

**ASIAN DEVELOPMENT BANK**

**IES: INO 99004**

**IMPACT EVALUATION STUDY**

**OF BANK ASSISTANCE IN THE**

**WATER SUPPLY AND SANITATION SECTOR**

**IN**

**INDONESIA**

**September 1999**

## CURRENCY EQUIVALENTS

Currency Unit — Rupiah (Rp)

Rp1.00	=	\$0.000123
\$1.00	=	Rp8,115.00

## ABBREVIATIONS

CAP	-	country assistance plan
COS	-	country operational strategy
CWCTS	-	Centralized Wastewater Collection and Treatment Scheme
EIRR	-	economic internal rate of return
FIRR	-	financial internal rate of return
GDP	-	gross domestic product
HC	-	house connection
HHS	-	Housing and Human Settlement
IKK	-	Ibu Kota Kecamatan (Subdistrict Capital)
IUIDP	-	Integrated Urban Infrastructure Development Project
KIP	-	kampung (village) improvement program
O&M	-	operation and maintenance
ODA	-	Overseas Development Administration
OECE	-	Overseas Economic Cooperation Fund
m <sup>3</sup>	-	cubic meter
NC	-	non-PDAM customer
NP	-	nonproject customer
NTL	-	nontechnical
PCR	-	project completion report
PDAM	-	Perusahaan Daerah Air Minum (Local Water and Sewerage Enterprise)
PFAP	-	Rural Water Supply and Sanitation Policy Formulation and Action
Planning Project		
PPAR	-	project performance audit report
PPP	-	public-private sector partnership
PSP	-	private sector participation
PT	-	public tap
REPELITA	-	Rencana Pembangunan Lima Tahun (Five-Year Development Plan)
TA	-	technical assistance
UFW	-	unaccounted-for water
WSPF	-	Water Supply Sector Policy Framework
WSS	-	water supply and sanitation
lcd	-	liter per capita per day

## NOTES

- (i) The fiscal year (FY) of the Government ends on 31 March.
- (ii) In this report, "\$" refers to US dollars.

**Operations Evaluation Office, IE-59**

## EXECUTIVE SUMMARY

For over two decades, the Indonesian economy has consistently achieved high economic performance, with gross domestic product averaging 7 percent per annum and inflation staying at single-digit levels. At the same time, the country has experienced a rapid growth in population and in demand for water supply and sewerage services. The 1997 urban population was about 74 million and growing at more than 4 percent per annum, 2-5 times higher than the national average of 1.7 percent per annum. The Government has attempted to meet the increasing demand by rapidly expanding public water supplies to cities and towns and, more recently, to rural areas. However, the expansion of water supplies has not kept pace with the spread of urbanization. As of 1998, only about 36 percent of the total population had access to proper water supply facilities. The provision of safe piped water and improved sanitation continues to be a primary concern in the Government's Five-Year Development Plan (REPELITA).

The Government's investment in water supply and sanitation (WSS) infrastructure services has increased significantly in real terms during the last four REPELITA periods. Although the bulk of this investment went to the urban water sector, water supply facilities in major cities of Indonesia are still inadequate by regional standards. Over the same period, the sanitation and rural subsectors received significantly lower levels of investment. As a consequence, the rural areas endure reduced service levels and greater variability in coverage. A large percentage of the rural communities continue to rely on unsafe water sources, and rudimentary latrines or open watercourses for the disposal of human waste. The current financial crisis in Indonesia further aggravates the Government's ability to fund future investment in the sector and on the ability of the sector to finance its own operating and maintenance costs.

During the early years of Bank assistance to the sector, loans were provided to individual projects and sector programs. Since the late 1980s, water supply projects have been integrated into broader urban infrastructure programs. Overall, the Bank has approved financing for eight WSS projects: six have been completed, one is ongoing, and one was cancelled. The Bank also financed 16 integrated urban infrastructure development projects (IUIDPs) with WSS components, of which 8 had been completed. In most IUIDPs, the water supply component alone accounted for the largest share of total project cost, about 27 percent on average. Combined WSS on average accounted for about 38 percent of the total IUIDP cost. The Bank's total technical assistance (TA) to the sector comprised 10 project preparatory TAs and 6 advisory TAs, and amounted to about 4 percent of the Bank's total TA program in Indonesia. Overall, Indonesia ranks sixth highest in terms of total Bank assistance to the WSS sector, or about 8.7 percent of the Bank's total assistance to the WSS sectors in all its developing member countries.

Of the six completed WSS projects, three have been postevaluated and rated as partly successful in achieving their objectives. Weak implementation capacity of the executing and implementing agencies and lack of political will to implement policy reforms in the sector were the major contributors to the less than satisfactory project

outcomes. Other specific reasons were (i) lack of community/beneficiary participation in project design/planning, (ii) inadequate or ineffective operation and maintenance (O&M) for project facilities, (iii) inability to meet cost recovery loan covenants, and (iv) inadequate institutional and interagency coordination. Three of the eight completed IUIDPs with WSS components have also been postevaluated and rated as generally successful in achieving their major objectives. Such ratings were attributed not only to actual physical accomplishments and project benefits, but also to the pioneering role the projects played in the implementation of the integrated urban development approach in Indonesia. Three more nonpostevaluated completed projects under this category were also rated generally successful in the respective project completion reports. Despite the generally positive evaluation of the completed urban development projects, there were also some commonly cited project shortcomings: (i) inadequate or poor institutional arrangements surrounding the participation of a multiplicity of implementing agencies (from various levels of government) and their lack of experience in implementing IUIDPs; (ii) lack of community mobilization efforts; (iii) difficulties in reaching the target poor population; (iv) counterpart funding problems in the wake of major local currency devaluation; and (v) poor/inappropriate project design, particularly the sewerage/sanitation and drainage components of most of the completed projects. In addition, all the completed projects experienced implementation delays ranging from 13 percent to 180 percent of the target implementation period.

Improved health and productivity of the population were the major themes of both the Government and the Bank's WSS sector policy. The Bank implemented this policy primarily by providing new capacity to meet future demand for water and improving existing facilities in the most cost-effective way. Institutional capacity building was a key component of the Bank's assistance to the sector. Integral to the Bank's sector policy were poverty reduction and improvement in the status of women. Other important sector objectives were to (i) improve the operations and financial performance of water agencies, (ii) reduce the high percentages of unaccounted-for water (UFW), (iii) strengthen the capabilities of the executing agencies, (iv) reduce the incidence of waterborne diseases, and (v) extend services to low-income groups. With sanitation projects, the objective was to improve public health standards by providing efficient sewage collection, treatment, and disposal systems.

Overall, the financial performance of the completed projects is below appraisal expectations mainly because of delays in project implementation, production volumes failing to meet appraisal targets, failure to achieve the expected reductions in UFW, and inability to raise tariffs sufficiently to cover costs. As a result, the financial internal rate of return (FIRR) values of all completed projects were below the appraisal estimates. Financial reevaluation of two of the completed projects shows that the FIRRs have improved since postevaluation, but still remain below the appraisal targets. The Study found a noticeable difference in the performance of the large urban-based local water enterprises (PDAMs) and the smaller semirural/urban-based PDAMs. The larger urban PDAMs were, at least until the recent financial crisis, able to achieve sustainable levels of operation and cost recovery. The smaller semirural/urban-based PDAMs lack the

resources necessary to achieve levels of performance comparable with those of the larger urban PDAMs. The smaller PDAMs performed poorly and are yet to demonstrate sustainable levels of O&M; they continue to rely on the Government for financial and institutional support. A more innovative approach is required to solve the needs of the rural sector if the imbalance between rural and urban service provision is to be addressed.

No economic evaluation had been conducted in all Bank-financed WSS projects. Using the methodology newly developed by the Bank, economic evaluations were carried out for two of the completed projects. The results demonstrated that economic benefits depended to a large extent on the resource cost savings derived from the Project. In the case of the Semarang Water Supply Project, the economic internal rate of return was about 14.8 percent, reflecting substantial resource cost savings by the beneficiaries. In the case of the Second Bandung Urban Development Project, the calculated economic internal rate of return of about 6.5 percent was due mainly to low resource savings because low-cost water from alternative sources in the preproject situation was available.

Institutional weakness remains a factor in the poor performance of sector institutions and will remain a primary concern of the sector in the future. There is a continuing need to strengthen performance in key areas to improve O&M standards; strengthen administrative efficiency and financial controls; and strengthen the planning, design, and implementation of new works.

O&M was found to be inadequate in most cases. This resulted in high UFW of over 30 percent in most Bank-financed WSS projects. Lack of a long-term UFW reduction program in most PDAMs was the main factor contributing to high UFW. The current financial crisis in the country further contributed to the worsening situation of O&M. The financial crisis also had a significant negative impact on the performance of most PDAMs and has resulted in increased O&M costs and declining revenues. The significant devaluation of the rupiah in 1997/98 increased the prices of spare parts and chemicals (mostly imported) by about 5 percent. Many commercial outlets and private consumers were unable to pay their water bills, resulting in significant loss of revenues. The impact of the crisis is already evident in the reduced earnings and profitability of many of the project-related PDAMs. During 1998, 87 PDAMs were declared bankrupt while another 100 or so were on the brink of insolvency. To help many of the more critical PDAMs survive the crisis and maintain basic levels of service and public health, the Government is implementing a program of emergency relief for the sector. In addition, the Government is attempting to push through the much needed reform of the sector and is looking to the private sector to play a greater role in the future by bringing new investment and more efficient business practices.

The Study found that the completed WSS projects only partly succeeded in targeting low-income communities, many of whom are denied the full benefits of piped water and sewerage by prohibitively high up-front connection charges. The current tariff

structure is distorting the demand for water by encouraging excessive consumption (and possibly wastage) by public tap users. The heavily subsidized tariff for public tap users is also reducing the income of the PDAMs.

Although the completed WSS projects in general have fallen short of achieving some of their targets and objectives, they have been able to deliver real benefits to consumers through lower cost water being made available in greater quantities than before. Some of the key issues for consideration are as follows:

- (i) There is an urgent need for Indonesia to implement the WSS reforms recommended by the World Bank and the Bank<sup>1</sup> in the sector, including reform of current tariff structures, if the sector is to graduate from its current dependent role to a more autonomous, financially independent, and customer-oriented service industry. The policy to encourage private sector participation should be spelled out in a more transparent manner if the sector is to attract private investment. Current tariff structures are distorting the demand for water by encouraging excessive consumption (and possibly wastage) of water by public tap users, and the heavily subsidized tariff for public tap users reducing the income of the PDAMs. Because of the high installation charges, the current tariff structure also prevents targeting the poor.
- (ii) The participation of local communities in the planning, design, and implementation of projects has a major impact on the success and sustainability of a project. Future Bank-financed projects must adopt a more participatory and demand-based approach that encourages communities to identify their own priorities and ways of achieving them. This is particularly so if the needs of important target groups such as low-income communities, women, indigenous communities, etc. are to be attended to. This issue is strongly supported by the recently approved regional and fiscal decentralization laws of the Government and by the Bank through Loan 1677-INO: Community and Local Government Support Sector Development Program.<sup>2</sup>
- (iii) The high level of UFW continues to be a major factor contributing to poor financial return of the PDAMs. Although the problems associated with reducing and controlling UFW are much better understood now than was the case at project implementation, significant reduction of UFW is unlikely to be achieved through passive or routine maintenance and repair work. An active long-term leakage monitoring and control program must be in place, and there should be political will to undertake drastic measures to disconnect illegal connections or eradicate other activities that contribute to high UFW.
- (iv) Sanitation is given a much lower priority than water supply and attracts only a small proportion of the total funding to the sector. The low level of demand for and willingness to pay for sanitation among respondents in the project areas

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<sup>1</sup> Reforms recommended under the World Bank 1997 Study on Urban Water Supply Sector Policy Framework and under the Bank's TA 2805-INO: *Strengthening Urban Water Management Policies and Strategies*, for \$600,000, approved on 2 June 1997.

<sup>2</sup> For \$200 million, approved on 25 March 1999.

stem from a lack of understanding of the effects of good sanitation on health. The Bank should further promote health education and ensure that it is an essential component of its WSS program both to stimulate demand and willingness to pay for sanitation and to maximize the health benefits of the project.

- (v) Weaknesses in institutional capacity, especially in the smaller PDAMs, continue to plague the WSS sector. Significant effort by both the Government and the Bank is needed to strengthen the management and technical capacity of PDAMs. The Bank should also strengthen the monitoring and evaluation of its capacity-building efforts by introducing appropriate targets and performance measures in all future projects.

## I. INTRODUCTION

1. Public investment in clean water serves to improve health and increase labor productivity. The provision of water supply and sanitation (WSS) has been a high priority in the Government's development objectives since the beginning of its First Five-Year Development Plan (REPELITA I) in 1969. To date, the Government has implemented six REPELITAs, each of which had consistently included significant investment in the WSS sector and focused on both urban and rural low-income communities, and areas with poor water resources and a high incidence of waterborne diseases.

2. This impact evaluation study (the Study) aims to review and assess the relevance, efficacy, sustainability, and impact of Bank operations in the WSS sector in Indonesia, with a view to improving future interventions in the sector. The Study focuses on the appropriate sector objectives, the physical, institutional, financial, economic, socioeconomic, and environmental impacts; and issues of sustainability. The Study highlights issues of strategic importance and the formulation of policies for countrywide WSS sector assistance by the Bank. Since many development agents are providing assistance to the WSS sector in Indonesia and the Bank's projects are scattered throughout the country, it is difficult to derive, in quantitative terms, the aggregate impacts of the Bank's projects. The Study, therefore, tends to be issues oriented and makes no attempt to quantify the aggregate development impacts of the intervention.

3. The Study draws findings and recommendations from a comprehensive review and assessment of six completed Bank-assisted WSS projects and eight completed Bank-assisted urban development projects with WSS components (Appendix 1, Tables A1.8 and A1.9). The Study also obtained information from a review of current sector issues and trends, and a desk review of relevant Bank documents of the completed WSS and urban development projects. The Bank's country assistance plan and the country operational strategy (COS) for Indonesia served as major references for the Study. The Study also undertook structured interviews with officials from key Government and private sector agencies active in the sector. Field visits were made to selected WSS project sites, and to local water enterprises, Perusahaan Daerah Air Minum (PDAMs), to collect technical and financial information relating to the (i) engineering, economic and financial, and environmental aspects of the water supply and sanitation systems; (ii) impact of policy reforms on the delivery of water and sanitation services; (iii) impact of tariffs on the efficiency of delivering water and sanitation services; (iv) willingness of consumers to pay for water and sanitation services; and (v) cost and benefit data required for financial and economic reevaluation of selected projects. A household WSS survey was also carried out in four selected WSS project areas to collect information on the socioeconomic status of the sample households, their current patterns of water use and consumption, level of customer satisfaction, and willingness to pay for improved levels of service.

## II. BACKGROUND

### A. Government Development Objectives and Investment in the WSS Sector

4. Drinking water, being a basic need, has been given high priority in successive REPELITAs. At the time of REPELITA I (1969/70–1973/74), Indonesia faced serious problems in the water supply sector. Many of the existing systems were degraded and failed to provide sufficient water to their users, both urban and rural. To counter this problem, REPELITA I emphasized the rehabilitation of existing systems and assumed that the new systems would be developed by local government units.<sup>3</sup> It soon became apparent that the local government units could not fulfill this role. In REPELITA II (1974/75–1978/79), the national Government played an increasing role in both the creation of new systems and the rehabilitation of existing systems. To encourage effective operation and maintenance (O&M) of both existing and future systems, REPELITA II also saw the creation of local water enterprises (PDAMs) and the introduction of standardized accounting and management procedures.

5. REPELITAs III and IV (1979/80–1983/84 and 1984/85–1988/89, respectively) saw a significant refocusing of the Government's policy toward the poor areas in large cities and for small and medium-size towns in the country. In accordance with the United Nations Drinking Water and Sanitation Decade (1981–1990), a new program for district capital town was initiated to further speed up the provision of piped water supply to over 3,000 small towns in and around subdistrict capitals (IKKs) with populations of between 3,000 and 20,000. However, due to budgetary constraints and unfamiliarity with the new program, only 400 IKK systems were completed during REPELITA III and 685 IKK systems during REPELITA IV.

6. Under REPELITA V (1989/90–1993/94), the sector policy was reformulated to reflect the Government's main objectives of poverty reduction and balanced regional development with a shift in the overall focus to the isolated and/or underdeveloped areas. The new policy involved the expansion of public standpipes in preference to house connections for the poor, and included smaller population centers of 1,000 people in the IKK Program. REPELITA V also included a commitment by the Government to the recovery of both capital and O&M costs of piped water supplies.

7. The general aim of REPELITA VI (1994/95–1998/99) is the growth of self-reliance through increased participation, efficiency, and productivity of the people. Under its sectoral approach, REPELITA VI gave high priority to the rehabilitation of existing facilities and the reduction of unaccounted-for water (UFW). It placed increasing emphasis on human resource development, including strengthening and training of PDAM staff, and encouraged greater private sector participation (PSP) in the water sector.

8. The Government's investment in WSS infrastructure services increased significantly over the REPELITA III and IV periods (Table 1). In the urban areas, the same trend in Government investment in the sector was observed. However, the investment for water and sanitation declined by about 42 percent and 27 percent, respectively, between REPELITAs V and VI. This was mainly due to the decrease in the dollar equivalent of the REPELITA VI budget due to the major depreciation in the value of the rupiah in 1997 amidst the regional financial

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<sup>3</sup> Daily supply was increased by approximately 520,000 cubic meters (m<sup>3</sup>) per day during the REPELITA I period.

crisis. In the rural areas, meanwhile, the REPELITA VI investment in water declined by about 82 percent from the REPELITA V budget, but a significant increase in the appropriated investment for sanitation development (i.e., about 640 percent increase over the REPELITA V budget) was noted.

**Table 1: REPELITA Budget for Water Supply and Sanitation (WSS) Sector**  
(in current prices, \$ million)<sup>a</sup>

Program	REPELITA III 1979/80-1983/84			REPELITA IV 1984/85-1988/89			REPELITA V 1989/90-1993/94			REPELITA VI 1994/95-1998/1999		
	Amount (\$)	% of HHS <sup>b</sup>	% Δ <sup>c</sup>	Amount (\$)	% of HHS <sup>b</sup>	% Δ <sup>c</sup>	Amount (\$)	% of HHS <sup>b</sup>	% Δ <sup>c</sup>	Amount (\$)	% of HHS <sup>b</sup>	% Δ <sup>c</sup>
Water												
Urban	198	56		450	62	+127	1,683	45	+274	971	52	-42
Rural	63	18		90	12	+43	506	14	+462	91	5	-82
Sanitation												
Urban	24	7		89	12	+271	338	9	+280	247	13	-27
Rural	5	1		3	1	-40	38	1	+1,16	281	15	+640
<b>Total WSS</b>	<b>290</b>	<b>82</b>		<b>632</b>	<b>87</b>	<b>+118</b>	<b>2,565</b>	<b>69</b>	<b>+306</b>	<b>1,590</b>	<b>85</b>	<b>-38</b>
<b>Total HHS<sup>b</sup></b>	<b>354</b>			<b>726</b>			<b>3,707</b>			<b>1,874</b>		

<sup>a</sup> Rupiah exchange rates (per \$1) used for REPELITA VI based on first quarter data of the International Monetary Fund-International Financial Statistics (IMFIS) were as follows: 1994-1995: Rp2,209; 1995-1996: Rp2,318; 1996-1997: Rp2,403; 1997-1998: Rp9,433; and 1998-1999: Rp10,000 (projection made in December 1998).

<sup>b</sup> Total REPELITA expenditure budget for the Housing and Human Settlements (HHS) sector.

<sup>c</sup> Percent increase (+) or decrease (-) in current REPELITA expenditure budget from preceding REPELITA.

Source: REPELITAs III, IV, V, and VI.

9. Sanitation issues are given much less attention than water supply and are linked to general environmental issues rather than considered separately. However, REPELITA VI has introduced some general approaches to sanitation management, giving priority to centralized facilities in the larger urban areas, and the specific targeting of high-density areas and the urban poor. For poor areas, on-site sanitation systems will be the basic facility. The physical targets for REPELITA VI are the construction of wastewater infrastructure in 9 large cities and 200 medium-size and small cities. While the physical targets for improved sanitation under REPELITA VI are an improvement, actual expenditures have fallen far short of these targets, partly because of the current financial crisis. The measures promulgated under REPELITA VI do not adequately address the needs of the sanitation subsector. Key sanitation-related issues, such as health education and the role of the community, are omitted. The cross-sectoral nature of sanitation was also not addressed.

10. The achievement of the Government's development objectives in the WSS sector are handicapped by the lack of (i) a comprehensive policy framework, and (ii) integrated approach to water resources management. By default, development policies embodied in the REPELITAs have served as de facto policies for the sector, specifically detailing the Government's commitment to the sector, target expenditures, and sector priorities. There is a large variation in service standards within the sector, noticeably between urban and rural areas. Likewise, relative to water supply development, sanitation is accorded a much lower priority by the Government in the past and given a relatively small proportion of the total funding to the sector (Table 1).

11. The development of a discrete national policy for the sector is now considered a priority of the Government, and is receiving external support. The Government's urban water sector policy is articulated in the World Bank report "Indonesia Urban Water Supply Sector Policy Framework (WSPF)," published in October 1997. The report identifies major policy changes aimed at improving financial performance and service standards, and making the sector more attractive for PSP. The rural sector policy is being addressed by the Rural Water Supply and

Sanitation Policy Formulation and Action Planning Project (PFAP).<sup>4</sup> The PFAP aims to develop a national policy for (rural) water supply and sanitation that ensures the sustainable delivery of services while encouraging consumer demand-driven and participatory approaches. This will be achieved through the practical pilot testing of a number of policy options. The Bank's TA 3137-INO, a WSS project, will also support, incorporate, and help operationalize the policy initiatives of WSPF and PFAP.<sup>5</sup>

12. A Bank-funded advisory technical assistance (TA),<sup>6</sup> which was completed in 1998, assisted the Government in strengthening its urban waste management policies and strategies.<sup>7</sup> The TA was a preliminary step in the formulation of a specific strategy and policy for the sanitation subsector and is consistent with the objectives of the WSPF. Due to the overlap/linkages between the water and sanitation sectors, the potential for synergistic policies and strategies needs to be addressed by close cooperation between the Government, the Bank and the World Bank. This is currently being addressed under TA 3137-INO.<sup>3</sup>

## **B. The Bank Assistance Program**

### **1. Country and Sector Operational Strategy**

13. The Bank's 1987 and 1989 COS, which covered part of REPELITA IV and the whole of REPELITA V, placed significant emphasis on human resource development and advocated an integrated approach to urban development in the social sectors. However, it did not explicitly define a strategy for the WSS sector. The Bank supported the provision of upgraded urban development facilities in line with current needs and expected growth, and continued the integrated approach to infrastructure development including the development of water supply and waste disposal facilities. The Bank's sector strategy for health also called for the provision of rural water supplies as part of its overall strategy for improvement in community health. Within the social sectors at large, the Bank's strategy pursued cost recovery and improved public-private coordination of service delivery and planning in the pursuit of enhanced sector efficiency and equity.

14. Since 1989 (i.e., the initial year of REPELITA V), increased emphasis has been placed on physical, financial, social, and infrastructure investment to promote growth; on human resource development to generate employment and increase productivity; and on sustainable natural resource utilization and conservation to improve environmental management. The most pronounced changes in Bank operations in Indonesia during the REPELITA V period were the increased emphasis on natural resources management, and a progressive shift in the Bank's

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<sup>4</sup> Project financed by the Australian Agency for International Development (AusAID). The executing agency is the United Nations Development Programme/World Bank Regional Water and Sanitation Group for East Asia and the Pacific (RWSG-EAP), which will also provide some cost sharing.

<sup>5</sup> TA 3137-INO: *Water Supply and Sanitation (Sector) Project*, for \$600,000, approved on 22 December 1998.

<sup>6</sup> TA 2805-INO: *Strengthening Urban Waste Management Policies and Strategies Project*, for \$600,000, approved on 2 June 1997.

<sup>7</sup> Asian Development Bank. 1998. Draft final report "Towards a National Environmental Sanitation Program for Indonesia." October.

operational program toward the eastern region of Indonesia, in support of Government efforts to address imbalances in regional development. The current REPELITA (VI, 1994-1999) gives greater emphasis on PSP and improved public sector resource management, while capacity building has become a key component of Bank assistance to the sector.

15. In the 1994 COS, the Bank pursued three main strategic objectives in the Indonesia assistance program, namely: (i) efficient growth, (ii) human resource development, and (iii) sustainable utilization of natural resources. An integral part of the three objectives is poverty reduction and the improvement of the status of women.

16. In addition to the overall country objectives (para. 15), the sector objectives in the urban development and health subsectors contained relevant objectives pertaining to the WSS sector. The improved health and productivity of the population were the underlying major themes of both the Government and the Bank's WSS sector policy. The Bank implemented and interpreted this policy primarily via the provision of new capacity to meet future demand and improving existing WSS facilities in the most cost-effective way. Other objectives were to (i) improve the operations and financial performance of water agencies, (ii) reduce the high percentages of UFW, (iii) strengthen the capabilities of the executing agencies, (iv) reduce the incidence of waterborne diseases, (v) improve firefighting capacity, and (vi) extend services to low-income groups. With sanitation projects, the objective was to improve public health standards by providing efficient sewage collection, treatment, and disposal systems.

17. An important objective of the Government's policy for the water sector was to encourage greater PSP. PSP in the sector to date has included concessions for water treatment and distribution, service contracts for meter reading, leakage repair, and revenue collection. These concessions are referred to as public-private sector partnerships. The Government has awarded two concessions for the provision of water supplies to western and eastern Jakarta. The private sector is also involved in the provision and operation of WSS infrastructure for new residential, tourist, commercial, and industrial developments.

18. The completed Bank projects essentially predate the Government's PSP objectives for the sector, and consequently have had little direct impact in this regard. The completed projects contained no specific components or covenants related to PSP. However, through their capacity-building efforts, the Bank projects have contributed indirectly to PSP by building strong and effective PDAMs. As a result, the projects have indirectly helped to make PDAMs become efficient and an attractive target for privatization. The Bank-financed TAs<sup>8</sup> on promoting PSP and on water tariff policy and reform have also made important contributions to the regulatory reform necessary for greater private sector involvement in the sector.

## **2. Relevance of the Bank's Country and Sector Operational Strategy**

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<sup>8</sup> TA 2016-INO: *Private Sector Participation in Urban Development (Bandung and Semarang)*, for \$600,000, approved on 14 December 1993; TA 2501-INO: *Water Tariff Structure and Financial Policies of Water Enterprises*, for \$600,000, approved on 22 December 1995; and TA 2837-INO: *Capacity Building for Private Sector Participation in Urban Development*, for \$850,000, approved on 11 August 1997.

19. On hindsight, the Bank lacked a discrete policy for the WSS sector in the past. Its country objectives in the urban development and health sectors resulted in a diverse range of objectives that were too varied, diverse, often nebulous, and even contradictory. As water is a social and economic good, WSS projects can have a range of social objectives (e.g., improved health, targeting of the poor, community participation, and status of women) as well as financial objectives (e.g., improved efficiency and productivity, PSP). It is important from the outset that project objectives be clearly stated and prioritized.

20. Projects should be designed so that they achieve strategic policy goals and objectives. Given that the policy goal for the WSS sector is improved health and productivity of the population, and that other key objectives relate to poverty reduction and the improved status of women, then project design should incorporate measures to achieve these goals and objectives. Instead, Bank-financed WSS sector projects in the past focused mainly on the provision of infrastructure, and increasing efficiency and productivity through training, institutional strengthening, and encouraging PSP. The assumption was that increasing the availability of water and sanitation would lead to improvement in community health, and benefit low-income communities and women.

21. An evaluation of completed Bank-financed WSS sector projects indicated the following major weaknesses:

- (i) Low priority was given to the sanitation component.
- (ii) Health education and linkages between health, sanitation, and water supply were not integrated into WSS projects.
- (iii) Training and institutional strengthening objectives were appropriate and relevant, but lacked performance measures to monitor effectiveness.
- (iv) While Bank policy clearly emphasizes targeting of disadvantaged communities (e.g., the poor, women, etc.), projects lacked specifically targeted measures to achieve those objectives.
- (v) While improved health remains an overriding sector goal, project designs did not address how it would be achieved. As no monitoring of community health took place (either during implementation or at postevaluation), the health impact of projects could not be assessed.
- (vi) While Bank policy stressed a community-participatory approach to development, experience to date shows lack of meaningful community consultation in planning and implementation of projects.
- (vii) Projects were evaluated (both project completion reports [PCRs] and project performance audit reports [PPARs]) according to their performance in achieving financial and physical targets (disbursements, costs, water production, number of connections, etc.), and not with respect to achieving policy objectives.

### 3. The Bank's Investment Program and Performance in Indonesia's WSS Sector

#### a. Loan and Technical Assistance

22. Since the Bank's initial involvement in the sector in 1972, Indonesia has received the sixth largest share of Bank assistance in the WSS sector relative to the Bank's other developing member countries (Appendix 1, Table A1.1). The Bank has approved nine loans for WSS amounting to a total of \$325.6 million. This amount represents about 2 percent of the Bank's total loan portfolio in Indonesia (Appendix 1, Table A1.2). The loans financed eight projects, six of which have been completed (with total approved loan amount of \$174.6 million), one is still ongoing, and one was cancelled (with total approved loan amount of \$151 million) (Appendix 1, Table A1.3). In addition, the Bank has approved 18 loans amounting to \$1,462.85 million to finance 16 urban development projects with WSS components (Appendix 1, Table A1.4). In terms of regional distribution, many of the Bank's projects in the WSS sector were concentrated in Java (five loans with total loan amount of \$95.4 million or about 29.3 percent of total lending to the sector). Similarly, the majority of Bank-assisted urban development projects with WSS components were concentrated in Java (eight loans with total amount of \$582.55 million or about 40 percent of Bank assistance to the urban development sector) and Sumatra (five loans totaling \$493.3 million or about 34 percent of total Bank assistance to the sector). The five remaining loans amounting to \$387 million funded five national or multiregional urban development projects (Appendix 1, Table A1.5). During earlier years (1970s to early 1980s), the modality of the Bank's loan assistance to the sector was generally project based. The sector loan approach was introduced in the 1980s with the approval of the Small Towns Water Supply (Sector) Project.<sup>9</sup> The nature of the project and the stage of the development of the sector at that time, indicated that a sector loan was a more appropriate form of Bank intervention. Three more WSS Bank-financed projects of this modality have been approved to date.<sup>10</sup> By the late 1980s, the Bank's assistance to the WSS sector had shifted to integration with the Bank's urban development projects. Under this approach, WSS projects are included as components of integrated urban infrastructure development projects (IUIDPs). Appendix 1 provides details on the Bank's operations in Indonesia's WSS sector.

23. The Bank's TA to the sector as of 31 December 1998 totaled \$5.955 million or about 4.2 percent of the Bank's total TA program in Indonesia. This amount funded 11 project preparatory TAs and 6 advisory TAs (Appendix 1, Tables A1.6 and A1.7).

#### b. Project Performance

<sup>9</sup> Loan 493-INO: *Small Towns Water Supply (Sector) Project*, for \$32 million, approved on 11 December 1980.

<sup>10</sup> These include (i) Loan 731-INO: *IKK Water Supply (Sector) Project*, for \$40.2 million, approved on 17 January 1985; Loan 1069-INO: *Second IKK Water Supply (Sector) Project*, for \$39 million, approved on 18 December 1990; and Loan 1352-INO: *Rural Water Supply and Sanitation (Sector) Project*, for \$85 million, approved on 2 February 1995.

24. A common rationale for the Bank's water supply and sanitation projects in Indonesia (including the WSS components of urban development projects) is the provision of safe piped water, effective sanitation, and reduction of the incidence of waterborne diseases, with particular attention to the lower income population in the project areas. Emphasis on institutional development of WSS institutions, particularly at local levels, is another common objective. A commonality in the major components of completed projects is the expansion of water delivery capacity through installation of new or rehabilitation of (i) existing water source pumping facilities and treatment plants, (ii) storage tanks, (iii) reservoirs, (iv) transmission and distribution pipelines, (v) house connections, and (vi) public standpipes.

25. Three of the six completed WSS projects have been postevaluated, two non-postevaluated projects have available PCRs, and a PCR is under preparation for one project that was completed in July 1997 (Appendix 1, Table A1.8). Of the 16 urban development projects with WSS components, 8 have been completed to date, 3 of which have also been postevaluated. Five of the nonpostevaluated completed projects have available PCRs (Appendix 1, Table A1.9).

26. The three WSS projects that had been postevaluated were all rated as partly successful in achieving their major objectives and respective project components. Weak implementation capacity and lack of political will were two major contributing factors for the outcome. Other commonly cited contributing factors for the partial success of the completed projects were (i) consumers' lack of willingness to pay or avail of piped water supply services due to the high cost of connections, (ii) lack of community/beneficiary participation in project design/planning, (iii) inadequate or ineffective O&M for project facilities, (iv) inability to meet cost recovery project loan covenants, and (v) weak institutional coordination. The importance of linking major water supply projects with integrated development in sewerage, sanitation, and drainage as a measure to avert or limit negative environmental impacts of water supply projects was also underscored. The PCR for the first IKK water supply sector project did not provide a rating for the Project, but the PCR for the follow-up second IKK water supply sector project noted that implementation of both the first and second projects was generally successful and project component targets were generally achieved as envisaged. The summaries of WSS project objectives and achievements, implementation issues, and lessons learned are given in Appendix 1, Tables A1.10, A1.11, and A1.12, respectively.

27. The Bank-financed IUIDPs with WSS components fared well in achieving their main objectives. The individual projects' components were also generally implemented as envisaged. The three postevaluated IUIDPs were all rated generally successful. Such ratings were attributed, not only to actual physical accomplishments and project benefits, but also to their contribution to the implementation of the integrated urban development approach in Indonesia's two major cities, Bandung and Medan, and in some of the smaller towns. All five nonpostevaluated completed projects under this category were also rated generally successful in their respective PCRs. Despite the positive assessments of the completed IUIDPs, they had some shortcomings: (i) inadequate institutional coordination considering the participation in each project of a multiplicity of implementing agencies from various levels (i.e., national, provincial, and local) and lack of experience of these agencies in implementing IUIDPs; (ii) lack of community mobilization efforts; (iii) difficulties in reaching the target poor population; (iv) counterpart funding problems in the wake of major local currency devaluation; and (v) poor project design, particularly the sewerage/sanitation and drainage components of most of the completed projects. Detailed summary assessments of these constraints are also highlighted in Appendix 1, Tables A1.11 and A1.12. In a typical IUIDP project, the water supply component

gets the biggest share of total project cost, i.e., about 27 percent on average. Water supply and sanitation combined on average make up about 38 percent of the total cost.

28. A review of all completed WSS projects and urban development projects with WSS components indicated that many WSS projects experienced cost underruns during implementation. The main contributing factors were (i) devaluation of the rupiah against the dollar, (ii) savings in foreign exchange costs due to increases in local cost financing, (iii) savings from price and physical contingency allocations, (iv) competitive contract prices, (v) reduction in project scope, and (vi) unutilized or reduced allocation for interest during construction. There were also projects that experienced cost overruns because of (i) increases in costs due to delays in project implementation, (ii) changes in or expanded project scope, and (iii) underestimated appraisal project cost or unit prices. A summary of the reasons for cost deviations in all completed projects is given in Appendix 1, Table A.13.

29. The review also indicated that most completed WSS projects suffered implementation delays that ranged from 13 percent to 180 percent of the target implementation period at appraisal. The main causes of the delays were (i) delayed or inadequate local counterpart funds; (ii) delay in engagement of consultants; (iii) construction delays and difficulties, including land acquisition problems; (iv) delay in the preparation of subproject detailed designs, bid documents, and contracts; (v) inadequate/poor institutional arrangements; and (vi) in some cases, the poor performance of contractors and suppliers. A more detailed summary is given in Appendix 1, Table A1.14.

### **C. External Assistance in Indonesia's WSS Sector**

30. The Government of Indonesia has closely coordinated external assistance to the WSS sector. The Bank has also actively consulted and collaborated with other international aid agencies on WSS and urban development strategies, institutional development, financial arrangements and sector policies, and major activities in terms of regional distribution. Considerable effort is made by the various aid agencies to ensure coordination and complementarity of the assistance provided.

31. Over a span of four REPELITAs (from REPELITA III [1979-1984]) to REPELITA VI [1994-1999]), the three major external sources for the sector have been the World Bank (about 34 percent of total cumulative external assistance), the Japanese Government (28 percent) through its Overseas Economic Cooperation Fund, and the Bank (20.5 percent). Other significant bilateral sources include the United States (about 10 percent), Netherlands (about 3 percent), and Australia (2 percent).<sup>11</sup> Consistent with the Government's development objectives, the Bank and other external sources have generally concentrated their assistance on supporting WSS development in the urban areas. The operational strategies of these multilateral and bilateral sources generally integrate WSS components under their respective urban development projects. Details on external assistance to the WSS sector of Indonesia are given in Appendix 2.

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<sup>11</sup> Figures for bilateral sources other than Japan under REPELITA VI are not available.

### III. IMPACT OF BANK OPERATIONS

#### A. Project Impact

##### 1. Project Approach, Design, and Construction

32. The Government adopted the IUIDP approach in Bank-financed projects in recent years. These common problems were associated with IUIDPs: (i) projects are very complex in terms of the number of subsectors covered; (ii) due to the large number of Government agencies involved, greater coordination and capacity-building efforts are required, and also greater supervision during implementation; (iii) conflicting interests and overlapping responsibilities affect the performance of the executing agencies;<sup>12</sup> and (iv) IUIDP is still largely treated as an exercise in the physical development of separate subproject components, instead of a long-term integrated development program.<sup>13</sup> The Government recognizes the benefits in the more integrated, decentralized, and program approach offered by IUIDP, and considers the additional complexities as manageable.

33. However, the IUIDP approach is now increasingly at odds with a WSS sector's general policy of promoting PSP. The PDAMs are expected to be managed as separate, self-financing business units, largely free of local government involvement. PDAMs should have the freedom and independence to plan for their own needs, free of Government interference, if they are to enter into partnership with the private sector. This is currently not the case. PDAMs are heavily inhibited or influenced by both the national and local governments. The IUIDP model does not seem compatible with the Government's policy objectives to enable the PDAMs to function independently with a view of promoting partnership with the private sector.

34. The standards of engineering design (which reflect the performance of international consultants) have generally been good. However, there have been instances of poor performance by domestic consultants.<sup>14</sup> The two IKK water supply (sector) projects (footnote 8) provided strong evidence that new approaches and technologies should not be introduced without prior pilot project testing and community approval.<sup>15</sup> The executing agencies generally agreed that there is need for greater resources at the project feasibility stage to adequately determine water source yields. One case in example was that water yields were overestimated

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<sup>12</sup> The Bank's Postevaluation Office's Special Study on Executing Agency Arrangements (1984) noted that Bank experience suggests an unfavorable correlation between the number of agencies involved and overall project success.

<sup>13</sup> PCR: INO 22264: *Secondary Cities Urban Development (Sector) Project*, November 1998.

<sup>14</sup> The affected projects are Loans 195(SF): *Bandung Water Supply Project*, for \$11.5 million, approved on 7 November 1974; 401-INO: *Bandung Water Supply Project (Supplementary)*, for \$8 million, approved on 29 May 1979; 768-INO: *Second Bandung Urban Development Project*, for \$132.4 million, approved on 12 December 1985, and Loan 493-INO: *Small Towns Water Supply Project* (footnote 7).

<sup>15</sup> One typical example was that flow restrictors were rejected by consumers. Most were damaged or removed after a few months, resulting in much greater flows in the higher pressure end of the systems while leaving water shortages in the tailend of the system. Consumers expressed a preference for metered systems even though they would have to pay for the cost of conversion. Most or all of the systems have since been converted to meter usage.

or inadequately assessed in the case of the Bandung water supply and the IKK water supply projects.

35. One major concern with projects in the WSS sector is the quality of construction. This is often below the required standards, leading to rapid deterioration of the completed works and a greater O&M burden. Instances of poor contractor performance have been cited in many project evaluation reports.<sup>16</sup> From discussions with PDAMs, poor-quality construction is considered a widespread problem and many construction problems only become evident later, usually after postevaluation. Poor standards of construction supervision are contributory factors. The poor quality of some of the locally manufactured pipes further contributed to poor project performance.<sup>17</sup>

36. Closely related to the water supply system design is the sewerage and sanitation component. The majority of Indonesian households rely on on-site systems (e.g., septic tanks and effluent drainage systems) for the treatment and disposal of waste. In most cases, septic systems were poorly designed and built. Septage collection is inadequate and disposal is poorly controlled. Effluent drainage systems are either often blocked (due to poor maintenance) or nonexistent.<sup>18</sup> Households are generally unaware of the O&M of such systems, and receive no training or information in this regard. One example is the sewage treatment plant constructed under the Second Bandung Urban Development Project (footnote 12). It was experiencing operational difficulties associated mainly with its underutilization.<sup>19</sup> The city of Bandung was unsuccessful in approving and implementing the regulations requiring wastewater procedures to connect to the new system. The plant is operating at only 30 percent of capacity due to the slow rate of growth in the demand for sewer connections. This has resulted in the intermittent operation of the facility, a situation that impacts unfavorably on the quality of the final effluent discharged. There are also reported instances of illegal trade waste discharges to sewers<sup>20</sup> and instances of raw sewage being diverted from the treatment plant inlet canal to irrigation, posing a potential health hazard. In most cases, it was found that there was lack of community consultations at the design stage, and the sanitation component was included without taking into account the needs of the project beneficiaries.

## 2. Operation and Maintenance

37. The PDAMs are responsible for the O&M of all existing and future water supply systems in their respective localities. The level of maintenance varies according to the availability of skills and funds in each PDAM. The main source of funding is the tariff collection; however, the Government also subsidizes some of the smaller PDAMs. O&M varies from good (such as in the PDAM Medan) to poor in the smaller semirural PDAMs.

<sup>16</sup> PPA: INO 14041: *Medan Urban Development Project*, November 1991; PCR: INO 21216: *Second Medan Urban Development Project*, January 1997; and PCR: INO 16008: *IKK Water Supply Sector Project*, December 1993.

<sup>17</sup> PPA: INO 13042: *Small Towns Water Supply (Sector) Project*, December 1992; and PCR: INO 17138: *Second Bandung Urban Development Project*, December 1995.

<sup>18</sup> Asian Development Bank. 1998. Final Report of Consultant for TA 2805-INO: *Strengthening Urban Waste Management*. October.

<sup>19</sup> Based on site visits and interviews with PDAM officials and plant operators.

<sup>20</sup> Ibid.

38. Due to the current financial crisis, most PDAMs are facing serious shortage of funding for O&M activities. They also have poor management and many suffer from water source constraints. Examples are PDAM Bandung<sup>21</sup> and PDAM Semarang<sup>22</sup> which provide only about four hours water supply per day and are able to add only limited new connections each year. The IKK systems managed by the PDAMs in Lampung generally supply water for less than eight hours a day. In Lampung Utara, two of the IKK systems (IKK Candi Mas and IKK Bumi Agung Marga) had to be shut down completely since their water sources had dried up. The overall output of PDAM Lampung Utara declined by 50 percent in the last five years. Lampung Tengah has also seen a 50 percent decline in the output and sales of water mainly as a result of customers being cut off for nonpayment of bills. However, there are exceptions. PDAM Tirtanadi Medan<sup>23</sup> is one example with good and effective O&M practice, and can serve as a model for other PDAMs. It supplies potable water 24 hours a day to its customers, and has been able to reduce its UFW from 38 percent in 1980 to 20 percent at the present time. Its efficient management in the past has resulted in a strong financial situation that has enabled it to increase the number of new connections and finance significant infrastructure expansions from its own resources, despite the financial crisis. As part of its customer service culture, it has established good public relations through information dissemination and dialogue with customer representative groups, and responds to consumer complaints.

39. Though there is evidence of some gradual improvement over the last five years, standards of O&M in most Bank-Project-related PDAMs are still poor, as evidenced by high levels of UFW, intermittent operation, erratic or declining levels of production, and inadequate spending or budget for O&M. Particularly worrisome are the performances of the IKK systems in Lampung, which show a steady pattern of falling output and demand due to poor O&M. Dissatisfaction with the standard of service provided by the PDAMs is growing and highlights the added difficulties of operating in rural towns where, often, available alternative water sources compete with the poorly managed PDAM supply.

40. As an indication of O&M efficiency, two indicators, viz., UFW and expenditure on O&M, were examined in Bank-funded PDAMs (Appendix 3).

#### **a. Unaccounted-for Water**

41. UFW is broadly taken to be the unaccounted-for difference between water production and consumption, and includes both technical (i.e., leakage) and nontechnical (i.e., illegal use, metering errors) components. UFW is an important indicator of the condition of the distribution system, and reflects the standard of O&M. Like other aid agencies' projects, Bank-funded WSS projects have performed poorly in achieving target reductions in UFW. This is in part due to the setting of unrealistic targets without an effective and appropriate built-in program to reduce the

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<sup>21</sup> Related Bank projects: Loans 195/401-INO: *Bandung Water Supply Project* (footnote 12); Loan 271-INO: *Bandung Urban Development and Sanitation Project*, for \$1.15 million, approved on 26 August 1976; Loan 400-INO: *Bandung Urban Development Project*, for \$32.3 million, approved on 29 May 1979; and Loan 768-INO: *Second Bandung Urban Development Project* (footnote 12).

<sup>22</sup> Related project: Loan 547-INO: *Semarang Water Supply Project*, for \$35.5 million, approved on 25 November 1981.

<sup>23</sup> Related Bank projects: Loan 550-INO: *Medan Urban Development Project*, for \$39.3 million, approved on 26 November 1981; and Loan 919-INO: *Second Medan Urban Development Project*, for \$175 million, approved on 10 November 1988.

UFW.<sup>24</sup> There have also been unrealistic expectations that reductions in UFW would automatically occur as a consequence of the project. In practice, the opposite occurred as the increased system pressures and greater availability of water flows led, in the short term at least, to much higher levels of UFW. It is now recognized that specific UFW programs are required if reductions in UFW are to be achieved. Improvements in UFW will only begin to show up years after project completion, and this would require significant improvements in O&M. The problems associated with reducing and controlling UFW are much better addressed now than they were at project appraisal and implementation in the 1980s and early 1990s. It is now realized that significant UFW reduction is unlikely to be achieved through passive or routine maintenance and repair work. Active long-term leakage monitoring and control as well as political will to get rid of illegal connections and corruption are needed if significant UFW reduction is to be achieved.

42. Experience since postevaluation shows that PDAMs that have initiated specific UFW reduction programs and have committed adequate resources to O&M have been able to achieve a steady reduction in UFW levels. One good example is PDAM Medan, which has achieved good progress through specific UFW reduction measures. As a result, UFW fell, from 38 to 20 percent over the period 1993-1997. Other examples are PDAM Bandung which is currently implementing programs to reduce UFW levels through an O&M program and regular replacement of faulty water meters, and improvements in meter reading and billing to reduce levels of administrative losses; and PDAM Semarang, which has equipped its meter readers with hand-held data loggers, so data can be entered in the field (manually) and downloaded electronically back in the office. The results for Bandung show a steady reduction in UFW from a peak of 61 percent in 1992 to about 43 percent in 1997. However, the UFW level is still high. The percentage of UFW in PDAM Semarang has shown a steady decline, from 41 percent in 1993 to 36 percent in 1997. For PDAMs in Lampung Utara and Tengah, data derived from 14 IKK systems showed that while output from the IKK systems has been declining, the average rate of UFW has been relatively steady at about 30 percent. This has been attributed mainly to actions taken to reduce leakage and other losses. In most other PDAMs, however, the increasing or high level of UFW (over 40 percent) is symptomatic of declining levels of O&M, suggesting deteriorating physical performance of related Bank-supported WSS projects.<sup>25</sup> It must be emphasized that at the time of the Study, data for assessing the impact of the current financial crisis on PDAMs' ability to carry out an effective UFW program were not available. However, discussions with PDAMs indicated that they all face severe budget problems in the current situation, which will significantly affect the UFW program in the next three years.

#### **b. Operation and Maintenance Expenditure**

43. Operating ratio is a measure of a PDAM's total O&M spending expressed as a proportion of its total operating revenue. While there is no rule of thumb regarding the proportion of operating revenue that should be spent on O&M, it is noted that the water utilities for both Singapore and Kuala Lumpur which are considered regionally to be efficient operators, have

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<sup>24</sup> Examples are target UFW of 25 percent for Loan 547-INO: *Semarang Water Supply Project* (footnote 20) and Loans 983/984(SF)-INO: *Secondary Cities Urban Development Project*, for \$120 million, approved on 9 November 1989; and 28 percent for Loans 195/401-INO: *Bandung Water Supply Project* (footnote 19).

<sup>25</sup> For example: Loan 493-INO: *Small Towns Water Supply (Sector) Project* (footnote 12); and IKK subprojects under Loan 731-INO: *IKK Water Supply (Sector) Project* (footnote 8); and Loan 1069-INO: *Second IKK Water Supply (Sector) Project* (footnote 8) managed by PDAM Lampung Tengah.

operating ratios of about 0.60.<sup>26</sup> Operating ratios much higher than this would indicate excessive spending on O&M and inefficiency. Operating ratios greater than one imply excessive and unsustainable levels of O&M spending.

44. PDAMs Tirtanadi Medan and Bandung currently spend 57 percent (i.e., operating ratio of 0.57) of their operating revenue on O&M. For PDAM Semarang, 62 percent of its operating revenue goes to O&M. In contrast, PDAM Weleri spends 100 percent of its operating revenue on O&M. PDAMs Lampung Utara and Tengah have consistently had operating ratios greater than unity. These smaller PDAMs have a small revenue base (due to low tariffs). Because of administrative and management inefficiencies, their O&M costs are high. This means that they are spending more on O&M than the revenue they are receiving from water sales, and rely on Government for subsidies to remain in operation. It is noteworthy that, compared with the other surveyed PDAMs, the PDAMs of Lampung have the highest level of proportionate spending on O&M and yet have poor levels of operating performance. The data indicate that large urban PDAMs (i.e., Medan, Bandung, and Semarang)<sup>27</sup> enjoy adequate O&M budgets (operating ratios for 1997 in the range of 0.57-0.62), while smaller PDAMs (i.e., Weleri and Lampung)<sup>28</sup> tend to spend a disproportionately higher amount on O&M (operating ratios for 1997 in the range of 1.00-1.56). The large urban PDAMs seem to benefit from economies of scale. They spend a lower proportion of their budget on O&M and achieve a higher level of O&M efficiency than the smaller rural/semiurban PDAMs.

45. The data on O&M spending presented here represent the situation of the PDAMs before the full impact of the financial crisis was felt. Data for 1998 show a substantial deterioration in the financial performance of most PDAMs due to rising O&M costs and declining revenues. Some preliminary analysis of the impact of the financial crisis is given in paras. 61-64.

## **B. Institutional Impact**

46. A key component of Bank assistance to the sector is institutional capacity building. All Bank-assisted WSS projects have included substantial support to strengthen the capacity of all levels of Government in the planning and implementation of WSS projects. On average, the completed Bank-assisted WSS projects allocated about 10 percent of total project cost for institutional development at appraisal, but the actual cost averaged about 17 percent of actual total project cost. For completed urban development projects, the appraisal estimate and actual allocation for institutional development averaged about 6 percent and 8 percent, respectively.

47. Generally, the institutional development component comprised consulting services for project design and engineering, project supervision, institutional support, and training. One ongoing Bank-assisted urban development loan project is concerned exclusively with building the capacity of local and provincial government agencies involved in urban development,

<sup>26</sup> Asian Development Bank. 1997. *Second Water Utilities Data Book*. Manila.

<sup>27</sup> Related projects: Loan 550-INO: *Medan Urban Development Project* (footnote 21); Loan 919-INO: *Second Medan Urban Development Project* (footnote 22); Loans 195/401: *Bandung Water Supply Project* (footnote 12); Loans 271/400-INO: *Bandung Urban Development Project* (footnote 20); Loan 768-INO: *Second Bandung Urban Development Project* (footnote 20); and Loan 547-INO: *Semarang Water Supply Project* (footnote 20).

<sup>28</sup> Loan 493-INO: *Small Towns Water Supply (Sector) Project* (footnote 7); Loan 731-INO: *IKK Water Supply (Sector) Project* (footnote 8); and Loan 1069-INO: *Second IKK Water Supply Project* (footnote 8).

including institutions in the WSS sector.<sup>29</sup> In addition, the Bank has funded six advisory TA projects, which provided for institutional support to the WSS sector. Much of the capacity-building effort in the sector has been directed at the PDAMs, which are the key institutions responsible for the operation and management of water and sanitation facilities. The institutional strengthening consultants generally provided advisory services in project management, gave additional technical support to the projects, helped prepare and conduct training programs for the PDAM staff in areas related to O&M of project facilities, and gave advice on commercial accounting and financial management.

48. Many of the completed WSS projects provided significant institutional impact to the newly established PDAMs through technology transfer<sup>30</sup> and staff development. There was also strong evidence that domestic consultant capabilities were strengthened. The establishment and strengthening of sector institutions was an important achievement for a number of projects. During the implementation of the Bandung Urban Development Project, a separate sewerage division was created within the PDAM Bandung (which was itself created as a precondition for the Bank loan for the Bandung Water Supply Project), and a new and autonomous solid waste collection enterprise or *Perusahaan Daerah Kebersihan* was established.<sup>31</sup> PDAM Bandung has matured into an effective water utility and now operates more or less as an autonomous entity under the municipality. Under the Small Towns Water Supply Sector Project (footnote 7), fully autonomous PDAMs were established in all of the project towns. Under successive Bank-assisted IUIDP projects, PDAM Tirtanadi Medan has been transformed into a modern and efficient water enterprise that is achieving performance levels that need to be emulated by other PDAMs in Indonesia. However, while the establishment of sector institutions under the projects was regarded as a significant achievement in itself, much more needs to be done to strengthen the performance of these newly established institutions and achieve acceptable levels of service reliability.

49. For many of the completed IUIDP projects, the Study concurred with postevaluation findings that the projects have had a positive institutional impact, and aided the decentralization process by enabling local government units to gain experience in planning, management, and implementation of projects. However, it is difficult to attribute such impacts solely to the Bank's activities. This is because over the same period of implementation of Bank projects, a nationwide policy shift toward integration and decentralization in urban development was adopted by the Government. It is fair to say that the Bank's IUIDP projects have helped foster this policy.

50. Although central, provincial, and local-level government officials gained valuable experience in subproject preparation, project implementation and monitoring are still largely dependent on external consultants. Project capacity-building efforts have generally less impact in the area of O&M. This was because the consultants' assignments were normally completed with commissioning and handing over of the project facility, allowing little opportunity for extended on-the-job training of operators.

<sup>29</sup> Loan 1572-INO: *Capacity Building in Urban Infrastructure Management Project*, for \$42 million, approved on 4 November 1997.

<sup>30</sup> Loan 493-INO: *Small Towns Water Supply Sector Project* (footnote 7); Loan 547-INO: *Semarang Water Supply Project* (footnote 21); Loans 731/1069-INO: *IKK Water Supply Sector Project I & II* (footnote 8); and Loan 629-INO: *Small Towns Urban Development Project*, for \$36.7 million, approved on 9 June 1983.

<sup>31</sup> The *Perusahaan Daerah Kebersihan* established under the Project was the first in Indonesia and a precursor of several others in the country.

51. Despite the importance attached to capacity building and institutional strengthening, and the considerable resources allocated to the PDAMs, the lack of performance indicators at appraisal stage makes it difficult to evaluate the effectiveness and impact of institutional strengthening.

## C. Financial Impact

### 1. Financial Impact on Project-Related PDAMs

52. The financial impact of completed Bank-financed WSS projects was assessed from a review of the PCRs, PPARs and data collected in this Study. In addition, the financial internal rates of return (FIRRs) for two completed projects were recalculated and the financial operating performance of selected project-related PDAMs was evaluated.

53. Among the three postevaluated WSS projects, the Semarang Water Supply Project (footnote 20) improved the financial management and billing efficiency of PDAM Semarang through financial capacity building and introduction of a computerized billing systems. As a result, billing efficiency was improved from 51 percent in 1980 to 80 percent in 1990, and is currently at 92 percent. The Study concurred with the PPAR findings that PDAM Semarang's financial performance is satisfactory, and capacity-building measures to improve financial management were rated as successful. Meanwhile, the PPAR findings of the Small Towns Water Supply Project (footnote 7) noted that while most of the water enterprises were covering operating costs, depreciation and debt service were not being covered by operating revenues. The current Study data for PDAM Kendal (for the town of Weleri) support this finding.

54. Postevaluation experience notes that the financial benefits of the postevaluated projects were significantly reduced due mainly to delays in project implementation, production volumes failing to meet appraisal targets and failure to achieve the expected reductions in UFW. Financial loan covenants that required PDAMs to gradually increase tariffs to cover full cost recovery were generally not fully complied with. As a result, the FIRRs of all the completed projects were lower than the appraisal targets as indicated in Table 2.

**Table 2: Financial Internal Rates of Return of Completed WSS Projects**

Loan	Project Title	FIRR (%)			
		AR	PCR	PPAR	IES
195/401	<b>WSS Projects</b>	8.0	6.7	3.7	nc
493		nc	nc	nc	nc
547		6.2	2.3	3.1	4.8
731		nc	nc	na	nc
1069	Bandung Water Supply	nc	nc	na	nc
1158	Small Towns Water Supply	5.2	na	na	nc

Semarang Water Supply					
271/400	IKK Water Supply	nc	nc	nc	nc
550	Second IKK Water Supply	11.5	8.2	8.1	nc
629	Water Pollution Control	nc	nc	nc	nc
768		8.6	4.8	na	5.8
919		13.5	11.2	na	nc
983/984	<b>WSS Component Projects<sup>a</sup></b>	8-24	7-13	na	nc
1077		12-	7.7-10.6	na	nc
1078		64	6.0	na	nc
	Bandung Urban Development	9.7			
	Medan Urban Development				
	Small Towns Urban Development				
	Second Bandung Urban Development				
	Second Medan Urban Development				
	Secondary Cities Urban Development <sup>a</sup>				
	Botabek Urban Development				
	Bandar Lampung Urban Development				

nc = not computed, na = not available, AR = appraisal report, FIRR = financial internal rate of return, IES = impact evaluation study, IKK = Ibu Kota Kecamatan (Subdistrict Capitals), PCR = project completion report, PPAR = project performance audit report, WSS = water supply and sanitation.

<sup>a</sup> FIRRs of urban development projects refer only to water supply component.

55. PDAM Tirtanadi Medan has shown good financial performance and is the only project-related operator that has shown a capacity to finance substantial portions of its capital works from its own resources. The rest of the project-related PDAMs continue to rely on Government and external assistance to finance capital works expansions.

56. Based on an assessment of operating and billing ratios (Appendix 3), the financial performance of PDAMs for Bandung and Semarang is satisfactory. Both have been able to gradually increase water production and operating revenues, and maintain an operating surplus. The financial impact of projects on the smaller urban and semi-urban PDAMs is less impressive. For PDAM Kendal, which implemented the Small Towns Water Supply Project (footnote 7), all of its income from water sales goes to finance O&M activities, leaving no surplus to meet other financial obligations. PDAMs Lampung Utara and Tengah, which managed the project facilities of the two IKK water supply projects, have consistently recorded operating losses, albeit with some gradual improvement in operating ratio. PDAMs for Kendal, Lampung Utara, and Tengah also exhibit a poor level of billings collections as evidenced by deteriorating billing ratios. The performance of small (semirural/urban) PDAMs is noticeably poorer than that of large urban PDAMs, and it is questionable whether there is the willingness to pay the tariff levels required to ensure their financial viability.

## 2. Financial Reevaluation

57. The FIRRs were reestimated for only two projects: i.e., Semarang Water Supply Project (footnote 21) and the Second Bandung Urban Development Project (footnote 12). It was not

possible to reestimate FIRR for the IKK Water Supply Project and the Small Towns Water Supply Project as financial cost data were not available for individual systems.

58. The reestimated FIRRs are presented in Appendix 4 and summarized in Table 2. The FIRRs for the Semarang Water Supply Project were estimated at 6.2 percent at appraisal, 2.3 percent at project completion, and 3.1 percent at postevaluation. It was reestimated at 4.8 under the current Study. Meanwhile, the FIRRs for the Second Bandung Urban Development Project's water supply component were 8.6 percent at appraisal and 4.8 percent at project completion. It was recalculated at 5.8 percent in the Study.

59. Both reestimated FIRRs are higher than at completion and at postevaluation, but remain significantly lower than their respective appraisal estimates. In the case of the Semarang Water Supply Project, actual water production, sales, and revenue are all higher than estimated at postevaluation. In the case of the Second Bandung Urban Development Project, while actual water production and sales, and hence total revenue, are lower than the project completion estimates, operating costs were significantly lower than previously estimated at postevaluation. Total water revenues remain significantly lower than the appraisal estimates because the anticipated UFW reductions in most project areas were not achieved as envisaged at appraisal. There were also substantial delays in project implementation, which resulted in delay in revenue realization.

60. The sensitivity analysis (Table 3) shows the impact on the FIRR (i) if assumed UFW reductions are not achieved (case 1), and (ii) if both assumed UFW reductions and tariff increases are not achieved (case 2). In both cases, the FIRR was adversely affected. This implies that the financial performance of the PDAMs would be worse if tariff increases as envisaged at appraisal are not achieved. The FIRR results highlight the importance to PDAMs of pursuing the much-needed tariff increases. Under the current economic and policy climate, PDAMs are under increasing pressure to become financially viable so as to attract increased private sector interest. In the longer term, it is reasonable to expect that the assumed tariff increases will be achieved, resulting in improved financial performance of PDAMs over the current situation. In the immediate and short term, however, the financial performance of PDAMs will deteriorate due to increased costs and reduced revenues, a consequence of the financial crisis affecting Indonesia. The likely impact of the financial and economic crisis on PDAMs is discussed in paras. 61-70.

**Table 3: Sensitivity Analysis**

Scenario	FIRR (%)	
	Semarang Water Supply Project	Second Bandung Urban Development Project
Base Case	4.8	5.8
Case 1	4.2	3.7
Case 2	1.4	0.6

FIRR = financial internal rate of return.

Notes: Case 1 assumes reductions of unaccounted-for water (UFW) are not achieved.

Case 2 assumes both UFW reductions and tariff increases are not achieved.

### 3. Impact of the Financial Crisis

61. The financial crisis that has been affecting Indonesia since late 1997 has had a serious impact on urban areas nationally, resulting in lost jobs, declining incomes, and increasing costs due to rapidly rising domestic inflation. In the WSS sector, the crisis has significantly increased O&M costs and reduced revenues. Long-overdue water tariff increases have had to be put on hold due to the financial (as well as political) crisis, and there is now serious concern as to whether a number of PDAMs can remain financially solvent for long if current conditions persist. In an effort to save costs and meet basic service, many PDAMs have cut back on operations (e.g., chemical dosing, pumping, etc.) and preventive maintenance. This could lead to higher maintenance costs and shorter asset lives in the longer term. A further implication of deteriorating service levels would be the public's increased exposure to the risk of disease.

62. At the time of this Study, available data were insufficient to give a complete picture of the impact of the crisis on the project-related PDAMs. However, there are clear indications that many PDAMs experienced reduced profitability during 1998. Preliminary results from the PCR of the Secondary Cities Urban Development Project (1998) reported reduced profits for their PDAMs during the first six months of 1998 as a result of the financial crisis. It predicted that profits for PDAM Bukit Tinggi in 1998 would be only 15 percent of those in 1997 and profits for PDAM Karawang only 30 percent of those in 1997. Financial operating data for PDAM Kendal up to August 1998 show an 8.6 percent fall in income, 18 percent rise in costs, and profits down by 53 percent from the previous year. PDAM Tirtanadi Medan appears to be weathering the financial crisis well. Although O&M costs have risen by 52 percent, it anticipates an 11 percent growth in profits for 1998.

63. Perpamsi (the Indonesian Water Users Association, which represents all PDAMs) collected preliminary data from its member PDAMs and evaluated the impact of the financial crisis on the performance of the 24 PDAMs in West Java. The evaluation compares the situation in 1997 (before the crisis) with the situation in 1998 (during crisis) and confirmed the worsening financial situation of the PDAMs and the adverse impact on their operations. The findings of the Perpamsi evaluation are summarized below:

- (i) PDAMs have reduced expenditures on O&M (by average 13 percent) and maintenance costs (particularly spare parts) have increased significantly. PDAMs are postponing the much-needed maintenance and repairs.

- (ii) Monthly expenditure on chemicals has risen by an average 65 percent, and expenditure on energy has risen by an average 22 percent. These are less than the actual increases as many PDAMs, to effect savings, have cut back on chemical dosing, and reduced pumping and operating hours.
- (iii) PDAM revenues are on the decline. Eight of the PDAMs confirmed a decline in revenues in 1998, from the previous year. Some 18 of the 24 PDAMs (i.e., 75 percent) have a cash balance ratio of less than the target level of 2 considered necessary for sustainable operations.
- (iv) Water consumption has decreased by an average of 6 percent. There has been a decrease in the number of new connections.
- (v) There are indications of an increase in UFW in 1998. The report infers that this is a result of reduced expenditure on O&M, and a reduction in the surveillance of illegal connections.

The experience of PDAMs in the rest of Indonesia is likely to mirror that of the West Java PDAMs. The latest available information indicates that, in 1998, 87 PDAMs were declared bankrupt and 100 or so are on the brink of insolvency.

64. Even before the crisis, it was clear that many PDAMs were experiencing unhealthy performance. An evaluation of the PDAMs, carried out as part of a World Bank-financed study,<sup>32</sup> pointed to a gradual decline in their financial performance between 1991 and 1995. The reasons cited for some PDAMs were high cost structures, poor revenue bases, poor operating and financial management systems, poor asset utilization, and inability to raise tariffs to meet costs (i.e., political interference). The poor performance of PDAMs makes them financially dependent on the Government for subsidies and reduces their capacity to fund the necessary system expansions and investments. PDAMs also lack the autonomy to make necessary decisions as there is strong interference from the Government.

#### **D. Economic Impact**

65. Until 1998, it was not the standard practice of the Bank to estimate economic internal rates of return (EIRR) for WSS projects at appraisal and even during PCR and PPAR preparation. Project appraisal has generally relied on the FIRR to assess the economic viability of the project, with the assumption that the FIRR represents a minimum estimate of the EIRR. There has been concern that this approach has not adequately reflected the economic impact of the Bank's WSS projects and has likely resulted in less than optimal resource allocations. A new set of guidelines for estimating the EIRR for the WSS was formally adopted in late 1998.<sup>33</sup>

66. To evaluate project impact on economic welfare, the EIRRs for two of the postevaluated projects (Semarang Water Supply Project and Second Bandung Urban Development Project)

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<sup>32</sup> World Bank. 1998. *Indonesia Urban Water Supply Sector Policy Framework*. October.

<sup>33</sup> Economics and Development Resource Center. 1998. *Handbook for the Economic Analysis of Water Supply Projects* (revised draft). Asian Development Bank, Manila.

were estimated, using the Bank's new guidelines. The economic analysis evaluated the EIRR on the basis of the resource cost savings using data from the socioeconomic survey on household water consumption and expenditure. Details on the methodology and assumptions used in the estimation of the EIRR values are in Appendix 5.

67. The newly estimated EIRR for the Semarang Water Supply Project is about 14.8 percent. For the Second Bandung Urban Development Project, the net economic impact of the project is low, with the estimated EIRR at about 6.5 percent. The results of the economic analysis show significant differences in the economic impact of the two projects. The high EIRR value for the Semarang Water Supply Project is due to the substantial resource cost savings as a result of replacing high-cost water from vendors with lower cost piped water provided under the project.

68. In the preproject situation, the beneficiaries were paying higher for alternative water supplies from vendors. Under the Project, the much lower cost water supplied resulted in substantial resource cost savings. This was translated into incremental project benefits under the new Bank Guidelines on estimating the EIRR.

69. The results for the Second Bandung Urban Development Project, on the other hand, show that the economic impact of the Project is below expectations. In this case, the beneficiaries in the preproject situation were paying relatively low-cost alternative water and this translated into low incremental benefits. Hence, the resource cost savings attributable to the project are low.

70. Sensitivity analysis was also carried out to show various adverse impacts on the EIRR (Table 4). Even under the worst case (case 3) scenario, the Semarang Water Supply Project returns demonstrate a substantial economic impact. The economic impact of the Second Bandung Urban Development Project is significantly reduced in all cases.

Table 4: Sensitivity Analysis (EIRR percent)

Scenario	EIRR (%)	
	Second Bandung Urban Development Project	Semarang Water Supply Project
Base Case	6.5	14.8
Case 1	3.6	14.2
Case 2	2.9	11.9
Case 3	-0.1	11.1

EIRR = economic internal rate of return, UFW = unaccounted-for water.

Notes: Case 1 assumes the inclusion of an opportunity cost for water valued at Rp100/m<sup>3</sup>.

**Case 2 assumes a reduction in benefits by 20 percent.**

**Case 3 assumes the combined effects of case 1 and 2.**

## E. Socioeconomic Impact

71. The primary goal of all WSS projects in Indonesia is the improvement in the living conditions and the health of communities through improved access to affordable, safe, and reliable water supply and sanitation services. Target groups often include low-income communities and those in most need of the services. Many of the social benefits of WSS projects in Indonesia and in other developing member countries of the Bank are difficult to quantify and lack adequate performance measurement criteria. This Study conducted an intensive socioeconomic survey in four project areas and one nonproject area to collect primary data for some assessment of the socioeconomic impact of projects. Details of the survey are in Appendix 6.

72. Respondents were classified as follows: (i) project beneficiaries, comprising PDAM customers with house connections (HC) and PDAM customers using public taps (PT); and (ii) nonbeneficiaries, comprising non-PDAM customers (NC) who reside in the project area, and non-PDAM customers who live outside of the project area (NP). Of the sample size of 600 households, 57 percent had house connections (HC respondents), 9 percent used public standposts (PT respondents), 27 percent were non-PDAM customers (NC respondents), and 7 percent lived outside of the project area (NP respondents). Overall, the project beneficiaries comprised 66 percent of the sample.

### 1. Household Water Consumption

73. Details on the household average water consumption and monthly water expenditure of the respondents are given in Tables 5 and 6, respectively. In Bandung, households using public taps consume far more water than any other group. Project beneficiaries (i.e., HC and PT respondents) consume more water than nonbeneficiaries (i.e., NC and NP respondents). Bandung nonbeneficiaries experience water shortages, and are unable to satisfy their demand for water. In Semarang, nonbeneficiaries spend more on water than project beneficiaries do. NP households spend the most on water while NC households consume the least water (and experience unsatisfied demand). In Weleri, NC respondents spend twice as much as project beneficiaries do on water, amounting to a high 7.2 percent of their household income. In Semarang and Weleri, nonbeneficiaries are paying more than the (usually assigned) affordability limit of 5 percent of household income, and would benefit from access to the PDAM supply. PDAM customers with private connections in Bandung, Weleri, and Lampung are benefiting from a very affordable water service, which costs between 1.7 percent and 2.6 percent of household income. In Semarang, those with private connections pay a relatively high 4 percent of household income on water, suggesting there is little scope for further tariff increases there. Due to the lack of reliability of the PDAM system, many customers also use water from other sources (primarily their own private wells). This involves some extra cost (pumping cost, time, cost of labor), and so their total real expenditure on water may be somewhat higher than the above quoted figures.

**Table 5: Average Household Water Consumption (m<sup>3</sup>/month)**

Respondent	Bandung	Semarang	Weleri	Lampung
House Connection	20	16.4	13	14
Public Tap	44	17.3	17	na
Noncustomer	10	7	8.5	14.5

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Nonproject	8	13	na	na
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na = not available, m<sup>3</sup> = cubic meter.

**Table 6: Average Household Expenditure on Water (Rupiah/month) and Affordability Ratio<sup>a</sup>**

Respondent	Bandung		Semarang		Weleri		Lampung	
	Rp	%	Rp	%	Rp	%	Rp	%
House Connection	13,500	1.7	12,000	4.0	9,000	2.6	10,000	2.6
Public Tap	14,700	3.1	7,000	2.3	7,000	2.1	na	na
Noncustomer	7,000	1.4	15,000	5.7	18,000	7.2	na	na
Nonproject	6,000	0.7	21,000	5.3	na	na	na	na

na = not available.

<sup>a</sup> Affordability ratio is the percentage of household income used to purchase water.

74. Table 7 shows the average unit cost of water by type of user. The data clearly show that PDAM PT customers are paying substantially less for water than those with house connections, and are reportedly fully able to satisfy their demand for water. There is no incentive for them to pay the high cost for a house connection, which in some cases is more than the household's one-month income, particularly as it would then require them to pay a substantially higher unit cost for water. The higher usage of water by PT customers compared with usage by HC customers is explained by the very low unit cost that PT customers pay, and the often short (approximately 9 meters) distance of the house from the public tap. On visits to the project areas, it was common to see hoses attached to public taps feeding directly into houses, giving them in effect a temporary house connection. The other main potential customer group for private connections is the NC respondents who are currently paying high unit costs for water (i.e., Rp2,143 and Rp2,118 in Semarang and Weleri, respectively). However, NC households typically have the lowest household income of any respondent group (except in Bandung) and would find the high cost of a private connection a major disincentive. The survey findings explain the low demand for private connections particularly among PT customers, and strongly support the need for tariff reform. The current tariff structure is distorting the demand for water and reducing the financial impact of the project.

**Table 7: Average Unit Cost of Water<sup>a</sup> (Rp/m<sup>3</sup>)**

Respondent	Bandung	Semarang	Weleri	Lampung
House Connection	675	732	692	715
Public Tap	334	405	411	-
Noncustomer	700	2,143	2,118	-
Nonproject	750	1,615	-	-

- = magnitude zero, m<sup>3</sup> = cubic meter.

<sup>a</sup> Average monthly expenditure on water divided by average monthly consumption (by household).

75. The survey results indicate that, in general, project beneficiaries pay a lower unit cost and consume greater quantities of water than nonbeneficiaries. It is fair to say that the projects have, therefore, made a positive contribution to the well-being of beneficiary households by making water more accessible and more available. In Semarang and Weleri,<sup>34</sup> the positive

<sup>34</sup> Related projects: Loan 547-INO: *Semarang Water Supply Project* (footnote 20) and Loan 493-INO: *Small Towns Water Supply Sector Project* (footnote 7).

impact of the projects on household expenditure is due to the lower monthly expenditure on water for beneficiary households. In Lampung,<sup>35</sup> there is no noticeable project benefit in terms of either quantity of water consumed or expenditure on water.

## 2. Low-Income Communities

76. All WSS projects aim to improve the health and well-being of communities (including low-income communities) by providing safe piped-water and sanitation services to those previously unserved, and most in need. As low-income communities make up a high proportion of those lacking in basic services, they generally form one of the main target groups for WSS projects.

77. It is not enough to assume that poor communities or households will benefit from water and sanitation activities. The postevaluation findings of the Bandung Water Supply Project (footnote 12) noted that while one of the main objectives of the project was to increase access of poor people to potable water, only 38 percent of the target coverage was actually achieved. The Study also confirmed the postevaluation findings that in many instances, users of public standpipes had to pay up to 50 times the scheduled tariff for water. This had come about because public facilities were being operated by local officials for personal gain. The poor were, therefore, denied the benefits of the project and forced to continue collecting water from polluted shallow wells.

78. The household socioeconomic survey also provides information on income class. Of those with household connections in the Bandung Water Supply Project area, only 25 percent of the sample population fall into the low-income group (earning about Rp200,000-Rp500,000 per month). Whereas in Semarang (Semarang Water Supply Project), Weleri (Small Towns Water Supply Project), and Lampung (IKK Water Supply Project), about 95 percent of the sample population fell into the lowest income group. While these results suggest that the latter three projects had more successfully targeted the lower income groups within those communities, there was no evidence that the projects had actually reached the poorest of the poor, i.e., households with monthly income of less than Rp200,000 per month and typically living in informal housing and unserved areas.

79. The kampung improvement program (KIP) component of IUIDP projects is specifically geared toward the needs of lower income groups.<sup>36</sup> However, evidence suggests that many of the principal beneficiaries of KIPs are households outside the originally targeted low-income groups. It was also observed that infrastructure improvements in the kampungs inevitably benefit a disproportionate number of the better-off households. In terms of relative project component cost, KIP components comprise a small proportion (about 6 percent) of total IUIDP total project cost; hence, the net impact on lower-income communities within the project area is minimal.

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<sup>35</sup> Related project: Loan 731-INO: *IKK Water Supply Sector Project* (footnote 8).

<sup>36</sup> KIP involves low-cost improvement of infrastructure and basic services in *kampungs* (i.e., densely populated, low-income communities) including water supply, solid waste management, local drainage, footpaths, culverts, and sanitation facilities.

80. Low-income communities are also being excluded from access to sewerage services because they cannot afford the high cost of sewerage connections. The location of low-income communities, often in low-lying areas remote from main sewers, can make sewer connection expensive if not technically unfeasible.

### **3. Health Impact**

81. An expected benefit of better access to safe and reliable WSS services is an improvement in the health and living conditions of the community. However, it is also recognized that the expected health gains are dependent on many other associated factors including (health) education, nutrition, income, and environment. The essential cross-sector nature of WSS means that improvements in one area alone, say water supply, will not be sufficient to result in significant health gains without complementary improvements in other areas. On hindsight, WSS projects should have the necessary components well-integrated into and responsive to community needs. Completed Bank-financed WSS projects have little or no emphasis on sanitation and health education as an integral component of the project. The results of the household survey also indicate a lack of awareness of the linkages between clean water, sanitation, and health. Almost none of the households reported ever receiving any health education.

82. Even though a major goal for the WSS sector is to improve the health and productivity of the population, there has been little or no attempt, at either appraisal or postevaluation, to collect indicative health data to assess the health status of beneficiaries. Project appraisal, completion, and postevaluation reports generally make little or no reference to health issues, other than to generally associate health benefits to the project as a result of improved access to WSS services. As part of the household survey, data on water-related diseases were collected from the Health Department offices (*Puskasmas*) at subdistrict level. *Puskasmas* monitor diarrhea, typhoid, amoebiasis, dysentery, hepatitis A, scabies, other skin diseases, and conjunctivitis. However, health monitoring by *Puskasmas* is not routinely carried out, and is dependent on available resources. The available records covered a very limited period, one or two years in some cases, and were in many cases incomplete. Much of the information for this Study were collected from extensive discussion with health workers in the project areas. It was observed that overall, with better access to safe and potable water supply, the health status of the community has improved significantly compared with the before-project situation.

83. In general, there has been a marked improvement in the health of the Indonesian population over the last decade as a result of improvements in living condition, lifestyle, and education. The WSS projects have undoubtedly had a positive impact on the health and well-being of the beneficiary households by making water supply and sanitation facilities more accessible and affordable. This has been acknowledged in the household socioeconomic survey, where project beneficiaries rated "health" as the second most important reason (after "convenience") for having a house connection.

### **4. Gender and Development**

84. It is difficult to assess the impact of the Bank's water- and sanitation-related activities on the position of women due to a lack of appropriate data (e.g., gender-disaggregated data on water use, gender roles in project planning and implementation, etc). This lack is to some extent due to the age of the projects evaluated. At the design stage of these projects, the issue of women in development—the need to improve the position of women—was not considered. Consequently, the WSS projects had no specific goals or objectives on the topic and no separation of data along gender lines.

85. Most women respondents agreed that they have benefited from the improved WSS facilities provided by the projects. Such benefits included decreased time for water collection, and reduction in water- and sanitation-related diseases. Women are the main users of water in the household and the time saving is being used for other productive work.

## **F. Environmental Impact**

86. Completed WSS projects were observed to have had no adverse impact on the environment since completion, and were generally assessed as having positive environmental outcomes. The Second Medan Urban Development Project, a typical example of an IUIDP-type project, has been assessed as contributing significantly toward the betterment of the urban environment, particularly by enhancing the quality of infrastructure (i.e., footpaths, water supply, and sanitation) in the 16 kampungs with a population of 200,000. The city also benefited from improved drainage and sewerage, and improved methods of solid waste disposal. These observations concurred with views expressed in most project PCRs and PPARs of projects under review.

87. The completed Bank-financed WSS projects were not subject to any major environment-related loan covenants. Four of the eight completed IUIDP projects with WSS components had major covenants relating to the environment.<sup>37</sup> These related to the establishment of monitoring and evaluation systems to ensure that water quality, environmental sanitation, and public health standards are met. Full compliance was achieved for only two projects (Loan 919-INO and Loans 983/984-INO) while the remainder achieved partial compliance. A further covenant relating to the levying of environmental surcharges on all water uses (Loan 550-INO) was fully complied with.

88. Nonetheless, where significant environmental issues have been highlighted in project documents, such as declining water tables (and groundwater production levels) due to over-pumping of aquifers (Bandung and Semarang Water Supply Projects, footnotes 12 and 20) and the impact on the environment of sewerage discharges (Second Bandung Urban Development Project, footnote 12), there has been no attempt to investigate these project issues. The Medan Urban Development Project's PPAR questioned whether it was environmentally sound and economically justifiable to replace a proven system of on-site disposal (septic tank and soil filtration) with a centralized system that concentrates flows in rivers. Environmental benefits are achieved if the collected sewage is treated to approved standards prior to discharge. However,

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<sup>37</sup> Loans 271/400-INO: *Bandung Urban Development Project* (footnote 19); Loan 550-INO: *Medan Urban Development Project* (footnote 21); Loan 919-INO: *Second Medan Urban Development Project* (footnote 21); and Loans 983/984-INO: *Secondary Cities Urban Development Project* (footnote 22).

in cases where the sewage treatment facility is not operating effectively, or where it is being bypassed altogether,<sup>38</sup> the environmental impact on the receiving river can be extremely adverse. Given this scenario, the environmental consequences of failure with on-site systems are less severe. A thorough evaluation of the environmental impact of centralized sewerage facilities, including a risk analysis, should be considered.

89. Decline in water tables and falling groundwater production levels are the result of over-pumping, a possible indication that groundwater use exceeds recharge and water is being mined. In Bandung, deep well yields have declined to 19 percent of their original capacity. In Semarang and in many of the IKK communities in Lampung, groundwater and spring yields are also declining significantly. Alternative surface water sources will be more expensive to develop, and will require more treatment. In the case of Bandung, where a large part of the aquifer lies below the city center, there is the added risk (and economic cost) of land subsidence as a result of sustained water mining. There is a need to investigate these issues in future WSS projects.

#### **IV. KEY ISSUES FOR CONSIDERATION**

##### **A. Effect of the Financial Crisis on PDAMs' Financial Performance**

90. The financial crisis currently affecting Indonesia has had a significant negative impact on the financial performance of many PDAMs through increased O&M costs and declining revenues. There is now serious concern as to whether a number of PDAMs can remain financially solvent for long if current conditions persist. As of December 1998, 87 PDAMs were declared bankrupt and another 100 or so are on the brink of insolvency. The current situation has necessitated an emergency rescue program of assistance by the Government to enable PDAMs in critical condition to maintain basic services. Arguably, as few as 8 percent of all PDAMs could be considered to be in good shape financially. This underlines the urgent need for assistance, and at the same time strengthens the Government's hand in forcing the pace of reform. The Bank is currently providing a TA (footnote 3) to devise measures to assist about 100 PDAMs that are on the brink of insolvency.

##### **B. Need for Decentralization Reforms**

91. The current Government's proposed decentralization reforms (paras. 13-18) are likely to have far-reaching consequences on the sector, and could lead to substantial reallocation of staff and resources from central to local government. How this proposed agenda affects the way the Bank deals with the Government and packages its sector assistance has to be examined. With greater responsibility devolved to the local government level, substantial institutional change will likely result in increased requirements for capacity building and institutional strengthening. Consequently, a revision of the Bank's current country and sector operational strategies may be

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<sup>38</sup> Instances of flow being diverted to irrigation have been documented in the PPAR for Loan 768-INO: *Second Bandung Urban Development Project*.

needed. The recently approved loan for a community and local government support sector development program<sup>39</sup> intends to address the issue of decentralization. The extent to which the decentralization reforms could be realized under the new Government is an important issue. Close monitoring of the outcome is necessary.

### **C. Water Tariffs and Political Will to Implement Them**

92. The water tariffs in most districts are low and need to be increased to provide higher financial income to the PDAMs. Even though PDAMs are autonomous water utilities, in reality, they are indirectly controlled by the local government and politicians. This, coupled with the fact that consumers are normally unwilling to pay more for the water supplied, makes it extremely difficult for the PDAMs to increase the water tariffs. Even if a new water tariff structure is introduced, there is generally lack of political will to implement it for fear of consumer protest. This issue will be tested under the yet to be elected new Government.

### **D. Improvement in Operation and Maintenance and Unaccounted-for Water**

93. Improvements in O&M, including specific programs to reduce UFW levels, represent a cost-effective and environmentally responsible approach to water supply management and should form essential components of future Bank-financed projects. In particular, reducing the current high levels of UFW remains a major challenge in the sector. The current financial crisis is putting increasing pressure on O&M budgets through increased costs and reduced revenues. Most PDAMs are financially weak and will require additional financial support to maintain even basic levels of service to consumers. Specific programs to reduce high levels of UFW are not yet in place. The key factor now is financing the survival of many PDAMs and instituting measures for appropriate O&M and reduction of UFW.

### **E. Weak Institutional Capacity**

94. Institutional weakness is assessed as one of the main reasons for poor WSS service delivery in Indonesia. In particular, the small PDAMs operating in the semi-rural/urban subsector lack the size and resources to achieve levels of performance comparable with those of the large urban PDAMs. They will continue to need institutional support and capacity building for some time to come. For the sector as a whole, there is a need to strengthen performance in key areas to reduce the current high levels of UFW, improve standards of O&M, and strengthen administrative efficiency and financial controls. Sustained improvements in planning and design of facilities and implementation will also be required if the sector is to continue to meet growing demand. To achieve improved levels of performance will require skilled and motivated individuals and strong, effective institutions responsive to community needs, all operating in a transparent and enabling regulatory environment. Capacity building will, therefore, continue to

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<sup>39</sup> Loan 1677-INO: *Community and Local Government Support Sector Development Program*, for \$200 million, approved on 25 March 1999.

be a primary concern of the sector in the foreseeable future. To ensure sustainability of project benefits, capacity building should include, among others, programs advocating further participatory approaches, group formation and training of water users, and building the capacity of communities, particularly women, to manage and operate water systems by themselves. To improve the PDAMs' corporate capability and sectoral cohesion, the Government should consider a national regulatory framework that provides uniform performance guidelines, effective performance monitoring procedures, and higher standards of management through effective training and skills development and, possibly, through private sector management contracts.

## **F. Enhancing Private Sector Participation**

95. Increased PSP is essential for the sector if it is to improve its financial, administrative and operating efficiency, and attract the levels of investment required to expand services to those currently unserved. PSP could take place through (i) service contracts (e.g., meter reading and billing and leakage reduction); (ii) operating concessions (e.g., transferring full responsibility for all service obligations formerly carried out by the local government to the private sector); (iii) build-operate-own/build-operate-transfer contracts; and (iv) PDAMs working with the private sector as an equity partner. Private sector interest in the sector to date has targeted the larger urban PDAMs, where the large consumer base is seen as offering good investment potential. The key regulatory changes that are required for the sector to become more attracted to PSP have been identified.<sup>40</sup> If implemented by the Government, these changes will create a more enabling and transparent operating environment conducive to greater private sector investment. A further key factor that will influence the level of PSP in the sector is the impact of the current financial crisis on sector profitability. It is not clear at this stage whether the private sector has the capability or the funding to participate in the WSS sector in the next few years.

## **V. CONCLUSIONS**

### **A. Overall Assessment**

96. Bank-financed projects in Indonesia's WSS sector have contributed toward increasing water production and delivery of potable piped water to many urban and rural families that are in real need of water. The projects were distributed in different parts of the country so that the impacts were not concentrated in a particular section or community. The supply of safe and potable water to local communities has generated substantial socioeconomic benefits and helped achieve, to some extent, the goal of increased productivity and improved health. However, many completed projects have fallen short of achieving their appraisal targets and objectives. In particular, UFW reduction and tariff increase were poorly realized. Despite that,

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<sup>40</sup> World Bank. 1997. *Indonesia Water Supply Sector Policy Framework (WSPF)*. Indonesia Discussion Paper Series. December. Washington, D.C.

the projects have been able to deliver real benefits to consumers through lower water cost and water availability in greater quantities than before. The results of the economic evaluation demonstrate that even where projects fall short of expectations, they are able to deliver worthwhile economic benefits. This is particularly so for water projects in the large urban areas where alternative supplies are scarce and costly, as is the case in many of the towns and cities of Indonesia. In most cases, however, the benefits to the consumers have been significantly reduced because of the high level of UFW. High levels of UFW have also adversely affected the financial viability of most of the PDAMs. Although the facilities provided were adequate to produce the water quantities needed, sustainability of benefits could only be realized if UFW is significantly reduced and water tariffs are increased to achieve sufficient funding for O&M of the water supply system.

97. Institutional strengthening was a key component in the Bank-financed WSS projects. Although the operational and financial capability of many PDAMs have improved, their operational efficiencies are still below satisfactory levels. Nevertheless, the projects have made important contributions to the improved performance of the sector and its key institutions through institutional strengthening and training. The Bank-financed projects have also encouraged and supported the formation of more effective water, sewerage, and solid waste enterprises as part of its integrated urban development program. The current levels of performance of the surveyed PDAMs indicate that, for the sector as a whole, there is substantial need for further strengthening in key areas to reduce the high levels of UFW and improve O&M, and improve administrative efficiency and financial controls. Capacity building will, therefore, continue to be a primary requirement of the sector in the foreseeable future.

98. For the semi-urban/rural water sector, there remain major institutional weaknesses and difficulties in providing levels of service similar to those in the larger cities. In that sector, smaller PDAMs are always subject to political interference and are unable to increase tariffs and control illegal connections. As a result, revenues are low and operating costs high. In rural areas, the PDAM customers may also have access to alternative cheaper water supplies such as wells and springs. The WSS needs substantial reform and institutional strengthening to improve its operational efficiencies and management, and financial performance.

99. Given the scale of resources required to meet the development needs of the sector, it is entirely appropriate for the Government, with the support of the Bank, to pursue a policy of encouraging greater private sector investment in the sector. To date, private participation in the sector has been hampered by lack of an enabling and transparent regulatory environment. There is also the problem of adequate financial return based on existing tariff rates, economies of scale, and lack of consumers' willingness to pay. Regulatory reform in the sector is now an urgent need.

100. The sanitation subsector is perhaps the weakest component of the Bank's overall sector program. Levels of sanitation coverage lagged well behind those of the water subsector, especially in rural areas. Sanitation receives a much lower priority than water supply from both the Bank and the Government, and attracts only a small proportion of the total funding to the sector. The low level of demand for sanitation, and the low level of understanding of the linkages between health and sanitation among communities, are of major concern. Sanitation and health education are not well integrated into Bank-financed WSS projects. A number of important issues concerning the Bank's strategy for sanitation and sewerage need to be enforced through stronger covenants and governance. The environmental justification for

replacing septic systems with centralized sewage treatment plants needs to be proven. Finding solutions to waste disposal in Indonesia's growing towns and cities will be a major challenge for the sector in the future.

101. The financial and political crises that have been affecting Indonesia since late 1997 is likely to accelerate the need for change in the sector. The impact of the financial crisis on the performance of the sector is already apparent in the form of greatly increased O&M costs and reduced revenues for PDAMs. The sector will need additional support to enable it to weather the crisis and continue to provide essential levels of service to consumers.

## **B. Lessons Learned**

102. There are some examples of effective and efficient institutions. Lessons learned from the success of PDAMs such as Tirtanadi Medan should be used to help other PDAMs achieve similar standards of performance. The priority for the Bank should be to encourage the privatization of the larger successful urban PDAMs to serve as role models and lead the recovery of the sector. A successful urban sector will offer opportunities for cross-subsidization of services to low-income communities, and allow PDAMs to expand their service areas by absorbing smaller and financially weaker PDAMs. The experience of PDAM Tirtanadi Medan has indicated that the natural tendency for a financially strong and efficient water enterprise is to seek growth opportunities through expansion of its service area.

103. The performance of sector institutions indicates that, despite some progress, achievements are mixed and institutional strengthening and capacity building should remain a priority need of the sector for some time to come. The lack of performance indicators for institutional strengthening makes it difficult to evaluate its effectiveness and impact, and is a notable weakness.

104. Standards of O&M are still inadequate, as evidenced by the high levels of UFW, intermittent operation, erratic or declining levels of production, and inadequate spending on O&M. Improvements in O&M, including specific programs to reduce levels of UFW, represent a cost-effective and environmentally responsible approach to water management and should form essential components of future Bank-financed projects.

105. The participation of local communities in the planning, design, and implementation of projects has a major impact on the success and sustainability of a project. This is particularly important for rural projects where communities generally have alternative water supply sources, and their demand for the project as well as their level of commitment must be established from the outset. The Bank-financed projects in the past have had little meaningful community involvement. As a result, many project objectives have not been fully realized. Important project benefits, such as targeting of the poor and addressing the needs of women, will only be achieved if the participation of such groups in the project is actively encouraged. This confirms the appropriateness of the Bank's current policy on social assessment and other cross-cutting issues.

106. One of the major obstacles to the improved financial performance of PDAMs is their inability to raise tariffs to levels necessary to fully recover costs. This was mainly due to

significant political interference in most PDAMs. The current low tariff levels are subsidizing PDAM customers and encouraging overconsumption of water. The high cost of private HC is suppressing the demand for piped water and forcing many to use higher cost alternatives. There is an urgent need for a revised tariff structure, based on the principles of economic efficiency, financial viability, social equity, and administrative simplicity. However, setting loan covenants to make adjustments in the tariff structure should be accompanied by the Government's will to implement the decision. This is a difficult process and the outcome of the Bank's recently approved Community and Local Government Support Sector Development Program (footnote 37) would shed some light on the issue in the near future.

### C. Follow-Up Actions

107. In the next revision of the Bank's COS and sector policy, it is vital to reflect the changed political and economic realities of Indonesia, and the new sector approaches being pursued by the Government. The goals and objectives for the sector must be clearly defined such that there is a logical process from stated goals and objectives to project implementation and desired outcomes. The Bank's sector policy needs to be refocused to reflect the major policy goal of improved health. It must address issues such as the Government's proposed decentralization reforms, the needs of the urban and rural sectors, PSP, and more effective targeting of the needs of the poor. It must also incorporate appropriate linkages that address essential cross-sector issues (e.g., health, women, poverty). The sector policy also needs to be revised and strengthened in some key areas to reflect the Bank's guidelines on environmental procedures, gender and development, and health.

108. The Bank should examine and review its level of commitment to fund the sanitation subsector. There is a need to ensure that health education is included as an essential component of future sanitation programs. The current low level of need for sanitation should be further examined by actively consulting and listening to communities to determine the appropriate sanitation service levels for which they are willing to pay. The Bank's current sanitation strategy includes examining the range of sewerage options for urban areas, taking into account the environmental consequences.

109. The Bank should closely monitor the progress of the decentralization reform process as advocated under Loan 1677-INO (footnote 37) and ensure that technically strong PDAMs are assisted to implement the new tariff structure and the specific program to reduce high levels of UFW. It is hoped that the adoption of decentralization laws will result in greater political will to implement tough measures to ensure the financial independence of PDAMs.

110. Greater emphasis and support should be given to a sector approach to future WSS projects, which is compatible with increasing PSP as advocated by the Government.

111. Significant effort is needed to strengthen the management and technical capacity of PDAMs. Government interference in PDAM operations should stop. The Bank should strengthen the monitoring and evaluation of its capacity-building efforts by introducing appropriate targets and performance measures in all future projects.

## APPENDIXES

Number	Title	Page	Cited on (page, para.)
1	Bank Operations in the Water Supply and Sanitation Sector	33	1,3
2	External Assistance to the Water Supply and Sanitation Sector	53	9,31
3	Operational Indicators of Selected Water Enterprises (PDAMs)	58	12,40
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6	Highlights of the Household Socioeconomic Survey of Selected Bank-Assisted Water Supply and Sanitation Project Areas in Indonesia	68	21,71

**BANK OPERATIONS IN THE WATER SUPPLY AND SANITATION SECTOR**

**Table A1.1: ADB Loan and Technical Assistance (TA) Approvals for the Water Supply and Sanitation Sector, by Developing Member Country**  
(as of 31 December 1998)

Developing Member Country	ADB Assistance (\$ million)		Total Amount <sup>a</sup> (\$million)	% of Total	Rank
	Loan	TA			
Philippines	727.800	10.414	738.214	19.43	1
Thailand	540.000	7.897	547.897	14.42	2
Korea, Republic of	488.400	1.341	489.741	12.89	3
China, People's Republic of	390.000	9.142	399.142	10.50	4
Pakistan	334.500	4.540	339.040	8.92	5
Indonesia	325.600	5.955	331.555	8.72	6
Malaysia	219.110	1.417	220.527	5.80	7
Viet Nam	204.600	3.620	208.220	5.48	8
Sri Lanka	145.000	2.177	147.177	3.87	9
Nepal	69.000	2.721	71.721	1.89	10
Bangladesh	45.400	2.539	47.939	1.26	11
Singapore	47.000	0.000	47.000	1.24	12
Hong Kong, China	41.500	0.000	41.500	1.09	13
Lao People's Democratic Republic	38.100	2.632	40.732	1.07	14
Myanmar	35.960	1.022	36.982	0.97	15
Papua New Guinea	30.200	1.742	31.942	0.84	16
Cambodia	20.000	1.200	21.200	0.56	17
Micronesia, Federation States of	10.600	0.837	11.437	0.30	18
Kiribati	10.240	0.400	10.640	0.28	19
Marshall Islands	9.900	0.000	9.900	0.26	20
Bhutan	3.300	0.500	3.800	0.10	21
Solomon Islands	1.650	0.172	1.822	0.05	22
Fiji Islands	0.000	1.400	1.400	0.04	23
Kyrgyz Republic	0.000	0.600	0.600	0.02	24
Cook Islands	0.000	0.540	0.540	0.01	25
Samoa	0.000	0.115	0.115	0.00	26
Tonga	0.000	0.100	0.100	0.00	27
<b>Total</b>	<b>3,737.860</b>	<b>63.023</b>	<b>3,800.883</b>	<b>100.00</b>	

ADB = Asian Development Bank.

<sup>a</sup> Original approved amount.

**Table A1.2: Cumulative Loan Assistance to Indonesia, by Sector**  
(as of 31 December 1998)

<b>Sector/Subsector</b>	<b>No. of Loans</b>	<b>Amount (\$ million)</b>	<b>% of Total</b>
Agriculture and Agro-Industry	95	3,737.26	23.5
Energy	26	2,730.05	17.1
Finance	10	2,437.00	15.3
Industry and Nonfuel Minerals	7	349.70	2.2
Social Infrastructure	63	4,204.10	26.4
Education	30	1,812.35	11.4
Health and Population	6	603.30	3.8
Urban Development and Housing	18	1,462.85	9.2
Water Supply and Sanitation	9	325.60	2.0
Transport and Communications	30	2,354.86	14.8
Multisector	4	114.00	0.7
<b>Total</b>	<b>235</b>	<b>15,926.97</b>	<b>100.0</b>

Source: Asian Development Bank.

**Table A1.3: Bank-Assisted Projects for the Water Supply and Sanitation Sector in Indonesia**  
(as of 31 December 1998)

<b>Loan No.</b>	<b>Title</b>	<b>Approved Loan Amount (\$ million)</b>	<b>Approval Date</b>	<b>Closing Date</b>	<b>Modality</b>
195	Bandung Water Supply	11.50	7/Nov/74	20/Aug/85	Project
401	Bandung Water Supply (Supp.)	8.00	29/May/79	10/Sep/86	Project
493	Small Towns Water Supply (Sector)	32.00	11/Dec/80	31/Jan/90	Sector
547	Semarang Water Supply	35.50	25/Nov/81	12/Jul/90	Project
731	IKK Water Supply Sector	40.20	17/Jan/85	15/Mar/93	Sector
1069	IKK Water Supply Sector II	39.00	18/Dec/90	21/Feb/97	Sector
1158	Water Pollution Control	8.40	4/Feb/92	15/Jul/97	Project
1352	Rural Water Supply and Sanitation Sector	85.00	2/Feb/95	30/Sep/00	Sector
1527	Capacity Building of Water Supply Enterprises	66.00	17/Jul/97	Cancelled	Project
	<b>Total</b>	<b>325.60</b>			

**Table A1.4: Bank-Assisted Urban Development Projects with Water Supply and Sanitation  
Component in Indonesia**  
(as of 31 December 1998)

<b>Loan No.</b>	<b>Title</b>	<b>Approved Loan Amount (\$ million)</b>	<b>Approval Date</b>	<b>Closing Date</b>	<b>Modality</b>
271	Bandung Urban Development and Sanitation	1.15	26/Aug/76	18/Oct/79	Project
400	Bandung Urban Development	32.30	29/May/79	26/Feb/88	Project
550	Medan Urban Development	39.30	26/Nov/81	11/Oct/89	Project
629	Small Towns Urban Development	36.70	9/Jun/83	18/Dec/90	Project
768	Bandung Urban Development II	132.40	12/Dec/85	11/Jul/94	Sector
919	Medan Urban Development II	175.00	10/Nov/88	25/Jun/96	Project
983	Secondary Cities Urban Development	70.00	9/Nov/89	25/Mar/97	Sector
984	Secondary Cities Urban Development	50.00	9/Nov/89	25/Mar/97	Sector
1077	Botabek Urban Development	80.00	31/Jan/91	1/Dec/97	Project
1078	Bandar Lampung Urban Development	33.00	31/Jan/91	22/Oct/97	Project
1111	Bogor and Palembang Urban Development	140.00	31/Oct/91	30/Sep/98	Project
1198	Central Java and D.I Yogyakarta Urban Development	150.00	26/Nov/92	30/Sep/98	Sector
1292	Eastern Islands Urban Development Sector	85.00	21/Dec/93	31/Mar/99	Sector
1383	Sumatra Urban Development	130.00	26/Dec/95	31/Dec/01	Sector
1384	West Java Urban Development	70.00	26/Sep/95	31/Dec/01	Sector
1511	Metro Botabek Urban Development	80.00	19/Dec/96	31/Mar/02	Sector
1572	Capacity Building in Urban Infrastructure Management	42.00	4/Nov/97	31/Oct/02	Project
1587	Metropolitan Medan Urban Development	116.00	8/Dec/97	31/Mar/03	Project
	<b>Total</b>	<b>1,462.85</b>			

Source: Asian Development Bank.

**Table A1.5: Regional Distribution of Water Supply and Sanitation and Urban Development Bank Loans in Indonesia**  
(as of 31 December 1998)

Region	No. of Loans	WSS Projects		No. of Loans	Urban Development Projects	
		Loan Amount (\$ million)	% of Total Investment		Loan Amount (\$ million)	% of Total Investment
Java	5	95.4	29.3	8	582.55	39.8
Sumatra	0	0	0	5	493.3	33.7
Sulawesi	0	0	0	0	0	0
Kalimantan	0	0	0	0	0	0
Irian Jaya	0	0	0	0	0	0
Bali	0	0	0	0	0	0
Nusa Tenggara	0	0	0	0	0	0
National/Multi-regional	4	230.2	70.7	5	387	26.5
<b>Total</b>	<b>9</b>	<b>325.6</b>	<b>100.0</b>	<b>18</b>	<b>1,462.85</b>	<b>100.0</b>

Source: Indonesia Country Information Booklet, Asian Development Bank.

**Table A1.6: Cumulative Bank Technical Assistance (TA) to Indonesia, by Sector**  
(as of 31 December 1998)

Sector/Subsector	Number of TAs	Amount (\$ million)	Percent of Total
Agriculture and Agro-Industry			
Natural Resources	139	57.58	40.3
Energy	29	10.822	7.6
Finance Sector	22	3.492	2.4
Industry and Nonfuel Minerals	15	7.807	5.5
Social Infrastructure	92	36.979	25.9
Education	34	12.008	8.4
Health and Population	16	9.375	6.6
Urban Development and Housing	25	9.641	6.7
Water Supply and Sanitation	17	5.955	4.2
Transport and Communications	40	14.283	10.0
Environment	10	4.944	3.5
Others	17	6.915	4.8
<b>Total</b>	<b>364</b>	<b>142.822</b>	<b>100.0</b>

Source: Asian Development Bank.

**A1.7: Bank Technical Assistance (TA)-Supported Water Supply and  
Sanitation Projects in Indonesia**  
(as of 31 December 1998)

TA No.	Title	Approved TA Amount (\$ million)	Approval Date
<b>Project Preparatory TAs (PPTAs)</b>			
0066	Bandung Water Supply	0.295	6/Jun/72
0093	Irian Jaya Water Supply	0.050	18/Jul/73
0254	Semarang Groundwater Investigation and Development	0.210	31/Oct/78
0346	Water Supply Sector	0.100	21/Mar/80
0501	IKK and Small Towns Water Supply Sector	0.250	23/Dec/82
0601	Water Supply and Sanitation Sector Profile	0.050	28/May/84
1083	Water Quality Management Sector	0.590	8/Dec/88
1474	Study of Water Supply and Sewage Disposal in Bandar Lampung	0.320	31/Jan/91
1818	Rural Water Supply and Sanitation Sector	0.600	23/Dec/92
2507	Water Loss Reduction (Sector)	0.100	26/Dec/95
3137	Water Supply and Sanitation Sector	0.600	22/Dec/98
<b>Subtotal</b>		<b>3.165</b>	
<b>Advisory TAs (ADTAs)</b>			
749	Improving Administration of Externally Aided Projects in Cipta Karya	0.350	18/Feb/86
1107	Water Supply and Sanitation Sector Study	0.350	13/Jan/89
1443	Institutional Strengthening for IKK Water Supply Sector II	0.290	18/Dec/90
1713	Institutional Support to Water Supply Enterprises	0.600	15/Jun/92
2501	Water Tariff Structure and Financial Policies of Water Enterprises	0.600	22/Dec/95
2805	Strengthening of Urban Waste Management Policies and Strategies	0.600	2/Jun/97
<b>Subtotal</b>		<b>2.790</b>	
<b>Total</b>		<b>5.955</b>	

IKK = subdistrict capital.

Source: Asian Development Bank.

## **EXTERNAL ASSISTANCE TO THE WATER SUPPLY AND SANITATION SECTOR**

### **A. General**

1. External assistance to the water supply and sanitation (WSS) and urban development sectors in Indonesia over the last four REPELITAs — REPELITA III (1979-1984) to REPELITA VI (1994-1999) — is shown in Table A2.1. The three major external sources have been the World Bank (34 percent of total cumulative external assistance), the Japanese Government (28 percent), and the Asian Development Bank (20.5 percent). Other significant bilateral sources include the United States (about 10 percent), Netherlands (about 3 percent), and Australia (2 percent). In general, these multilateral and bilateral sources integrate WSS components in their respective urban development projects. Table A2.2 shows a list of WSS and urban development projects in Indonesia funded by the major external sources.

### **B. Major Aid Agencies**

#### **1. Asian Development Bank**

2. The Bank's total loan assistance to Indonesia's WSS sector totals \$325.6 million, financing eight projects as of 31 December 1998. This figure represents the sixth largest assistance to the sector across the Bank's developing member countries. To complement the loans, the Bank also approved technical assistance (TA) amounting to \$5.955 million to fund 11 project preparatory TAs and 6 advisory TAs during the same period. In addition, the Bank approved funding for 16 integrated urban development projects with WSS components amounting to \$1,462.85 million.

3. The Bank's lending assistance to the sector has primarily focused on the provision of safe drinking water, generally in the urban areas. This has entailed the provision of new capacity to meet future demand and improving existing facilities in the most cost-effective way. Other objectives are to (i) improve the operations and financial performance of water agencies, (ii) reduce the high percentages of unaccounted-for water, (iii) strengthen the capabilities of the executing agencies, (iv) reduce the incidence of waterborne diseases, and (v) extend services to low-income groups. Less attention has been given to sanitation in the Bank's WSS loan projects. Generally, sanitation project components aim to improve public health standards by providing efficient sewage collection, treatment, and disposal systems.

#### **2. World Bank**

4. The World Bank's overall lending program for Indonesia is designed to respond selectively to the country's development priorities. It is shaped by such considerations as overall financing needs, burden-sharing expectations among aid agencies, exposure limits, and resource constraints. The defining characteristics of the World Bank's lending strategy for Indonesia are (i) a shift toward smaller, more participatory, and regionally oriented projects; and (ii) avoidance of lending in areas adequately served by the private sector.

5. The World Bank's growing concern for Indonesia's WSS sector is reflected in its current strategy. While lending for infrastructure has remained a large part of the program in keeping with the need to eliminate critical bottlenecks, there has been a shift in emphasis toward

improving the quality of urban services and specifically dealing with improving water quality and waste management, among others.

6. As of 31 March 1998, the cumulative commitments of the World Bank to Indonesia's WSS and urban development sectors amounted to \$2,313.1 million or about 21 percent of the World Bank's aggregate cumulative commitment to Indonesia.<sup>1</sup>

### **3. Overseas Economic Cooperation Fund, Japan**

7. Japan began extending loans to Indonesia in 1968 and has since then been one of the major sources of aid to Indonesia.<sup>2</sup> Japan's Overseas Economic Cooperation Fund (OECF) is responsible for providing bilateral official development assistance (ODA) loans. Support for urban infrastructure development is a key element of OECF's operating strategy in the 21<sup>st</sup> century. As of 31 March 1997, OECF has committed more than ¥2,000 billion (\$16.12 billion equivalent)<sup>3</sup> in cumulative loans to develop urban infrastructure. Of this amount, 75 percent has gone to cities in Asia, including Jakarta in Indonesia. On a sector basis, water supply and sewerage and sanitation account for approximately 40 percent of the total, of which 25.3 percent is concentrated in Asia.

8. In response to Indonesia's pursuit of a more balanced approach to national development, OECF has formulated plans to provide ODA loans in more diverse fields such as environmental preservation, social infrastructure, human resources development, poverty reductions, and rural development. As of the end of FY1996, the cumulative total of ODA loan commitments to the Government of Indonesia was ¥2,900 billion (\$25 billion equivalent). This accounted for approximately 20 percent of all ODA loans to foreign governments and made Indonesia the largest recipient of ODA loans from Japan. About 8.5 percent of this amount (i.e., ¥247,562 million [\$2.13 billion equivalent]) was committed to the social services sector, including the WSS and urban development component. As of September 1998, OECF had seven ongoing WSS and urban development funded-projects in Indonesia, amounting to ¥44,650 million (\$330,900 equivalent), three of which were due for completion by the end of 1998.

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<sup>1</sup> IMF-Indonesia: First Review Under the Standby Arrangement, 13 April 1998.

<sup>2</sup> The Overseas Economic Cooperation Fund, Japan Annual Report, 1997.

<sup>3</sup> At the exchange rate of yen (¥) 1 = \$0.00806 as of March 1977, 0.00862 as of September 1996, and 0.00741 as of December 1998.

## OPERATIONAL INDICATORS OF SELECTED WATER ENTERPRISES (PDAMS)

Town/City	Unit	Supply hours/day	Staff/1,000 connection	Year					Reference Projects
				1993	1994	1995	1996	1997	
<b>A. MEDAN</b>									
Water Sales	m <sup>3</sup> x 10 <sup>3</sup>	24	4.7		63,720	70,134	77,674	83,344	Loan 550-INO: Medan Urban Development Project
UFW	%				28	27	22	20	
Total Connections	No.			186,823	188,265	208,461	222,829		Loan 919-INO: Medan Urban Development. Project II
Consumption/ connection	m <sup>3</sup> /annum			341	373		374		
Operating Ratio				0.73	0.74	0.67	0.57		
Billing Ratio				1.00	1.00	1.00	0.99		
<b>B. BANDUNG</b>									
<i>Kotamadya</i>									
Water Sales	m <sup>3</sup> x 10 <sup>3</sup>	4	7.1	34,173	37,870	37,531	37,390	38,483	Loan 195/401-INO: Bandung Water Supply
UFW	%			56	51	57	47	43	
Total Connections	No.			120,787	127,745	132,087	133,707	135,019	Loan 271/400-INO: Bandung Urban Development
Consumption/ connection	m <sup>3</sup> /annum			283	296	284	280	285	
Operating Ratio				1.05	0.72	0.84	0.69	0.57	
Billing Ratio				0.92	0.99	0.95	0.93	0.88	
Loan 768-INO: Second Bandung Urban Development									
<b>C. SEMARANG</b>									
Water Sales	m <sup>3</sup> x 10 <sup>3</sup>	4		23,741	34,490	25,532	29,180	31,838	Loan 547-INO: Semarang Water Supply
UFW	%			41	39	38	38	36	
Total Connections	No.			65,802	71,107	82,444	97,775	105,168	
Consumption/ connection	m <sup>3</sup> /annum			361	485	310	298	303	
Operating Ratio				.52	.67	.60	.59	.62	
Billing Ratio				.97	.96	.97	.96	.92	
<b>D. WELERI</b>									
Water Sales	m <sup>3</sup> x 10 <sup>3</sup>	14	5.2 <sup>a</sup>	187	196	235	257	275	Loan 493-INO: Small Towns Water Supply
UFW	%			47	47	48	52	45	
Total Connections	No.			1,106	1,230	1,333	1,403	1,550	
Consumption/ connection	m <sup>3</sup> /annum			169	159	176	183	178	
Operating Ratio				0.49	1.00	1.00	1.00	1.00	
Billing Ratio				0.97	0.52	0.59	0.49	0.36	
<b>E. LAMPUNG</b>									
<b>Utara</b>									
Water Sales	m <sup>3</sup> x 10 <sup>3</sup>	6 - 8	18.8	240	209	171	152	116	Loan 731-INO: IKK Water Supply
UFW	%			42	39	34	30	30	
Total Connections	No.			1,316	1,316	848	866	796	Loan 1069-INO: Second IKK Water Supply
Consumption/ connection	m <sup>3</sup> /annum			182	159	201	175	146	
Operating Ratio				2.04	1.58	1.30	1.20	1.56	
Billing Ratio				0.83	0.83	0.89	0.80	0.56	
<b>Tengan</b>									
Water Sales	m <sup>3</sup> x 10 <sup>3</sup>	4 - 8	12.5		500	331	248	255	
UFW	%				29	29	29	32	
Total Connections	No.				1,671	1,785	1,700	1,603	
Consumption/ connection	m <sup>3</sup> /annum				299	185	146	159	
Operating Ratio					1.99	1.76	1.38	1.26	
Billing Ratio					0.77	0.80	0.74	0.73	

UFW = unaccounted-for water.

<sup>a</sup> Does not include head office staff.

## FINANCIAL INTERNAL RATE OF RETURN CALCULATIONS

1. The financial internal rates of return (FIRRs) of the Semarang Water Supply Project (Loan 547-INO) and the water supply component of the Second Bandung Urban Development Project (Loan 768-INO) were reevaluated based on the following assumptions:

- (i) The economic life of the projects was 25 years, i.e., from 1990-2014 for the Semarang Water Supply Project, and 1992-2016 for the Second Bandung Urban Development Project.
- (ii) All financial values were adjusted to 1997 constant price level. The portion of the project cost comprising foreign exchange expenditure was deflated using the World Bank's manufacturers' unit value index as the foreign price index. All local currency costs and revenues in Indonesian rupiah were deflated using the gross domestic product deflator as the local price index.
- (iii) The proportions of project expenditure in foreign exchange and local currency were as follows:

<u>Item</u>	<u>Foreign Exchange Cost</u>	<u>Local Currency Cost</u>
Capital Costs	60 percent	40 percent
Operation and Maintenance (O&M) Costs	40 percent	60 percent

- (iv) O&M costs were to remain approximately at current levels.
- (v) The rate of unaccounted-for water (UFW) would be gradually reduced to 30 percent from 49 percent in 1990 for Semarang, and 61 percent in 1992 for Bandung.
- (vi) The base case assumed (a) a gradual reduction in UFW to 30 percent, at the rate of 2 percent reduction per year; and (b) water tariff increases (i.e., increase by 20 percent in years 1999 and 2002 for Semarang, and by 15 percent in years 1999 and 2002 for Bandung).
- (vii) The sensitivity analysis considered two cases: (a) failure to achieve UFW reduction targets (case 1), and (b) failure to achieve both tariff increases and UFW reductions (case 2).

2. The detailed recalculation of the FIRRs (base case) for the two projects are shown in Tables A4.1 and A4.2. The reestimated FIRR of 4.8 percent for the Semarang Water Supply Project while higher than the project estimated FIRR of 2.3 percent and 3.1 percent at completion and postevaluation, respectively, is still 1.4 percentage points lower than the estimated FIRR of 6.1 percent at appraisal. The reestimated FIRR of 5.8 percent for the water supply component of the Second Bandung Urban Development Project is higher than the FIRR estimate of 4.8 percent at completion but still lower by 3.8 percent percentage points than the appraisal estimate of 8.6 percent. The FIRRs of the two projects are significantly lower than the appraisal estimates primarily because of (i) nonachievement of UFW reduction targets; and (ii) project implementation delays, which delayed the realization of project benefits.

**Table A4.1: Financial Internal Rate of Return (FIRR)  
Semarang Water Supply Project (Loan 547-INO)**  
(in 1997 prices)

Year	Incremental Production (million m <sup>3</sup> )	UFW (%)	Incremental Sales (million m <sup>3</sup> )	Average Tariff (Rp/m <sup>3</sup> )	Incremental Revenue (Rp million)	Capital Cost (Rp million)	Incremental O&M Cost (Rp million)	Total Cost (Rp million)	Net Cash Flow (Rp million)
1983		35				321		321	-321
1984		44				3,743		3,743	-3,743
1985		49				10,502		10,502	-10,502
1986		51				13,301		13,301	-13,301
1987		50				31,184		31,184	-31,184
1988		51				29,379		29,379	-29,379
1989		46				15,867		15,867	-15,867
1 1990	5.89	49	3.01		1,159	12,880	630	13,510	-12,352
2 1991	7.76	44	5.68		1,680		1,179	1,179	502
3 1992	14.00	42	9.90		3,130		2,192	2,192	938
4 1993	15.53	41	11.09	614	6,803		2,716	2,716	4,087
5 1994	15.50	39	11.87	431	5,113		3,789	3,789	1,323
6 1995	16.44	38	12.86	737	9,481		4,627	4,627	4,854
7 1996	22.07	38	16.35	731	11,946		5,723	5,723	6,223
8 1997	25.35	36	19.38	712	13,798		6,777	6,777	7,021
9 1998	25.28	37	18.84	730	13,753		6,596	6,596	7,158
10 1999	25.28	36	19.34	875	16,923		6,771	6,771	10,152
11 2000	25.28	35	19.84	875	17,360		6,946	6,946	10,414
12 2001	25.28	34	20.34	875	17,798		7,121	7,121	10,677
13 2002	25.28	33	20.84	1050	21,882		7,296	7,296	14,586
14 2003	25.28	32	21.34	1050	22,407		7,471	7,471	14,936
15 2004	25.28	31	21.84	1050	22,932		7,646	7,646	15,286
16 2005	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
17 2006	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
18 2007	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
19 2008	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
20 2009	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
21 2010	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
22 2011	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
23 2012	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
24 2013	25.28	30	22.34	1050	23,457		7,821	7,821	15,636
25 2014	25.28	30	22.34	1050	23,457		7,821	7,821	15,636

**FIRR = 4.8 %**

m<sup>3</sup> = cubic meter, O&M = operation and maintenance.

**Assumptions:**

1. Percent unaccounted-for water will level out at 30 percent by the year 2005.
2. Expenditure on O&M will remain at current levels.
3. Water tariff will increase in 1999 and 2002 (base case).

**Table A4.2: Financial Internal Rate of Return**  
**Second Bandung Urban Development Project - Water Supply Component (Loan 768-INO)**  
(in 1997 prices)

Year	Incremental Production (million m <sup>3</sup> )	UFW (%)	Incremental Sales (million m <sup>3</sup> )	Average Tariff (Rp/m <sup>3</sup> )	Incremental Revenue (Rp million)	Capital Cost (Rp million)	Incremental O&M Cost (Rp million)	Total Cost (Rp million)	Net Cash flow (Rp million)
1986									
1987						1,222		1,222	-1,222
1988						13,328		13,328	-13,328
1989						30,465		30,465	-30,465
1990						31,847		31,847	-31,847
1991						24,928		24,928	-24,928
1 1992	27.73	61	10.83	631	6,837	26,801	5,493	32,294	-25,458
2 1993	33.36	52	16.06	631	10,135	9,380	10,100	19,480	-9,345
3 1994	35.18	48	18.30	901	16,488	2,497	14,145	16,642	-154
4 1995	32.38	46	17.36	976	16,943		14,867	14,867	2,076
5 1996	30.76	45	16.82	986	16,586		10,215	10,215	6,370
6 1997	34.33	47	18.36	976	17,920		9,007	9,007	8,913
7 1998	34.38	45	18.91	980	18,531		9,386	9,386	9,145
8 1999	34.38	43	19.60	1150	22,536		9,949	9,949	12,587
9 2000	34.38	41	20.28	1150	23,327		10,546	10,546	12,781
10 2001	34.38	39	20.97	1150	24,118	341	11,178	11,519	12,599
11 2002	34.38	37	21.66	1265	27,399		11,849	11,849	15,550
12 2003	34.38	35	22.35	1265	28,269		11,849	11,849	16,420
13 2004	34.38	33	23.03	1265	29,139		11,849	11,849	17,290
14 2005	34.38	31	23.72	1265	30,009		11,849	11,849	18,159
15 2006	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
16 2007	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
17 2008	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
18 2009	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
19 2010	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
20 2011	34.38	30	24.07	1265	30,443	681	11,849	12,530	17,913
21 2012	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
22 2013	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
23 2014	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
24 2015	34.38	30	24.07	1265	30,443		11,849	11,849	18,594
25 2016	34.38	30	24.07	1265	30,443		11,849	11,849	18,594

**FIRR = 5.8%**

m<sup>3</sup> = cubic meter, O&M = operation and maintenance.

**Assumptions:**

1. Percent unaccounted-for water will level out at 30 percent by the year 2004.
2. Expenditure on O&M will remain at current levels.
3. Water tariff will increase in 1999 and 2002 (base case).

## ECONOMIC INTERNAL RATE OF RETURN CALCULATIONS

1. Although not one of the completed water supply and sanitation projects reviewed attempted to calculate the economic internal rate of return (EIRR) at appraisal, completion, and postevaluation, this Study initiated EIRR calculations for two projects under review: the Semarang Water Supply Project (Loan 547-INO) and the water supply component of the Second Bandung Urban Development Project (Loan 768-INO).
  
2. The EIRR calculations were carried out using the new Bank guidelines for the economic analysis of water supply projects.<sup>1</sup> The new approach calls for the identification, quantification, and valuation of economic benefits and costs following two basic principles: (i) comparison of the with- and without-project situations, and (ii) the distinction between nonincremental and incremental inputs (costs) and outputs (benefits). As defined in the guidelines, nonincremental inputs are project demands that are met by existing supplies, and incremental inputs are project demands that are met by an increase in the total supply of the input. Nonincremental outputs are project outputs that replace existing outputs, and incremental outputs expand supply to meet new or additional demands.
  
3. In this Study, the following assumptions were used in the EIRR calculations:
  - (i) The economic life of both projects was 25 years, i.e., 1990-2014 for the Semarang Water Supply Project, and 1992-2016 for the Second Bandung Urban Development Project.
  - (ii) Nontechnical unaccounted-for water (UFW) as a percentage of total UFW was 50 percent for Semarang and 65 percent for Bandung.
  - (iii) The project benefits were calculated in terms of the resource cost savings attributable to
    - (a) incremental water, i.e., the increased consumption of water possible as a result of the project.
    - (b) consumers' replacing some (or all) of their current water (usually from the highest cost source, such as water vendors) with lower cost water provided by the project. The water that is replaced is referred to as nonincremental water.
    - (c) Nontechnical UFW (e.g., due to illegal connections, etc.), which represents that portion of the UFW that is consumed, and is therefore included as an economic benefit.
  - (iv) Based on data from the socioeconomic survey on household consumption, average tariffs (i.e., financial prices), and monthly expenditure for water by the different groups of consumers (i.e., depicting the with-project and without-project situations), the incremental and nonincremental prices of water were derived (Table A5.1) using the following assumptions:

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<sup>1</sup> Asian Development Bank. August 1998. *Handbook for the Economic Analysis of Water Supply Projects*. Revised Draft, Economics and Development Resource Center.

- (a) Nonincremental water consists of existing vendor-supplied water + 50 percent of the current spring/well water usage.
- (b) The financial price of nonincremental water is taken as the weighted average price of the vendor and spring/well water.
- (c) The financial price of incremental water is taken as the simple average of the with-project and nonincremental prices, where the average with-project price is the weighted average of house connection and public standposts users.
- (d) The proportion of house connection users to public standposts users is taken as 80 percent to 20 percent.
- (e) The financial price of UFW nontechnical is the weighted average of the incremental and nonincremental prices for water.

Table A5.1: Incremental and Nonincremental Price of Water

Item	Consumption/ Month (m <sup>3</sup> )	Financial Price (Rp/m <sup>3</sup> )	Expenditure/ Month (Rp)
<b>Semarang</b>			
With Project (HC)	16.4	732	12,000
With Project (PT)	17.3	405	7,000
Average with Project <sup>a</sup>	16.6	667	
W/out Project (NC)	7	2,143	15,000
W/out Project (NP)	13	1,615	21,000
Average W/out Project <sup>b</sup>	10	1,800	18,000
Average with Project	16.6	667	
Average without Project, comprising:	10	1,800	
Water Vendor Purchases	3	3,000	9,000
Flat Fee for Spring/Well Use	7		1,500
Nonincremental Water			
100 percent vendor + 50 percent spring/well	6.5	1,500 <sup>c</sup>	
Incremental Water	6.6	(1,500+667)/2 = 1,084	
		<b>1,290<sup>d</sup></b>	
<b>UFW (NTL)</b>			
<b>Bandung</b>			
With Project (HC)	20	675	13,500
With Project (PT)	44	334	14,700
Average with Project <sup>a</sup>		607	
W/out Project (NC)	10	700	7,000
W/out Project (NP)	8	750	6,000
Average without Project <sup>b</sup>	9	722	6,500
Average with Project	20	607	
Average without Project, comprising:	9	722	
Water Vendor Purchases	2	2,500	5,000
Flat Fee for Spring/Well Use	7		1,500
Nonincremental Water			
100 percent vendor + 50 percent spring/well	5.5	1045 <sup>c</sup>	
Incremental Water	11	(1,045+607)/2 = 826	
		<b>899<sup>d</sup></b>	
<b>UFW (NTL)</b>			

m<sup>3</sup> = cubic meter, NTL = nontechnical, PDAM = Perusahaan Daerah Air Minum local water and sewerage enterprise, UFW = unaccounted-for water.

<sup>a</sup> Assumes 80 percent house connection (HC) and 20 percent public standpost (PT) coverage.

<sup>b</sup> Average of non-PDAM customers (NC) and nonproject area (NP) cases.

<sup>c</sup> Weighted average price of water from vendors and from spring/well use.

<sup>d</sup> Weighted average price of incremental and nonincremental water.

- (v) From the socioeconomic survey results, nonincremental water was 50 percent and 33 percent of total water use in Semarang Water Supply Project and Second Bandung Urban Development Project, respectively.
- (vi) Capital costs (60 percent foreign and 40 percent local costs) and operating costs (40 percent foreign and 60 percent local) were converted to financial prices using manufacturers' unit value and gross domestic product deflator indices.
- (vii) The standard conversion factors used to convert financial prices to economic prices based on the world price numeraire are shown in Table A5.2.

**Table A5.2: Conversion Factors Used in Economic Pricing**

Item	Component	Share (%)	SCF
Nonincremental Water:			
Vendors	Labor	50	0.6
	Nontraded	50	0.9
Spring/Wells	Traded	20	1.0
	Nontraded	80	0.9
Incremental Water		100	0.9
Capital Costs	Foreign	60	1.0
	Local	40	0.9
Operation and maintenance (O&M) Costs	Foreign	40	1.0
	Local	60	0.9

- (viii) Sensitivity analysis considered the inclusion of an opportunity cost for water (OCW) valued at Rp100/m<sup>3</sup> (case 1), and a reduction in benefits by 20 percent (case 2). Case 3 combined the effects of case 1 and case 2.

4. Tables A5.3 and A5.4 show the calculation of the EIRR for the Semarang Water Supply Project and the water supply component of the Second Bandung Urban Development Project. The estimated EIRR of 14.8 percent for the Semarang Water Supply Project is higher by 10 percentage points than its recalculated financial internal rate of return (FIRR) of 4.8 percent. The estimated EIRR of 6.5 percent for the water supply component of the Second Bandung Urban Development Project is slightly higher than its recalculated FIRR of 5.8 percent.

5. The EIRR estimate for the Semarang Water Supply Project suggests that the Project has far greater benefits than what is shown by its reestimated FIRR. The Project's economic impact was magnified by the substantial resource cost savings for the beneficiaries, resulting from the replacement of high-cost alternative water supplies with much lower cost piped water supplied under the Project.

6. The economic impact of the water supply component of the Second Bandung Urban Development Project as indicated by its calculated EIRR, on the other hand, is at par with what its reestimated FIRR suggests. The calculated EIRR of 6.5 percent suggests that the Project has fallen short of expectations as it is still below the water supply component's FIRR appraisal estimate of 8.6 percent.

## HIGHLIGHTS OF THE HOUSEHOLD SOCIOECONOMIC SURVEY OF SELECTED BANK-ASSISTED WATER SUPPLY AND SANITATION PROJECT AREAS

### A. Scope and Methodology

1. A household survey was carried out in a sample of four project areas (and a control sample of nonproject beneficiaries), with the objective of collecting data on the current socioeconomic status of project beneficiaries. Information gathered included housing conditions, income and expenditure, current patterns of use of and expenditure on water, level of customer satisfaction, and ability and willingness to pay for improved levels of service. The areas comprised two cities, i.e., Bandung (Loan 768-INO: Second Bandung Urban Development Project) and Semarang (Loan 547-INO: Semarang Water Supply Project); one small town, i.e., Kendal (Weleri) in Central Java (Loan 493-INO: Small Towns Water Supply Project); and five IKKs or subdistrict capitals with a population of 3,000 to 20,000 in two districts of Lampung town (Loan 731-INO: IKK Water Supply Project). A total of 18 districts were covered in the four areas. Two nonproject districts were included in Bandung and Semarang. The survey area and distribution of the sample of 600 households are shown in Table A6.1.

**Table A6.1: Socioeconomic Survey Area and Number of Respondents**

City/Town	District	Subdistrict	Number of Respondents <sup>a</sup>				Total	%
			Beneficiaries		Nonbeneficiaries			
			HC	PT	NC	NP		
<b>Bandung</b>	1. Sukajadi	1. Pasteur	28	7	14	0	49	
	2. Bandung	2. Citarum	11	0	0	0	11	
		3. Tamansari	9	3	5	0	17	
		4. Antapani	19	0	0	0	19	
	4. Lengkong	5. Paledang	20	1	10	0	31	
	5. Astana	6. Cibadak	14	2	7	0	23	
	6. Bojongloa	7. Babakah Asih	14	6	7	0	27	
	7. Arcamanik	8. Cisaranten	0	0	0	20	20	
		<b>Subtotal</b>	<b>115</b>	<b>19</b>	<b>43</b>	<b>20</b>	<b>197</b>	<b>33</b>
<b>Semaran</b>	8. Semarang	9. Kalibanteng Timur	14	0	8	0	22	
		10. Bongsari	18	5	9	0	32	
		11. Tugurejo	0	0	0	20	20	
	9. Semarang	12. Tanjungmas	37	5	18	0	60	
		10. Gayamsari	15	3	8	0	26	
	11. Pedurungan	14. Palebon	30	10	15	0	55	
			<b>Subtotal</b>	<b>114</b>	<b>23</b>	<b>58</b>	<b>20</b>	<b>215</b>
<b>Kendal</b>	12. Weleri I	15. Weleri	11	0	7	0	18	
	13. Weleri II	16. Nawangsari	14	2	7	0	23	
		17. Panyangkring	3	2	2	0	7	
	14. Weleri III	18. Panaruban I	10	2	6	0	18	
	15. Weleri IV	19. Panaruban II	4	0	2	0	6	
		20. Karangdowo	4	0	2	0	6	
	16. Weleri V	21. Sambungsari	8	4	3	0	15	
		<b>Subtotal</b>	<b>54</b>	<b>10</b>	<b>29</b>	<b>0</b>	<b>93</b>	<b>15</b>
<b>Lampung</b>	17. Sekampung	22. Sumber Gede	15	0	9	0	24	
		23. Giri Klopo Mulyo	5	0	3	0	8	
	18. Way Jepara	24. Brajasakti	20	1	10	0	31	
		25. Labuhan Ratu I	10	1	5	0	16	
		26. Labuhan Ratu II	10	0	6	0	16	
			<b>Subtotal</b>	<b>60</b>	<b>2</b>	<b>33</b>	<b>0</b>	<b>95</b>
		<b>Total</b>	<b>343</b>	<b>54</b>	<b>163</b>	<b>40</b>	<b>600</b>	<b>100</b>
		<b>% of Total</b>	<b>57</b>	<b>9</b>	<b>27</b>	<b>7</b>	<b>100</b>	

PDAM = Perusahaan Daerah Air Minum local water and sewerage enterprise.

<sup>a</sup> HC = PDAM customers with house connections, PT = PDAM customers using public taps, NC = non-PDAM customers residing in the project area, NP = non-PDAM customers who live outside the project area.

2. The survey made use of a structured interview questionnaire in the vernacular, i.e., Bahasa Indonesia. A sample of about 3-10 percent of the household population was randomly selected in each survey area. The sample respondents were categorized as follows: (i) project beneficiaries, which comprised Perusahaan Daerah Air Minum (PDAM) customers with house connections (HC) and PDAM customers using public taps (PT); and (ii) nonbeneficiaries, comprising non-PDAM customers residing in the project area (NC) and non-PDAM customers residing outside the project area (NP). The survey covered 397 (or 66 percent) project beneficiaries and 203 (or 34 percent) nonbeneficiaries.

3. The survey was carried out during the period 18 August-18 November 1998 by four field staff led by an Indonesian anthropologist engaged by the Bank in collaboration and coordination with concerned project PDAMs and government agencies.

## B. Socioeconomic Profile of Survey Respondents

### 1. Demographic Characteristics

4. Table A6.2 shows the population and the available water supply schemes in the respective areas. Bandung is the most populated town among the survey areas, followed by Semarang, Lampung, and Kendal. The average household size was five persons in Bandung, Semarang, and Lampung and four in Kendal (Weleri). The annual population growth in the survey areas was 1.03 percent for Bandung, 2.5 percent for Semarang, and 3.3 percent for Weleri.<sup>1</sup> In terms of coverage of available water supply schemes, however, Bandung covers only about 4.3 percent of its population (about 3.4 percent having house connections and 0.9 percent served by public taps<sup>2</sup>). Comparatively, the water supply schemes of Semarang serve about 28.2 percent of its population (26.8 percent by house connection and 1.4 percent by public taps), Kendal covers about 25.5 percent (24.3 percent by house connection and 1.2 percent by public taps), and Lampung covers about 8.7 percent (7.3 percent by house connection and 1.4 percent by public taps).

**Table A6.2: Population and Available Water Supply Schemes of Survey Areas**

City/Town	No. of Districts	Population			No. of Households	No. of House Connections	No. of Public Taps
		Male	Female	Total			
Bandung	7	59,623	58,898	118,521	23,704	808	21
Semarang	4	35,194	36,732	71,926	14,385	3,850	20
Kendal (Weleri)	5	13,330	13,805	27,135	6,784	1,650	8
Lampung	2	15,424	16,384	31,808	6,362	461	9
<b>Total</b>	<b>18</b>	<b>123,571</b>	<b>125,819</b>	<b>249,390</b>	<b>51,235</b>	<b>6,769</b>	<b>58</b>

5. The majority of the respondents were female (336 or about 56 percent), only 37 or 11 percent of whom were household heads. Of the 264 (or 44 percent) male respondents, 235 or about 89 percent were household heads.

6. The highest educational level of the respondents was senior high school, i.e., 37.5 percent. The remaining respondents' levels of education were 20.4 percent

<sup>1</sup> No data was available on annual population growth for Lampung.

<sup>2</sup> Based on the calculation 1 public tap per 10 households.

elementary, 19.7 percent junior high school, 8.5 percent university, 8.0 percent academy, and 6.0 percent no schooling. There was no significant difference across types of respondents (HC, PT, NC, and NP) with respect to educational attainment. Bandung registered the highest proportion (about 7.6 percent of total) of respondents with university education while Weleri posted the highest percentage of respondents with no schooling (about 0.7 percent of total).

7. The majority of the respondents were Government employees (30.7 percent). About 22.5 percent were engaged in labor-intensive occupations, 21.3 percent were private employees, 21.7 percent were private entrepreneurs, 2.3 percent were engaged in agriculture and fishing, and the remaining 1.5 percent were plain housewives.

## 2. Income and Expenditure

8. Bandung posted significantly higher monthly incomes (Rp713,000) than the other survey areas. There was no significant variation in household income among the other survey areas. The average monthly household income was Rp300,000 for Semarang, Rp317,000 for Weleri, and Rp366,000 for Lampung. Incomes also varied across user groups. HC and NP respondents registered the highest incomes (Rp800,000 and Rp900,000, respectively). PT and NC respondents had incomes of Rp475,000 and Rp500,000, respectively. The average income of project beneficiaries surveyed was lower in Semarang than in Weleri or Lampung. This indicates that the project benefited mainly lower income households in Semarang. In Bandung, by comparison, the project beneficiaries included a relatively high number of middle to higher income households (Table A6.3).

**Table A6.3: Average Household Income (Rp/month)**

Respondent	Bandung	Semarang	Weleri	Lampung
House Connection	800,000	300,000	350,000	375,000
Public Tap	475,000	300,000	337,500	na
Non-PDAM Customer	500,000	265,000	250,000	350,000
Nonproject	900,000	400,000	na	na

na = not available.

9. The bulk of the respondents' income was expended on food (about 52 percent), followed by education (about 11 percent), transport (about 10 percent), and utilities/fuel (about 8 percent). Only about 2.4 percent was expended for tax/contribution, including the monthly water services bill. Bandung posted the highest percent allocation for tax/contribution at about 5 percent, followed by Lampung (about 3 percent), Weleri (about 1.1 percent), and Semarang (about 0.8 percent).

## 3. Housing Condition

10. About 86.9 percent of the respondents owned their house, about 5.3 percent lived in the family house, and about 4.8 percent were renting. Most of the house structures were permanent (about 89.7 percent), 7.8 percent were semipermanent, and only 2.5 percent were made of nonpermanent materials.

## C. Water Sources, Consumption, and Expenditure

### 1. Sources of Water

11. A high proportion of NC households had private wells. However, due to declining groundwater yields and quality in Semarang and Bandung, they also relied on alternatives to groundwater sources. For NP households in Bandung, over 50 percent of water was supplied by PDAM tankers. In Semarang, NC and NP households relied on alternative spring sources and water vendors for the bulk of their water supply. In Weleri, the piped water supply was more reliable and households obtained a higher percentage of their water from the PDAM. Due to a high iron content in the PDAM supply in Lampung, well water was used predominantly for drinking and cooking purposes, and PDAM water was used for washing and bathing. PDAM's PT customers could spend up to one hour per day collecting water, while non-PDAM customers could spend up to three hours collecting water from spring sources.

### 2. Water Consumption and Expenditure

12. The households' average water consumption and monthly expenditure on water varied across the survey areas (Tables A6.4 and A6.5). Bandung households using public taps consumed far more water and posted the highest proportion of income spent on water purchases. Bandung nonbeneficiaries (NC and NP households) experienced water shortages, and were unable to satisfy their demand for water. Nonbeneficiaries in Semarang spent more on water than did the project beneficiaries (HC and PT). NP households spent the most on water while NC households consumed the least water (and experienced unsatisfied demand). NP respondents in Weleri spent twice as much as project beneficiaries on water, amounting to a high 7.2 percent of their household income. Nonbeneficiaries in Semarang and Weleri paid more than the (usually assigned) affordability limit of 5 percent of household income, and therefore would likely benefit from access to PDAM supply. HC respondents in Bandung, Weleri, and Lampung were benefiting from a very affordable water service, which cost between 1.7 percent and 2.6 percent of household income. In Semarang, the relatively high proportion of monthly household income (4 percent) spent by HC respondents on water suggests little scope for further tariff increases in the area. Because the PDAM system could be unreliable, many project beneficiaries also used water from other sources (primarily their own private wells). That entailed some extra costs (pumping cost, time cost of labor) to the consumers; hence, their total real expenditure on water may be somewhat higher than the quoted figures.

**Table A6.4: Average Household Water Consumption (m<sup>3</sup>/month)**

<b>Respondent</b>	<b>Bandung</b>	<b>Semarang</b>	<b>Weleri</b>	<b>Lampung</b>
House Connection	20	16.4	13	14
Public Tap	44	17.3	17	na
Noncustomer	10	7	8.5	14.5
Nonproject	8	13	na	na

m<sup>3</sup> = cubic meter, na = not available.

**Table A6.5: Average Household Expenditure on Water (Rp/month), and Affordability Ratio<sup>a</sup>**

Respondent	Bandung		Semarang		Weleri		Lampung	
	Expenditure	Ratio	Expenditure	Ratio	Expenditure	Ratio	Expenditure	Ratio
House								
Connection	13,500	1.7	12,000	4.0	9,000	2.6	10,000	2.6
Public Tap	14,700	3.1	7,000	2.3	7,000	2.1	na	
Noncustomer	7,000	1.4	15,000	5.7	18,000	7.2	na	
Nonproject	6,000	0.7	21,000	5.3	na		na	

na = not available.

<sup>a</sup> Affordability ratio is the percentage of household income used to purchase water.

13. There were minor variations in water tariff across the survey areas. Weleri posted the highest unit rate, while Lampung had the lowest. Bandung levied a monthly maintenance fee of Rp2,500 (minimum) and added a 30 percent sewerage charge to the water bill of all customers. The sewerage charge was not included in the above computations. Water consumption data indicate that households primarily using public taps consumed more water than those with house connections.

#### **D. Willingness to Pay for Services**

14. Households identified convenience as the most important reason for having a house connection. Less than a third of the households using public taps were interested in having a house connection, because either they were satisfied with their present arrangements or they found the cost of connection too high. Nonbeneficiaries in Bandung, Semarang, and Weleri were willing to have a house connection. In Lampung, however, there was a low demand for house connections. The average willingness to pay for a house connection was between Rp214,000 and Rp320,000 for all the project locations (Table A6.6). NC respondents in Bandung expressed the highest willingness to pay the connection fee (Rp320,000) and the monthly fee for water (Rp26,250). Nonbeneficiaries in Bandung were willing to pay a high monthly amount for water, far higher than they currently spent monthly, reflecting the scarcity of water in that area. In Semarang, nonbeneficiaries were paying relatively high amounts for water, e.g., substantially greater than their counterparts in Bandung. This is because the quality of the water in many of the shallow well sources in Semarang is poor (due to saline intrusions, flooding, etc.) and households are therefore compelled to purchase water, at a high unit cost, from water vendors. As such, nonbeneficiaries in Semarang would pay less for piped water than what they were currently paying for water from other sources (i.e., their willingness to pay is less than their ability to pay). In Weleri, NC respondents who were paying very high (i.e., 7.2 percent of household income) for water also expressed a lower willingness to pay (5.2 percent of income) for water for the same reasons cited in Semarang.

**Table A6.6: Willingness To Pay (Rp)**

<b>Respondent</b>	<b>Bandung</b>	<b>Semarang</b>	<b>Weleri</b>	<b>Lampung</b>
<b>Monthly Fee for Piped Water Supply</b>				
Public Tap	13,125	10,250	13,200	na
Noncustomer	22,000	8,600	12,900	10,600
Nonproject	26,250	9,800	na	na
<b>Connection Fee</b>				
Public Tap	225,100	245,000	214,000	na
Noncustomer	242,500	255,000	257,800	237,500
Nonproject	320,000	243,000	na	na

na = not available.

15. HC respondents in Bandung and Semarang were willing to pay Rp10,000 and Rp5,000, respectively (on top of their monthly water bill) for an improved level of service. Those in Weleri and Lampung did not express willingness to pay any additional amount for improved level of service. This reflects the poor level of water service in Bandung and Semarang, where water is only available for an average of four hours a day.

16. The results confirm that willingness to pay is different from ability to pay. In Semarang and Weleri, some households were paying over 5 percent and as much as 7.2 percent of their income on nonpiped water supplies. Yet many of these same households were also unwilling to have a private connection, which would enable them to save on their monthly water bill. The results indicate that most households are comfortable paying between 3 percent and 4 percent of their income on water. Willingness to pay for a piped water supply depends on a number of factors, including income level, reliability of the PDAM supply, cost of connection, and accessibility and availability of alternative supplies. The cost and availability of alternative supplies clearly have had a major influence on willingness to pay in the areas surveyed. Equally, many households have obviously decided that it is not worth paying the high up-front fee for connection to the PDAM system, knowing they will still require a backup supply due to the unreliability of the PDAM service.

## **E. Sanitation Condition**

17. The majority of the households (about 94 percent) have a private toilet and bathroom. Generally, those with private water connections also have the highest percentage of ownership of private sanitation facility (Table A6.7). Bandung households expressed the highest levels of satisfaction with their sanitation arrangements. Households in Semarang and Weleri, meanwhile, were only “fairly” satisfied with their arrangements. In general, those with house connections were more satisfied with their sanitation facility due to the added convenience of having running water in their toilets.

Table A6.7: Ownership of Sanitation Facility (%)

Type	Bandung				Semarang				Weleri			Lampung	
	HC	PT	NC	NP	HC	PT	NC	NP	HC	PT	NC	HC	NC
Private Facility	100	90	78	100	100	91	95	100	91	80	100	100	97
Public Facility	0	10	18	0	0	0	3	0	0	0	0	0	3
None	0	0	4	0	0	9	2	0	9	20	0	0	0

18. Although most households considered wastewater disposal to be “very important,” they did not clearly associate this with any health risk. The survey showed that very few of the households received any health education as part of the Bank-funded projects. The results indicate a lack of awareness of the linkages between clean water, sanitation, and health. As part of the household survey, information on water-related diseases were collected from the Health Department Offices (*Puskasmas*) at subdistrict level. *Puskasmas* monitor diarrhea, typhoid, amoebiasis, dysentery, hepatitis A, scabies, other skin diseases, and conjunctivitis. However, monitoring is not routinely carried out and is dependent on resources. The available records covered only the last two to five years. In some cases, only one or two years’ data were available and thus were insufficient to allow any meaningful interpretation of long-term health trends. Given these responses, it is not surprising that very few households were willing to pay for connection to a sewerage system, or a monthly sewerage charge for disposal of their wastewater.