from the uncertainty involved in interpreting the no responses. For those answers that we recorded as no, Table 9 presents information regarding the frequency with which respondents gave a particular answer to the household connection decision question. As shown, there were 164 responses categorized as no. Of these, 32% said that the reason for their no response was that they could not afford it. Another 18% said they were in favor of the program, but the costs are too high. These responses, which represent one half of the no, seem to be clearly negative and correctly classified. Another 30% of respondents, however, said they needed to

know what their neighbors' opinions about the project were before they could make a decision about their position. During questionnaire development, our enumerators told us that this was a polite way of saying no, and that such a response should be classified as a rejection rather than as a not sure or don't know response. It seems to us, however, that assigning such responses to the no category is less certain than the responses related to budget constraints. Similarly, other responses listed in Table 9 also seem somewhat ambiguous (e.g., the current situation is satisfactory and I agree if participation is required). For this reason, we believe that the proportion of respondents classified as rejecting the improved water and sanitation service program is likely to be too high. That is, we believe that more households would favor the service programs than indicated by our summary of the household survey results.

Table 9: Description, frequency of No responses

Description	Number of times recorded	% of no responses
I cannot afford it	52	32%
I need to know others' opinion about program	49	30%
I agree, but the costs are too high	30	18%
Yes, if costs are reduced	11	7%
I have many children, expenses, etc., to worry about	8	5%
I agree, but current situation is satisfactory	6	4%
I agree, but without advance payment	4	2%
Yes, if payment period is extended	2	1%
Yes, if participation is required by the government	1	<1%
I can pay but I want to avoid rumors (about my wealth)	1	<1%
TOTAL	164	100%

9.3 Community meeting results

All participants in the community meetings faced identical prices in the hypothetical neighborhood deal described for Semarang: a full service assessment fee of 150,000 Rp. and a self help assessment fee of 75,000 Rp.; water and sewer line connection fees of 300,000 Rp. and 200,000 Rp., respectively; an average monthly tariff of 15,000 Rp. without existing water connections and a 25% water bill surcharge for those with a connection; and installation costs for households needing to purchase a water-sealed toilet.

Meeting participants were asked to consider what they would do if faced with the choice of participating in this hypothetical new program.

After discussion and debate, the group was asked if they would prefer their RT to participate in a "full service" arrangement or a "self help" arrangement; if they preferred that their RT not participate in the program; or if they were unable to reach consensus on the matter. The results of this question are provided in Table 10. Of the 316 individuals attending the community meetings, 27% were in favor of their RT's participation in the program. Of these, the vast majority (92%) preferred a "full service" arrangement. Thirty-nine percent were opposed to their RT's involvement with the program, as compared to over half of the household survey respondents. One third of the community meeting participants provided a response of "don't know" or "not sure" to the facilitators whereas only 2% of survey respondents exhibited such uncertainty.

Table 10: Proportion of community meeting participants preferring full service, self help, or no participation

	Full service	Self help	No participation	Don't know/ Unsure
Bugangan	22%	0%	19%	59%
Dadapsari	41%	0%	39%	20%
Sekayu	9%	7%	60%	24%
Total sample	24%	2%	39%	35%

In both the household survey and the community meetings, a greater proportion of Semarang residents oppose their RT's participation in an improved water supply and sanitation program than support it. The large percentage of "unsure" responses among community dialogue participants make direct comparison of these findings difficult. Whereas many different types of responses were classified by enumerators as "No" answers in the household survey (see above), community meeting facilitators were asked simply to record the responses of participants without interpretation. It might then be expected that the majority of 109 "unsure" responses obtained during the community meetings would actually indicate opposition to the program. At the same time, the open discussion format of the meetings may have afforded participants the opportunity to consider a relatively greater range of issues about the program (e.g., the views of their neighbors) and enabled them to consider their decision more thoroughly. This added information may indeed have left many unsure about their preferences for improved water supply and sanitation service.

10. Summary And Conclusions

Our work leads us to believe that, if the city's high economic growth rates continue, Semarang will almost certainly be sewered over the next 25-50 years. There is thus little question in our minds about whether a sewer network will eventually be constructed in Semarang; it is less clear, however, when and where construction should begin or the type of planning process that should be employed. This first phase of our study is an initial step in the process of learning more about household demand for improved water and sanitation services in Semarang, but we believe it provides some important insights into how the city's water and sewer network might evolve.

Although the sample of households we interviewed and the number of community meetings held were both quite small, the findings from our Phase I case study show that both the existing water and sanitation situation, as well as household demand for improved services, in Semarang are quite complicated. Only a minority of households have a private water

connection, and many households want one. Some households without private connections obtain drinking and cooking water quite cheaply from public taps; others pay high prices to water vendors. Most households, even those with private connections, have their own shallow wells from which they obtain water for bathing and washing.

Regarding sanitation services, it is important to recognize that great strides have already been made in Semarang. Most households have water-sealed toilets for their exclusive use and the majority appear to be quite satisfied with their household sanitation situation. Nor do households seem overly concerned about neighborhood sanitary conditions, and by and large they are unaware of sewerage and wastewater treatment technologies that could improve the existing situation. Individuals in some neighborhoods are worried about flooding, and part of this concern is probably related to the spread of human excrement and wastewater that occurs during flooding episodes. This problem, however, is localized in specific districts of Semarang; the city's overall drainage is generally adequate. Large investments have already been made in constructing a system of large, lined drainage canals. Although these surface drains are heavily polluted, most people do not appear very bothered by the odors. The perceived benefits of surface water quality improvements in Semarang are thus likely to be low.

The results of both the household interviews and the community meetings appear to suggest that willingness to pay for a connection to a sewer system is low. Many people questioned whether the "neighborhood deal" proposed was a good idea even at very low prices. Among those households interested in having their neighborhood install new water and sewer lines, a diversity of opinion exists about whether to use an engineering contractor or a self-help approach. On the other hand, some households were enthusiastic about neighborhood sanitation improvements, and many survey respondents and community meeting participants were keenly interested to learn more about the sewerage and wastewater treatment technologies introduced.

In general, our results suggest that household demand for improved sanitation sewers is highly uncertain; people in Semarang are simply not yet of one mind regarding the need for new sewers in their neighborhood. Although more in-depth field work (including a survey with a larger sample) will help develop a better understanding of household demand, it is likely that a policy framework will have to be designed in the context of considerable uncertainty about demand. Our policy message might thus be summarized as: Demand is uncertain, so be careful.

Approaching sanitation planning in Semarang as an effort to design the best "neighborhood deal" has considerable advantages given this uncertainty in demand. If the municipal government offers neighborhoods the best deal it can afford and that is technically sound, then it would not be necessary to estimate demand neighborhood by neighborhood. Planners and engineers would need a rough picture of demand for improved services in order to anticipate what neighborhood deal they can offer and to decide where to build trunk sewers, but accurate predictions of connection rates in each neighborhood would not be required. Some neighborhoods would decide to install sewers now, others later, and some perhaps not at all. The sewer network in Semarang would thus begin with the neighborhood and move outward.¹⁹ If trunk sewers are built along the existing main canals, many neighborhoods in Semarang will be able to connect to the larger sewer network without needing long interceptor sewers or waiting for other neighborhoods to install sewers.

We believe that these conclusions have ten important implications for the focus and direction of the Phase II Semarang study.

(1) Examine household demand for alternative "deal structures."

In order to implement a demand-driven planning approach in Semarang, more needs to be learned about exactly what kind of neighborhood deal households and neighborhoods would prefer. It is important to

emphasize that the Phase I field research described in this report assessed demand for essentially one deal structure. This deal may well not be the one households would find most attractive. More research and discussion are needed to design the neighborhood deal that best serves households in Semarang, given the constraints faced by government. One issue of particular importance is whether it is desirable to offer different deals in different parts of the city. In Phase I we proposed a single deal to all households; however, the costs of installing sewers will be higher in some neighborhoods than others. Costs for one neighborhood may also differ depending on what other neighborhoods in the area decide to do. The possibility of offering different neighborhoods different deals raises a host of issues, such as fairness and practicality, that need to be carefully examined.

(2) Examine government perceptions of and attitudes toward alternative deal structures.

Our focus in Phase I was on households and neighborhoods in Semarang; we had little time to discuss in depth the concept of a neighborhood deal or alternative deal structures with government officials. In Phase II this task should be given top priority.

(3) Present respondents and participants in community meetings realistic cost estimates for different technological options.

In Phase I we gave respondents hypothetical prices and costs for improved sanitation services. In Phase II we intend to present households with realistic cost estimates for different technological options, based on actual neighborhood conditions. This will require that some preliminary engineering designs and cost estimates be prepared for the study areas selected in Semarang before the Phase II study begins.

(4) Estimate demand for private water and sewer connections separately.

In Phase I, following conventional wisdom, we assumed that new water and sewer services

¹⁹ This approach would be similar to the Malaysia model (see Appendix A).

should be bundled, i.e., that households currently without a private water connection could not connect to the new water lines without also connecting to the new sewer lines. This issue needs to be rethought. Somewhat surprisingly, our preliminary findings suggest that the demand for the neighborhood deal is strongest among households that already have a private water connection. It does not seem that bundling water and sewer services increased demand of unconnected households for both services. In Phase II we intend to study this issue much more systematically, and to estimate demand for private water and sewer connections separately.

- (5) Determine households' knowledge of health risks, as well as which aspects of their current sanitation situation they dislike.

In Phase II we will focus more attention on respondents' perceptions of the health risks they face from the current sanitation situation, and what aspects they would most like to see changed. This information is necessary to design the most attractive neighborhood deal for households; it should also prove valuable for any social marketing or publicity effort initiated to explain the final sanitation program.

- (6) Determine the financing arrangements households prefer.

The question of financing arrangements for both the assessment fee and the connection costs needs to be thoroughly discussed with households. In Phase I our neighborhood deal offered financing of the assessment fee and connection costs for 1-2 years. This is likely to be too short a period. Other aspects of the financing package also need to be studied, such as the actual terms of the contract and what happens if a household defaults. We should also investigate whether the approach of charging an assessment fee for all households in a neighborhood, regardless of whether a household connects, is workable in Semarang. Are there alternative means of reducing the financial risk to the government that would work better?

- (7) Determine how households and neighborhood leaders prefer to be involved with engineering contractors.

Much more needs to be learned about how neighborhoods and households would like to see both the full-service, engineering contractor and the self-help program options organized. For example, how would the community like to be involved in the selection of an engineering contractor? Over what time period would construction occur? Would the neighborhood be involved in authorizing payment to the contractor and/or in ensuring quality control?

- (8) Determine the appropriate scale for the neighborhood deal.

In Phase I we assumed that the neighborhood deal could be offered to the RT, the smallest possible neighborhood unit. This may well be too small a group of households. The neighborhood deal should certainly be discussed at the RT level, but a collective decision may need to be made at either the RW or kelurahan level. In other words, a group of RTs may need to agree to participate in the deal before construction begins. The Phase II study should investigate this issue in detail.

- (9) Pay greater attention to the question of whether gender differences in demand for improved sanitation services exist .

During the Phase I research it was not possible to organize community meetings with only women in the sample neighborhoods. In Phase II we intend to answer the question of whether women are willing to pay more or less than men for improved sanitation services, and, if so, why.

- (10) Increase the number of respondents in the household survey and the number of community meetings in order to heighten confidence in the results.

Phase I was designed as a pretest; the sample sizes used for both the household survey and the community meetings were not intended to be sufficient for rigorous statistical analysis. In Phase

If we will increase these sample sizes in order to enable us to conduct econometric analyses of the data and to present results in which we have greater confidence.

In summary, we propose that Phase II of the Semarang study address these ten issues so that a neighborhood deal can be designed that forms the basis for implementation of the urban sanitation component of the Semarang urban redevelopment project. The ultimate design of the neighborhood deal will have to balance the interests of government with those of households and neighborhoods. One way that the results of the Phase II research might be used is to create a Blue Ribbon Commission of various stakeholders in Semarang, and to charge this commission with the task of designing the deal(s) that will be offered to neighborhoods and households. The results of our Phase II study could thus serve as input to the commission's deliberations.

A possible alternative to this proposed Phase II study of household demand for improved sanitation is a series of demonstration projects that would presumably install new water and sewer lines in selected neighborhoods in Semarang. In our opinion, however, it would not be advisable to initiate demonstration projects independently of the demand-driven planning approach suggested by the concept of a neighborhood deal. Unless carefully designed and implemented, demonstration projects could entail serious undesirable side effects. If some neighborhoods are provided with new services, for example, we believe that information about the deal implicit in such demonstration projects will quickly spread throughout Semarang; this could create difficulties for full-scale project implementation.

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 Phone 2542260400
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 The World Bank
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RSWGSouth Asia
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