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WATER SUPPLY AND SANITATION SECTOR STUDY OF INDONESIA

REPORT
FOR TECHNICAL REFERENCE GROUP
ON RURAL RAINY WATER SUPPLY AND
SANITATION (IRG)

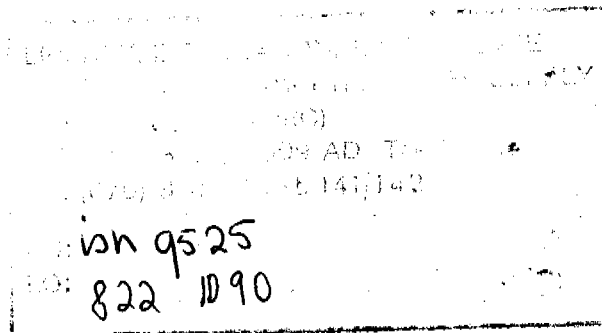
ASIAN DEVELOPMENT BANK

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INDONESIA

WATER SUPPLY AND SANITATION SECTOR STUDY



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This Sector Study has been prepared by consultants with the assistance of the staff of the Water Supply Division of the Asian Development Bank and in consultation with the Indonesian Government.

ABBREVIATIONS AND GLOSSARY

Agraria	Land Affairs
AIDAB	Australian International Development Assistance Bureau
AIT	Asian Institute of Technology
APBD	Regional Revenue and Expenditure Budget
APBN	National Revenue and Expenditure Budget
BANGDA	Directorate General for Regional Development MHA
BANGDAS	Directorate General for Desa Development MHA
BAPPEDA	Regional Development Planning Board
BAPPENAS	National Development Planning Board
Bidang Diklat Air Bersih	Subdirectorates for Training Basic Needs Approach
BNA	Basic Needs Approach
BPAM	Interim Regional Water Enterprise
BPD	Bank Pembangunan Daerah
BPN	National Land Agency
BRI	Bank Rakyat Indonesia
BUDP	Bandung Urban Development Project
Bupati	Head of Kabupaten
CARE	Cooperative for American Relief Everywhere
Camat	Head of Kecamatan
CDO-CDC-EH	Community Development Organization (see also LPSM)
Cipta Karya	Directorate General of Human Settlements, MPW
DAB	Directorate of Water Supply, Ministry of Public Works
Dalan Negeri	Ministry of Home Affairs
Desa	Village or the Fourth Level of Government and Administrative Unit Below Kecamatan
DEPKES	Departemen Kesehatan (Department of Health)
DGCK	Directorate General of Cipta Karya
DGRD	Directorate General of Regional Development
DGWRD	Directorate General of Water Resource Development
DI	Special Territory
Dinas	Office (in city or province)
Dinas Bangunan	Building Quality Control Service Agency
Dinas Kesehatan	Health Service Agency
Dinas Kebersihan	Cleansing Service Agency
Dinas Pasar	Market Service Agency
Dinas Perumahan	Housing Service Agency
Dinas Pertamanan	Parks and Gardens Service Agency
Dinas P & K	Education and Cultural Service Agency
Dinas Tata Kota	Town Planning Agency
Dipenda	Regional/Local Revenue Service Agency
DKI	Special Government Area for Capital of Indonesia
DLAJR	Transport and Traffic Agency
DOH	Department of Health
DPOD	Directorate General for Regional Autonomy MHA
DPR	House of Representatives
DPU	Dinas PU or Public Works Service Agency
DPUK	Kabupaten/Kotamadya Public Works Service Agency
DRIP-DGCK	Drainage Improvement Program
Dusun	Hamlet
ESA	Environmental Sanitation Agency
ESS	Environmental Sanitation Services

FY	Fiscal Year
GBHN	Basic Guidelines of National Policy
GDP	Gross Domestic Project
GOI	Government of Indonesia
HC	House Connection
HRD	Human Resources Development
HDPE	High Density Polyethylene
IBRD	International Bank for Reconstruction and Development
IDWSSD	International Drinking Water Supply and Sanitation Decade
IKK	Principal City or Town of Kecamatan
IMR	Infant Mortality Rate
INKINDO	Organization of Indonesian Consultants
INPRES	Instruction of President - National Subsidy for Local Development
ISSP	In-Service Support Program
ISO	International Standard Organization
IUIDP	Integrated Urban Infrastructure Development Program
JSSP	Jakarta Sewerage and Sanitation Project
JUDP3	Third Jakarta Urban Development Project
Kabupaten	District or Local Government and Administrative Unit Below Province Level (Regency) in Rural Areas
Kanwil	Provincial Branch Offices
Kecamatan	Subdistrict or an Administrative Unit Below Kabupaten/Kotamadya Level
Kelurahan	An Administrative Unit Below Kecamatan in Urban Areas
KEPRES	Presidential Decree
KIP	Kampung Improvement Program
KMKP	Kredit Model Kerja Permanen or Permanent Working Capital Credit
Kotamadya	Local Government and Administrative Unit Below Province Level (Regency) in Urban Areas
KUB	Small Business Group
KUPEDES	Kredit Umum Pedesaan or General Village Credit Program
LKMD	Desa Community Self Reliance Organization
LMD	Desa Community Consultative Group
lpcd	Litres/capita/day
LPRES	Institute for Socio Economic Research, Education and Information (CDO)
lps	litres/second
LPSM	Community Development Organization (NGO)
LSM	Community Self-reliance Organization (NGO)
Lurah	Head of Kelurahan
MCK	Public Bathing, Washing and Toilet Facility
MHA	Ministry of Home Affairs
MIIP	Market Infrastructure Improvement Program
MME	Ministry of Mines and Energy
MOF	Ministry of Finance
MOH	Ministry of Health
MPR	Peoples Consultative Assembly
MPW	Ministry of Public Works
NGO	Non-Government Organization
NRW	Non-Revenue Water
NSWRS	National Standard Water Rate Structure
NUDS	National Urban Development Strategy

O&M	Operation and Maintenance
OXFAM	International Development Famine Relief Organization
PAB	Project Office within Kabupaten
PAM	Water Enterprise
PBB	Land and Property Tax
PDAM	Regional Water Enterprise
Pelita	Five Year Development Period
Pemda	Regional/Local Government
PFO	Project Finance Office
PIU	Project Implementing Unit
PKK	Family Welfare Organization
P3KT	Program Pengembangan Prasarana Kota Terpadu (IUIDP)
PLP	Directorate of Environmental Sanitation
P2LDT	Integrated Desa Environmental and Housing Improvement Program
PMDU	Provincial Monitoring and Development Unit
PMU	Project Management Unit
PPSAB (P2SAB)	Provincial Water Supply Project
PTU	Provincial Training Unit
PVC	Poly Vinyl Chloride
PU	Public Works
PUOD	Directorate General of Public Administration and Regional Autonomy in the Ministry of Home Affairs
Pusbinlat	Centre for Training and Management
Pusdiklat	Centre for Training and Education
RWS	Rural Water Supply
STD/DGCK	Subdirectorate for Training Development within DGCK
RWSS	Rural Water Supply and Sanitation
Repelita	Five Year Development Period Plan
Repelita I	First Five-Year Development Plan (1969/70-1973/74)
Repelita II	Second Five-Year Development Plan (1974/75-1978/79)
Repelita III	Third Five-Year Development Plan (1979/80-1983/84)
Repelita IV	Fourth Five-Year Development Plan (1984/85-1988/89)
Repelita V	Fifth Five-Year Development Plan (1989/90-1993/94)
SII	Industrial Standards of Indonesia
TK I	Provincial Level
TK II	Regency (Kabupaten/Kotamadya) Level
UFW	Unaccounted-for Water
UIMDS	Urban Institutional Manpower Development Study
UN	United Nations
UNICEF	United Nations International Children's Fund
UPVC	Unpractised Polyvinyl Chloride Pipe
WHO	World Health Organization
YIS	Organization for Indonesian Welfare - CDO

NOTES

- (i) In this Report "\$" refers to US dollars and "Rp" to Indonesian Rupiah;
- (ii) The fiscal year of the Government of Indonesia ends on 31 March; and
- (iii) For the purpose of conversion calculations, an exchange rate of Rp 1,700 to \$1.00 has been used. This was the rate generally prevailing during the preparation of the Report.

FOREWORD

The Bank's emphasis on lending in the water supply and sanitation sector in Indonesia has gradually shifted from the major cities to smaller towns over the recent years. The sectoral coverage has included water supply, sewerage and low-cost sanitation. The Bank-financed water supply and sanitation projects provide for the rehabilitation of existing water supply and sanitation systems, system expansion, and facilities for reducing water losses and improving the environmental sanitation. The Bank also fosters sound institutional development and invariably seeks further improvement in financial management and performance of the executing agencies concerned, including the reduction of non-revenue earning water.

Anticipating continuing Bank involvement in assisting the water supply and sanitation sector in Indonesia, high priority was given by the Bank to the preparation of a more detailed assessment of future sector demand with a view to determining the potential and possibilities for assistance to the sector.

This sector study, prepared by consultants and Bank staff, is the result of the assessment. Though it was discussed in draft with the Government in January 1990, the study does not necessarily reflect formal Bank or Government views on the sector. In producing the study for wider dissemination, we hope that it will be useful to all interested in the past and future development of Indonesia's water supply and sanitation sector.

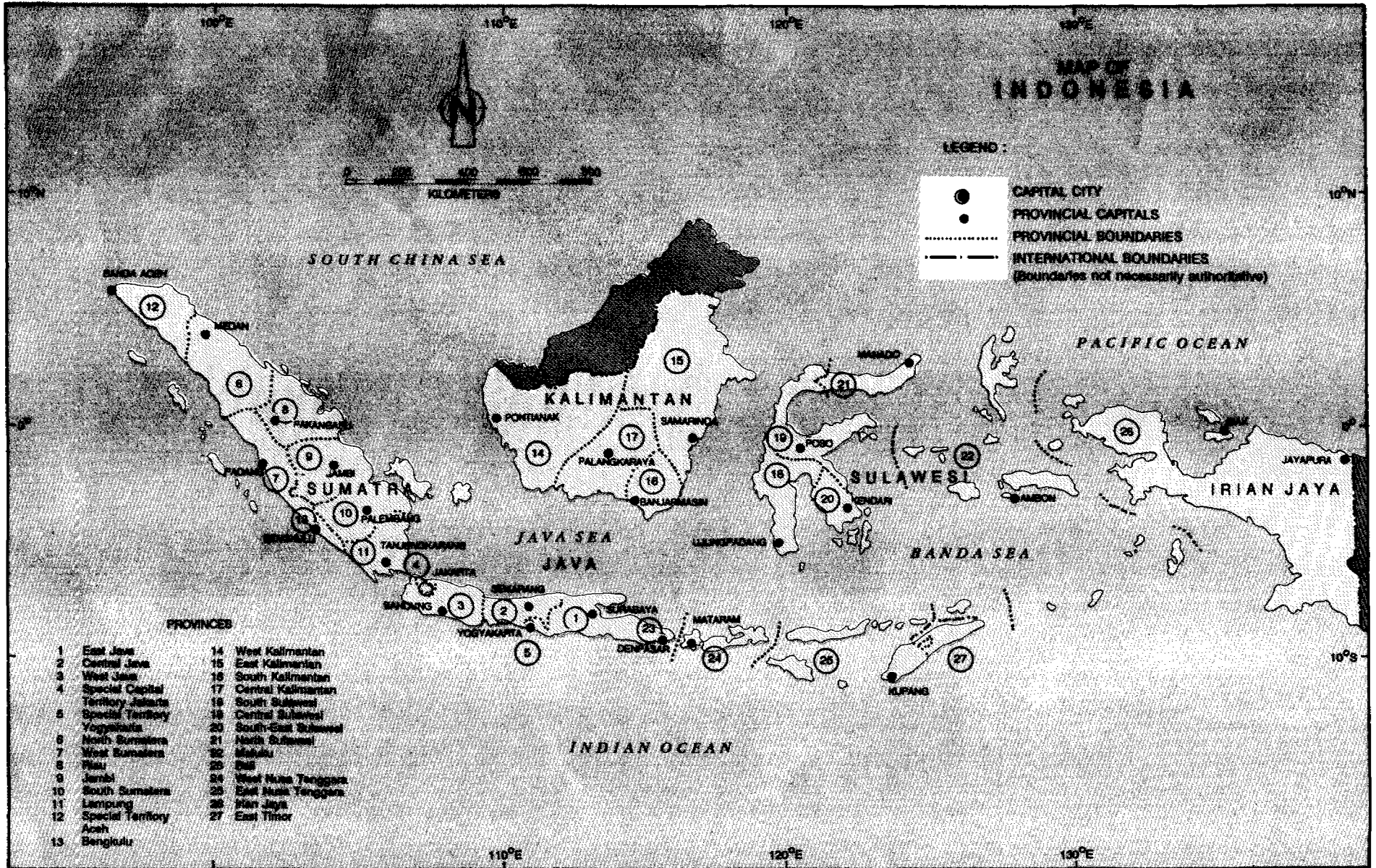
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Director
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EXECUTIVE SUMMARY

A. BACKGROUND

1. Indonesia, the fifth most populous nation in the world, has an estimated mid-1989 population of 179 million, growing at 2.1 per cent a year. This rate is expected to decline to 1.6 per cent per annum by the year 2000. The country is centrally administered from the capital Jakarta but with a growing degree of regional autonomy for its 27 provinces and 296 regencies/municipalities.

2. A resource rich nation with substantial oil and gas deposits, Indonesia is undertaking extensive economic restructuring to develop non-oil/gas exports and has recently embarked upon a policy of broad financial deregulation. The Government is also embarking on a program aimed at restructuring a number of Government enterprises with a view to improving their operational efficiency. In keeping with the Government's intention of allowing greater private sector participation in the development process some private sector management and/or ownership may be introduced.

3. Accounting for more than 60 per cent of the national population, there is a concentration of economic activity and industrialization on the island of Java. New developments, particularly in the oil/gas, mining and tourism fields are now being established in the outer provinces. Further infrastructure and support services need to be developed rapidly in support of these activities.

4. While agriculture still provides the bulk of employment, the country is industrializing and this is reflected in the higher than five per cent growth rate presently occurring in urban areas. Indonesian cities and towns are important social and economic centers in which urban employment is growing at about 4.7 per cent per year or almost twice the national rate. This provides good opportunities for the absorption of surplus rural labor but has serious implications for the provision of urban water supply and sanitation services.

5. Agriculture remains the most important component of GDP with a contribution of approximately 25 per cent. Manufacturing, mining and Tourism are expected to become stronger contributors to GDP over the Repelita V plan period (1989/90-1993/94). In the urban and particularly the rural areas, there remains a proportion of the community with incomes below the relative poverty level (\$268 per capita in 1985). Most development projects now being proposed and implemented by the Government include special components aimed specifically at poverty alleviation measures for these groups.

6. The infant mortality rate ^{1/} which is declining but still remains high amongst southeast Asian nations exhibits strong correlation to the percentage of population lacking proper sanitation. Further health programs aimed at reducing the incidence of diarrheal diseases are planned.

^{1/} As of 1988 the Government estimates the infant mortality rate (IMR) to be 86 infant deaths per 1,000 live births.

7. The Government with the support of external funding agencies has invested increasingly in water supply, particularly urban water supply over the past two decades. This investment has produced rapid nationwide expansion in service coverage for clean water supply. Development resources have been applied mainly for the construction of new facilities. Past programs have not emphasized the development of operation, maintenance and administrative management systems for these facilities. Urban sanitation programs have taken preference over rural programs.

B. Water Supply and Sanitation Sector

8. The provision of water supply and sanitation facilities to urban communities has been an important Government policy objective since five year development planning commenced in 1969 with Repelita I. Rural water supply programs were added during Repelita II. Given historical population growth rates, the dimensions of providing adequate urban and rural water supply and sanitation services have been and will continue to be enormous. The numbers of people in the urban and rural areas who are living below the poverty line, without safe potable water and without adequate sanitation has been steadily decreasing but still substantial investment needs to be made. Only with dedicated Government action, substantial external assistance and more effective use of private resources can this situation be improved.

9. Government investment in the provision of water supply and sanitation facilities has steadily risen from about Rp 17 billion in Repelita I to almost Rp 855 billion in Repelita IV. Government statistics indicate that these investments together with privately funded development have raised present water supply service coverage to an estimated 65 per cent in urban and 31 per cent in rural areas. They show that Government investment alone has contributed to the provision of 32 per cent of the facilities in the urban areas. Alternative sources provide differing figures on the coverage of Government funded facilities. A recent urban water supply study ^{1/} gave an estimate of 27 per cent whilst Housing Policy Study carried out by USAID in 1988-1989 gave a figure of 24 per cent. In rural areas no definitive figures have been found but the majority of facilities used would have been privately developed. For sanitation, present estimates of service coverage are 31 per cent for urban and 25 per cent for rural.

10. During Repelita IV a program approach for the improvement of investment analysis and planning evolved. Known as the "Integrated Urban Infrastructure Development Programme", (IUIDP), it broadly required that all new capital investments in urban infrastructure be proposed with a framework of appropriate local priorities, commitments to sound operations and maintenance practices, practical plans for local revenue mobilization and cost-recovery. The IUIDP approach supports the Government Executive Order PP 14/87 which establishes the principle that local governments should be more fully responsible and accountable for services which provide local benefit. Historically, urban and rural infrastructure has been planned, designed and implemented through Central Government.

^{1/} PT. Indah Karya et. al; 1988; Cipta Karya; Support Study for Master Planning for Water Supply Sub-Sector Policy: Alternative Strategy Reports.

11. A further planning approach termed P2LDT "Integrated Rural Infrastructure Planning" has been developed by the Ministry of Public Works from previous IUIDP planning guidelines (P3KT). This approach provides for the development of integrated rural infrastructure planning and is used as the basis for rural water supply and sanitation program development.

12. Within the Central Government five ministries have major responsibilities for the delivery of urban and rural water supply and sanitation services. They are:

- (a) Ministry of Home Affairs (MHA), responsible for all units of local government and their regional water enterprises (PDAMs);
- (b) Ministry of Public Works (MPW), responsible for technical support of local government implementation of water supply and sanitation programs, and responsible for operation of interim regional water enterprises (BPAMs);
- (c) Ministry of Finance (MOF) responsible for the regulation and guidance of program funding;
- (d) National Development Planning Board (BAPPENAS), provides ministerial level policy coordination and resource allocation for the development program; and
- (e) Ministry of Health (MOH), responsible for the development of community participation and health education programs in support of water supply and sanitation programs, and water quality monitoring and surveillance programs.

13. At the provincial and regional levels of government, the Central Governments representatives are respectively, the Governor and the Bupati. ^{1/} These levels of government are known as Tingkat I and Tingkat II within the Indonesian system. These provincial and regional levels of government have had less access to manpower and skills development programs than central level. The "turnkey" approach for the provision of regional infrastructure usually prescribed by the Central Government has resulted in only a limited transfer of technology to local governments. The Central Government has introduced new policies and is supporting new development projects which seek to strengthen the role of local government and increase the skills level of their staff.

14. These policies also seek to accelerate changes in shifting the financing patterns for urban infrastructure expenditure from predominantly Central Government grant support to more reliance on locally generated revenues and loan finance. The Government recognizes that the reducing availability of centrally sourced grant funds means that:

- (i) present levels of urban development can only be sustained through local governments mobilising additional revenue;

^{1/} Regent, chief executive of a kabupaten (district).

(ii) present grant and loan financing systems need amendment to provide incentives for local revenue generation and borrowing; and

(iii) subsectoral cost saving arrangements need to be reviewed.

15. In the water supply and sanitation sector, local government funding provides a substantial and growing component of development expenditure. For urban water supply and sanitation sub-sector development in Repelita IV, local funds (including INPRES) provided an average of 30 to 45 per cent of annual total development expenditure, domestic loans, around 10 per cent, central government funds, 15 to 30 per cent, and foreign aid, 30 to 50 per cent. For rural programs, the local funds contributed a higher proportion as no loan funds were utilized.

16. In urban areas ^{1/}, it was estimated at the end of Repelita IV (31 March 1989) that some 65 per cent (33 million) of the urban population is served with clean water. Approximately, 32 per cent are served from public piped systems whilst an estimated 33 per cent draw from private supply sources. Targets for Repelita IV which sought to provide access to clean water supplies for 75 per cent (38 million) of the urban population were not fully achieved. The Repelita V plan in reviewing the realizations of Repelita IV identifies the following factors as limiting achievement of targets:

(i) local government needed to be more involved;

(ii) community participation in the use and maintenance of clean water systems needed to be enhanced; and

(iii) community awareness of the importance of clean water needed to be increased.

17. Achieved service coverage figures do not reflect the serviceability of consumer house connections and public standpipes nor do they reflect the quality of water supplied. It is probable that the coverage for active, clean water supply at any point in time may be less than official estimates due to breakdown of equipment or contamination of supply.

18. Under the IUIDP approach, the responsibility for the planning, financing, construction, operation and maintenance of urban water supplies is moving to local government and in particular the local water enterprise. Through BPAMs MPW/DGCK has in the start up period assumed control of all of these activities even operation and maintenance. Operations and administrative management structure and systems in water enterprises throughout the country need to be further strengthened to raise serviceability levels and consumer satisfaction. Urban water supply programs already receive quite substantial external funding assistance and this is expected to continue with future programs.

^{1/} An urban area is defined by the Ministry of Public Works as having a population greater than 10,000 people.

19. Coverage levels for urban sanitation are difficult to determine precisely. Reported coverage at the end of Repelita IV (1989) was 31 per cent yet the 1985 Intercensal Survey indicates that 38 per cent of urban households had private toilets with septic tanks and a further 17 per cent without septic tanks. Urban sanitation facilities are also developed under guidelines of the IUIDP approach. Operation and maintenance services need further strengthening along the lines of those outlined for urban water supply. Except for past KIP (Kampung Improvement Program) projects, little external funding assistance has been provided to this subsector. However, under the IUIDP approach, it is expected that future investment levels will be substantially higher.

20. The proportion of the rural community with access to clean water has risen steadily from about 18 per cent at the end of Repelita II to almost 31 per cent (38 million people) at the conclusion of Repelita IV. Again, operation and maintenance practices need further development to improve the serviceability of installed equipment and the reliability of facilities. Most facilities are used on a regular basis. Major surveys which have been undertaken have noted that the following aspects in the delivery and operation of the rural water supply program should be strengthened to enhance the effectiveness of programs

- (i) interdepartmental and inter-sectoral coordination;
- (ii) community involvement in the planning of community facilities;
and
- (iii) monitoring, reporting and record keeping at village level.

21. Water management groups responsible for the operation and maintenance of rural water supply systems require further strengthening and technical support so that service levels and reliability can be raised. Maintenance of rural piped and non-piped systems which usually are small neighborhood or single family installations is often dependent upon the user communities' perception of facility "ownership". Planning and implementation of rural water supply development needs to continue to shift from a centrally prescribed system to one more under the control of the community. Investment in this subsector has not been large in comparison to the urban subsector. Most external funding up to the end of Repelita IV has come from bilateral agencies, UNICEF, WHO and NGO. Multilateral agencies are showing an increased interest in rural subsector investment.

22. Present rural sanitation coverage is small. Reported figures show 7.5 per cent of the population as having access to private latrines with septic tanks and 37.5 per cent of the population utilizing latrines. It is likely that most of facilities are located in the rural IKK towns and that village level coverage may be lower. Past rural sanitation implementation has emphasized the construction of demonstration units supported by parallel health education programs encouraging the community to construct their own facilities. These programs will require strengthening and development to raise their effectiveness.

23. Household drainage and solid waste management are components of sanitation, however in the rural areas, they assume only minor importance. Some formalized solid waste management is practiced in small IKK towns. Investment in the sector has been quite small with the expectation that the

majority of the community will construct its own facilities. External funding assistance has been limited to a small number of bilateral agencies, UNICEF and WHO and local NGOs utilizing private donor funds. Investments are expected to increase because of a higher level of interest from the multilateral agencies and Government policy that sanitation development should occur concurrently with water supply development.

C. Medium Term Development Plan (1989/90-1993/94) and Sector Issues

24. The Repelita V is highlighted by a 79 per cent increase in development expenditure allocation to the housing and human settlement sector of which water supply and sanitation is a subsector. Proposed subsectoral expenditure and percentages of total sector budget is: public housing, \$1,146 million (30.9 per cent); urban water supply, \$1,686 million (45.4 per cent); rural water supply, \$ 506 million (13.6 per cent); urban sanitation \$338 million (9.1 per cent); and rural sanitation, \$38 million (1.0 per cent). For urban water supply these figures represent a 374 per cent increase in budget over that achieved in Repelita IV.

25. By the end of Repelita V, it is planned that 80 per cent of the urban population and 60 per cent of the rural population will have access to clean water. This represents the provision of public piped services to an additional 13 million urban and 12 million rural people whilst a further 29 million rural people will be served with non-piped systems. In addition, a further 3 million urban people will be required to develop their own clean water supply facility without Government assistance. Targets for urban and rural sanitation services are not expressed in terms of a population coverage but simply as providing sanitation facilities in 200 cities and 5,000 rural locations.

26. These targets, which are substantial increases over those realized in Repelita IV, will require dedicated and disciplined program management by Government agencies. Repelita IV development provided access to a clean water supply for an additional 5.48 million urban people. Repelita V proposes an additional 12.9 million people. For rural areas, an additional 12.4 million people were provided for in Repelita IV, whilst Repelita V proposes to serve an additional 41.4 million people. With the planned improvement in community participation and substantial regional and local government support proposed by the Government, it is expected that with appropriate external funding assistance Repelita V targets can be realized. To achieve these targets, it is proposed that some 72 per cent of the total funding requirements be provided from external sources. At this time, external assistance for approximately 73 per cent of the foreign fund total requirement has been identified.

27. The Repelita V plan for the subsector as developed by MPW/DGCK appears to retain high levels of Central Government involvement in project implementation. Costings of preliminary annual expenditure and work plans suggest that the Government is providing for the full cost of the facility. Past experience in Indonesia and neighboring nations, has shown that for rural water supply and sanitation programs to achieve maximum effectiveness and sustainability community participation must be given high priority. Community participation includes involvement of the community in the planning, funding, construction, operation and maintenance of their facility. The Government has identified community participation as one of the major objectives of the Repelita V.

28. From the Repelita V and past practices, a number of specified technical, institutional, financial and other issues arise, which if addressed can enhance the effectiveness of the Replita V program. Design technologies and service levels presently used are generally considered appropriate for future programs. Where possible, they should be developed and implemented in ways which maximize the potential for community participation. Standardized or fixed technical designs have been shown to achieve limited consumer acceptability and have thus experienced difficulties with long term serviceability. Of significance has been the use of the flow restrictor standardized in the design of IKK water supply systems. Although a convenient technical solution its use has been difficult to introduce effectively to consumers. Mis-used, it can then become the catalyst for a system's hydraulic failure. The Government is recommending that IKK system design now be approached with a new flexibility amongst which the use of water meters would be appropriate. Their use would enhance efficient water system management.

29. Urban systems under the IUIDP approach will benefit from the preparation of individual local development plans. Many are presently under way. These plans, developed for each urban centre, incorporate the special features of each location and the requirements of the consumers. It is considered that for the rural areas, this planning approach should also be followed and that design service technologies should remain flexible and include as many of the consumers' requirements, as possible. For simple piped and non-piped systems, greater sustainability will be possible if initial facility development proposals come from the community.

30. Present service levels provide for domestic demands for house connections ranging from 210 litres per capita per day (lpcd) in the largest metropolitan city to 90 lpcd in small towns. Non-domestic demand allowance is 15 per cent while non-revenue water (NRW) ranges from 40 to 45 per cent. Public standpipes for urban communities of all sizes are served with 30 lpcd. The design ratio for house connections to public standpipes is assumed to be 50:50 where in practice, this ratio has been found to be 80:20. For rural areas, design demands allows 60 lpcd for house connections and 30 lpcd for public standpipes.

31. In support of the Government's stated desire for decentralization, planning of water supply and sanitation programs will incorporate broad provincial and kabupaten level resource allocation to be undertaken by central level agencies and actual location selection to be a function for kabupaten government. For this, guidelines stating planning priorities and selection methods can be provided by Central Government. Bappeda Tk. II is able to coordinate this selection process while Bappeda Tk. I would provide guidance and monitoring.

32. Human resources development is one of the major constraints within the Government's decentralization policy. Local Government requires considerable strengthening of their staff capabilities and skills for project planning, management and implementation. Since Repelita III, MPW has undertaken an extensive program of human resource development to improve the performance of its own staff. However, these programs also need to include public works staff employed at Tingkat I and II levels and water enterprise in local government. It is these staff who will have a major role in the future implementation of IUIDP and rural water supply and sanitation programs. Vocational training for

subprofessionals employed in BPAMs and PDAMs is urgently required. Where local government water and sanitation service enterprises experience difficulty in recruiting and retaining the appropriate technical and managerial staff necessary for effective operation of the enterprise, a strong case exists of the partial privatization of selected services. Functions which would suit this purpose include: (i) meter reading; (ii) bill preparation; and (iii) collection of payments.

33. Revenue collection in many urban water enterprises can be further improved. It is considered that with the Government's proposed change in management approach, many enterprises will be able to obtain significant improvements. These changes in approach may include:

- (i) penalty free grace period for consumers using illegal connections to apply for a registered connection, followed by
- (ii) selective situation enquiries and well publicized disconnections and penalties.

34. A National Standard Water Rate Structure (NSWRS) designed to recover operation and maintenance (O&M) costs and capital costs through a depreciation component has been operating since 1984. This structure used by the urban water supply enterprises (PDAMs/BPAMs) has found good general acceptance. However, regulations controlling the setting of tariffs make it extraordinarily difficult for PDAMs to effectively and quickly introduce revised tariffs which cover all operation, maintenance, administration debt servicing and depreciation costs. Different tariff structures exist for small and medium towns to those for large towns and metropolitan cities. Presently, tariffs vary from Rp 100 per cu.m for a monthly consumption up to 10 cu.m per month to Rp 10,000 per cu. m for commercial consumption greater than 50 cu. m per month.

35. Major levels of consumer dissatisfaction do not appear to arise from a concern for the cost of their water but more importantly the reliability of supply. Systems with higher levels of operational reliability are reported to achieve high levels of revenue collection indicating that a majority of consumers find tariffs affordable. For rural areas and the urban poor, further work is required to study the need for a rural water supply tariff structure. Additionally, guidelines for cross subsidization or cost sharing mechanisms within an enterprise that serves both urban and rural consumers need to be developed.

36. For rural water supply and sanitation development, past project performance has shown the strong correlation that exists, between the sustainability of the system and the consumer's perception of system "ownership". To assist the community in making their contribution to the planning and construction of facilities community credit schemes are required. A number of schemes presently being trialled on urban and rural projects appear to provide a suitable basis for development. Results of these projects which have been developed with strong community inputs indicate that consumers are experiencing little difficulty in meeting credit payment schedules and water tariff charges. It is apparent that some cost sharing and cross subsidization is occurring and the community is well able to develop its own methods as to how this may operate.

37. Perhaps the biggest single problem for water enterprise viability, level of service, consumer satisfaction and thus system sustainability is that of non-revenue water (NRW). In some major metropolitan cities NRW losses may be as high as 50 per cent of water produced. A staged NRW reduction program has been proposed for Jakarta. This proposal aims to reduce Jakarta NRW to 30 per cent by the year 2005. It is possible that more substantial gains can be made in the short term. Policy changes necessary to redress some noted administrative problems within most enterprises are under review. External funding agencies are looking to assist local enterprises in the development of more accountable management systems, in the improvement of operations and maintenance practices and in the reduction of NRW.

38. Management planning skills, particularly, at the lower levels of government continue to need strengthening and project management skills, particularly the supervision of community participation approaches suggests that the inclusion of this subject and its methodologies into present tertiary curricula would be appropriate. The further development of a National Water Resources Master Plan based on the present provincial data bases should be promoted as a component of all future projects.

39. Water quality and environmental surveillance and monitoring programs are assuming greater importance. The Government is continuing to emphasize the need for more effective monitoring and policing of policy based on the existing regulations. Sea water intrusion and pollution of groundwater is affecting considerable areas of Jakarta and some other major coastal cities yet consumers often have no reliable option other than to continue to use groundwater and increase contamination levels. Some studies with external assistance have been already completed for Jakarta and the implementation of proposals and recommendations is receiving urgent attention.

40. To support increased levels of community awareness of the benefits of improved water supply and sanitation facilities, the Government with the assistance of external agencies and some NGOs, is developing improved levels of information services. This is being achieved through the development of specific health education leaflets of school curriculum and radio programs directed to rural areas.

D. Sector Action Plan

41. In order to achieve the ambitious targets proposed for Repelita V, the Government has identified that some aspects of present planning policy, project implementation and management need to be strengthened and reviewed. This is particularly the case for the development of planning guidelines for rural water supply and sanitation programs based on the strategy developed within this study. The following recommendations are based upon this study's analysis and review of the water supply and sanitation subsectors with particular emphasis on the rural programs and the achievement of long term sustainability. Recommendations can be categorized as follows:

(a) General

Continued strengthening of management systems and the development of a greater awareness of community based development principles. Further development of water resources data bases to assist planning.

(b) Urban

Continued support for the IUIDP approach but with emphasis on speeding up the transfer of institutional management and implementation skills to the lower tiers of government. The career paths and structures available to officers at these levels require substantial enhancement. Environmental aspects of all programs, including damage control and rehabilitation should receive very high priority.

(c) Rural

Enhance true community participation in the development process by involving the community in the collection of basic data, planning, selection of technologies, funding, construction, and operation and maintenance of community systems. Develop independent community credit systems and government technical agency support to assist the community plan and provide their inputs. Engage community development training specialists to facilitate community participation in projects and to train existing Government agencies and NGO movements in the methodologies of sustainable community involvement.

42. To illustrate these recommendations, a proposed strategy for the implementation of rural water supply and sanitation programs in Indonesia has been prepared. This strategy has been costed and presented with a proposed institutional structure. Total required investment for rural water supply and sanitation is estimated to be \$550 million. Limited central and local government funds can be mobilized to fund programs but addition of external financial resources are required. Best estimates indicate that external assistance in excess of \$200 million is required to implement the proposed program.

43. Local counterpart fund constraints remain a key issue. Further constraints likely to have significant impact on the implementation of proposed programs include: (i) local/provincial government planning and management skills; (ii) quality of locally procured goods and services; (iii) technical skills and financial substance of Kabupaten/Kecamatan contractors; and (iv) efficiency of Government agencies in contacting goods and services. Solutions are often complex, however, if the Government actively follows up the recently introduced decentralization and financial regulations, program effectiveness will be steadily enhanced. External assistance agencies and the Government agree that emphasis must be placed on revenue yield improvement by maximizing user charges collection, reducing expenditure on large administrative overheads and reducing losses.

44. Identified major investment needs are as follows:

- urban water supply and sanitation development under IUIDP;
- water loss reduction in major cities;
- national rural water supply and sanitation program;
- national rehabilitation of urban subsector facilities; and
- national rehabilitation of rural subsector facilities.

45. Todate, Bank assistance has been primarily directed towards urban programs, although some IKK project activities would now be considered rural. There are many potential projects which have already been identified by the Government as well as further possibilities identified by this study. It would seem appropriate for the Bank to pursue further development of its interest in the following projects:

Investment Projects

- (i) Bandar Lampung Urban Development (\$52.5 million loan in 1990)
- (ii) Botabek Urban Development (\$60 million loan in 1990/1991)
- (iii) Water Loss Reduction Sector (\$50 million loan in 1990/1991)
- (iv) Bogor and Palembang Urban Development (\$50 million loan in 1991)
- (v) Water Quality Management (\$40 million loan in 1991)
- (vi) Second IKK Water Supply Sector (\$56 million loan in 1991/1992)
- (vii) Central Java and Yogyakarta Secondary Cities Urban Development (\$140 million loan in 1992, Project Preparation Technical Assistance (PPTA) for \$600,000 in 1990)
- (viii) Rural Water Supply and Sanitation Sector (\$100 million loan in 1993, PPTA for \$400,000 in 1991/1992 to be piggy-backed to Second IKK Water Supply Sector Project)
- (ix) Second West Java/Sumatra Secondary Cities Urban Development (\$150 million loan in 1993, project to be prepared under Loan No. 983: Secondary Cities Urban Development (Sector) for \$70 million approved in November 1989)

Technical Assistance

- (i) Central Java and Yogyakarta Secondary Cities Urban Development (PPTA for \$600,000 in 1990, Loan for \$140,000 in 1992)
- (ii) Institutional Support of Water Supply Enterprises (Advisory Technical Assistance (ADTA) for \$600,000 in 1990/1991, ADTA piggy-backed to Water Loss Reduction Project, Loan for for \$50 million in 1990/1991)
- (iii) Urban Poverty Alleviation (ADTA) for \$300,000 in 1991
- (iv) Rural Water Supply and Sanitation Sector (PPTA for \$400,000 in 1991/1992, to be piggy-backed to Second IKK Water Supply Sector Project) 1/
- (v) Strengthening Community Planning and Inputs (ADTA for \$350,000 in 1993 to be piggy-backed to Rural Water Supply and Sanitation Sector Project) 1/

1/ Not included in the Bank's Country Operational Program Paper, 1990-1993 of March 1990.

I. INTRODUCTION

A. Purpose of the Study

1. The Water Supply and Sanitation Sector ^{1/} Study is being undertaken to review, examine, and assess the development of policy, institutional and operational frameworks, institutional capabilities of involved agencies and support essential for effective development of Indonesia's water supply and sanitation delivery services. As significant studies covering the urban aspects of these services have been completed, the Bank and the Government agreed that this study should primarily focus on rural programs. The study reviews past medium term plan (Repelita) performances as well as present planning in order to develop recommendations for ensuring the effectiveness of subsector investment including further development of institutional and financial management capabilities. Additionally, the study focusses on development requirements within the subsector as an initial step towards the identification of specific projects and studies required for the present medium term plan (Repelita V).

B. Outline of the Study

2. This study report comprises four main chapters, as follows:

I Introduction

II Country and Sector Context

III Development Strategy and Sector Issues

IV Sector Action Plan

3. Chapter II covers the general background of the country's geography, population and economy, an overall review of the past sectoral performance and a detailed review of each of the water supply and sanitation subsectors for both urban and rural programs. Chapter III presents the plan proposed for the Repelita V period and develops the major policy issues identified in the previous subsectoral analyses. Chapter IV provides subsector action plan recommendations which aim to improve the effectiveness of investment while meeting the objectives of the Government's medium term plan, Repelita V. Chapter IV also includes an identification of priority projects and studies which are suitable for phased implementation over the medium term plan period and are potentially suitable for external funding assistance as investment projects and/or advisory technical assistance.

^{1/} Within GOI context, Water Supply and Sanitation are subsector components of the Housing and Human Settlements Sector. Within this report the concept of Water Supply and Sanitation as subsectors is maintained.

4. A study activities have included desk studies, literature surveys, case study field visits, discussions with officials of external funding agencies in Indonesia, GOI sectoral agencies and exchanges of information and data with consultants (foreign and local) implementing both urban and rural water supply and sanitation projects. This report incorporates the comments and advice of the Government and the Bank provided at the Study Workshop held on 17 January 1990.

C. Acknowledgements

5. The study has received valuable assistance and cooperation from numerous government officials within the Ministry of Public Works, Cipta Karya; Ministry of Health, Communicable Diseases Control and Environmental Health and Ministry of Home Affairs, Regional Development. The support provided by Ir. P. Sidabutar, Director of Bina Program and his staff has been particularly useful for the study. Regional and local government officials together with assisted the field studies and provided valuable comment and discussion. Bank staff member (Peter Wallum, Project Economist, IFWS) prepared the outline study format and has coordinated the study. The view comments provided by a number of Government, Bank and consultant officials are much appreciated.

II. COUNTRY AND SECTOR CONTEXT

A. Background

1. General

6. Indonesia, an archipelago nation of 13,667 islands, is located between the Pacific and Indian Oceans. The country stretches approximately 5,000 kilometers from west to east, ($94^{\circ} 45' E$ to $141^{\circ} 05' E$) and approximately 2,000 kilometers from north to south ($6^{\circ} 08' N$ to $11^{\circ} 15' S$). The numerous small islands, many uninhabited, and the larger islands all feature rugged mountains some of which remain volcanically active. In an equatorial tropical location, the country remains hot throughout the year, with daytime maximum temperatures in the range 26° to $33^{\circ} C$. Temperature is rarely extreme and humidity is usually high. Night time temperatures remain warm except where they are influenced by sea breezes or mountain elevation. The climate is monsoonal. In the western part of Java and in Sumatra the dry season lasts from June to September while further east it lasts a little longer, usually May to October. Average rainfall is high (approximately 2,000 mm per annum) throughout the western part of the country and in general declines towards the south and east (Kupang, Timor 1,010 mm per annum) before increasing again in the mountainous regions of Irian Jaya (Jayapura, 1,894 mm per annum).

7. For administrative purposes, the country is divided into 27 provinces (including the special territories of Jakarta, Yogyakarta and Aceh). The regional governments operate at four levels, viz. provincial (propinsi), regency/municipality (kabupaten/kotamadya), district (kecamatan) and subdistrict village (desa/kelurahan) levels. The 241 regencies and 55 municipalities in 1988 are divided into 3,601 districts which are further subdivided into approximately 67,000 subdistricts. 61,924 of these are gazetted as rural villages. Each of the regency/municipality and district units has an administrative centre located in one of its cities or towns often bearing the same name. The administrative capital of a district is called Ibu Kota Kecamatan (IKK).

8. The political system is based on the 1945 Constitution, reinstated in 1959, under which the state is structured as a unitary republic with strong executive power. The people's Consultative Assembly (MPR) is the highest authority in the state and the House of the People's Representatives (DPR), elected by general elections for five-year terms, is the principal legislative organ. The Government authority is centralized, with major control vested with the President, the Vice President and the Cabinet.

9. The fifth most populous nation in the world (after China, India, the Soviet Union and the United States of America), Indonesia has an estimated 1989 population of approximately 179 million. About 60 per cent of the country's population lives on the densely populated island of Java where population density exceeds 750 persons per sq. km. This is high compared with the country average density of 93 persons per sq. km. Table 1 summarizes the recent growth rate, total population and population density for each island group.

Table 1. Percentage of Total Population and Population Density
(persons per sq. km)

Island Group		1961	1971	1980	1985
Sumatera	% total	16.21	17.45	9.00	19.87
	density	33	44	59	69
Java	% total	64.95	63.83	61.88	60.87
	density	476	576	690	755
Nusa Tenggara	% total	5.73	5.55	0.76	0.69
	density	63	75	96	106
Kalimantan	% total	4.23	4.32	4.56	4.71
	density	8	10	12	14
Sulawesi	% total	7.29	0.15	0.05	7.04
	density	38	45	55	61
Maluku/Irian Jaya	% total	1.59	1.70	1.75	1.82
	density	3	4	5	6
Indonesia	pop density	100.00	100.00	100.00	100.00
			62	77	85

Source: Biro Pusat Statistik, Statistik Indonesia, 1988

10. Since 1950, extensive transmigration programs have caused a small redistribution of the population within island groups. As shown in Table 1, population growth has been most marked in Sumatera, Kalimantan and Maluku/Irian Jaya while decreases have occurred in the densely populated islands, particularly Java.

11. Urbanization has accelerated in recent decades as a consequence of three demographic factors:

- (i) migration from rural areas;
- (ii) natural increase (the excess of births over deaths); and
- (iii) reclassification of rapidly developing rural areas to cities.

The country's urban population ^{1/} in 1988, was about 50 million people and represented some 29 per cent of the total population. This sector continues to exhibit a slowly accelerating growth rate (presently around 4.5 per cent) which as shown in Table 2 forecasts a total urban population in excess of 60 million by 1993.

^{1/} As applied by MPW, urban population includes people living in communities with populations over 10,000; IKKs with population between 3,000 to 10,000 and the remaining population are considered to be rural.

Table 2. Total Population, Urban and Rural
(in million)

	Census 1971	Census 1980	SUPAS a/ 1985	Est. 1988	Forecast 1993
Urban	20.7	32.8	43.2	50.2	61.1
(% Total)	17.0	22.0	26.0	29.0	32.0
Rural	98.5	113.9	121.4	125.4	131.8
(% Total)	83.0	78.0	74.0	71.0	68.0
TOTAL	119.2	146.7	164.6	175.6	192.9

a/ SUPAS 1985: Intercensal Survey

Source: MPW Cipta Karya, Planning Document, 1989

12. Overall, Indonesia has a wide "spread" of urban settlements in terms of both size and geographical distribution. The strong growth exhibited by the large urban centers has important implications for urban development policies.

13. Indonesia is composed of over 300 ethnic groups, each with its own cultural identity and language. They speak between 250 and 400 languages or regional dialects but are held together in one unitary state based on the principle of "unity in diversity". Most people speak the national language, Bahasa Indonesia. Approximately, 89 per cent of the population are Muslim, 7 per cent Christians, 3 per cent Hindu and 1 per cent others. Religious freedom is guaranteed by the Constitution.

14. The overall GDP annual growth rate which had accelerated from six per cent in the late 1960's to eight per cent over the decade of the 1970's plunged appreciably in the early 1980's with falling world commodity prices. Since that time, the government has sought to restructure the economy, particularly the development of non-oil/gas export revenues. Statistics indicate GDP growth of 3.8 per cent in 1988 compared with 3.6 per cent in 1987. This figure is predicted to rise to almost 5.0 per cent in FY 1989/90, a budget which is characterized as continuing to support adjustment and economic recovery. However, it is not considered to be particularly expansionary in terms of real net domestic expenditure relative to GDP, given the non-oil tax effort represented in the budget.

15. Since October 1988, a financial deregulation package announced by the Government has promoted rapid growth in the financial sector. This competition has introduced a new flexibility for savings plans which is attracting small depositors using banks for the first time and the flow of offshore money back into the local market. Further deregulation is anticipated.

16. Greater opportunities are also now being provided to the private sector for investment, production and the implementation of economic activities. The public sector is focussing more on the provision of social and physical infrastructure and moving away from the large industrial ventures. Water supply and sanitation activities form major components of the social and physical infrastructure sector. Greater emphasis is being placed upon the mobilization of regional government resources and community self help and participation.

17. Waterborne and other communicable diseases are prevalent in Indonesia. Diarrhea is endemic and accounts for 18.8 per cent of the total deaths. ^{1/} One out of every three children and one out of every ten adults are reported to be suffering diarrhea or related conditions. The health statistics indicate that consumption of polluted water and contact with a polluted environment contribute to the heavy incidence of waterborne, water-related and parasitic diseases.

2. Development Planning and Regional Distribution of Development

18. Since 1969, economic development in Indonesia has been pursued in the context of successive Five-Year Development Plans. Repelita I (1969/70-1973/74) emphasized rehabilitation rather than new investment. Repelita II (1974/75-1978/79) advocated implementation of new programs and projects along with expansion and rehabilitation of existing facilities and considered socioeconomic problems as a central theme of development. Repelita III (1979/80-1983/84) placed greater emphasis than in the past on a more equitable distribution of the benefits of growth. Repelita IV (1984/85-1988/89), complete as of 31 March 1989, continued to stress growth and stability but placed greater emphasis than previously on the equity objective.

19. The present development policy of the Government in the Medium term, described in Repelita V (1989/90-1993/94) has been formulated on the basis of the Basic Guidelines of National Policy (GBHN) of 1988. The major development objectives are: (i) the promotion of non-oil exports; (ii) employment generation and human resource development; (iii) poverty alleviation; (iv) greater participation of the private sector in the development process; and (v) increasing the productivity and efficiency of existing investment through emphasis on operation and maintenance. Table 3 summarizes the sectoral composition of planned development expenditure under Repelita V, as compared to the planned and realized expenditure distribution under Repelita IV.

^{1/} Ministry of Health, 1988, Health Indicators and Data.

Table 3. Sectoral Composition of Development Expenditure
(in per cent)

	Repelita IV Planned	Repelita IV Actuals a/	Repelita V Planned	Per cent Change
Agriculture/Irrigation	12.7	14.7	16.0	+ 9
Industry/Mining	8.6	7.3	3.3	- 55
Energy	12.3	11.6	9.2	- 21
Transport/Communication and Tourism	12.6	15.4	19.1	+ 24
Manpower and Transmigration Regional, Rural and Urban Development	5.8	3.7	2.8	- 24
Education/Culture	6.8	9.6	10.0	+ 4
Health/Family Planning and Other Social	14.6	12.8	15.8	+ 23
Housing and Human Settlement b/	4.5	3.4	3.9	+ 15
Government Capital Participation	3.8	3.4	6.1	+ 79
General Public Services c/	2.2	2.4	1.6	- 33
Environment/Science/ Technology and Research	8.8	8.4	6.2	- 26
Others d/	4.8	7.3	4.4	
	-	2.5	1.8	- 28
Total	100.0	100.0	100.0	-

- a/ FY 1984/85-FY 1987/88 budget actuals and FY 1988/89 budget estimates.
b/ Water supply and sanitation included in this sector.
c/ Law and order, defense and security, Government apparatus.
d/ Trade and cooperatives, information and religion.

20. Noteworthy changes to the relative sectoral emphasis of development expenditure proposed during Repelita V are:

- (a) Increased emphasis to:
- (i) Housing and human settlement including water supply and sanitation;
 - (ii) Transportation, particularly road infrastructure;
 - (iii) Education; and
 - (iv) Agriculture including irrigation.

(b) Decreased emphasis on:

- (i) Industry and mining for which private sector funded development is being favored;
- (ii) Science, technology and research including natural resources and environment;
- (iii) General public services, manpower and transmigration; and
- (iv) the energy sector.

21. With an island nation as geographically and culturally diverse as Indonesia, it is often difficult for the Government to maintain a total balance on the equitable distribution of regional development resources. The Government acknowledges 1/ that the eastern provinces 2/ have been receiving the nation's smallest development budgets ever since the first Five-Year Development Plan, Repelita I. The central provinces 3/ have received the most. A review of selected indicators given in Table 4 highlight the development pattern. In a move to redress some of this imbalance, the INPRES 1989/90 funds released in December 1989 have given significantly increased allocations to the eastern provinces.

Table 4. Selected Development Indicators for Indonesia
(expressed as a per cent of totals)

	<u>Regional/Island Groups</u>					Maluku Irian Jaya
	Java & Madura	Sumatera	Kalimantan	Sulawesi	Nusa Tenggara	
Area	6.9	24.7	28.1	9.8	4.6	25.9
Population (1985)	60.9	19.9	4.7	7.0	5.7	1.8
Asphalted Roads (1986)	42.3	29.8	5.2	11.4	8.6	2.7
Electricity Generating Cap. (1987)	67.4	18.5	5.0	5.3	1.9	1.9
Telephone License (1986)	69.9	17.5	3.0	4.6	3.3	1.7
Cargo Loading (1987)	34.6	43.1	14.4	3.7	1.7	2.5

Source: Biro Pusat Statistik, Statistik Indonesia, 1988.

- 1/ Jakarta Post Report, 27 September 1988 on statement by Minister of Public Works.
- 2/ The eastern provinces are Bali, East and West Nusa Tenggara, Maluku, Irian Jaya, East Timor, South, Central, Southeast and North Sulawesi.
- 3/ The central provinces are DKI Jakarta, DI Yogyakarta, West, Central and East Java, West, South, Central and East Kalimantan.

22. The limited infrastructural development in the outer provinces, which are often the most resource rich (timber, minerals, oil, plantations), is restraining the rate and effectiveness of further resource development. It also impacts on the delivery of further Government housing and social services which are lacking in these provinces. The distribution of development projects among the three groups of provinces (western, central and eastern) is based on, among other things: (i) the provinces ability to support the national economic growth; and (ii) population.

B. Overall Review of the Water Supply and Sanitation Sector

1. Past Sectoral Resource Allocations and Subsectoral Distribution

23. The Third, Fourth and Five Five-Year Plan subsectoral distributions of actual and planned expenditures for National Development Budget (DIP) and Foreign Aid funds within the Housing and Human Settlements sector are shown in Table 5. The sector is also supported through the mobilization of local funds (including domestic loans, local government revenues and INPRES funds). Based on Repelita IV expenditure, these local funds are expected to add a further 30 to 35 per cent to the expenditure figures shown.

Table 5. Subsector and Program Expenditure a/
(\$ million - current prices)

Programs/Housing and Settlements Sector	Repelita III		Repelita IV			Repelita V		
	Amount	% Total	Amount	% Total	% Change	Amount	% Total	% Change
Water Supply								
- Urban	198	56	450	62	+ 127	1,686	45.4	+ 275
- Rural	63	18	90 c/	12	+ 43	506	13.6	+ 462
Sanitation b/								
- Urban	24	7	89	12	+ 271	338	9.1	+ 280
- Rural	5	1	3 c/	1	- 40	38	1.0	+1167
Totals	290		263		+ 218	2,568		+ 406

a/ Figures are for National Development Expenditure (DIP) and anticipated Foreign Aid funds only. They do not include INPRES provincial and local government budget estimates.

b/ Includes sewerage, solid waste management and drainage.

c/ Estimate only.

Source: MPW, MOH; Annual Reports, Repelitas III and IV.

24. Expenditures within the subsectors increased rapidly from Repelita III to Repelita IV (water +127 per cent, sanitation +271 per cent) and are planned to increase equally rapidly in Repelita V (water +280 per cent, sanitation +275 per cent) compared with Repelita IV.

25. The data shown in Table 5 also indicates that for both water supply and sanitation, Repelita V, has an emphasis on rural areas but in expenditure terms, the majority investment is still in urban areas. The reasons for this are relatively straight forward. Rural communities continue to have access to traditional forms of water supply and human waste disposal, while solid waste problems do not exist to the same extent as in urban areas. However, the rapidly growing urban areas, resulting from successful economic growth policies (self-sufficiency, industrial development, service sector growth) do not have access to traditional water resources, human waste disposal or solid waste disposal. Therefore, there has been a greater need for expenditure in urban areas. Additional, the per capita cost of supplying water services and sanitation in urban areas is often quite a number of times the costs which apply in rural areas. When all of these factors are taken into account, the relative expenditures on urban and rural water supply and sanitation infrastructure is more balanced than might first appear.

2. Past Sectoral Policies and Strategies

(a) Introduction

26. Water supply and sanitation facilities in Indonesia have been important components of the previous four Repelita programs, however, past emphasis has been given to urban areas. Across the sector, water supply has been given priority over sanitation in provision of resources, particularly in the rural areas.

27. Reported water supply and sanitation coverage at the end of Repelita IV are shown in Table 6.

Table 6: Sector Coverage, Repelitas III and IV

Subsector	Per Cent of Population Served			
	Repelita III		Repelita IV	
	Target	Achieved	Target	Achieved
Water Supply				
- Urban	60		75	65
- Rural <u>a/</u>	50	22	55	30.5
Sanitation <u>b/</u>				
- Urban				31 <u>c/</u>
- Rural utilizing latrines	37.5			
Rural with household facilities				n/a <u>d/</u>

a/ Figures include piped and point source supplies.

b/ These figures refer to achievements and targets for human waste disposal technologies. All sanitation programs will also incorporate attention to solid waste and drainage subsectors in accordance with Repelita V policies.

c/ Percentage of population with access to private latrines with septic tanks.

d/ While this figure is not available, it is likely to be of the order of 32 per cent. This figure is derived from 37.5 per cent using the same ratio as the target percentage.

Source: MPW, 1989

28. There is a considerable variation among agencies associated with the subsector as to the appropriate figures for rural water supply service coverage. MOH reports indicate a Repelita III target of 25 per cent with 32 per cent realization and a service coverage realization of 42 per cent at the end of Repelita IV. These statistics do not take into account that a number of water supply schemes, particularly IKK schemes, and to a lesser extent sanitation facilities are not operating at their design capacity. This is due to a variety of reasons relating to inadequate quality operation and maintenance practices, lack of community acceptance and poor or contaminated water.

29. Repelita IV targets, which sought to raise the clean water supply coverage to 75 per cent of the urban population and 55 per cent of the rural population were not fully achieved. Factors which limited achievement of Repelita IV targets have been identified as:

- (i) more attention was given to development of urban areas rather than rural;
- (ii) local government has not yet been sufficiently involved;

- (iii) community participation in the development, use and maintenance has been insufficient; and
- (iv) community awareness of the need for clean water and methods of delivery are not yet sufficiently coordinated.

(b) Subsector Policies Urban Water Supply

30. At the beginning of Repelita I the existing urban water supply systems were with few exceptions in a deteriorated condition. The total installed production capacity was less than 9,000 liters per second (lps), while many small cities lacked water supply systems altogether. The objectives set for the Repelita I planning period were geared towards improving and rehabilitating the existing systems, as well as setting targets for capacity extension in metropolitan areas, such as Jakarta, Bandung, Surabaya, Medan and Semarang. Altogether, 54 towns and cities were included in the Repelita I program which focussed on production increase rather than increase of distribution. This emphasis on production was occasioned by the fact that local authorities were responsible for distribution systems. During the plan period, a capacity increase of about 6,000 lps was realized requiring capital investments of approximately Rp17 billion.

31. The emphasis of Repelita II water supply program was again on production increases rather than rehabilitation, while assistance was also given by the Central Government in the establishment of distribution networks. The target of the plan was an increase of capacity from 15,000 to 29,000 lps, requiring a capital of RP166 billion. The targets of the program were again mainly directed towards the urban population in the metropolitan areas and the cities of Jakarta and Surabaya with an increase of 4,000 lps, while Bandung, Semarang, Medan and Palembang were to receive extra capacity of 2,000 lps. However, an additional 100 medium cities (population 100,000 to 500,000) and small towns (20,000 to 100,000 population) were also to receive an additional 6,000 lps capacity. Furthermore, a new development was started with the establishment of Semi-autonomous Regional Water Enterprises (PDAMs) in an attempt to separate the waterworks from other local government agencies. During Repelita II, the establishment of these enterprises was, however, limited to some major towns and cities, while the water supply systems in other towns and cities remained under the direct responsibility of the existing local government authorities.

32. Even though considerable progress was made during Repelita I and II, the low levels of urban and semi-urban population served by piped water systems in 1978 at the end of the first two Five-Year Development Plans, necessitated a fundamental reformulation of the policy direction for water supply. Therefore, the Government embarked during Repelita III on a strategy that focussed on a "basic needs approach" (BNA) for water supply. Although not developed upon a scientifically based assessment of needs the policy indicated specific target groups at which government investment should be aimed. It also recognized that because of the limited Central Government funds, the service level of water supply systems had to be relatively low in order to attain the maximum possible coverage of the urban and semi-urban population. Moreover, it was equally clear that the total urban and semi-urban population could not be served within the five-year period. Therefore, the two main objectives for Repelita III were to meet a target of an average residential consumption of 60 litres per capita per day (lpcd), covering 60 per cent of the total urban and semi-urban population in 1985.

33. Apart from the implementation of ongoing projects started under the first two Five-Year Development Plans, and the upgrading of water supply systems in 105 communities, the Government also started with the implementation of standardized packages, which included standard water treatment plants and stockpiling of various water supply components (pipes, accessories and pump) for about 50 small towns (20,000 to 100,000 population) and about 150 Ibu Kota Kecamatan (IKKs, 3,000 to 20,000 population).

34. From a mid-term review of Repelita III, the Government decided to incorporate a further program to speed up the provision of water supply by piped systems to 3,350 subdistrict capitals or Ibu Kota Kecamatan (IKKs). This program was designed to meet an average service level of 45 lpcd, which is lower than the 60 lpcd level for BNA system. However, the target was still to extend water supplies to 60 per cent of the 1985 urban and semi-urban population. Due to a severe shortage of qualified manpower, the IKK program was to rely mainly on technicians rather than engineers for preparation, implementation and later operation and maintenance of facilities. The program was further characterized by a distribution network comprising restrictors and standardization wherever possible, i.e., with respect to survey, design, procurement, implementation, operation and maintenance, in order to reduce workload, simplify technical and administrative tasks, and reduce costs.

35. The original IKK program for Repelita III was aimed at providing piped water supplies to about 1,700 IKKs with populations between 3,000 and 20,000 by 1985. In practice, however, the target was too ambitious because severe constraints, not envisaged earlier were encountered. The need for fragmentation into project packages suitable for foreign funding and each requiring their own procedures and approach, the time required for project preparation, the formulation of the standardized designs, the combination of tenders, financial and technical capabilities of local contractors, all contributed to a severe slippage in the original program. At the close of Repelita III, 53 schemes had been constructed and 346 were in the planning or implementation phase. 1/ Total allocations for the urban supply subsector in Repelita III amounted to Rp385 billion.

36. The policy of Repelita IV for water supply did not change basically from the previous Five-Year Development Plans. However, the Government as a matter of policy started to tackle urban and semi-urban water supply in the context of Integrated Urban Infrastructure Development Program (IUIDP). Targets providing 75 per cent of the urban population with Basic Needs 2/ by 1989 were set. Additionally, the IKK program was extended to cover 2,000 IKKs. In terms of production capacity, the Repelita III program had achieved a 60 per cent coverage of the urban population with average of 60 lpcd. However, this installed capacity had not been fully utilized, since the construction of distribution networks lagged behind. Government estimates indicate that only 40 per cent of the urban population was served through either house connections or public taps. Repelita IV plan emphasized the expansion of distribution networks in order to reach the 75 per cent target. It was further realized that

1/ AIDAB, DHV, IWACO, 1984; Cipta Karya, Report of IKK Review Mission.

2/ Basic Needs Approach (BNA) includes reliable drinking water.

water losses due to leakages and other unaccounted-for water were becoming points of major concern. The program for manpower development and training of the local PDAMs, which started under the previous Repelitas, was intensified and improved.

37. The Repelita IV targets were not fully realized due to the slow down in project implementation while IUIDP planning guidelines and project preparation studies were underway. As for Repelita III, similar difficulties were again experienced in implementing the program for IKK communities and there was substantial under achievement of targets. At the end of Repelita IV, 429 schemes had been constructed and a further 431 were in the planning or implementation phase. Total expenditure for the urban water supply subsector during Repelita IV amounted to Rp795 billion. 1/

(c) Subsector Policies Urban Sanitation

38. Until Repelita III (1979/80-1983/84), the urban sanitation subsector received only limited attention, the scope of work was mostly limited to the execution of studies which emphasized the need for the formulation of a national sanitation policy and the interdependence of the three components of drainage, solid waste disposal and sewerage. The attention of the Central Government was directed more at the urban water supply subsector as the means to improve health conditions. Historically, urban sanitation had been the responsibility of the Local Government and this policy was reinforced with the inauguration in 1974 of special INPRES funds for the financial assistance of urban and semi-urban drainage programs.

39. In Repelita III, it was recognized that the Central Government had to play a role in the first phases of development of urban sanitation. The urban poor development program or Kampung Improvement (KIP) 2/ of this Five-Year Development Plan represented an increased national effort to include drainage, solid waste and human waste disposal into one program. In line with a policy of environmental protection of towns, cities and metropolitan areas and improvement of physical conditions of low-income groups, the program included micro-drainage in the housing areas, garbage disposal boxes and collection carts, construction of units for communal bathing, washing and toilet facilities (MCKs).

40. Experience with KIP has shown that only towns, cities and metropolitan areas with full coverage of solid waste disposal and drainage show satisfactory results. Therefore, a number of projects with such components were executed in conjunction with KIP. At the same time, a separate Environmental Sanitation Program was established within Cipta Karya through which targets were set for the three sanitation components in five metropolitan areas, four large cities (500,000 to 1,000,000 population) and medium cities (100,000 to 500,000 population) in addition to KIP in some 150 small towns (20,000 to 100,000 population). In these metropolitan areas, cities and towns priority was given to low-income residential areas.

1/ This figure has been revised in October 1989 to Rp.1.4 billion.

2/ KIP was started in Jakarta in 1969 and the program was extended during Repelita II.

41. A typical feature of the targets was that they were generally not very specific but allowed for a certain flexibility in programming and implementation. For metropolitan areas, big and medium cities, the program included studies for preliminary sewerage master plans, promotion of municipal solid waste organization and provision of equipment, and rehabilitation of existing drainage systems. In addition, the program included pilot sewerage projects in Bandung, Tangerang and Medan, and drainage system extensions in four big cities.

42. During Repelita III, a total of about Rp20 billion through the annual National Development Budget Funds (DIP) was planned for sanitation programs to which was added foreign aid of about Rp22 billion. Especially for the medium cities, the general tendency of the implementation of the Repelita III program was a shortfall on the originally conceived program. Nine (out of original 30) medium cities only were covered, because of a concentration of investment into fewer areas. This was in contradiction to the planned geographical spreading.

43. In the context of the International Water Supply and Sanitation Decade (IDWSSD) and based on the outcome of a Yogyakarta workshop on sanitation in December 1982, important policy directives were formulated for the Repelita IV (1984/85)-1988/89). Objectives were set that incorporated: (i) decentralization of responsibility; (ii) development of cost recovery and self financing concepts; (iii) integration of sanitation components; and (iv) retention of technical development and guidance at Central Government levels. Repelita IV targets were not fully realized partly due to a slow down in implementation while IUIDP development studies were finalized and partly due to unforeseen implementation difficulties in the major urban projects. Problems were faced on most projects with community acceptance of facilities.

(d) Subsector Policies Rural Water Supply and Sanitation

44. Until Repelita II little provision was made by the Government in its regular development budget for rural water supply. In 1974 a major breakthrough was made with the inauguration of the INPRES funding system, through which funds were made directly available to local government for high priority needs, such as water supply. Funds made available were used for a variety of programs, such as dugwells, shallow and deep wells with handpumps, rainwater collection tanks, spring water intakes, simple piped systems and artesian wells. At the conclusion of Repelita II in 1978, these programs had resulted in an estimated population coverage of about 18 per cent for safe rural water supply which increased during Repelita III to 22 per cent. Expenditure during Repelita III for rural water supply projects had been Rp77 billion.

45. Towards the end of Repelita III in 1984 and as a result of the Bali workshops on the International Drinking Water and Sanitation Decade (IDWSSD) in 1981 and 1982, major policy decisions were formulated with respect to targets for water supply coverage. These formed the basis for Repelita IV, which targetted a 55 per cent coverage of rural population for water supply. The rural water supply program placed a heavy burden on both manpower and funds. In 1984, the Government decided to transfer the responsibility for rural piped and pumped water supply systems to MPW, Cipta Karya. Within the water supply subsector, this left MOH/DEPKES with a responsibility only for handpump/well programs, gravity piped water systems and rainwater collection tanks. Due to

reductions in the DIP and INPRES program funds, the Repelita IV rural water supply program failed to realize its targets with coverage being lifted to around 31 per cent. From 1987 onwards, INPRES funds would only be provided to development projects utilizing foreign funding assistance. Expenditure is estimated to have been Rp.159 billion.

(e) Integrated Urban Infrastructure Development Program (UIDP)
Approach

46. This approach, initiated between 1983 and 1985 by MPW, Cipta Karya (DGCK), dictated that water supply and sanitation development in urban areas be a component of UIDP programs. Other infrastructure elements to be included through this integrated program approach are drainage, housing (small urban centers only), roads, solid waste, kampung improvement and market improvement. There is strong opinion that it may be appropriate for other sectoral components to be added.

47. The main characteristics of the UIDP process are:

- (i) provision of urban infrastructure in an integrated and coordinated manner;
- (ii) spatial aspects to assess demand for urban services; and
- (iii) financial considerations which determine which demands can be satisfied and to what extent.

48. Under UIDP, it is expected that Central Government funds will be used as matching funds for approved local programs rather than as grants (as was the case previously). Through this incentive, local governments are encouraged to plan and program more systematically and to pay attention to local revenue raising. Implicit in the financial considerations are forecasting of revenues available to local government to serve the total investment package including the previously neglected area of operation and maintenance.

49. Possible exceptions to the above are the water supply and sanitation programs in the five metropolitan ^{1/} cities. In these centers, development is possible under subsector specific programs (such as the Jakarta Sewerage and Sanitation Program (JSSP)) although it can also occur as a component of a single city urban development program (such as the Bandung Urban Development Program (BUDP)).

50. While projects using the UIDP approach to urban development commenced in 1986, none have yet advanced to the implementation stage. The practical effectiveness of the approach has therefore, not yet been fully tested. Concern has been expressed by funding agencies, implementing agencies, consultants and recipient communities that the project preparation time is excessive. This was largely the result of attempting to apply "standardized" and "complete" UIDP

^{1/} Metropolitan areas are defined as those with urbanized populations greater than one million persons.

packages across all projects with a uniformly rigorous requirement for project preparation and appraisal, with insufficient flexibility to respond to the priorities and capacities of individual provinces and local governments. An important element in the IUIDP process is that programs can be developed to meet the identified, specific urban infrastructure needs of the local community rather than only complying with national standards and norms. Because of this increased flexibility urban water supply and sanitation, investment will continue to be channeled through the IUIDP program.

(f) P2LDT Approach

51. P2LDT (Pembangunan Perumahan dan Lingkungan Desa Secara Terpadu) is a program for integrated desa environmental improvement, originating in Repelita II as a pilot scheme for desa housing rehabilitation (P3D). It has been further developed by the Ministry of Public Works to include sanitation, water supply and other infrastructure (spatial planning and building improvement). This centrally planned program as proposed presents a concept for integrating rural sanitation and water supply subsector programs with the community housing program.

3. Institutional Background of the Sector

(a) Introduction

52. The institutional arrangements for water supply and sanitation have undergone several structural changes during the periods of Repelita III and IV, and a number of future changes are under consideration, particularly with respect to functioning and responsibilities under IUIDP. The major changes which have taken place are: (i) the establishment in 1984 of the Environmental Sanitation Division (PLP) separate from water supply within MPW, Cipta Karya; (ii) the change in 1987 of the responsibility for rural piped water supply from MOH, CDC-EH to MPW, Cipta Karya; and (iii) at the beginning of Repelita V 1989, the inclusion of all rural water supply and sanitation as part of MPW responsibility through the Directorate General, Cipta Karya.

(b) Central Government Agencies and Sectoral Responsibilities

53. Four ministries of the Central Government are principally responsible for the water supply and sanitation sector.

(i) Ministry of Public Works

54. The Ministry of Public Works through the Directorate General of Human Settlements (Cipta Karya), one of the three Directorates General of MPW, ^{1/} is the executing agency for the development of urban and rural subsectors for water supply, sanitation and drainage. Cipta Karya is responsible for project planning and selection, fund allocations, preliminary and detailed engineering, construction supervision, technical and management assistance to regional water enterprises, and in some cases, operation and maintenance of urban water systems, and implementation of sanitation projects in urban areas, including the installation of community toilets (MCKs) in Kampung Improvement Projects (KIP).

^{1/} The others being the Directorate General of Highways (Bina Marga) and the Directorate General of Water Resources Development (DGWRD).

55. The functions for water supply systems design and operation are the responsibility of the Directorate of Water Supply (DAB), while those for sanitation are the responsibility of the Directorate of Environmental Sanitation (PLP).

(ii) Ministry of Home Affairs

56. The Ministry of Home Affairs (Dalam Negeri) is involved in the water and sanitation sector through its Directorate General of Regional Development, Directorate General of Rural Development and the Directorate General of Public Administration and Regional Autonomy.

57. The function of the Directorate General of Regional Development (BANGDA) is to promote economic, social and political development at the regional level. These functions are implemented through integrating the planning process among the various sectors of activity and by ensuring correlation among national, regional and local development planning. DGRD is also responsible for managing the financial aspects of development at local levels, such as the INPRES ^{1/} programs. It is responsible for improving urban administration, the environment and for town planning, including urban services of which water supply and sanitation are part.

58. The Directorate General for Rural Development (BANGDES) is responsible for the development of the grass-roots administration, especially that of the villages in rural areas. It is concerned essentially with community development including the physical and social conditions of villages and it promotes the growth of the community's traditions, encouraging self-support and self-reliance. It is engaged in planning and in providing financial assistance for village activities. The Directorate General for Rural Development also fosters the traditional systems of mutual assistance in which people bear work burdens jointly and share the benefits of the results, the transfer and development of suitable technology, the improvement of housing and the village environment, training of cadres to become agents of change and development at the village level.

59. The Directorate General of Public Administration and Regional Autonomy (PUOD) supervises and monitors the proper functioning of all local governments and performance of their principal personnel. At the regional level, provincial representative councils headed by a governor in each of the provinces are responsible for the functions of local governments under their jurisdiction, welfare of the population and the formulation and execution of regional development programs. At the local level, the heads of districts (Kabupatens) have similar responsibility and authority. One Semi-autonomous Regional Water Enterprise (PDAM) in each Kabupatens established by the local government, assumes responsibility for the operation and maintenance of waterworks and for the extension of the distribution systems. Where necessary, Transitional Water Supply Management Units (BPAMs), under the supervision of the DAB Regional Project Office, look after the operation and maintenance of the systems until PDAMs are established.

^{1/} Funds provided by Presidential Decree to local government.

(iii) Ministry of Health

60. Within the Ministry of Health, the Directorate General for Communicable Disease Control and Environmental Health has the responsibility for community development through information and guidance of the water supply and sanitation programs in rural areas, the Jamban Keluarga community toilet program financed by INPRES, as well as water quality surveillance and health education programs nationwide.

(iv) Ministry of Finance

61. The Ministry of Finance through the Directorate General of Budget is responsible for sectoral development projects, funds are provided in the national, provincial and kabupaten/kotamadya development budgets. Annual government budgets are channeled through relevant ministries. Specific development projects are approved by the Central Government, the equity contribution or loans are provided by the Central Government through the Ministry of State Wealth to the Local Governments to augment their normal budgets.

(v) Other Central Government Agencies

62. Other Central Government agencies with a role in the water supply sector include the National Development Planning Agency (BAPPENAS) which funds available for water supply and sewerage projects through the Government's annual development budget, the Ministry of Mines and Energy (MME) which is in charge of ground water exploration and relevant data collection through its Directorate of Environmental Geology, the Ministry of Population and the Environment, responsible for establishing policies on water pollution control and environmental issues and the Ministry of Education and Culture, responsible for guidance on education and training, including sanitation and environmental health education in schools.

(c) Regional Government Agencies and Sectoral Responsibilities

63. Government Regulation No. 14, 1987 covers the transfer of some of Central Government's responsibilities in the field of public works to Local Government, as part of decentralization. The transfer of responsibilities includes roads, irrigation and human settlements (Cipta Karya, MPW). Cipta Karya in this respect is responsible for urban and regional space, structural aspects of buildings, housing, water supply, environmental sanitation and human settlements.

64. Activities being transferred to the Local Government Tk. I, (Provincial Government) are: (i) management for construction, operation and maintenance of urban services; and (ii) coordination of construction, maintenance and management of water supply and sanitation systems used by more than one Local Government Tk. II level.

(i) Provincial Level

65. At the provincial level, the Ministry of Public Works and the Ministry of Health have regional offices known as Kantor Wilayah Departemen Pekerjaan Umum and Kantor Wilayah Departemen Kesehatan. The offices are administratively and technically responsible to the Ministry of Public Works and Ministry of Health.

66. As the national government's representative in the province, the Provincial Governor is in turn responsible for the Kabupaten and lower levels of government through the Bupati who acts as the Governor's representative in the Kabupaten. The Governor as head of the province is responsible to the People's Assembly of the province. The Governor heads the following provincial administration with responsibility to the water supply and sanitation sector:

- (i) Regional Development Bureau (BANGDA Tk. I), responsible for the administration and development of Kabupatens and Kotamadyas;
- (ii) BAPPEDA Tk I, responsible for planning and coordination of program and monitoring activities in the province;
- (iii) Dinas Kesehatan Tk. I, responsible for the coordination of health services in the province;
- (iv) Dinas Pekerjaan Umum Tk. I, responsible for the coordination of public works projects and undertaking some implementation activities; and
- (v) Provincial Monitoring Development Units (PMDU), are responsible for controlling the operation and management, financial and management regulation of PDAMs and evaluating the priorities and viability of further PDAM investment proposals.

67. At present in all provinces, except for DKI Jakarta, a single person acts as the head of the Kanwil and Dinas offices, in the health sector and public works sector. There are, however, proposals to change this arrangement and have a separate person as head of the Kanwil and Dinas.

68. Within agencies at the provincial level, the divisions responsible for rural water supply and sanitation are:

- (i) The Division for Social Development in BAPPEDA Tk. I;
- (ii) The Division for Physical Development in BAPPEDA Tk. I;
- (iii) The Technical Section in the Kanwil Public Works;
- (iv) P2SAB, the project office from DAB, responsible for management and implementation of water supply projects within the province;
- (v) The Division for Communicable Disease Control and Environmental Health in the Kanwil Dep. Kes.;
- (vi) The Division for Promotion of Environmental Health in Dinas Kesehatan Tk. I; and
- (vii) The Sub-Dinas Cipta Karya in Dinas Pekerjaan Umum Tk. I.

(ii) Kabupaten/Kotamadya Level

69. The Bupati/Walikota is responsible to the Governor of the province and has an administration which includes:

- (i) BAPPEDA Tk. II, responsible for planning and coordination and monitoring of development activities in the Kabupaten/Kotamadya;
 - (ii) Dinas Kesehatan Tk. II, responsible for coordination and implementation of health service in the Kabupaten/Kotamadya;
 - (iii) BANGDES Tk. II office, responsible for the administration of the Kecamatan within Kabupaten/Kotamadya, as well as the training and support of the Desa Council (LKMD);
 - (iv) PDAM, a water supply enterprise, responsible to the Bupati/Walikota; and
 - (v) PAB project office for the implementation of water supply projects within the Kabupaten.
- (d) Non-Government Agencies and Sectoral Responsibilities

70. The Government supports the community development role of several official organizations which function at the desa and kelurahan level. These organizations are referred to as NGO's and include the Desa Community Self Reliance Organization (LKMD), Family Welfare Organization (PKK), Karang Taruna (National Youth Organization) and Pramuka (National Scouting Organization).

71. The LKMD is made up of ten sections for desa development staffed by volunteers who are responsible for encouraging community participation in the planning and implementation of development activities. Three sections are important in the development of water supply and sanitation, physical development (6), health (7), and women's affairs (10).

72. The PKK is an organization with a non-registered membership consisting only of women. PKK activities are focussed in village and urban neighborhoods. PKK has been given responsibility for promoting activities in the field of clean water and sanitation. PKK is responsible for women's affairs (Section 10) in the LKMD. It can serve a useful role in such activities as encouraging of community participation, water use education and the collection of water charges.

73. PKK commenced as a family life education pilot project in a single villages in Central Java in 1969. With support from the Directorate of the Family Life Non-Formal Education Programme and Pertiwi (the wives of officials/provincial government) it soon spread throughout Central Java. Recognizing its potential for community development, the Government declared it a nationwide movement in 1975. Since then, it has spread rapidly throughout the country. The PKK formally is responsible for promoting family health and nutrition, housing, environment and sanitation, women's education and income generating activities in coordination with the responsible departments. PKK

teams formed at national and provincial levels facilitate and monitor the activities of lower level PKKs. The Chairperson of the National PKK is the wife of the Minister of Home Affairs. This structure is generally paralleled through all lower administrative levels with the wife chairing the respective motivating team.

(e) Program Responsibilities

(i) Urban Water Supply

74. Current GOI policy aims to have a single semi-autonomous water enterprise at Tingkat II level, a PDAM. New or embryonic water enterprises (BPAM) are constructed and managed by DAB, Cipta Karya through the PPSAB office at provincial and PAB office at Kabupaten, until such time as they are financially viable. Then they are handed over to the Pemda Tk II administration. The PAB office is not linked structurally with Pemda Tk II organization.

(ii) Water Quality Surveillance and Monitoring

75. Ministry of Health, Directorate General of Communicable Disease Control and Environmental Health is responsible for monitoring the chemical and bacteriological quality of water supplies, but due to limitations in laboratory facilities, trained staff, and funding the number and coverage of sample collection and analysis is low.

(iii) Urban Sanitation

76. Under the current policies of IUIDP and decentralization, local government at Tk II level will assume responsibility for identification, planning and implementation of all urban development projects with the need for substantial strengthening of their technical planning, institutional, and management capability. During the transition phase to full local government control, central government agencies will continue to provide active technical and management inputs to the development of many of the urban services. The provision of urban sanitation functions at local level are currently managed by a number of departments or organizations as summarized in Table 7.

Table 7. Alternative Organizational Arrangements for the Provision of Urban Services at Local Level

<u>Urban Services</u>	<u>Department or Organization</u>
Water Supply	BPAM, PDAM, DPUK, BAPPEDA
Drainage/Flood Control	DPUK
Solid Waste Management	DPUK, Dinas Kebersihan, Dinas Tatakota, P.D. Kebersihan
Human Waste	DPUK, Dinas Kebersihan, Dinas Kesehatan
KIP	DPUK, BPAM, Dinas Tatakota, PDAM (shared responsibility with Tk I)
MIIP	
Public Housing	Dinas Tatakota, Perumnas, BAPPEDA,
BTN	
Urban Roads	DPUK
Traffic Management	DLIAJR Tk I, DPUK
Markets	Dipenda, Dinas Pasar, PD Pasar
Educational Facilities	Dinas P & K, DPUK
Health Facilities	Dinas Kesehatan, DPUK

77. From this Table it can be seen that in some cities, solid waste disposal services are provided by DPUK, in others by a specialized department, Dinas Kebersihan, and again in others by Dinas Tatakota. In general, it can be said that as the city grows, there is an increase in the level of operations. This development results in the establishment of new departments specializing in the provision of a single service.

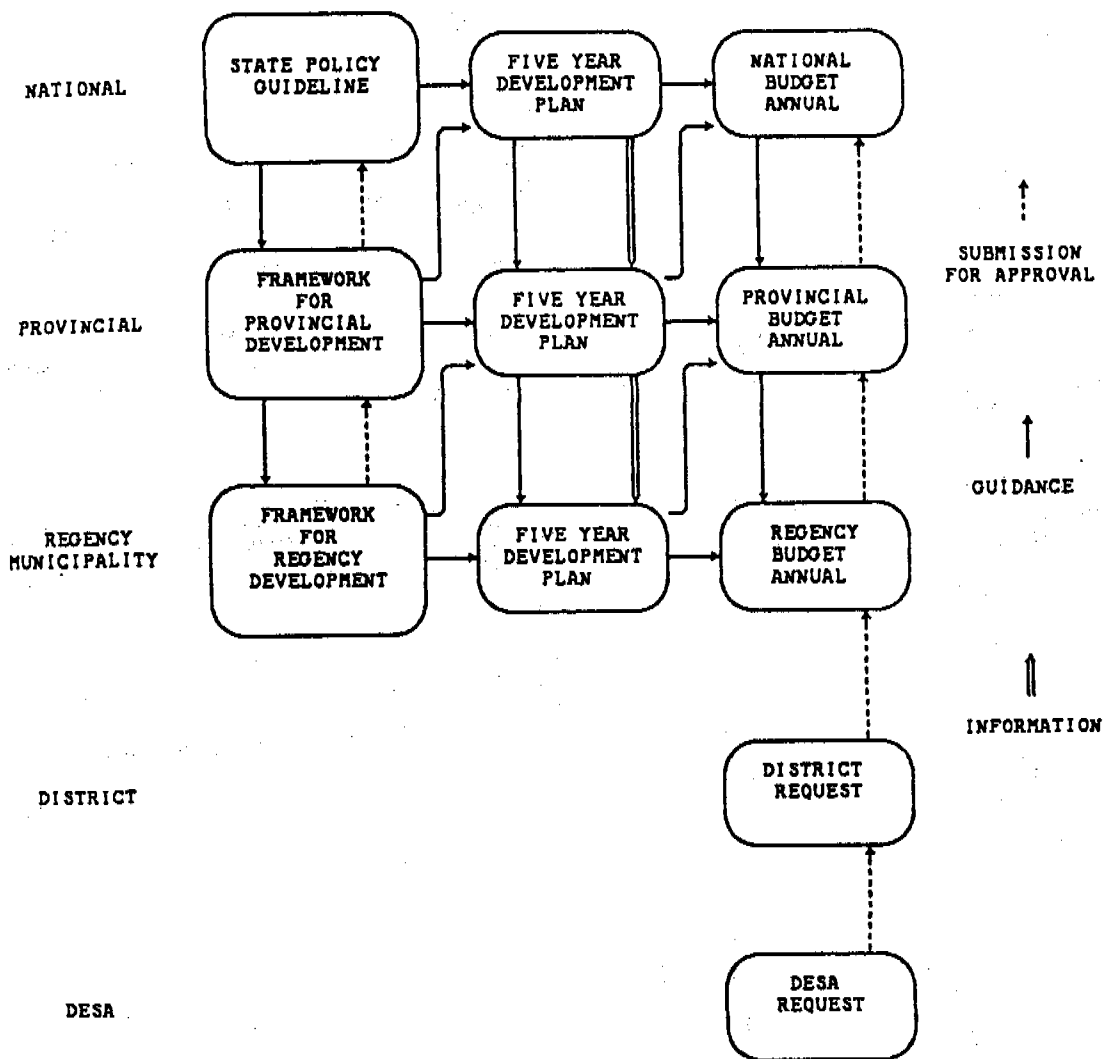
4. Financial Background of the Sector

(a) Financial Budgeting

78. The formulation of annual budgeting by local governments is designed to include the integrated mechanisms of top down and bottom up planning, and is presented in Figure 1.

79. The top down approach is based on the national policy guidelines which lead to provincial and regional development frameworks reflecting the needs of local government (the bottom up concept) as well as complying with national policy. Hence, approval of the framework at each level is required by the next higher echelon of government. The broad policy frameworks, once approved, provide the basis for the formulation of the Five-Year Development Plans at the three levels of government, with guidance from the next highest level as required.

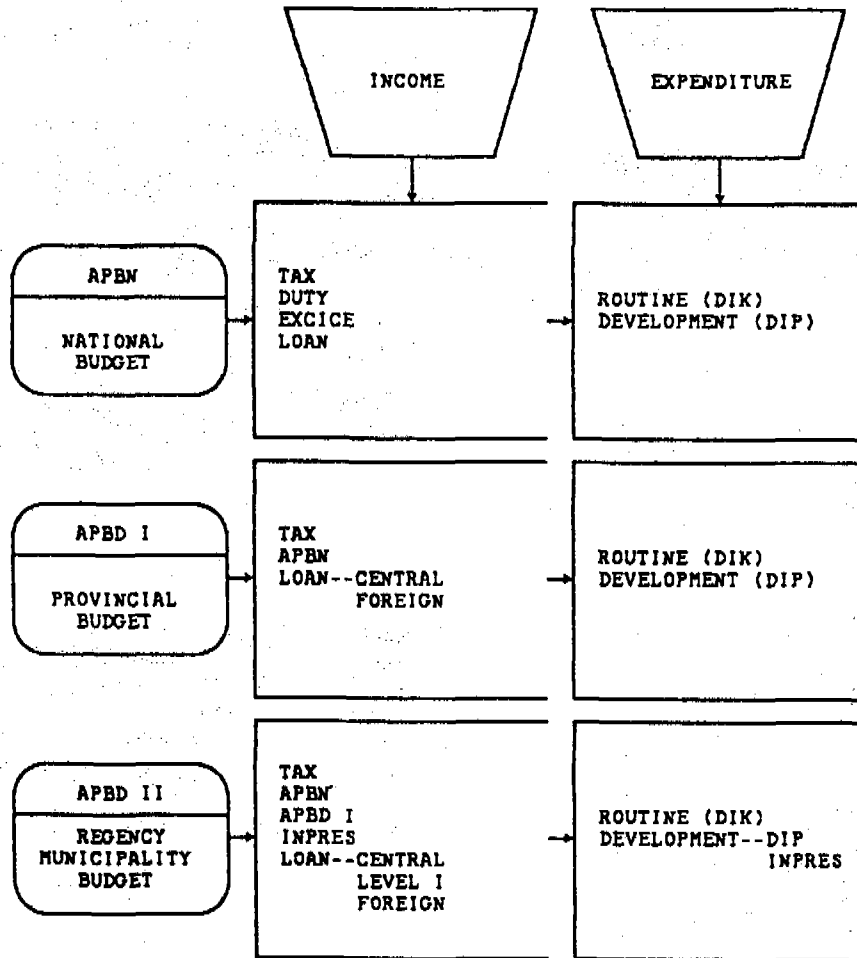
Figure 1. The Planning and Budgeting Process



80. The preparation of annual operational budgets is a bottom up process commencing with proposals formulated at desa level and with additional proposals included and given priority at each consecutive level. This results in increased selectivity as the proposals proceed upwards and unpredictability as to which proposals are finally approved for implementation. The IBRD funded UIMDS project suggests that of about 200 proposals made at desa/kelurahan level, about 15-20 are finally approved as projects. The process as it currently operates favors projects funded from the development budget and tends to discount projects with high O&M and manpower development requirements.

81. The annual budget links agency plans to actual approved activities related to available resources, of which funds is one of the major limiting factors. The sources and uses of funds at each level of government is presented in Figure 2. The final budget document contains both routine and development budget expenditures, but the forms and procedures used to develop each of these expenditures follow separate process.

Figure 2. Local Government Sources and Uses of Funds



(b) Tariff Structure

82. The National Standard Water Rate Structure (NSWRS) has been formulated in recognition of the fact that water is a basic need for communities and it must be distributed fairly. It is a scarce commodity, therefore, efficient use is required. One of the methods used is to apply progressive tariffs to reduce loss and waste. The water tariff system is constructed as far as possible on customer's needs and their ability to pay. Thus, the consumer using more water will pay more. The decree of MPW and MOHA No. 5, 1984/28 KPTS 1984, dated 23 January 1984, instructed PDAM/BPAM within Indonesia to follow the NSWRS, which is shown in Table 8.

Table 8. National Standard Water Rate StructureA. NSWRS for Small and Medium town

Small town : 20,000 - 100,000 inhabitants
 Medium town : 100,000 - 500,000 inhabitants

Type of Customer	Consumption Block (cum per month)			
	0 - 10	11 - 20	21 - 30	>30
1. Public standpipe	0.8A	0.8A	0.8A	0.8A
2. Social	0.8A	1.0A	1.5A	2.0A
3. Household	1.0A	1.5A	2.0A	3.0A
4. Government	1.0A	1.5A	2.0A	3.0A
5. Small commercial	2.5A	2.5A	5.0A	5.0A
6. Large commercial	4.0A	4.0A	8.0A	8.0A
7. Small industry	3.0A	3.0A	6.0A	6.0A
8. Large industry	5.0A	5.0A	10.0A	10.0A
9. Special	15.0A	15.0A	15.0A	15.0A

B. NSWRS for Large and Metropolitan City

Type of Customer	Consumption Block (cum per month)			
	0 - 10	11 - 20	21 - 30	>30
1. Public standpipe	0.8A	0.8A	0.8A	0.8A
2. Social	0.8A	1.5A	2.0A	3.0A
3. Household	1.0A	2.0A	3.0A	5.0A
4. Government	1.5A	2.5A	4.0A	6.0A
5. Small commercial	4.0A	4.0A	8.0A	8.0A
6. Large commercial	5.0A	5.0A	10.0A	10.0A
7. Small industry	4.5A	4.5A	9.0A	9.0A
8. Large industry	6.0A	6.0A	12.0A	12.0A
9. Special	20.0A	20.0A	20.0A	20.0A

Note : Factor "A" is to be determined by the water enterprise as the ratio of total cost divided by total water consumption which has been weighted by the above tariff structure.

Source: Joint Degree of Ministry of Home Affairs and Agency of Public Works No. 5 of 1984/28/KPTS/1984 dated 23 January 1984.

(c) Revenue Collection

83. Major differences exist with revenue collection efficiency among the large PDAMs. For some enterprises, the total amount owing from customers was more than 100 per cent of the revenue due for the year, while for others, it was less than 20 per cent. The presence of large government establishments within an enterprise area was seen to affect collection efficiency. The smaller water enterprises show a similar range of performance in the collection of revenue.

(d) Contribution of PDAMs to Local Government

84. Instruction No. 610/7027/SJ of 10 July 1985, from the Ministry of Home Affairs, requires that 60 per cent of the net profit of PDAMs be paid to local government. Payment of the contribution from net profit is not required if the population supplied with service by the PDAM is less than 75 per cent of the total urban population or in the case of rural PDAMs is less than 60 per cent of the population. In practice, not all PDAMs have implemented this instruction. On the other hand, some PDAMs have been required to make a contribution to local government despite the fact that they are making a loss. Table 9 shows the profitability and contribution to local government of a sample of PDAMs.

Table 9. Profit and Contribution to Local Government of a Sample of PDAMs

Name	PDAM/Province		Profit (Loss) in Rp million	Contribution to Local Gov't. (Rp million)
1. Bandung	West Java	1975/87	NA	1,043
2. Surabaya	East Java	1982/86	14,100	7,750
3. Malang	East Java	1982/86	2,549	1,399
4. Kediri	East Java	1982/86	75	41
5. Madiun	East Java	1979/86	(103)	26
6. Medan	West Sumatra	1985/87	NA	449
7. Pematang Siantar	West Sumatra	1985/87	604	NA
8. Banjar Masin	South Kalimantan	1986	187	110

Source: PT. Bina Asih, 1989; Direktorat Jenderal Pemerintahan Umum dan Otonomi daerah (PUOD) Departemen Dalam Negeri, Suplemen Laporan Akhir.

5. Private Sector Involvement(a) General

85. Involvement of the private sector through investment in the water supply and sanitation sector is minimal. Predominantly, development of facilities is financed by the Government at central and local level for projects

spread over the whole country. A few private organizations or persons also participate. These are generally industries or developers, building their own water supply system and wastewater treatment, facilities or house owners, installing a latrine or septic tank.

86. The usual procedures and task divisions for water supply and sanitation projects shown in Table 10 highlights the small inputs presently available for private sector investors. However, there is a considerable scope of work for private consultants and contractors.

Table 10. Procedure and Task Division with Water Supply and Sanitation Works, 1984

Task	Executed by
1. Identification	Government
2. Feasibility Study	Consultant
3. Terms of Reference	Government and/or Consultant
4. Design/Tender Documents	Consultant
5. Bid Evaluation	Government, sometimes with Consultant
6. Civil Work	Civil Contractor
7. Mechanical/Electrical Works	Contractor and Supplier
8. Materials	Supplied by Government or to be Procured by Contractor
9. Labor	Contractor and/or Beneficiary
10. Supervision	Consultant and Government

Source: MPW, Cipta Karya, 1984

87. To execute work for or supply materials to a Government organization requires prequalification with that organization. The classification for scale of works qualification is presented in Table 11.

Table 11. Classification of Consultants, Contractors and Suppliers

<u>Work Value</u> (x million Rp.)	<u>Qualification</u>	<u>Operation Boundary</u>
A. <u>Contractor</u>		
> Rp. 5 < 20	C3	
> Rp. 20 < 50	C2	Local contractors
> Rp. 50 < 100	C2	(Dati II)
> Rp. 100 < 200	B2	
More than Rp. 200-Rp. 500	B1	Dati I contractors should be given priority
> Rp. 500	A	All contractors
B. <u>Consultants</u>		
> Rp. 5 < 20	C	
> Rp. 20 < 60	B	Local consultants
> Rp. 60 < 200	C	(Dati I)
> Rp. 200	A	All consultants
C. <u>Material Supply/Other Service</u>		
> Rp. 5 < 20	C3	
> Rp. 20 < 50	C2	Local suppliers
> Rp. 50 < 100	C1	(Dati I)
> Rp. 200 < 200	B2	
> Rp. 200 < 500	B1	Dati I suppliers should be given priority
> Rp. 500	A	All suppliers

Range of classifications:

- Construction sector are: A, B1, B2, C1, C2, C3
- Consulting services are: A, B, C
- Material supplies/other services sector: A, B1, B2, C1, C2 and C3

Source: Cipta Karya, 1986

(b) Consultants

88. Some 1,400 domestic engineering consultant firms operate in the Indonesian market. Many are very small with one or two professionals; only a few have more than 100 professionals on their staff. The Indonesian professional organization for engineering consultants is named the Organization of Indonesian Consultants (INKINDO) which has about 600 member firms.

89. For large water supply projects Cipta Karya usually invite 10 to 20 prequalified domestic consultants, who possess experience in previous similar projects. A number of these consultants make use of foreign expertise, either in joint venture or with ad-hoc arrangements. Quite a number of foreign consultants are active in the sector, mostly in projects funded by bilateral or multilateral assistance, wherein the engagement of a foreign consultant is generally a donor requirement. Since such projects often aim at the transfer of technology, the foreign consultant is required to work closely with domestic consultants.

90. The Presidential Decree, KEPRES 29/30 of April 1984, stipulates that, depending on their availability, only local consultants are to be invited for any consultancy job in Indonesia. The local consultants may, if their experience and/or capability in a specific area is insufficient, hire a foreign consultant. Foreign consultants are only allowed to bid if they are associated with a local firm and this prerequisite must be stated in the tender documents.

91. To further develop the experience and capabilities of private consultants the British Government is assisting selected INKINDO members through the provision of work experience and training programs in Britain. Programs are approximately three months duration and up to ten trainees are selected each year. This program is in its fourth year of operation.

(c) Contractors

92. Indonesia has a large number of small civil engineering contractors working in the fields of water supply and sanitation. The total number of contractors qualified by Cipta Karya for implementation of its projects is about 30,000, of which 90 per cent are in the small category and 10 per cent in the large and medium categories. The role of small contractors in the implementation of projects was enhanced by the introduction in 1980 of a Presidential Decree (KEPRES 14A) which required that projects with a value of less than Rp. 200 million (or about \$120,000) should be tendered among the small contractors established in the district in which the works will be undertaken. As considerable amounts of funds were spent during Repelita III on water supply projects in small towns and medium cities (often district capitals) and IKKs (subdistrict capitals), in contract sizes of less than Rp. 200 million, many small contractors have been involved in the subsector since 1980.

(d) Local Manufacturers and Suppliers

93. The equipment and materials used in water supply and sanitation projects vary from simple to highly sophisticated. In general most forms of equipment are available in Indonesia, either locally produced or assembled under license; only highly sophisticated equipment has to be imported fully

built up. Availability of all necessary equipment and materials is sometimes variable in the outer provinces. Delays in the delivery of specified material can be frequent. The availability of various materials and equipment is listed in Table 12 with the classification of origin.

94. Equipment and materials produced in Indonesia are usually manufactured to SII (Standards Association of Indonesia), however, it is reported 1/ that for a number of brand items, different qualities are available. Variations in price with first quality items can be as much as 50 per cent. Factory test and quality inspection certificates are rarely utilized or stipulated on Government orders. Private quality inspection services are available in Jakarta.

95. The government procurement process has undergone recent review and rationalization. Details of the revised process are presented in Figure 3.

(e) Operation of Services by Private Sector

96. The data collected from 160 urban water enterprises 2/ suggested that considerable improvements in the technical management, operation and maintenance of the enterprise and its water supply facilities could be made. All water enterprises continue to experience difficulties in the recruitment and retention of qualified staff, particularly those with considerable experience. To circumvent this problem, a small number of enterprises have already contracted private individuals or organizations (consultants and contractors) to provide some services. The majority of these services have been for solid waste collection and disposal 3/ and water carrying.

97. To date, no water enterprise operations have been totally privatised and it is unlikely, for the foreseeable future that this will occur on a widespread basis. However, the Government is currently investigating proposals to privatize some water supply enterprise tasks in several metropolitan areas, mainly in the areas of water source development, water treatment and major transmission mains. With the support of USAID, a technical assistance study is planned to commence in October 1989 to strengthen the financial and institutional management of PDAMs. This will investigate the potential for privatizing some large city water enterprises. Initially, the study will focus on Semarang and Surabaya.

1/ Yayasan Dian Desa, 1989; Regional Study on Domestic Shallow Well Water Supplies Through Self Help Indonesia, A Survey Report.

2/ PT. Indah Karya et al; 1988; Cipta Karya : Support Study for Master Planning for Water Supply Subsector Policy, Alternative Strategy Reports.

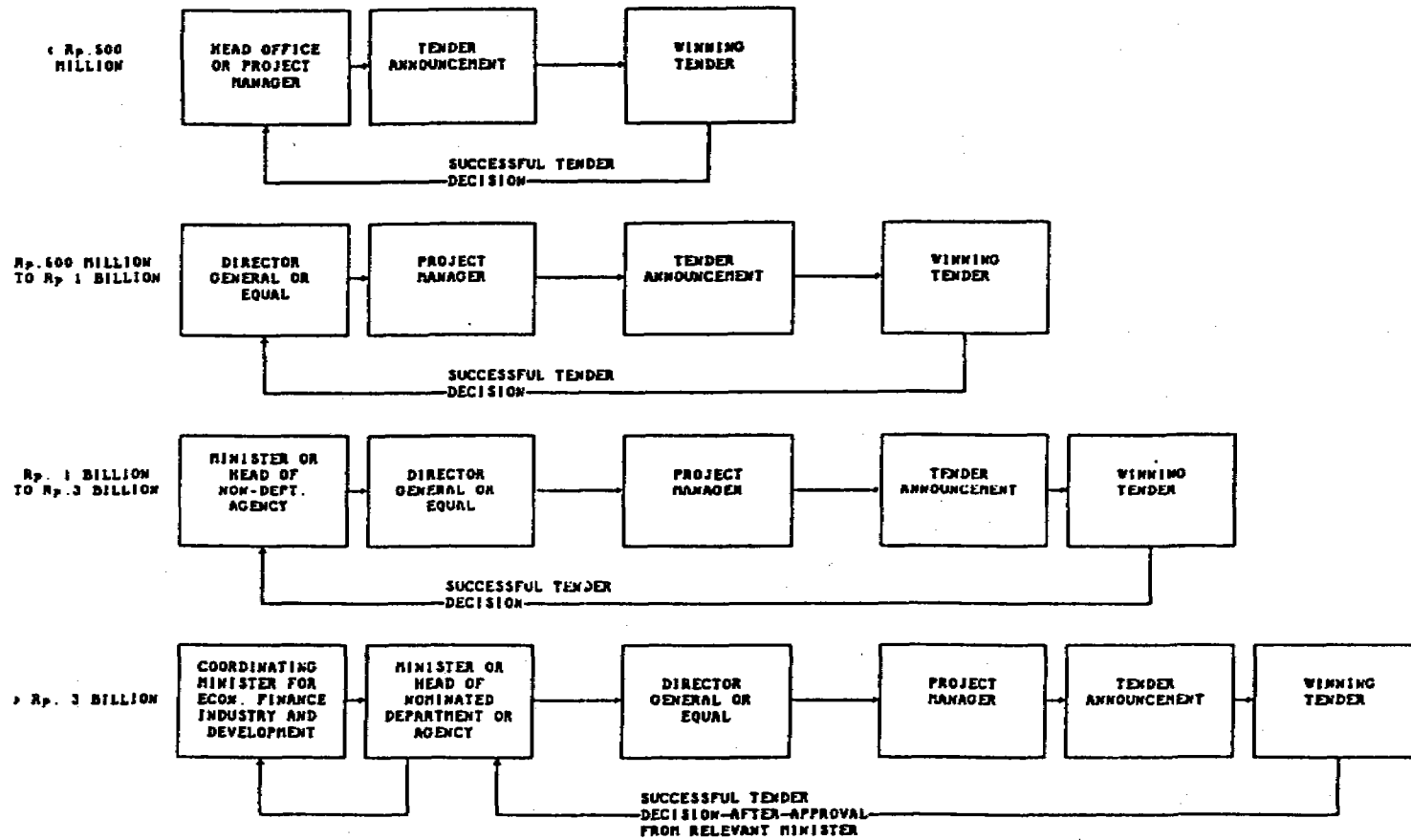
3/ For example, 60 per cent of Surabaya's solid waste services are let to private contract.

Table 12 . Availability of Materials and Equipment

<u>Locally Produced</u>	
1. concrete pipes (reinforced)	limited supply, one factory in Jakarta
2. concrete pipes (non-reinforced)	
3. vitrified clay pipes	produced under license
4. PVC pipes	various local manufacturers
5. Asbestos cement pipes	produced under license
6. galvanized iron pipes	
7. cast-iron pipes	
8. centrifugal pumps, small	local assembly on limited scale
9. pipeline valves & fittings to 200mm	local manufacture
10. water meters	local assembly
11. generators	ample supply of local assembly
12. hand pumps	local manufacture
13. hydraulic ram pumps	
14. electro-submersible pumps	
15. screens. deepwell	
16. water supply package plants	local assembly in unit ranging from 2.5 to 40 lps
17. cement	various local manufacturers
18. reinforcement steel	
19. HDPE pipes	local manufacture to order new manufacturer possible
20. water tank (fiberglass)	local manufacture
21. diesel engines (to 12 kW)	local manufacture
<u>Imported</u>	
22. cast-iron accessories	
23. centrifugal pumps, large	imported, local assembly on a limited scale starting
21. deep well pumps	
22. screw-pumps	
23. water laboratory equipment	
24. surface aerator	
25. gearboxes	

Source: Cipta Karya, 1984. and Study Update

Figure 3 . Government Procurement Procedures



6. Water Resources Control Regulations

(a) Surface Water

98. Water resources in Indonesia are managed by the Ministry of Public Works, Directorate General of Water Resources (DGWRD) or Dit Jen Pengairan. However, in 1982 the responsibility for groundwater resources management was transferred to the Ministry for Mines and Energy.

99. Surface waters are the responsibility of DGWRD (Dit jen Pengairan) and the usage of spring water is also managed by DGWRD. Even though there is priority for the usage of a water source for drinking water, there are some conflicts of interest for the use of the water. The principle of first users having higher priority applies. This situation often remains difficult and complex for clear resolution. Other agencies who manage irrigation, water supply, electricity and others sectors using water resources are known as users.

100. For a case where the water resources are used for multipurpose activities in the same or several river basins, such as Brantas river, Bengawan - Solo rivers, Citarum-Jatiluhur, an independent authority under the coordination of several Ministries can be developed, for example Perum Otorita Jatiluhur.

(b) Groundwater

101. In Indonesia, groundwater generally, is drawn from two potential sources - shallow and deep. Communities throughout the country have drawn groundwater from shallow aquifers for centuries and in the rural areas continue to do so. In urban areas population density and contamination of shallow groundwater by wastewater, has seen the utilization of shallow groundwater for water supply diminish. As the quality of the shallow groundwater deteriorates the utilization of deep groundwater has risen significantly.

102. Domestic and industrial usage of deep groundwater is increasing as PDAMs are not able to meet demands. This high rate of withdrawal is affecting the environmental conditions. In metro or large cities, especially those located in coastal areas such as Jakarta, Semarang and Surabaya, the damage is reaching serious levels. The Government, both Central, Provincial and Municipal have recently begun to address this problem.

103. Despite the fact that many government agencies are engaged in groundwater abstraction, the Ministry of Mines and Energy has long been known as the main authority responsible for groundwater management. In 1974, the Water Resources Development Law No. 11 was promulgated to replace the Dutch Colonial Government Regulation on Water Resources Management of 1936. The Law of 1974 put the responsibility for the management of water resources, excluding ground water resources, under the Ministry of Public Works. Subsequently, Government Regulation No. 22 of 1982 on Water Resources Management was promulgated clearly stating in Article 6, the responsibility for groundwater resources management was under the Ministry of Mines and Energy.

104. The Director General of Geology and Mineral Resources is given the authority and responsibility for the implementation of groundwater resources management, through legislation contained in the following two documents:

- (i) Regulation of Minister of Mines and Energy, No.03/P/M/Pertamben/1983 on Groundwater Management; and
- (ii) Decree of the Directorate General of Geology and Mineral Resources, No. 392.K/562/060000/85 on Guidelines for the Implementation of Groundwater Management.

105. These documents cover the following:

- (i) To coordinate all activities in groundwater investigations. The scope and the plan of groundwater investigation shall be submitted to the Director General for approval before implementation of the investigation.
- (ii) To issue licence for water well drilling firms. The licence for water well drilling firm, class A, shall be issued by the Director General, Directorate of Environmental Geology. Environmental Geology shall issue all licenses for class B, domiciled in the Island of Java; the Heads of the regional Office of the Ministry of Mines and Energy shall issue licences for drilling firms, classes C1 and C2, domiciled within their territories;
- (iii) To regulate abstraction, except that for investigation and domestic use, groundwater may only be pumped with a licence issued by the Governor of the Province. This is issued in accordance with binding technical recommendations from the Directorate of Environment Geology, for Java, or from the Regional Office of the Ministry of Mines and Energy, for all other areas; and
- (iv) To manage a national groundwater data bank which shall be established at the Directorate of Environmental Geology and the Regional Office of the Ministry and Energy.

106. Besides the above mentioned national legislation, Provincial Governments as the representative administrators in the regions have developed their own local regulations. For the Metro and large cities, the regulations are mainly for the control of volume extracted, either by new development permit or contribution fees of water discharge from deep well. For the Metropolitan City of Jakarta (DKI Jakarta) the provincial regulation was originally issued in the form of Governor Decree No. 1145 of 1982. This has recently been superseded by Governor Decree No. 7 of 1989. These regulations basically set financial charges for drilling permits and groundwater abstraction. They do not address environmental protection or pollution issues.

C. Sub-Sector Background

1. Urban Water Supply

(a) General

107. Indonesia's urban population is reasonably well-distributed spatially, occupying five metropolitan areas of 1 million or more inhabitants (Jakarta, Surabaya, Bandung and Semarang on the island of Java, and Medan in Northern Sumatera), about 50 major cities of more than 100,000 residents, and 350 moderately sized urban areas throughout the nation. Approximately one-half of the current urban population resides in the ten largest urban areas ^{1/}, including the estimated 9 million residents of the special capital of Jakarta.

108. Indonesia's cities and towns are important social and economic centers, providing a growing range of services and the economic requirements for growth of manufacturing and commerce as well as markets for agriculture. Urban employment has grown at about 4.77 per cent per year or almost twice the national rate, providing opportunities for the absorption of surplus rural labor. It is estimated that 25 per cent of urban families have incomes below the poverty level (\$268/capita in 1985) ^{2/}.

109. Local governments are yet to assume meaningful responsibility for their own development. Three quarters of urban infrastructure expenditure has traditionally been financed by the Central Government, much of it through earmarked grants under the control of central Ministry of Public Works (MPW) directorates. Integration of infrastructure expenditure programming and implementation has been weak at the field level, and there has been inadequate attention to the development of local government revenue, management and institutions. Central local funds transfers comprise nearly one-third of the central government budget; this provides substantial, but yet unrealized, potential for improved efficiency in local government investment and this will have a substantial fiscal impact.

(b) Urban Service Coverage

110. At the end of Repelita IV (31 March 1989), GOI figures estimate that 65 per cent of the urban population is served with clean water, 16 million persons or 32 per cent of the urban population, receive service via piped water supply systems while a further 33 per cent draw water from their own private water supply systems. These are predominantly private wells. Table 13 summarizes the past Repelita service coverage achievements and the targets for the Repelita V plan.

^{1/} The ten largest urban centers are Jakarta, Bandung, Surabaya, Medan, Palembang, Semarang, Bogor, Ujung Pandang, Surakarta and Yogyakarta.
^{2/} UNDP, 1989; GOI, Project Document, IUIDP Implementation Support;

Table 13. Urban Service Coverage

Item	Unit	Repelita			
		III	IV Target	IV Achieved	V
Population to be supplied by PBAMs and PDAMs	Persons ($\times 10^6$)	9	21	16	29
	Per cent	23	42	32	47
Population to be supplied by private systems	Persons ($\times 10^6$)	13	17	17	20
	Per cent	32	33	33	33
Total population supplied	Persons ($\times 10^6$)	22	38	33	49
	Percent	55	75	65	80
Production capacity of BPAMs and PDAMs only	l/s ('000)	36	51	51	65

Source: Chapter 18 of Repelita V Program Document, Republic of Indonesia

111. While these service coverage figures are considered reasonable estimates of the existing situation, they do not account for the operating condition of the present services and the quality of water supplied. Surveys 1/ 2/ 3/ of existing urban water supply facilities report that the operational capacity of these facilities may be reduced by as much as 50 to 80 per cent at any one time due to:

- (i) inappropriate technical design causing system failure;
- (ii) lack of adequate operation and maintenance;
- (iii) lack of funds for repairs within the water supply enterprise (BPAM, PDAM); and
- (iv) lack of consumer willingness to pay tariffs due to their perception that the system is not suitable for their needs or providing the planned quantity of water.

- 1/ AIDAB, DHV, IWACO; 1984; Cipta Karya: Report of the IKK Review Mission and Cipta Karya Internal review of IKK systems, November 1988.
- 2/ PT. Indah Karya et. al; 1988; Cipta Karya: Support Study for Master Planning for Water Supply Subsector Policy, Alternative Strategy Reports.
- 3/ PDAM - Jaya, Jakarta, 1989; Review of operation of Rulo Gadung Water Treatment Plant.

112. Even the 11 major cities 1/ do not attain 24 hours supply. Operation and maintenance constraints are noted as the major reason for this situation. Most consumer complaints relate to low or absent pressure and consequent lack of supply. Overall, approximately 25 per cent of all connections receive water for periods of less than 8 hours per day while 37 per cent of households with a piped water supply system connection indicated that they also draw water from other sources. It is therefore likely that present service coverage figures are overstated.

113. The availability and usage of equipment for the sampling and measurement of chemical water quality parameters is generally below that which is considered necessary to provide reasonable levels of protection for consumers. Ministry of Health water quality laboratories, although modestly equipped are not used on a regular or systematic basis for chemical water quality or bacteriological monitoring. Studies of urban piped water systems estimate that 8.4 per cent are contaminated by various bacterial agents. 2/ Similar studies of rural areas found that 62 per cent of wells were contaminated. It is considered that this figure would most probably apply also in the urban situation. In summary, present coverage in the urban sector appears to be: 3/ (i) active house connection, 1,450,000; and (ii) active public standpipes, 16,000.

114. Applying the usually adopted urban figures of 5 persons per household and 100 persons per public standpipe, the above estimates give a present urban service coverage for active piped water supply of approximately 18 per cent. With a further 33 per cent of the urban population utilizing their own private water supply systems of which 30 per cent may be bacteriologically contaminated, it is likely that total urban coverage for active, clean water supply is likely to be around 40 per cent. Recent press statements 4/ tend to support this estimate.

(c) Service Levels

115. Urban water supply systems are designed on the basis of various per capita water demands specified by the Directorate of Water Supply, Directorate General of Cipta Karya (DAB, DGCK). These per capita design demands, developed in previous Repelitas cover; (i) domestic consumption (house connection and public standpipe); (ii) non-domestic consumption (commercial, industrial and institutional); and (iii) an allowance for system losses.

1/ Cities with 1988 population greater than 500,000 persons are Bandung, Bogor, Jakarta, Malang, Medan, Palembang, Semarang, Surabaya, Surakarta, Ujung Pandang, Yogyakarta.

2/ P2SAB, DJCK, 1989; Policies and Programmes in Rural Water Supply and Environmental Sanitation in Repelita V (1989/90-1993/94).

3/ PT. Indah Karya et al; 1988; Cipta Karya: Support Study for Master Planning for Water Supply Subsector Policy, Alternative Strategy Reports.

4/ Jakarta Post report 8th December 1989 on statement by the Minister of Home Affairs.

116. The service levels adopted for past Repelitas and proposed for Repelita V are specified in Table 14. Field surveys (see Appendix 16) have confirmed the appropriateness of these consumption levels for direct house connections and public standpipes. Field practice which indicates a house connections/public standpipe ratio of approximately 80/20, substantially alters the average domestic demand shown.

Table 14. Urban Water Supply Service Levels

Town Category	I Metro City	II Large Town	III Medium Town	IV Small Town	V IKK
1994 Population ('000's)	Over 1000	500 to 1000	100 to 500	20 to 100	10 to 20
Percentage of Population to be served	80	80	80	80	80
Domestic Demand (lpcd)					
Direct House					
Connections	210	170	150	90	60
Standpipes	30	30	30	30	30
Average	120	100	90	60	45
Non-Domestic Demand (% of Domestic Demand)	60	40	30	20	5
Allowance for Unaccounted for Water (% of Total Production)	20	20	20	15	15

Source: Chapter 18 of Repelita V program document, GOI, 1989.

117. The planning approach adopted in previous Repelita and maintained for Repelita V proposes that 50 percent of the served population be supplied via public standpipes and 50 per cent via house connections. A house connection is deemed to service a household of 5 persons while a public standpipe provides for 100 persons. It is relatively simple to confirm the number of persons in a household, but it is difficult to accurately assess the number of persons supplied from a public standpipe. Data from water enterprises covers a range from 50 to almost 300 persons per standpipe. If a figure of 100 persons per standpipe is assumed, the service coverage figures given in para 113 represent a consumer ratio of approximately 80:20 in favor of house connections. Thus,

a more flexible approach based on actual consumer requirements for each urban system may be more appropriate at detailed design stage. This approach is now being adopted by DAB, DGCK for their improved or adjusted IKK system design guidelines.

118. Non-domestic water consumption, derived from data supplied by water enterprises, is summarized in Table 15.

Table 15. Non-Domestic Water Consumption

Town Category	Study Result		Present Allowance
	lpcd	Average lpcd	lpcd
I	44- 99	61	72
II	13-102	44	40
III	8-115	29	27
IV	2-105	18	12
V	4-39	11	2.5

Source: Indah Karya et al; 1988 Cipta Karya; Support Study for Master Planning for Water Supply Subsector Policy.

119. Even though there is a broad scatter of data it is apparent that the non-domestic demand presently specified appears to be about adequate for average demands. However, non-domestic demand is unique for each town and the appropriateness of the specified figure should be always investigated during detailed design.

120. Non-Revenue Water (NRW) is a serious problem for the majority of water enterprises throughout Indonesia. The national average for NRW is approximately 43 per cent of total production. In a number of major cities the situation for NRW is higher than the national average, e.g., Jakarta 54.2 per cent; Semarang 54.6 per cent and Palembang 49.7 per cent.

(d) Project Development Cycle Responsibilities

121. Urban water supply is a component part of the IUIDP process. As part of the Government's stated policy of decentralization, 1/ local governments, and in particular, local water enterprises are being encouraged to plan and develop local programs more systematically. This is in contrast to past Repelita III and IV urban infrastructure development, which was centrally prescribed and often not well matched to user demands and local institutional needs 2/. This previous pattern has tended to counteract coordination efforts. It pays little attention to user demands or preferences and preserve entrenched and fragmented institutional arrangements. The water supply systems resulting from these past programs have now been handed onto local water enterprises, most

1/ See Indonesian Law No 5, 1974 and Presidential Decrees No. 14, 1987 and No. 6, 1988.

2/ AIDAB, DHV, IWACO; 1984; Cipta Karya, Report of the IKK Review Mission.

of whom are presently ill prepared or equipped to handle these poorly planned and constructed water supply systems. Under IUIDP guidelines, the planning and design for water supply systems is now being addressed at the regional/local level. This will assist in the development of more consumer appropriate systems and enhance the potential for future adequate and effective operation and maintenance of these systems. The present operation and maintenance of most existing urban water supply systems clearly needs strengthening.

122. Operation management and maintenance of urban water supply systems is a component of water enterprise operations, which in Indonesia appears to receive minimal attention. This is particularly so when compared to the resources provided for administrative and financial matters. An important aspect in system management and control is the availability of accurate as constructed drawings which are progressively updated as modifications are made. A high 65 per cent of system networks are reported to be covered by accurate drawings, but there is concern that these drawings do not accurately reflect the current status of connections and components. This situation complicates leakage detection programs.

123. Regular operation and maintenance inspection programs of system components and facilities are reported to be undertaken by most water enterprises. However, the frequency of inspection is often irregular and usually not at the regular recommended intervals suggested by the component equipment manufacture. The details of presently instituted inspection programs are summarized in Table 16.

Table 16. Frequency of Water Enterprise Facility/Component Inspection Program

<u>Inspection Type</u>	<u>Percentage of Urban Enterprises with Inspection Schedule</u>
1. Leakage detection and pipe damage patrol (at least twice/year)	53.5
2. Production facilities and buildings and grounds	60.0
3. Distribution system including valves, hydrants and fittings	37.0
4. Pump performance	26.6
5. Pump Efficiency	23.7
6. Generator sets	20.3

Source: P. T. Indah Karya et al; 1988; Cipta Karya; Support Study for Master Planning for Water Supply Subsector Policy.

124. Preventive maintenance schedules for more than 50 per cent of electro-mechanical equipment installed exists in only 19.4 per cent of all water enterprises. Even in the largest towns in Indonesia the frequency for these schedules is not more than 50 per cent. The implementation of preventive maintenance schedules is made more difficult, because of a lack of operation and spare parts manuals for the installed equipment. Only 20.9 per cent of water enterprises have such information available for more than 50 per cent of their equipment. Of the 11 major cities, only Bogor, Jakarta, Palembang and Surabaya have both preventive maintenance schedules and O&M manuals and spare parts books available for more than 50 per cent of their electro-mechanical equipment. A further complication for most water enterprises management and staff is that usually none of the written material for their electro-mechanical equipment is available in Bahasa Indonesia.

(e) Approaches to Community Participation

125. The guidelines for IKK water supply systems included a community approach whereby the community was to be informed about the technical aspects of the system and the tariffs for household connections and public standpipes. The location of public standpipes was to be decided in consultation with the community. The head of the IKK office was to provide a customer relations service. Two reviews of IKK water supply systems 1/ 2/ indicated that frequently, these guidelines were not followed. However, when community meetings were held or household visits were made, the information provided was often inaccurate, and problems arising from the new technology of the IKK systems were not dealt with or questions answered accurately. Resistance stemmed from failures in the system to meet the designed flow rates, to produce the quantity of water expected, and to provide a continuous supply. It is likely that this situation is repeated in many other urban cities and towns.

126. The Sub-Directorate Pengaturan of DAB has developed the community education approach for IKK systems. However, this remains an information giving approach rather than a two way consultative process.

(f) Expenditures and Revenues

127. Financial data on approximately 285 water enterprises (BPAMs plus PDAMs), grouped by province and for the year 1987, show gross receipts (revenue) amounted to \$118.6 million while expenditures amounted to \$49.2 million. The operating surplus (after interest on borrowings, but before allowing for depreciation) amounted therefore to \$69.4 million. This aggregate data obscures the fact that some enterprises do not operate profitably and that considerable work remains to be done on improving both operational and financial flexibility. However, it is encouraging that, despite a number of significant shortcomings, water enterprises are increasingly, becoming capable of generating a major contribution to the investment needs of the urban water supply subsector. Thus, the above operating surplus, if repeated in each year of Repelita IV, would have generated some 70 per cent of total program investment during that period.

1/ AIDAB, DHV, IWACO; 1984; Cipta Karya; Report of the IKK Review Mission.
2/ Government of the Netherlands: IWACO, WASERCO; 1985; IKK Review and Action Program Report.

128. Further data 1/ shows that actual profits reported by all enterprises, after allowing for depreciation, was only about \$11 million. After correcting for a number of deficiencies in estimates of asset values and producing standardized estimates of depreciation, estimates varied from a profit of \$10 million to a loss of \$15 million. Care must therefore be taken with reported profit figures. However, the comment made in the preceding paragraph remains valid. That is, the water enterprises do have the ability to generate cash surpluses which are capable of making a significant contribution to the subsector investment requirement.

(g) External Financing and Donor Involvement

129. Since independence, there has been considerable involvement by multilateral and bilateral agencies in the development of urban water supply in Indonesia. Most of the early development logically occurred in cities and towns on the densely populated islands (Java, Sumatera and Bali) while more recent development has been more widely directed across the country.

130. Investment assistance to the subsector from foreign sources before 1960 was limited. During this period, turnkey projects supported through French bilateral and loan programs were undertaken for the cities of Jakarta, Bandung and Semarang, all on the island of Java. Through the 1960s, the World Bank began assistance with the funding of a Five Cities Project which supported the construction of water supply services in Malang, Samarinda, Cirebon, Banyuwangi and Yogyakarta. Further assistance during this period was provided through the bilateral programs of the Netherlands and Swiss governments.

131. While the World Bank continued through Repelitas I, II and III as a major foreign donor, further assistance was provided through the bilateral programs of Australia (Bogor, 1970; Denpasar, 1972; Cilacap, 1976), the Netherlands (Medan and Palembang, 1976/77) and France (Pontianak, Banjarmasin, Ambon and Manado). During Repelita II, the Asian Development Bank which had been a major foreign funding source for the Indonesian energy, agriculture and transport sectors began to also support the urban development sector through the funding of feasibility studies for water supply development in Medan and Semarang. These proposals proceeded to implementation in early Repelita III.

132. All of these multilateral and bilateral agencies continued their association with the water supply subsector through Pelitas III and IV. During this period the Japanese Government, through JICA and OECF, became a major contributor to the subsector with programs aimed initially at the larger cities (Jakarta and Ujung Pandang). The World Bank and the Asian Development Bank are also prominent contributors to programs in major urban centers although recently they have also begun to focus on regional and rural programs.

133. Following on from the development of the IUIDP approach and the issue of the Urban Sector Policy Statement 2/ external donor agencies have responded to provide good coordinated action and support for the urban sector program of

1/ Indah Karya Consulting Engineers, Sir M. MacDonald and Partners Asia, DHV Consulting Engineers and PT Bromo Masrang Consultants. Support Study for Master Planning for Water Supply Subsector Policy. Alternative Strategy Report" Jakarta, October 1988.

2/ Urban Sector Policy Statement and Associated Action Plan, GOI, 1987.

which urban water supply is a major component. The Asian Development Bank, the World Bank, UN agencies and the bilateral programs of the Governments of the USA, Canada, Australia, Netherlands, Switzerland, Denmark, France, Britain, Korea and Japan have incorporated all or parts of the sector policy statement and strategy in a series of project and program support commitments.

2. Urban Sanitation

(a) General

134. Urban sanitation in Indonesia incorporates human waste disposal, solid waste management and drainage (excluding main drains and flood mitigation works). All sanitation services have proved difficult to implement and sustain in urban areas and previous Repelita targets have generally not been achieved, despite considerable financial investment. Drainage and solid waste systems are strongly linked in urban areas. Solid waste not collected is often deposited in drains causing unsanitary conditions, exacerbating flooding and significantly contributing to pollution of receiving water bodies.

135. Solid waste management has received considerable investment in past Repelitas. Current policy recognizes the difficulty in achieving 100 per cent coverage of urban centers in the short term and aims to collect and dispose of 100 per cent of municipal waste but only 60 per cent of privately generated waste. Achievement of these levels is close although accurate quantitative data has not been sighted. Operational difficulties give rise to inadequate supervision of private contractors, particularly with respect to their location and method of disposal. Sewerage systems generally accept both sullage and human waste, however for those household with on-site disposal facilities, sullage is normally discharged to drains. For such households there are often no effective means of draining rainwater and sullage to prevent unsanitary conditions around the house. Thus what is often viewed as a failure by the community to provide household drainage is often a failure of authorities to provide adequate secondary or main drains.

136. In practice, very little attention has been paid in the past to drainage associated with on site disposal systems. This is considered to be due to the fact that the majority of on-site disposal facilities have been owner built. The community has generally not appreciated the importance of improved household drainage. Current programs in the metropolitan cities are having more success with improving sullage drainage but drainage of rainwater has received less attention. There is a clear need to strengthen the drainage aspects associated with future on-site disposal systems and to strengthen this as a component of community public health education programs, and to ensure that downstream drainage has the capacity to ensure household drains will be effective.

137. In Jakarta, and other urban areas suffering from seawater intrusion into groundwater aquifers, there is a linkage between household drainage of rainwater and alleviation of groundwater contamination. At present there are some innovative proposals to pilot test groundwater recharge by capturing rain water from household roofs and directing it to specially designed infiltration/recharge wells constructed within the house compound. It is

probable that these small recharge wells may not have a major impact on the control of seawater intrusion. Regulation of private bores, particularly those operated by commercial enterprises will have a greater impact over the long term.

(b) Urban Coverage

138. The exact level of coverage of urban human waste disposal is difficult to determine precisely. The Repelita IV achievement is quoted (see Table 6) as 31 per cent of the population with access to private latrines with septic tanks. The 1985 Intercensal Population Survey indicated that 38 per cent of urban households had private toilets with septic tanks and a further 17 per cent had private toilets without septic tanks ^{1/}. Many of the existing septic tanks systems are reported to be defective, and many of the pit latrines would not meet acceptable standards. ^{2/} The Jakarta Sanitation and Sewerage Project was reported to be aiming to provide some 1.1 million with on-site disposal systems. ^{3/} The current JSSP pilot program will serve some 37,000 persons.

139. Present and committed piped urban sewerage projects serve about 1.2 million persons or about 2.4 per cent of the 1988 (end of Repelita IV) population, however very little sewage treatment is yet provided. MCKs and other community toilets might serve a further 1 million persons. This will increase the populations utilizing sewerage systems to 4.4 per cent of the 1988 urban population.

Table 17. Previous Urban Sanitation Achievements
Number of Cities a/

Program	I	II	III	IV
Solid Waste	-	4	1	16
Drainage	-	18	29	38
Sewerage	-	-	4	4

a/ Figures are cumulative.

Source: Departemen Pekerjaan Umum, 1987; GOI, Report on National Workshop and Conference with External Support Agencies on Water Supply and Sanitation.

- ^{1/} PT Indah Karya et al; 1988; Cipta Karya; Preparation of National Strategic Plan for the Human Waste and Waste Water Disposal SubSector for Urban Areas, Summary, Draft Final Report.
- ^{2/} Latrine standards as such do not exist however many organizations throughout the world, such as, the World Bank, the Ross Institute, AIT (Bangkok) publish significant literature on appropriate sanitation. The designs and principles in this literature are generally accepted as the acceptable standards.
- ^{3/} PT Indah Karya et al, 1988; Cipta Karya; Preparation of National Strategic Plan for the Human Waste and Waste Water Disposal Subsector for Urban Areas, Summary, Draft Final Report.

140. Definitive data giving the urban sanitation subsector achievements of past Repelita programs does not appear to be available. Table 17 gives data which is designated by the Government to be previous sanitation achievements but it provides neither the scope nor extent of services and expenditure achieved. This data does not assist a meaningful analysis of the subsectoral performance.

141. Existing urban sewerage and sanitation facilities suffer from many deficiencies. Septic tank systems suffer from poor maintenance and design, effluent drainage systems are often blocked and in many cases non-existent. Septage collection is inadequate and disposal poorly controlled. Public facilities are often poorly designed and located with minimal community involvement in the design and implementation phases. They are often poorly kept and rejected by the community.

142. Metropolitan sewerage projects are too expensive for wide scale application. Difficulties are experienced in planning, enforcing house connections and in system operation and maintenance. These systems are therefore not operating to design standards or capacity. A number of the larger cities have Dutch built drainage/sewerage systems, all of which have been neglected and are generally inoperable. Recent studies to investigate the feasibility of rehabilitating these systems have reported favorably and it is likely that a number of upgrading projects will proceed.

(c) Service Levels and Design Technologies

143. Service levels for urban human waste disposal are either:

- (i) connection to sewerage system;
- (ii) individual household on-site disposal facilities or
- (iii) public or communal facilities (either using on-site disposal technologies or sewerage system disposal).

144. Conventional sewerage availability is, and will remain, limited to those systems existing or currently under development ^{1/} and therefore, the majority of services are form of on-site technologies. On-site disposal system technologies suitable for urban areas are well developed in Indonesia. ^{2/} Technology selection and siting criteria which are adopted for use in urban areas are well understood, however, there is some criticism that latrine siting criteria are often not observed in the field causing pollution of the living environment. Technologies in current use are:

- (i) Septic tank leaching systems;
- (ii) Twin or single leaching pits;

^{1/} These cities are Jakarta, Bandung, Yogyakarta, Cirebon, Palembang, Semarang and Surakarta.

^{2/} PT Indah Karya et al; 1988 Cipta Karya; Preparation of National Strategic Plan for the Human Waste and Waste Water Disposal Subsector for Urban Areas, Draft Final Report, Volume 2, Strategy Guidelines and Design Criteria.

- (iii) Pit latrines;
 - (iv) Sullage disposal with on-site human waste disposal systems;
 - (v) Toilet facilities for groups of families;
 - (vi) Toilet facilities for unrestricted use; and
 - (vii) Community pit latrines.
- (d) Project Development Cycle Responsibilities.

145. Urban sanitation is a component of the IUIDP process. Unlike the difficulties experienced with the urban water supplies (see para 111), there are currently no substantial urban sanitation systems that are being handed over to the newly formed sanitation enterprises. These enterprises are generally formed concurrently with the implementation of facilities and often incorporate the takeover of project staff. Thus, the enterprise has knowledge of, and control over the standard of facilities provided.

146. Project development generally is initiated by the Central Government, often with the involvement of a donor or external funding agency. Project planning is coordinated with other services under the IUIDP process. Implementation of facilities is on a project basis, using contractors for major elements and the community participation process for on-site human waste disposal facilities.

147. Project sustainability is often adversely affected by operation and maintenance. Operation and maintenance of on-site disposal facilities is the sole responsibility of the user(s). Septage collection and disposal is by private contractor. Criticisms of this system are:

- (i) Owners tend not to have septic tanks desludged when necessary and this leads to the malfunctioning of many existing septic tank systems.
- (ii) Septage removal contractors are reported to often dispose of septage to local drains rather than the designated receival sites to the significant detriment of the environment.

148. Operation and maintenance responsibilities for sewerage facilities and public ownership of sanitation facilities varies from city to city throughout Indonesia. Sewerage systems in metropolitan centers are still under development, and the operational and maintenance responsibilities are not totally clarified. In Jakarta it has been recommended ^{1/} that an enterprise, Perusahaan Air Limbah-Jakarta Raya (PAL-Jaya), separate from PAM-Jaya ^{2/} be set up to take responsibility for the sewerage system. The first step in achieving this has been the establishment of Badan Pengelola Air Limbah (BPAL). In other cities the responsibility is at Tingkat II level, either as a division of the local PDAM or as a new institution similar to the PDAM.

^{1/} Institutional Study for Jakarta Sanitation and Sewerage Project, 1989.
^{2/} PAM-Jaya is the Jakarta City Water Enterprise.

(e) Approaches to Community Participation

149. The construction of household sanitation facilities has generally been the responsibility of the householder with some financial assistance from Government on certain projects. Community participation in urban sanitation has primarily focussed on the community providing land for public sanitation facilities including ablution blocks, drains, solid waste disposal and pathways. During Pelita III the Kampung Improvement Program (KIP) introduced sanitation facilities to densely populated urban areas. These were designed by MPW and constructed or implemented in phases. The community was required to provide and for the construction and to maintain the facilities.

150. A further pilot program was undertaken which built onto the benefits of KIP and engaged an Indonesian Community Development Organization with community development workers to mobilize community programs whereby the community would benefit from the construction and facilities provided. These programs included economic activities and environmental improvement in which many poorly constructed drains were rebuilt by the community.

151. Recent pilot projects 1/ have commenced in which credit is offered to urban households for the construction of on-site sanitation facilities and in which the community approach is used. The level of interest and applications for credit has increased as the reliability of the credit arrangements has been established and proven. The UNICEF program for selected urban areas provides assistance to families and groups of families in the construction of their own on-site sanitation facilities. The families provide land and resources and design their own superstructure.

(f) External Financing and Donor Involvement

152. As described in paras 38 to 40 the construction of urban sanitation facilities financed from external sources commenced with KIP during Repelita III. These programs were directed to the densely populated urban areas. Further pilot program described in para 148 were introduced in Cirebon, Surabaya, Tangerang, Semarang, Ujung Pandang, Solo, Denpasar, Klaten, Palembang, Bojonegoro. These KIP projects were funded by ADB or IBRD. During Repelita V, three further pilot projects will commence. These include Jakarta Sanitation and Sewerage Project (IBRD/OECF funded), the UNDP Six Cities project and UNICEF.

3. Rural Water Supply and Sanitation(a) General

153. The rural population of Indonesia, presently estimated to be 125 million persons live throughout the country in some 61,942 rural desas distributed throughout 246 Kabupaten. Rural desas generally do not contain more than 2,000 persons. 2/ Nationally, each Kabupaten contain an average of about 250 desas. This figure can be as high as 500 desas in Java or as low as 100 desas in Irian Jaya.

1/ Urban poor community sanitation in Bandung, Surabaya, Semarang, Probolinggo, Palembang, Padang, Medan, Pasuruan, Pontianak, Banjarmasin.

2/ Typically, about 350 houses.

154. Most of the desa inhabitants lead relatively simple lives. In some areas this is now being influenced by the establishment of industrial, mining or tourist facilities. Usually levels of education are not high, most work in agriculture and many are in the lowest income groups in the country. Few have access to grid electricity and other public services. Traditionally, most have obtained their own water needs from local water sources, usually surface water sources or shallow dug wells. Many of these sources are now polluted due to non-protection and the existing environmental sanitation conditions.

155. In addition to the Governments programs in rural water supply, a considerable number of Non-Government Organizations (NGOs) and bilateral agencies have been active in this field.

(b) Rural Service Coverage

156. Achievements in the provision of rural water supply facilities through progressive Repelitas have raised the proportion of rural population with access to clean water from approximately 22 per cent at the end of Replita III (1984) to more than 30 per cent at the end of Repelita IV (1989).

157. Table 18 summarizes the past Repelita water supply service coverage achievements for Repelita III and IV. Table 19 summarizes the past Repelita sanitation achievements.

158. It should be noted that the figures in the above table refer to the rural population as defined under the Repelita IV plan. Upon the commencement of the Repelita V Plan (1 April 1989) the designation "rural" was amended to also include small IKK towns with populations between 3,000 and 10,000 persons. It is not presently known how many of these IKKs have changed from their previous "semi-urban" designation to "rural". The present service coverage in these rural IKKs could be higher than the average end of Repelita IV figure. However, it is more likely that these IKKs are also experiencing similar operational and maintenance problems to those reported for urban water supply systems. Hence, the active service coverage is probably significantly less.

159. Rural water supply systems are experiencing many similar operational and maintenance problems to those described for the urban subsector. An extensive survey ^{1/} completed in 1987, noted that only about 65 per cent of water facilities were functional and more than 60 per cent were used on a regular basis. Major problems noted within the implementation and operation of rural water supply systems included: (i) lack of interdepartmental and intersectoral coordination; (ii) lack of community involvement in the planning of facilities; and (iii) lack of adequate monitoring, reporting and record keeping at village level.

^{1/} Akademi Penilik Kesehatan Teknologi Sanitasi Jakarta and Yayasan Indonesia Sejahtera; 1987 UNICEF AND WHO: Evaluation of the INPRES Water Supply and Sanitation Programs.

Table 18. Previous Rural Water Supply Achievements

Item	Unit	Repelita Plan		
		III Achieved	IV Target	IV Achieved
Population Supplied	Per Cent	22	55	30.5
Type of Source:				
Spring water reservoir	No.		700	200
Artesan well	No.		340	100
Rainwater reservoir	No.		40,000	14,000
Shallow/deep well (handpump)	No.		325,000	204,000
Dug well	No.		22,500	44,600
Infiltration galleries	No.		570	
Spring protection	No.		1,400	1,030
Simple slow sand filter	No.		870	

Source: Chapter 18 of the Repelita III and IV Plan; Annual Report, Republic of Indonesia.

Table 19. Previous Rural Sanitation Achievements

Program	R e p e l i t a			
	I Cities a/	II Cities a/	III Cities a/	IV Cities a/
Household latrine	200	1,652,000	1,799,750	1,857,138
Communal latrine	-	-	420	663
Sullage disposal	-	-	30,825	83,356
Solid waste	-	-	-	-
Drainage	-	-	-	-

a/ Figures are cumulative.

Source: Departemen Pekerjaan Umum; 1987; GOI; Report on National Workshop and Conference with External Support Agencies on Water Supply and Sanitation.

160. Examination of the data available on rural water supply systems reveals the high reliability of systems when compared to urban water supply systems and the exceptionally high reliability of "passive" systems, i.e., those without any mechanized components. This data is summarized in Table 20.

Table 20. Survey of Serviceability and Use of Rural Water Supply Facilities

	Individual Facilities				Community Facilities	
	Shallow Well Handpump	Deep Well Handpump	Dug Well	Rain Collectors	Piped System	Protected Springs
Functioning	846	142	218	46	16	24
% of Total	65.4	55.9	94.0	61.3	94.1	88.9
Used	812	126	212	32	16	24
% of Total	62.9	49.6	91.4	42.7	91.1	88.9
Continuous	770	109	200	6	15	24
% of Total	59.5	42.9	86.2	8.0	88.2	88.9
Drinking/Cooking	140	32	21	22	3	3
% of Total	17.2	25.4	9.9	68.9	17.6	11.1
All purpose ^{a/}	622	82	176	4	12	21
% of Total	76.6	65.1	83.0	12.5	70.6	77.8
Clear Water	739	107	194	21	15	23
% of Total	91.0	84.9	91.5	65.6	88.2	85.2

^{a/} All purpose means the water is used for drinking, cooking, washing and bathing.

Source: Akademi Penilik Kesehatan Technology Sanitasi Jakarta and Yayasan Indonesia Sejahtera; UNICEF and WHO; Evaluation of the INPRES Water Supply and Sanitation Program.

161. As for the urban systems, rural water supply systems are not monitored on a regular basis for chemical water and bacteriological quality. Because of the remote location of many water sources, it is unrealistic to assume that total water quality monitoring could be achieved or is necessary.

162. Rural sanitation coverage at the end of Repelita IV was small. Reported ^{1/} figures are: (i) 7.5 per cent of the population had access to private latrines with septic tanks; and (ii) 37.5 per cent of the population utilize latrines. It has been observed that many septic tanks are not desludged at the appropriate time and many children do not use facilities, even when available.

163. Within the rural sector adequate sanitation facilities are more likely to be available to populations in rural IKK towns. The coverage at sub-IKK or desa, level is thus less than those stated above.

^{1/} GOI; 1989; Repelita V Program, Book II Chapter 18 and Book III Chapter 23.

(c) Service Levels and Design Technologies

164. Rural water supply systems are designed on the basis of various per capita water demands specified by DAB, DJCK. These per capita design demands, developed in previous Repelitas for rural IKKs and recently for sub-IKK rural communities, cover: (i) domestic consumption (house connection and public standpipe); (ii) non-domestic consumption (commercial, industrial and institutional); and (iii) an allowance for system losses. The service levels planned for Repelita V are those specified by DJCK, DAB and used in previous Repelitas. These are shown in Table 21.

Table 21. Repelita V Rural Water Supply Service Levels

Town Category	IV IKK, Rural	VI Sub-IKK
1994 population ('000s)	3 to 10	Below 3
Percentage of population to be served	60	60
Domestic demand (lpcd)		
Direct house connections	60	-
Standpipes	30	30
Average	45	30
Non-domestic demand (% of domestic demand)	5	-
Allowance for Unaccounted-for Water (% of Total Production)	15	15

Source: DAB, DJCK, 1989.

165. Field surveys 1/ 2/ confirm that these specified consumption levels continue to be appropriate. Table 22 summarizes findings on consumption per facility for sub-IKK level rural communities. The above data gives averages only and is broadly scattered when including most rural water supply projects presently under implementation in Indonesia. However, the design consumption per facility for sub-IKK communities as specified by DJCK, DAB is conservative and is more than adequate to meet average demands. For the rural IKK towns, domestic demand figures the same as for urban IKK towns are specified and these are considered appropriate.

1/ Akademi Penilik Kesehatan Teknologi Sanitas Jakarta and Yayasan Indonesia Sejahtera; 1987; UNICEF and WHO; Evaluation of the INPRES Water Supply and Sanitation Program.

2/ IWACO, WASECO; 1989; Depkes: Final Report, Interim Programme FY 1988-89, Rural Water Supply and Sanitation Program 1987-1992, West Java.

Table 22. Consumption per Rural Water Supply Facility

	Study Results				Repelita V Plan lpcd
	Average Families/ Facility	Average <u>a</u> / Person/ Facility	Average Liter Family	Average Consumption lpcd	
Shallow well handpump	13	78	110.0	18.3	40
Deep well handpump	15	90	91.3	15.2	50
Dug well	14	84	184.0	30.7	25
Rain Collector	10	60	36.6	6.1	7
Piped System	362	2,172	214.0	35.7	4,000
Protected Spring	61	366	143.0	23.8	200

a/ A rural household/family is considered to consist of six persons.

Source: DAB, DJCK, 1989.

166. The specified service levels for sub-IKK rural communities only provide water through public standpipes. There are however, situations where piped water supply systems and house connections are provided. Often, rural households have indicated that they would prefer to have and would be prepared to pay for a house connection from a piped water supply system. These consumer requirements should be determined in the early stages of the project planning and incorporated at detailed design stage if water source potential and the piped system hydraulics allow this.

167. Non-domestic consumption has been specified only for rural IKK communities. As for the urban situation, this appears appropriate but should be investigated for each situation during detailed design.

168. Non-Revenue Water (NRW) remains a problem in the rural sector, particularly for piped systems and more specifically where a water user group or system management association is not present or functioning. The specified allowance of 15 per cent of domestic demand is considered appropriate for situations where a water management association is present.

169. The technologies which should be applied in the rural areas are usually more simple yet more difficult to select correctly than those for urban areas. This is because:

- (i) rural water supply systems often service only a small number of consumers. In some instances, this may be only one family;

- (ii) available resources are limited; and
- (iii) it is unlikely that a full time operator or maintenance person/enterprise will be involved.

170. Rural sanitation technologies in current use are:

- (i) Ventilated Improved Pit (VIP) latrine.
- (ii) Pour flush (PF) latrines with single or twin pits.
- (iii) Pour flush (PF) latrines with septic tank and with or without effluent soakage pit or trench.
- (iv) Public toilets, using pour flush septic tank latrines or pit latrines.
- (v) MCKs.

171. Sanitation facilities installed under recent programs are more likely to be constructed to accepted public health standards than the older facilities which are often in an unsanitary condition. Notwithstanding, this 47 per cent of the sanitation facilities funded under the INPRES program are reported to be not used. ^{1/}

172. INPRES funding used for the sanitation program incorporated the same approach to community participation as for rural water supply well construction. Private household facilities are constructed and used but there are frequent examples of the latrines being abandoned when the pit is full. This indicates lack of acceptance of the technology.

173. Although past MOH and INPRES programs have undertaken major latrine construction programs, rural sanitation implementation has often been by the construction of demonstration units. Through parallel health education programs the community is encouraged to construct their own facilities.

174. Household drainage and solid waste management are components of sanitation in rural areas. At the rural level, however, little attention is often paid to these associated matters. It is only in the urban IKK town that some formalized solid waste management is practiced but these services are not extensive.

(d) Project Development Cycle Responsibilities

175. As described in para 112 and 115, it is the poor performance to date with many aspects of projects delivery which has also contributed to a low serviceability of installed rural water supply and sanitation facilities. The

^{1/} Akademi Penilik Kesehatan Teknologi Sanitas Jakarta and Yayasan Indonesia Sejahtera; 1987; UNICEF and WHO; Evaluation of the INPRES Water Supply and Sanitation Program.

method of delivery of the program is a constraint demonstrated by consideration of past experience with program delivery. In 1987, an evaluation ^{1/} was carried out of the INPRES (Presidential Instruction) Rural Water Supply and Sanitation Program. The review covered more than 3,000 facilities in three provinces (west Sumatra, West Java and West Nusa Tenggara). Difficulties faced by the review included: (i) lack of consistent records of available facilities; (ii) no records of actual location of facilities; and (iii) no written records of any kind in the villages in which the facilities were constructed.

176. While proposals are initiated from the "bottom" (the village), changes to the proposals (for financial or technical reasons) imposed from the "top" (Central Government) means that what actually happens has little relationship with original proposals and there is no mechanism to provide explanation as to why this is. As a consequence, the facilities constructed are seen to belong to the Government and to be the responsibility of the Government. Table 23 clearly shows that functionality and use of constructed facilities is very much lower than it should be. That only 61 per cent of the facilities constructed during Repelita IV (1984-1989) are reported to be still in use is dramatic demonstration of inadequacies in the program. Usage data is as reported rather than observed.

Table 23. Functionality and Usage of Facilities

	<u>Facilities</u>		<u>Functional Checked</u>		<u>Used</u>	
	No.	%	No	%	No.	%
Repelita II	355	100	170	48	135	31
Repelita III	1,576	100	1,183	75	984	62
Repelita IV	1,146	100	739	64	704	61

Source: Akademi Penilik Kesehatan Teknologi Sanitasi; 1987; Ministry of Health, GOI; Evaluation of the INPRES Water Supply and Sanitation Program.

177. Facilities which functioned poorly were rain collectors (only 43 per cent still in use), family latrines (48 per cent in use), and deepwell handpumps (50 per cent in use, but half required repair of some kind). Facilities which performed well were spring captures (89 per cent still in use), dugwells (92 per cent in use), and piped systems, 16 out of 17 of which were still in use. About average were shallow wells with handpump (63 per cent) and waste water disposal facilities (70 per cent).

^{1/} Evaluation of the INPRES Water Supply and Sanitation Program. Akademi Penilik Kesehatan Tehnologi Sanitasi, Jakarta and Yayasan Indonesia Sejahtera. For Ministry of Health, GOI Jakarta, May 1987.

178. Gravity piped water supply systems clearly have advantages in usefulness and serviceability and should be promoted wherever possible. While they are expensive in the short term, they are more cost effective in the long term. They may even be less demanding on Government resources in the short term if communities are permitted to contribute (labor, materials, land, and cash). Some 74 per cent of village water user groups still felt that they were not involved in the planning or selection of facility type. On the other hand, 78 per cent of user groups had contributed to the construction of facilities in some way. Not surprisingly, 61 per cent of groups stated that maintenance was not their responsibility.

(e) Approaches to Community Participation

179. The Government planning cycle requires that proposals be made by the Desa and this is often referred to as community participation in planning. In principle, annual project selection (the bottom up planning process) is derived from project proposals beginning at Desa or Kelurahan level with additional proposals added at each successive level (i.e., Kecamatan, Kabupaten province). The net result is that only about 10 per cent of community proposals submitted to Tingkat II level are implemented, and these often bear little or no relationship to the original submissions proposed. In practice, the project proposals tend to be a "wish list" resulting from lack of skill in community proposal preparation, and lack of information on available resources.

180. Review ^{1/} of the INPRES funding program approach indicates that the water user group is rarely involved in decisions regarding the location of the facility. Usually, the planning of the location is handled by Desa leaders with Health Department personnel. Also, the community are not informed that the INPRES funding system for wells provides a set amount of money for labor and materials. The user group is expected to provide the labor and materials necessary to complete the well. This community input is often referred to as community participation. The finishing off of a planned facility is also regarded by the Government as cost sharing and a form of community participation.

181. This situation contrasts that in Thailand where up to 80 per cent of the rural communities water supply and sanitation proposals are implemented. Shortcomings in the present delivery systems adopted by the Government and its agencies have been identified as:

- (i) community proposals for facilities, if received are not usually proceeded with or the community consulted regarding modifications which may make the proposal unsuitable for implementation;
- (ii) communities are provided with facilities they have not asked for or do not want;

^{1/} Akademi Penilik Kesehatan Teknologi Sanitas Jakarta and Yayasan Indonesia Sejahtera; 1987; UNICEF and WHO; Evaluation of the INPRES Water Supply and Sanitation Program.

- (iii) the community received little preparation or consultation before project implementation;
- (iv) the community are seen as recipients and not participants in the project;
- (v) community contributions to provide labor are sometimes ignored; and
- (vi) community organizations, such as PKK, Pramuka, LKMD and Posyandu, are often used to promote community participation in self-help projects, but rarely have sufficient funds or skills to undertake these activities effectively.

182. The consequence of the limited involvement of the rural villages in planning, locating, funding and constructing facilities is their limited sense of ownership and responsibility. This leads to a limited understanding of the value of the facility or desire to maintain it. These field study findings 1/ 2/ relate equally to the IKK and sub-IKK level rural communities.

183. While the Government continues to plan, design and construct rural water supply facilities in a centrally prescribed manner, it is difficult to see that the rural communities access to a safe, reliable water supply can be significantly improved in the long term. The Government is presently implementing a rural water supply and sanitation project in Bengkulu and Lampung provinces 3/ with INPRES funds and WHO/UNDP assistance, which proposes to build community participation on the development of environmental health facilities and yet few funds are provided for community motivation. No funds are provided to stimulate desa activity. The INPRES funds, of which Rp100,000 is available per desa are used for training and not as stimulant funds. These reports state that progress for the first five months of project implementation was good, but since that time, the following ten months saw little progress. Problems were identified as:

- (i) the kader trained in each desa to carry out health education, community water source survey and community environmental health needs survey and to encourage community activity lack skills, lack aids and lack of guidance;
- (ii) many kader have dropped out of the project;
- (iii) the sanitarians who provide supervision of and support for the katers lack mobility;

1/ AIDAB, DHV, IWACO, 1984; Cipta Karya; Report of the IKK Review Mission.
2/ Akademi Penilik Kesehatan Teknologi Sanitasi Jakarta and Yayasan Indonesia Sejahtera 1987; UNICEF and WHO; Evaluation of the INPRES Water Supply and Sanitation Program.
3/ S. Nugroho, 1989; WHO/UNDP/DEPKES; RWSS Project, Bengkulu and Lampung provinces.

- (iv) the community have been given a great deal of information, but are not able to apply it due to lack of project funds for hardware; and
- (v) the community have expressed that their primary need in the desa is for food not environmental health.

184. Whereas there are an increasing number of rural water supply and sanitation projects funded by bilateral foreign or local private NGO organizations, which are implementing highly successful projects with high levels of community motivation, participation and involvement in the ongoing operation and maintenance of the installed facilities. These projects are usually based upon the following:

- (i) a high priority for community participation in all aspects of project planning, design, construction and operation based upon the formation of community water user groups and the concept of community ownership;
- (ii) the engagement of specialist community motivators to live and work within the community to assist them in articulating their needs and requirements in improving their understanding of the benefits of a cleaner, healthier living environment and in realizing economic benefits from time saved;
- (iii) a cooperative relationship between the technical, community and administrative components, which jointly establishes the approach to planning, implementation and management which recognizes community ownership;
- (iv) the involvement and integration of Government counterpart agencies into the overall project planning and construction technical assistance support to the community as their needs require;
- (v) the provision of counterpart financial contributions in proportion to the funds raised by the community for project implementation as assistance to the community; and
- (vi) the establishment of a sustainable desa level water user association within the LKMD operating, maintaining and managing their own water supply and sanitation facilities.

185. While it must be acknowledged that a bilaterally or privately funded rural development project may have different management and financial systems to that of a Government sponsored project, there must be great concern that the apparent results should be so diametrically opposite.

(f) External Financing and Donor Involvement

186. Foreign assistance for rural water supply and sanitation programs prior to 1980 was primarily through projects carried out by Indonesian Community Development Organizations and Appropriate Technology Organizations with funding

from foreign NGOs based in Australia, England, Netherlands, USA and West Germany as well as bilateral agency funding from USA and Canada. The only bilateral project in rural water supply and sanitation prior to 1980 was the project in West Java carried out by the Netherlands Government. In 1980 at the commencement of the IDWSSD and following the Decade Workshop held in Bali in 1981, an increase in assistance to the government program was provided by UNICEN, WHO and UNDP with materials technical assistance and research and development for relatively major programs in NTB, S.E. Sulawesi, South Sulawesi, Central Java, DI Yogyakarta and West Sumatera provinces. WHO commenced assistance to a major rural water supply and sanitation project in Bengkulu and Lampung provinces in 1987. The project aims to raise access to these facilities for rural communities to 65 per cent. Since that time, further bilateral projects have been implemented by Australia, France (rural IKK) in addition to the funding to the Indonesian Community Development Organizations working in these subsector programs. CARE Indonesia commenced work in 1980 with funding from USA and Canada.

187. A number of IKK schemes are presently underway. These are being funded by ADB (Loan No. 731-INO, February 1985) for 125 IKK in Central Java, DI Yogyakarta, South Sumatera and Lampung provinces. A second phase for 125 IKK project is also planned. The bilateral agencies of Australia (Eastern Island, Sumbawa IKK project - 26 towns), Denmark 51 IKK in West Java) and the Netherlands (West Java Rural Water Supply and Sanitation Project) have also been active in the subsector and the bilateral agencies of Australia, Denmark and Netherlands. Some of these projects are now quite heavily modified from the original IKK technical approach design concept and focus strongly on the need to inform the community and encourage genuine community participation.

III. DEVELOPMENT STRATEGY AND SECTOR ISSUES

A. Medium Term Development Plan - Repelita V (1989/90 to 1993/94)

1. Population

188. The rate of population growth in Indonesia is slowing due to a successfully implemented family planning control program. Over the decade 1961-1971 the national population growth rate was 2.10 per cent per annum. The 1970s saw this rate rise to 2.32 per cent per annum, however, during the period 1980 - 1985 the rate fell appreciably to 2.15 per cent per annum. This rate is expected to fall further to 1.6 per cent per annum by the year 2000, and to 1.4 per cent per annum by the year 2005.

189. The population growth rate is not uniform. These rates are influenced by inter-island migration as well as the Government's transmigration programs. Table 24 shows the variation by island group.

Table 24. Population Growth Rates (per cent per annum)

Island Group	1961-1971	1971-1980	1980-1985
Sumatera	2.86	3.32	3.08
Java	1.91	2.02	1.81
Nusa Tenggara	1.78	2.01	1.93
Kalimantan	2.34	2.96	2.81
Sulawesi	1.90	2.22	2.11
Maluku/Irian Jaya	2.69	2.79	2.88
Average	2.10	2.32	2.15

Source: Biro Pusat Statistik; 1988; GOI; Statistik Indonesia.

190. Using these projected growth rates Table 25 shows the population projections for Indonesia.

Table 25. Population Projection

Year	Population (million)	Growth Rate (% per annum)
1985	164.6	-
1990	182.7	2.10
1995	199.6	1.79
2000	216.1	1.60
2005	231.4	1.38

Source: Biro Pusat Statistik, 1988; GOI, Statistik Indonesia.

191. The absolute magnitude of the population, the population drift from rural areas to urban centers and the uneven population densities throughout the main island groups (see Table 1), have important implications for the size and nature of demand for water supply and sanitation services.

2. Demand Trends

192. Urban populations require water supply and sanitation services at a higher level than rural populations, and if these are not provided the adverse effect on public health and the environment is pronounced. As urban communities become more affluent, particularly the growing middle class, their per capita demands for water are expected to increase, also increasing their wastewater generation. Urban communities are generally reliant upon the government to provide these services since the nature of the technology precludes the self-help approach. Thus, while Repelita V policies provide an emphasis to the rural sector, the majority of the public investment in monetary terms is still directed to urban areas.

193. The growing sophistication of middle class urban populations is creating changes in the demand pattern for water supply and sanitation services. Instances of this are:

- (i) The preference for house connected water supply over public standpipes.
- (ii) The preference for water sealed toilets and for septic tank facilities over twin or single pit types. ^{1/}

194. These strong preferences are also reflected in rural area demand. It is therefore important that future programs be flexible in the service standards they offer otherwise the facilities will be rejected by the recipient communities.

3. Water Supply and Sanitation Development Plan

(a) General

195. National targets for water supply and sanitation coverage are summarized in the Repelita V (1989/90 to 1993/94). This plan incorporates the following major national objectives, many of which are applicable to development in the water supply and sanitation sector;

- (i) the promotion of non-oil exports;
- (ii) employment generation and human resource development;
- (iii) poverty alleviation;
- (iv) greater participation of the private sector in the development process; and
- (v) increasing the productivity and efficiency of existing investment through emphasis on operation and maintenance.

^{1/} The preference for septic tanks over pits is largely based on misconception of technical and environmental superiority.

196. The proportion of total budget for the Housing and Human Settlement sector has been increased from 3.4 per cent in Repelita IV to 6.1 per cent in Repelita V, an increase of 79 per cent, (see Table 3). Water supply and sanitation (including solid waste and drainage) and environmental health facilities are components within this sector. This large increase in the relative budget allocation for the Housing and Human Settlement sector is most significant and underlies the Government's determination to achieve effective development in this area. The major proportion of this increase is to be directed to water supply and sanitation programs. This expenditure target while appearing ambitious when viewed in the context of past Repelita programs is required simply to ensure that reasonable service coverage can be maintained for an ever increasing population. Target service coverage levels of 80 per cent for urban and 60 per cent for rural communities have been set. Considering the fact that many existing facilities may not be operating at full capacity, the target objectives presented could be optimistic.

197. The general policies to be applied to urban development within Repelita V include:

- (i) Infrastructure provision, in principle, will be within the authority and responsibility of local governments.
- (ii) Planning and programming for urban development will be decentralized and integrated.
- (iii) Further strengthening of local government capabilities and resources will be undertaken.
- (iv) The financing system for urban infrastructure development will be improved and strengthened.

198. The concept of integrated development of infrastructure elements, commenced during Repelita IV with the IUIDP (Integrated Urban Infrastructure Development Program), is being further strengthened for Repelita V. Water supply and sanitation are components of comprehensive plans to improve the living environment in both urban and rural areas. These improvements in cleanliness and environmental health are to be achieved through the development of approaches which enable greater participation and responsibility by the community towards the maintenance of their living environment.

199. Through previous Repelita programs water supply and sanitation activities were grouped within the designation and program categories shown in Table 24. From Repelita V, MPW propose that the designation "semi-urban" should no longer be used and that the IKKs should be designated either urban or rural as shown in Table 26. For Repelita V the designations urban and rural only will be used. Larger IKKs remain designated as urban while smaller IKKs become rural. Both will continue to be serviced by a "modified" IKK design approach.

Table 26. Community Categories

Designation	Category	City Size	Program	Designation
Urban	I	Metropolitan City > 1,000,000	IUIDP	Urban
Urban	II	Large City 500,000 to 1,000,000	IUIDP	Urban
Urban	III	Medium Town 100,000 to 500,000	IUIDP	Urban
Urban	IV	Small Town 20,000 to 100,000	IUIDP	Urban
Semi-Urban	V	IKK Town 10,000 to 20,000	IKK	Urban
Semi-Urban	VI	IKK Rural Town 3,000 to 10,000	IKK	Rural
Rural	VII	Sub-IKK Town < 3,000		Rural

Source: MPW, Bina Program, 1989.

(b) Urban Water Supply

200. During Repelita V, it is proposed to provide water supply services to an additional population of approximately 13 million people through 1,600,000 house connections for 11,200,000 persons and 17,900 public standpipes for approximately 1,800,000 persons. It is estimated that 33 per cent of the population will continue drawing water from private systems. Table 25 summarizes the present condition and targets for urban water supply systems. With the exception of large metropolitan cities, urban water supply programs for Repelita V will be implemented as components of IUIDP programs. Metropolitan areas will be developed through either area specific integrated infrastructure development programs 1/ or sector specific development programs within the metropolitan area 2/.

201. The urban water supply program will have the following priorities:

- (i) utilization of excess production capacity;

1/ For example the Bandung Urban Development Program.

2/ For example the Metro and Large Cities Urban Development Program.

- (ii) rehabilitation, including reductions in water losses;
- (iii) construction of new systems; and
- (iv) extension of existing system.

202. These programs, as shown in Table 27, will emphasise further development and rehabilitation of existing infrastructure. This emphasis acknowledges that a significant proportion of existing facilities are not operating as designed or to their design capacity. It is noted that there is a discrepancy in the additional population to be served as shown in Table 27 when compared with Repelita V targets. It is believed that the higher figure given in Table 25 includes the population who will benefit from the rehabilitation of existing systems.

203. The targets as planned are bold. For example, where Pelita IV provided water supply to an additional 5.48 million urban people, Repelita V plans to increase the urban population provided with water service by 12.90 million, an increase of 235 per cent.

Table 27. Repelita V Urban Water Supply Program

Size of Town	No. of Projects	Additional Population to be Served	Type of Activity <u>a/</u>				Total
			I	II	III	IV	
>1,000,000	8	2,515,000	3	4	0	7	14
500,000 to 1,000,000	11	1,980,000	7	4	0	11	22
100,000 to 500,000	68	3,389,000	48	25	5	58	136
20,000 to 100,000	365	5,009,000	153	36	186	113	388
10,000 to 20,000	365	1,705,000	106	14	251	50	421
Total	817	14,598,000	317	833	442	2,339	1,081

a/

- I Utilization of existing capacity
- II Rehabilitation
- III New System
- IV System extension

Source: Cipta Karya, 1989; GOI, Kebijakan operasional Repelita V, Program Air Bersih

204. Priority is to be given to areas that lack clean water, areas vulnerable to communicable diseases and urban transmigration areas. Programs will also be directed to meeting the needs of the urban poor. Provision of piped water supply systems in urban areas is the responsibility of Government. Notwithstanding this, the community and its leaders should be actively consulted from planning stages through to implementation and operation.

205. For urban populations planned to receive non-house-connection water supply (i.e. public standpipes) the program will incorporate intensive communication, information transfer and community education. This should be at all stages of the program.

206. The provincial distribution of proposed urban water supply expenditure is shown in Table 28.

Table 28. Proposed Repelita V Targets for Urban Water Supply

ADMINISTRATIVE NAME	TOTAL PERSONS SERVED END OF REPELITA IV (Million)	ADDITIONAL PERSONS TO BE SERVED IN REPELITA V (Million)		COST ESTIMATE (\$ Million)		TOTAL
		BIG CITY	SMALL CITY	BIG CITY	SMALL CITY	
DI ACEH	376	0	96		3	3
SUMATERA UTARA	1,262	466	346	74	23	97
SUMATERA BARAT	485	119	50	19	0	19
RIAU	306	0	241	0	41	41
JAMBI	270	0	79	0	7	7
SUMATERA SELATAN	843	309	221	25	25	50
BENKULU	150	0	33	0	1	1
LAMPUNG	300	146	106	56	13	69
DKI JAKARTA	1,793	2,200	0	19	0	319
JAWA BARAT	2,682	1,201	1,299	265	182	447
JAWA TENGAH	1,821	607	1,064	102	137	239
DI YOGYAKARTA	318	178	44	11	1	12
JAWA TIMUR	3,003	775	1,274	143	114	257
BALI	398	0	149	0	5	5
NUSA TENGGARA BARAT	238	0	59	0	23	23
NUSA TENGGARA TIMUR	234	0	96	0	4	4
TIMOR TIMUR	35	0	19	0	0	0
KALIMANTAN BARAT	252	122	70	12	3	15
KALIMANTAN TENGAH	168	0	68	0	3	3
KALIMANTAN SELATAN	431	145	61	6	1	6
KALIMANTAN TIMUR	257	119	190	12	10	22
SULAWESI UTARA	458	0	153	0	2	2
SULAWESI TENGAH	169	0	58	0	0	0
SULAWESI SELATAN	692	295	209	21	3	24
SULAWESI TENGGARA	137	0	47	0	0	0
MALUKU	169	0	80	0	16	16
IRIAN JAYA	142	0	108	0	5	5
TOTAL	17,389	6,681	6,220	1,064	622	1,686

Source: Cipta Karya, 1989; GOI, Program Repelita V Bidang Cipta Karya Dan Program Tahuman 1, 1989/90.

(c) Urban Sanitation

207. A mix of human waste and wastewater technologies will be determined in each urban area to provide the most technically appropriate and cost effective programs to suit local needs and conditions. These should follow the national guidelines. Priority is to be given to providing human waste disposal facilities for populations suffering the most unsanitary conditions. Further priority is given to rehabilitation and proper operation and maintenance of all existing facilities. Rehabilitation of existing Dutch built sewerage systems and community toilets will be undertaken wherever feasible.

208. It is planned that all ongoing major city sewerage projects be completed during Repelita V to the extent where they are operational. New sewerage projects will be undertaken during Repelita V only in areas where on-site disposal systems are not feasible, or in areas where they can be locally afforded.

209. Community toilet projects will be greatly extended with much greater community participation, and coordinated with financial assistance programmes for private and shared facilities. Community toilets will generally be installed for defined small groups of families. Larger facilities can be constructed at markets and bus stations for unrestricted use.

210. It is planned to improve on-site disposal operation and maintenance by:

- (i) investigation of the causes of septic tank/leaching system failures;
- (ii) provision of better septage services; and
- (iii) establishing proper facilities for septage disposal.

211. Central Government will give special assistance to regions which have the greatest needs and where there is high development potential, especially in tourism. Proposed Repelita V targets for urban sanitation are shown in Table 29. This table includes solid waste management and human waste disposal but excludes drainage as no data was available.

Table 29: Proposed Repelita V Targets for Urban Sanitation

ADMINISTRATIVE NAME	SOLID WASTE			HUMAN WASTE		
	NO. OF TOWNS TO BE SERVED		TOTAL COST	NO. OF TOWNS TO BE SERVED		TOTAL COST
	BIG CITY	SMALL CITY	CITY	BIG CITY	SMALL CITY	
	No.	No.	\$ (million)	No.	No.	\$ (million)
DI ACEH	0	11	0.1	0	2	0.4
SUMATERA UTARA	1	26	3.3	1	10	12.3
SUMATERA BARAT	1	7	0.4	1	1	1.9
RIAU	0	17	0.6	0	7	2.7
JAMBI	0	5	0.2	0	2	1.1
SUMATERA SELATAN	1	22	2.6	1	6	9.2
BENKULU	0	4	0.1	0	1	0.2
LAMPUNG	1	11	1.6	1	3	5.1
DKI JAKARTA	1	0	13.0	1	0	47.1
JAWA BARAT	4	65	14.7	4	39	39.4
JAWA TENGAH	3	55	5.9	3	29	24.3
DI YOGYAKARTA	1	9	0.2	1	2	1.7
JAWA TIMUR	2	73	6.6	2	37	22.3
BALI	0	15	0.3		4	0.9
NUSA TENGGARA BARAT	0	10	0.6		5	2.7
NUSA TENGGARA TIMUR	0	15	0.2		3	1.0
TIMOR TIMUR	0	4	0.1		2	0.4
KALIMANTAN BARAT	1	6	0.4		2	2.2
KALIMANTAN TENGAH	0	8	0.6		2	0.3
KALIMANTAN SELATAN	1	7	0.3		2	2.2
KALIMANTAN TIMUR	1	9	0.1		6	3.1
SULAWESI UTARA	0	10	1.2		5	1.4
SULAWESI TENGAH	0	6	0.1		1	0.1
SULAWESI SELATAN	1	23	0.2		6	2.8
SULAWESI TENGGARA	0	4	0.1		1	0.1
MALUKU	0	4	0.2		2	1.0
IRIAN JAYA	0	8	0.1		3	1.0
	19	423	54	15	181	187

Source: Cipta Karya, 1989; GOI; Program Repelita V Bidang Cipta Karya Dan Program Tahunan 1, 1989/90.

212. Sixty seven cities have been identified as suitable targets for major drainage projects with projects already proceeding in some areas. Table 30 shows the distribution of these targets together with an indication of those projects already underway.

Table 30. Target City Distribution for Urban Drainage Program

City Category	Population Range	Target Cities		Project Underway	
		No.	Total Population (million)	No.	Total Population (million)
Jakarta	> 1	1	11	1	11
Metro	> 1	5	11	5	11
Large	0.5 to 1.0	7	6	2	2
Medium	0.1 to 0.5	23	6	7	2
Small	> 0.1	31	2	1	.072
Total		67	36	16	26

Source: Haskoning, Rayakonsult, 1989; MPW, Urban Sector Drainage and Flood Protection Study, Position Paper No. 4, Urban Flood Protection under Repelita V.

(d) Rural Water Supply and Sanitation

213. In addition to the general policies which are to be applied in Repelita V, and were outlined earlier, the following rural development policies will apply specifically for development in rural areas:

- (i) Special attention will be given to increased rural, development to ensure appropriate balance between urban and rural areas. Rural housing action improvement program will include rural water supply and sanitation. Program will also provide infrastructure support for rural growth centers.
- (ii) Whenever appropriate, budget provision for rural development will give priority to self-help schemes.
- (iii) Particular attention, is to be given to the problems of fishing villages, less developed areas, border village and villages prone to natural disasters.

214. Government funding will be provided through Inpres, sectoral programs and community self-help. The Government will also provide physical assistance, pilot projects, training and information campaigns.

215. Provision of rural water supply and sanitation facilities during Repelita V will be through the INPRES program as well as through sectoral programs.

216. While the Government has an obligation for the provision of clean water and sanitation in rural areas these facilities are generally provided of the community themselves is basically the responsibility of the community itself. Government support is in the form of technical assistance with infrastructure, communication, information and education, pilot projects, technical, management training and financial grants.

217. The selection of participating communities must be appropriate. Priority is to be given to areas that lack clean water, and adequate sanitation, fishermen villages, transmigration areas vulnerable to communicable diseases and rural growth centers. 1/

218. For rural areas lacking awareness of the importance of clean water and sanitation, the program will incorporate intensive communication, information transfer and community education. The community and its leaders will be encouraged to be actively involved from the planning stages to the operation and maintenance of the facility.

219. For Repelita V, it is proposed that clean water supply be provided to a further 41 million persons in the rural areas. This would raise total coverage in these areas to 60 per cent. To achieve this target, it is planned to install 3,000 piped systems, 2,320 for IKK towns (population 3,000 to 10,000) and 680 in desa (villages) with a population less than 3,000. A further 25,000 desa systems are to be installed by rural communities mainly utilizing their own resources following the construction of pilot projects (demonstration facilities) by the Government.

220. As for urban, the rural programs will emphasize the full utilization of existing facilities. As shown in Table 29 approximately 15 per cent of the IKK rural piped systems will be based on the expansion of existing capacity and systems. For community populations of less than 3,000 persons water supply will in general be non-piped systems with no individual house connections. For rural communities with population in the range 3,000 to 10,000 persons piped water supply systems with house connections are planned. 2/ The proposed MPW, DAB rural water supply program and work schedule is given in Table 31.

1/ Certain rural communities have been designated as rural growth villages indicating a potential to grow rapidly in both size and economic importance.

2/ Piped system could be improved or adjusted IKK systems. A term in current use is "modified IKK schemes", although this does not dictate specific modification to earlier standards.

Table 31. Repelita V Rural Water Supply Program

Size of Town	No. of Towns	Additional Population Served	Type of Activity a/				Total
			I	II	III	IV	
3,000 to 10,000	2,320	10,548,000	303	0	1,982	35	2,320
< 3,000 (Piped System)	680	1,402,000	0	0	680	0	680
< 3,000 (Non-Piped System) b/	25,000	29,750,000	0	0	25,000	0	25,000

a/ I Utilization of existing capacity
 II Rehabilitation
 III New System
 IV System extension

b/ Through community participation

Source: Cipta Karya, 1989; GOI, Kebijakan operasional Repelita V, Program Air Bersih.

221. It is further Government Policy that rural water supply facilities will always be planned and implemented in conjunction with sanitation improvement programs.

222. Rural population is expected to grow to 131.8 million persons by the end of Repelita V. Coverage targets for rural sanitation for Repelita V are 79 million persons utilizing latrines and 62 million persons with adequate household facilities. In terms of persons to be provided with facilities during Repelita V this represents an additional 32 million to be using latrines, including an additional 27 million ^{1/} persons with household facilities. The sanitation program will cover 5,000 desa. These targets are bold.

223. Communal or public facilities will need to be constructed for those households who are not included in the Repelita V program. Some rural communities that have been provided with water supplies, particularly IKKs, under previous Repelitas will be provided with sanitation programs during Repelita V.

^{1/} The figure of 27 million persons is approximate only since 1988 coverage in this category is not known.

224. The proposed Repelita V expenditure program for rural water supply and sanitation by province is shown in Table 32.

Table 32. Proposed Repelita V Expenditure Targets for Rural Water Supply and Sanitation

ADMINISTRATIVE NAME	SANITATION		WATER SUPPLY	
	RURAL DESAS No.	TOTAL COST (Public) \$ (Million)	RURAL Population Persons ('000)	TOTAL COST (Public) \$ (Million)
DI ACEH	120	0.9	1,820	30
SUMATERA UTARA	267	2.2	4,501	12
SUMATERA BARAT	143	1.0	2,154	14
RIAU	90	0.6	1,315	9
JAMBI	68	0.5	1,016	7
SUMATERA SELATAN	168	1.3	2,623	18
BENKULU	40	0.3	571	4
LAMPUNG	193	1.4	2,954	20
DKI JAKARTA	0	0.0	0	0
JAWA BARAT	909	6.9	14,480	97
JAWA TENGAH	902	6.8	14,369	96
DI YOGYAKARTA	97	0.7	1,488	10
JAWA TIMUR	981	7.4	15,639	105
BALI	93	0.7	1,424	10
NUSA TENGGARA BARAT	109	0.8	1,686	11
NUSA TENGGARA TIMUR	119	0.9	1,840	12
TIMOR TIMUR	26	0.2	352	2
KALIMANTAN BARAT	100	0.7	1,530	10
KALIMANTAN TENGAH	59	0.4	878	6
KALIMANTAN SELATAN	77	1.6	1,167	8
KALIMANTAN TIMUR	25	0.2	340	2
SULAWESI UTARA	79	0.6	1,203	8
SULAWESI TENGAH	60	0.4	890	6
SULAWESI SELATAN	214	0.6	363	23
SULAWESI TENGGARA	46	0.3	676	5
MALUKU	62	0.4	931	6
IRIAN JAYA	53	0.4	789	5
	4,980	37	78,180	506

Source: Cipta Karya, 1989; GOI, Program Repelita V Bidang Cipta Karya, Dan Program Tahunan I, 1989/90.

(e) Water Quality Monitoring

225. Water quality issues and monitoring programs for Repelita V are the responsibility of MOH. This work, together with the community involvement programs form fourteen sub-programs to be run during Repelita V.

226. Water quality program targets are listed in Table 33.

Table 33. Water Quality and Monitoring Program Targets

Item	Value	Unit
Water quality programs	297	programs
Water system quality programs	296	programs
Testing laboratory establishment	286	laboratories
Sampling and testing	350,000	samples
Water system inspections	480,000	inspections

Source: MOH, 1989.

(f) Expenditure Plan

227. The plans and sectoral targets for Repelita V expenditures, especially in urban areas, were based upon major studies carried out during the period from late 1987 to early 1989. These studies covered each of the major infrastructure subsectors and, for present purposes, included the following:

- (i) Water Supply Sub-Sector Studies for Urban Areas.
- (ii) Human Waste and Waste Water Disposal Subsector for Urban Areas.
- (iii) Urban Sector Drainage and Flood Protection.

228. Table 34 provides data on the planned Repelita V DIP and external agency funding investments within the various programs of the Housing and Settlements sub-sector. Past achievements indicate that with the mobilization of local government investment (domestic loans, INPRES and APBD funds) the figures provided in Table 34 would be expected to increase by some 30 to 35 per cent. This data is subject to final confirmation by Cipta Karya.

Table 34. Housing and Settlements Sub-sector Expenditure
Repelita V (\$ million)

Program Component	Annual Expenditures					Total a/ b/		
	1989 1990	1990 1991	1991 1992	1992 1993	1993 1994	Local c/	Foreign	Total
Public Housing	112	171	229	287	346	383	763	1,146
Water Supply								
- urban	159	253	337	421	515	260	1,426	1,686
- rural	48	76	101	126	155	304	202	506
Sanitation								
- urban sewerage	14	24	32	41	51	30	133	163
- rural sewerage	3	6	8	9	12	32	6	38
- solid waste	5	9	12	15	19	24	36	60
- drainage	10	17	23	29	37	17	99	116
TOTAL a/	350	557	743	928	1,135	1,050	2,664	3,714

a/ Totals may not add due to rounding.

b/ Figures include Tim Koordinasi October 1989 review.

c/ Local refers to DIP Murni.

Source: Documents of Directorate General of Human Settlements, 1989.

229. The significant features of Table 34 are:

- (i) of the total expenditure of Rp 6,573 billion (\$3,714 million) some Rp 3,880 billion (\$2,192 million), or 59 per cent, is planned for water supplies.
- (ii) A further 31 per cent of the expenditure is planned for the public housing program.
- (iii) the remaining 10 per cent is spread between the sub-sectors of human waste, solid waste and drainage.

230. Analysis of the data given in Tables 26, 27, 29 and 31 indicated that 77 per cent of all water supply expenditures (Rp 2,984 billion or \$1,686 million) is planned for urban areas of which 63 per cent (Rp 1,880 billion or \$1,062 million) is planned for metropolitan or large cities.

231. Geographically, 75 per cent of all expenditures will be in Java (including Jakarta) thus, reflecting the population concentration of Java. Ninety per cent ^{1/} of all sanitation sector expenditure will take place in urban areas, of which 65 per cent is planned for metropolitan and large cities.

^{1/} This figure assumes that all planned solid waste and sanitation programs will be for urban areas.

232. To achieve the targets, some 72 per cent of the funds will need to be provided from external assistance. Table 35 provides an approximate summary of the source of foreign funds for Repelita V expenditures. "Committed" funds represent commitments to new and ongoing projects. "Pipeline" funds represent estimates of likely funding for projects which are currently in various stages of preparation. "Identified" funds are those for which potential projects have only been broadly identified and on which little or no preparation has been carried out.

233. As would be expected the "committed" funds show a declining trend from 1989/90 to 1993/94 while "identified" funds show that the planning is for a strongly rising trend.

Table 35. Repelita V Funding Sources (\$ million)

Program Component	1989 1990	1990 1991	1991 1992	1992 1993	1993 1994	Total	Total Program Cost
Required Foreign Funds <u>a/</u>	251	400	533	666	815	2,664	-
Available Funds <u>b/</u>							
- committed	216	146	150	84	61	657	1,052
- pipeline	0	61	155	191	163	570	855
- identified	0	24	134	262	306	726	1,142
Total	216	231	439	537	530	1,953	3,049
% Availability <u>c/</u>	86%	58%	82%	81%	65%	73%	

a/ Required to meet the planning targets of the Repelita V.

b/ From all foreign sources, multi-lateral and bilateral as at July 1989.

c/ Based upon total committed, pipeline and identified project funding as a percentage of required funding.

234. If the total anticipated "available" foreign funding shown in Table 35 (Rp 3,456 billion or \$1,953 million) is compared with the total "required" external assistance funding (Rp 4,715 billion or \$2,644 million) an apparent shortfall amounting to Rp 1,259 billion or \$711 million may be noted. The shortfall in external assistance funding availability at this very early stage in Repelita V appears to be about 27 per cent of the Directorate General of Human Settlements subsector requirement. This should not be a cause of too much concern.

235. Available data indicates that the planned annual rates of expenditure will be more than treble between the first year (1989/90) and the last (1993/94). The rate of increase in expenditure is planned to be an ambitious 27 per cent per annum.

236. Repelita V budget proposals for the MOH Water Quality Surveillance and Control Program and Community Participation Campaign, which support the water supply and sanitation Repelita V programs have been only partially funded. The Government has been provided only as counterpart funding to foreign-assisted projects (WHO, UNICEF, Australia and Netherlands bilateral programs). It is expected that further funds will be available as new externally assisted projects are implemented. The present Repelita V expenditure allocation is Rp30.2 billion of which Rp5.0 billion is marked for 1989/90. In addition to this allocation MOH has received a further special budget allocation of Rp300 million for the implementation of these support programs (1989/90) in coastal and poor communities.

B. Technical Issues

1. Resources Allocation and Location Selection

(a) General

237. Repelita V programs in water supply and sanitation can only be effectively planned and implemented if emphasis is placed on the issues of: (i) equity of resource allocation; and (ii) appropriateness of program and project locations. A number of Government agencies have developed their own methodologies of rural project location selection. Each use different basal data and methodologies. Differing criteria are also used for allocation of Central Government funds within each sub-sector to regions, provinces or kabupatens.

238. A general model has been developed by NUDS that can be used as a basis for the allocation of funding for the urban infrastructure services, to assist the IUIDP program.

239. There is a clear need to develop a uniform approach that can be used by all subsectors to:

- (i) Allocate funds 1/ on a regional, provincial or kabupaten basis
- (ii) Select locations where project activities should occur.

(b) Urban Programs

240. The model developed by NUDS is considered appropriate for use by the IUIDP programs. This model is also appropriate for major metropolitan areas and could be modified to produce a useful selection process for the urban towns. The model results can be aggregated on a provincial or regional basis to provide some guidance in the relative needs of each area. This provides guidelines for the allocation of resources to each area.

(c) Rural Programs

241. Rural programs provide more difficulties in funding allocation and project location selection because: (i) there are a much greater number of locations to be selected and funded; (ii) the project activity occurs at a lower administrative level; and (iii) the involvement of the community in all project activities is more critical.

1/ Proposed per capita cost models for water supply have been developed.

242. In the development of any models for rural funds allocation and site selection, it is essential to make a clear distinction between these two objectives, and to ensure that the process for each is applied at the correct level of administration. The following principals should be incorporated in program planning models and in their application:

- (i) The Central Government should not attempt to allocate funds to to/or select individual rural project locations.
- (ii) The Central Government should allocate program funds to each Kabupaten using an allocation model that takes into account (with suitable weighting factors) the following criteria: population, income, community health, geographical, and physical factors, community requirements, and extent of previous development.
- (iii) Project site location selection should be undertaken at Kabupaten level using nationally adopted guidelines.
- (iv) Desa level communities should identify projects that accord with their needs. These should be submitted to Kabupaten level for consideration.
- (v) Selection of projects at Kabupaten level should in general only be from those project requested by the community. If other projects are proposed for funding by the Kabupaten level, they should be discussed with the community first and only considered if the recipient community wants them.
- (vi) Kabupaten project selection guidelines should incorporate the following criteria (with suitable weighting): (i) community's desire for project; (ii) community's ability to fund and operate facilities; (iii) population; (iv) community health; (v) physical character of proposed location; (vi) previous development; (vii) proximity to other potential projects sites (could be managed and implemented by the same team); and (viii) other local/national factors considered relevant.

2. Service Levels

(a) Water Supply

243. Consumer satisfaction which leads to a willingness to pay for services is based upon the water users perception of the suitability and reliability of their water supply system. Water quality is also an important consideration but the highest priority for generating satisfaction is system reliability. Reliability is judged mainly on the provision of an uninterrupted supply (during system operating hours if not continuous) and an adequate supply pressure. Thus, effort should be concentrated on improving the reliability of water supply systems. This has been recognized by the Government in Repelita V and will receive high priority. In the urban systems, further attention should be paid to:

- (i) control of non-revenue water (NRW);

- (ii) raising the present O&M programs to higher levels;
- (iii) monitoring the whole transmission and distribution system for flow and pressure at critical places; and
- (iv) checking the capacity of the system before allowing new connections.

244. The issues described above also apply to rural piped systems where they are managed by a water enterprise. Rural piped systems not managed by an enterprise should be encouraged to form their own water user management group. This group should then address and assign high priority to these issues.

245. Non-piped rural water supply systems are usually operated for one neighborhood user group or sometimes just one family. These groups will have difficulty in implementing a systematic O&M program. However, they should be encouraged through participation in the planning, design and construction phases of their water supply system to develop an understanding of the importance of O&M and to develop skills which will more easily allow them to operate and maintain their system.

246. Repelita V urban water supply programs aim to provide an additional 1,600,000 house connections and 17,900 public standpipes. This provides a ratio of 78 : 22 ^{1/} in favor of house connections. This ratio is in keeping with the findings of previous field studies. However, it is stressed that this ratio should remain flexible for design purposes to allow for the special attention which should be provided for poor areas. The Government may need to look at providing grant funds or some other cross subsidization mechanism support which would encourage the BPAM/PDAM to install these facilities which are essentially social services. For any ratio which is adopted it is important to note that the average domestic demand design figure needs to be amended to reflect this ratio.

247. Additionally, if Repelita V targets are to be met a further three million urban persons will be required to develop their own private water supply source. No plan is provided for how this might be done and no Government assistance is envisaged. It would seem that this target may be unattainable without:

- (i) the support of a community education program highlighting methods of construction which to ensure sanitary facilities;
- (ii) the support of a community credit scheme.

248. The Government would have to be careful to ensure that further private wells are not constructed in urban areas already subject to seawater intrusion and groundwater pollution. This further development would worsen present environmental problems. Urban residents in any of these problem areas should be served only through piped systems.

^{1/} Official data suggests an urban household usually consists of five persons. Cipta Karya/DAB planning use seven persons. An urban public standpipe is designed to serve 100 persons.

(b) Sanitation Program Coverage Levels

249. Repelita V rural sanitation targets are expressed in percentages of population using latrines and having household latrines. Expressed in numbers of people this means Repelita V programs should provide for an additional 32 million persons using latrines and possibly an additional 27 million persons with their own household latrine.

250. Due to the low population densities in the rural areas and the lower standard of living, solid waste management does not create severe environmental problems. Facilities and equipment for solid waste management at Desa level will not be required except for market areas. Effort should thus be limited to the consideration of solid waste as component of public health education programs. For market areas, handcart technology would be suitable.

251. For rural IKK towns, with population in the range 3,000 to 10,000 persons, solid waste management becomes more important. While sanitation programs will be a component of sanitation programs within these communities, the technology remains relatively simple and should comprise handcart collection from neighborhood roadside dumps to several central transfer stations. Removal from these stations to final landfill would be by tractor drawn trailer with annual loading and unloading.

252. For household latrines the target coverage should be 80 per cent of the communities. Recommended service levels for public and communal facilities are presented in Table 36.

Table 36. Recommended Service Levels for Public Facilities

Facility	Service Levels	Type
<u>Sanitation</u>		
Religious institution latrines	500 persons	users/latrines
School latrines	100 "	pupils/latrines
Market	500 "	users/latrines
MCK	100 "	users/MCK
<u>Solid Waste - Desa</u>		
Markets	1 unit	handcart/desa
<u>Solid Waste - IKK</u>		
Handcart	1 "	handcart/1000 persons
Transfer stations	1 "	per 1000 persons
Tractor	1 "	per IKK
Trailer	1 "	+ 1 spare

Source: Directorate General of Human Settlements, 1989.

253. The Repelita V rural sanitation program will implement these activities in 5,000 Desas. The population living in these rural Desa will be some 10 to 13 million persons. ^{1/} These figures fall far short of target figures, even if complete coverage were attained in each of the 5,000 Desas. It is clear that sanitation activity will be required in other locations. Even if it is proposed that this apparent shortfall be met entirely by community programs, additional government effort would be required in areas of community organization, motivation education and financing.

3. Design Technologies

(a) General

254. Water supply design technologies now applied to the urban and rural situations are generally appropriate to meet the consumers requirements and the operating conditions in Indonesia. However, in the rural regions there is sometimes a tendency to apply slightly higher technologies than might be appropriate. Often these concern the difficulties which apply in supplying, constructing, operating and maintaining these facilities in remote areas. Para 294 further describes some of the difficulties experienced in the remote provinces in obtaining materials which may be readily available on the island of Java.

255. Table 37 defines the technologies which MPW/DGCK propose to apply for water supply systems. These classifications are generally agreed with except that for chlorination by hypochlorite which should be considered as a medium technology. Trained manpower is required to operate and maintain this equipment and to prepare and monitor dosing levels in accordance with residual chlorine readings.

^{1/} Using national average population figures for Desas.

Table 37. Sample of Rural Water Supply Technology and Application

Type of Technology	Application				
	Piped System	Non Piped	Big Community	Small Community	Single Household
<u>SIMPLE TECHNOLOGY</u>					
Dug well, shallow well		-		-	-
Gravity spring	-	-	-	-	-
Rainwater collectors		-		-	-
Mobile tank		-		-	
<u>MEDIUM TECHNOLOGY</u>					
Hand pump		-		-	-
Wind mill	-	-		-	
Hydraulic ram	-			-	
Diesel pump	-	-	-	-	
Electric pump	-		-	-	
Jet pump	-			-	-
Slow sand filter	-	-	-	-	-
<u>HIGH TECHNOLOGY</u>					
Water treatment plant with rapid sand filter	-		-		
Submersible pump	-		-	-	
Solar pump	-	-		-	
Desalination	-		-	-	
Automatic control and telemetry system	-		-	-	

Note: Chlorination by using hypochlorite assumed as simple and medium technology and chlorination by using gas assumed as high technology.

Sources: Program Pemakaian Pompa Tangan Untuk Penyediaan Air Bersih Pedesaan Dalam Repelita V, 1989, Cipta Karya, Direktorat Air Bersih.

256. It is further considered that systems utilizing automatic control and telemetry are not appropriate for small communities, particularly in rural areas. Simple methods of control are more appropriate. It is also suggested that the Government review the suitability of rain water collectors. It is understood that there may be some cultural reluctance on the part of the rural people to using rainwater. Recent studies ^{1/} show that rainwater collectors even though in good condition and functioning are often not used by up to 60 per cent of the population served.

^{1/} Akademi Penilik Teknoligi Sanitasi, Jakarta and Yayasan Indonesia Sejahtera, 1987; Evaluation of the INPRES water supply and sanitation program.

257. Similarly, the DGCK/DAB Repelita V plan relies heavily for its successful achievement of targets on the installation of 1.98 million household water filters serving 9.9 million rural users. This filter has been developed and field trialled on the Netherlands assisted West Java Rural Water Supply and Sanitation project. According to project reports ^{1/} major technical problems have been overcome but the question of whether there will be a real demand by the rural population is still unanswered. It appears rather unwise for the Government to base 33 per cent of its rural water supply program on a new, unproven technology. A difference also exists between the prototype unit cost which is reported to be almost double that which is allowed in the DGCK/DAB plans.

258. For the construction of drilled wells, it is planned that mechanical drilling methods be employed. It will be more appropriate where geological conditions allow for manual drilling methods and water jetting to be considered. This would provide a lower overall unit cost and allow greater degree of community participation.

(b) Community, Technical Relationship

259. New technologies, especially appropriate technologies, have been developed which depend on a sound community technical relationship. At a minimum, the community is involved in aspects of construction, as well as in providing resources of labor and materials or through credit systems.

260. The implications of this new relationship is that:

- (i) the method of planning and implementation as well as operation and maintenance are no longer determined by the technical requirement. A new iterative process must be in place where community, technical and administrative components work together. The Indonesian concept of "musyawarah" (consultation and consensus) is a relevant approach; and
- (ii) projects which contain elements of experimentation or research (pilot projects) should be carefully planned in consultation with the community. Care should be taken to fully inform the community of the technical aspects of the pilot project before their resources are used.

261. As discussed when evaluating technologies for application in rural programs, it is important accurately to assess the need for complementary community education programs. If a need technology or derivative thereof, which is well known to the community is used, little community assistance will be needed, whereas technology new to the community may need extensive support training programs before the community reaches the necessary level of competence to accept and operate the technology and feel confident in doing so. A useful example of this is the IKK water supply program which represented an exciting theoretical model for low cost water supplies throughout the country. It employed innovative but previously untried methods of design and implementation

^{1/} IWACO, WASERCO, 1989; Rural Water Supply and Sanitation Programme 1987/82, West Java.

based around the use of flow restrictures. The operating principles of the systems were new to all consumers and required considerable consumer education and support for successful implementation. As discussed in para 125, the information provided to the community was inadequate, the problems which needed solution were not dealt with and the systems frequently did not perform according to expectation.

(c) IKK Design

262. Following the basic philosophy of development in Indonesia as incorporated in the GBHN (Basic Guidelines of National Policy), prepared for Repelita III, the Government 1/ decided to provide water supplies not only to urban but also to the semi-urban and subdistrict populations living in district capital towns (Ibu Kota Kecamatan). The IKK water supply program is based up on the following three objectives:

- (i) cost effective facilities will be designed and constructed for those IKKs which are considered to be capable of supporting a water system; and
- (ii) the long term operation and maintenance of these systems is deemed to be equally as important as their construction;
- (iii) the institutional capacity to ensure both of the above is to be developed to coordinate physical, human and monetary resources.

263. Reviewed 2/ to determine the existing condition of IKK schemes, several unsatisfactory results were found, such as:

- (i) no IKK water supply scheme was working as designed. In all the schemes inspected, most or all of the flow restrictors had been tampered with, removed or not installed in the first place. The consumers, the contractors, PDAM/BPAM and PAB-IKK were all responsible to varying degrees;
- (ii) each 2.5 lps scheme was serving an estimated average of 1,800 people instead of the 3,600 designed. In all schemes inspected, public standpipes were underutilized, hence, the cost per capita of each scheme is double the theoretical figure and cost recovery is lower than calculated; and
- (iii) an overwhelming majority of scheme managers, operators and consumers regarded the IKK system as a second rate water supply scheme. Most people are disappointed and the efforts of the Government in undertaking this massive and costly program are not recognized by the people.

1/ Cipta Karya, 1981; IKK Water Supply Program, Strategy and Scope.

2/ AIDAB, DHV and IWACO BV, 1984,; Report of IKK Review Mission.

264. Based on the above mentioned findings and some further early experiences, modified IKK policies and design parameters were adopted in 1986 by DGCK/DAB. These modification also failed to reverse the fundamental problems which occurred in the application of IKK design approach. Recently, design restrictions on IKK systems have been made more flexible in order to reflect the special design requirements of each IKK town. Specific design issues which have proven difficult to implement are the use of flow restrictors, the lack of supply system central storage and public taps.

265. The use of flow restrictors is the unique, indispensable and most controversial characteristic of the IKK design strategy. The flow restrictor is the key to success or failure of the IKK water supply concept. The flow restrictor is designed to allow a continuous trickle flow, the flat rate tariffs, the equal and limited supply of water to each person in each of the groups of house connection and neighborhood taps and an even distribution of water throughout the system. Flow restrictors also allow the deletion of water meters, peak flows and central storage.

266. The proponents of the IKK design approach proposed that the water intended for drinking, cooking, washing plates as well as bathing, should be delivered and stored in the bak mandi (the water storage tank in the house). This is not considered by the people to be a potable water receptacle nor is it constructed or maintained in a way suitable to store drinking water. This concern has now been overcome on some IKK projects through the provision of a special drinking water receptacle, usually a 30 liter plastic tank, installed on the wall above the bak mandi. When full the supply to this tank overflow is diverted by to the bak mandi.

268. Tanks and taps intended to be used communally are essential components of the IKK system. The households which use the water are each required to pay a monthly fee. The designation of these facilities as public standpipes (hydran umum or kran umum), has tended to reduce the sense of neighborhood ownership and community responsibility for the facility. It has also led to many being located in public places where few or no families are served. A change in consumer attitudes towards these standpipes will be facilitated not only by the consultation procedures for location considered elsewhere in this report, but also by a change of name.

269. A preferred name for this facility is "Kran Warga" (neighborhood tap) as these taps are mainly to provide adequate clean water for people who cannot afford house connections. This supports the Government's intention to ensure better access to safe water for the poorest group of people. As land in a suitable location is necessary, it is important to have total neighborhood community support for the scheme. With is support and concept of ownership, the neighborhood is usually prepared to donate the land required for their community facility.

(d) Septic Tank Systems

270. Pilot low cost sewerage and sewage treatment projects should be undertaken to determine their suitability for wider application in Indonesia and for demonstration purposes. Proven low cost sewerage should be installed especially in Kampung areas where on-site disposal is not feasible. Wide scale community based financial assistance and technical guidance programs should be established for the construction and renovation of private and shared toilets with on-site disposal facilities.

271. While currently adopted septic tank design standards are appropriate, there has often been problems with effluent leaching facilities not adhering to guideline standards. Other perennial problems with septic tanks are lack of desludging and septage disposal. It is considered that on-site sanitation programs should provide enhanced education to ensure adequate leaching facilities are provided. Programs should also ensure that desludging facilities are available to each community (probably as private ventures) and that acceptable septage disposal facilities provided as part of each program.

(e) Urban Sanitation

272. While the extent of urban sanitation (human waste management) in Indonesia is not great, those projects that are proceeding have highlighted a number of issues that need to be addressed in future projects:

- (i) suitability of on-site technologies in areas of high population density;
- (ii) coordination with reliable water supplies; and
- (iii) piloting alternate technologies.

273. The issue of on-site disposal technologies in high density areas has been most prominent in the current Jakarta Sewerage and Sanitation Project (JSSP) pilot project. Earlier work, particularly by UNDP had predicted that on-site technologies were feasible in urban areas up to a density of 500 persons per hectare. The current JSSP pilot project is applying on-site technologies in the form of septic tank systems and leaching pits, ^{1/} to high density areas in Jakarta. In many cases, pits and tanks were installed beneath floors of the dwellings due to lack of suitable open space. These were often towards the front of the dwelling to allow access for pumpout, etc., while the toilet was preferred at the rear of the dwelling, necessitating laying of pipes beneath the floor of the house.

274. These practices are under serious review by the JSSP project due to concern over the future maintainability of such an arrangements. Areas of concern are:

- (i) the relative inaccessibility of the tank or leaching pit may cause maintenance to be delayed;

¹ Leaching pit is the preferred term in urban Indonesia for facilities that are essentially pour flush latrines. These facilities are constructed, either over the pit or with the pit offset some distance.

- (ii) malfunction could result in contamination of the dwelling area; and
- (iii) installation costs (born by the householder) are more expensive than open area construction.

275. The Jakarta pilot project has also reinforced the need for reliable water supplies to be provided in conjunction with human waste disposal facilities. Water supply in the project area is largely from shallow groundwater and in the densely built up areas. It is often not possible to attain adequate separation distances between the water well and the soakage pit. Public or communal facilities in the project area are provided with piped water, however, due to low pressure and often intermittent supply, water is not always available. Without a consistent water supply, these facilities are rejected by potential users. Even if the water supply problems are later rectified, it is very difficult to change the initial perception that the facility is inadequate. Thus, there is a need for future urban sanitation projects to reexamine the suitability of on-site technologies in areas of population densities above 200 to 300 persons per hectare. It is also considered essential that piped water supply be provided for individual dwellings in areas of high density ^{1/} using on-site human waste disposal facilities.

276. The above paragraphs cast doubt on the long term sustainability of on-site human waste disposal in areas where the population density is greater than 200 persons per hectare. In such areas, some form of piped sewers will need to be considered, if public health goals are to be achieved. Conventional sewerage should be reconsidered for these areas. If conventional sewerage remains unfeasible, then alternative technologies should be trialled. The catchment areas of existing conventional sewers can be extended into adjacent high density areas utilizing alternative piped sewer technologies, such as: (i) shallow sewers; (ii) small bore sewers; and (iii) other potentially suitable technologies. These technologies are not currently in extensive use although there is considerable interest in piloting them in those metropolitan cities with very high population densities and/or existing limited sewerage systems.

277. Design and implementation methodologies for urban sanitation facilities need to be strengthened to enable the facilities constructed to be more attuned to the needs of recipient communities and to be more sustainable. Areas that need strengthening are seen to be:

- (i) the range of design for individual facilities need to be more flexible to allow the maximum advantage to be made of local conditions. For example, the standard design for a leaching pit has a depth of some 1.5 m. There are areas in Jakarta where the water table is permanently below 3 m to 4m. In these situations, leaching pits up to 3m deep could be installed at very little extra cost. Such a pit would have a design life much greater than the standard;

^{2/} Greater than 200 persons per hectare.

- (ii) the design process for on-site sanitation facilities does not involve the designers visiting each proposed location and devising the most advantageous arrangements for each site. Potential improvements to the standard designs are thus not identified;
- (iii) no technical supervision of construction of on-site facilities is performed with the result that there is no mechanism to avoid inappropriate use of materials, poor construction or unwise alterations to facility location. Lack of attention to these factors may often lead to the householder not receiving value for their money; and
- (iv) the additional technical input required to address these issues will significantly increase the design and supervision cost of on-site sanitation projects, but will lead to facilities that will be more substantial and longer lasting, and therefore, more accepted by the community in the long term.

(e) Rural Sanitation

278. Rural sanitation facilities should be limited to on-site technologies for households and public facilities, such as schools, markets and religious institutions. Technologies used should be limited to those that have proven suitable for Indonesia and their specific selection will be based on personal preference, affordability and technical suitability. They will include:

- (i) ventilated improved pit (VIP) latrines;
- (ii) pour flush (PF) latrines with single or twin leaching pits;
- (iii) pour flush latrines with septic tank and effluent soakage pit of trench;
- (iv) public toilets using pour flush or septic tank latrines; and
- (v) MCKs ^{1/}

279. Sanitation in Indonesia incorporates considerations of drainage and solid waste facilities. Rural sanitation programs will thus incorporate drainage of households surrounds to enable healthy environments to be attained.

(f) Pipe Materials

280. Selection of suitable pipe materials is essentially based on the following criteria: (i) the specific demands of the project; (ii) the design life of the project; (iii) the property of the pipe material; (iv) compliance

^{1/} MCK - Mandi Cuci Kakus is a public bathing, washing and toilet facility. These facilities are often constructed without washing facilities, but are still referred to as MCKs.

with Indonesian and/or international standards; (v) local conditions, such as aggressive soil, seismic conditions, etc.; and (vi) cost of pipe and cost of pipelaying.

281. Pipe materials used for water supply in Indonesia have in the past, generally been galvanized iron or unpractised polyvinyl chloride (uPVC), with ductile or cast iron for major mains. Asbestos cement pipe has also been used to some extent. High density polyethylene (HDPE) pipe has not been used to any significant extent. Water supply projects often suffer major problems that can be traced back to the use of an incorrect or unsuitable pipe type.

282. Problems with galvanized iron pipe generally relate to rapid internal corrosion and/or breakage at the threaded joint. These problems are made worse if light grade pipe is used instead of heavy grade pipe. After cutting a thread on a light grade pipe the wall thickness is very thin and subject to damage during transit. Even if the threaded joint is made satisfactorily, it remains a point of mechanical weakness. These problems can result in the pipe have an operational life of two years or less. If galvanized pipe must be used then it should be the heavy grade rather than the light grade pipe if reasonable service life is to be achieved.

283. Asbestos cement pipe is considered not suitable due to the fact that illegal connections can be relatively easily made often with considerable damage to the pipe.

284. UPVC pipe is a suitable material for internal house plumbing but is also used extensively for external applications, where poor laying practices or ultra violet degradation often result in failure. UPVC pipe is also subject to mechanical damage either malicious or accidental and illegal connections can be easily made; both factors making it somewhat less suitable for extensive external use in Indonesia.

285. Ductile iron and to a lesser extent, steel pipe both have high mechanical strength, long design lives and cannot be easily tapped without proper equipment (reducing illegal connections). They are, however, expensive and their use should be limited to situations where their properties are essential.

286. HDPE pipe is suitable for many water supply applications in Indonesia and its expanded use is strongly recommended. Its advantages lie in the fact that it is a flexible yet tough pipe that is not as subject to mechanical damage or poor laying practices as UPVC. Smaller diameters are supplied in roll form, thus, reducing the number of joints which are potential points of leakage.

4. Implementation Methods

(a) Demonstration Units

287. On-site disposal facilities for households in both rural and urban areas will largely be built by individual householders. As part of the community education program the authorities have constructed demonstration latrines in each area to enable householders to see the benefits and as examples of the technology. This method of service delivery is again proposed for Repelita V programs.

288. Past programs have often not had the multiplier effect envisaged and this has in part been attributed to the type of demonstration units constructed. These have been built to very high quality, particularly the latrine superstructures with consequent high cost. This cost has deterred people from building their own facilities. In some instances, authorities have insisted on this high standard. This problem is apparent in INPRES funded programs as well as most others.

289. It is essential that demonstration units, particularly, the superstructures be built to a variety of standards that must include examples of very low cost units using locally available materials for walls and roof. It is also essential that authorities do not insist that any esthetic, non-functional quality be attained in latrine superstructures. Furthermore, these demonstration programs must be carefully prepared, and presented, so that as well as showing the community what to do, they are also given ideas and assistance with how to complete the necessary tasks. Most of the rural community do know what should be done and they have a desire to attain better services, but what they often lack are the resources and mobilization skills necessary to actually build the facilities.

(b) Demonstration Unit Multiplier Effect

290. Repelita IV programs assumed that for every one government built demonstration latrine, the community would construct three latrines themselves. The achievement was approximately one community built facility for every two government built facility. ^{1/} Thus, the program underachieved in this area by a factor of approximately six. Repelita V programs, both in water supply and sanitation incorporate the concept of demonstration/multiplier and are assuming that a significant multiplier effect will be achieved. The implementation methodology must be critically reviewed and revised, if this past underachievement is not to be repeated in Repelita V.

(c) Communal and Public Sanitation Facilities

291. Communal ^{2/} and public ^{3/} sanitation facilities have been and will continue to be a part of sanitation programs within Indonesia. However, there have been problems with community acceptance that have resulted in many communal and public facilities not being used. These difficulties can often be traced to deficiencies in the community consultation and participation processes. Public facilities, such as MCKs, are often not popular with the public who often would prefer, and are willing to pay for their own facilities. This single fact has often been missed by project planners who have imposed unwanted public facilities on communities.

^{1/} These targetted and achieved multiplier ratios are quoted as general figures covering components of both water supply and sanitation programs. The real figure for latrines alone is, however, expected to be similar.

^{2/} Communal facilities are those where use is restricted to a small number of households (five to ten nos.).

^{3/} Public facilities are those with unrestricted access.

292. To a lesser extent, communal facilities suffer the same problems. Inadequate care has been taken to define at the outset user groups for these facilities with the result that they are often not maintained or used or managed in a way acceptable to the user community. It is essential that the community participation and project design processes be fully integrated in future projects to determine the nature of facilities wanted by the people. The processes should allow potential users of community facilities to define the scope of these facilities themselves.

5. Construction

293. Because the Indonesian construction industry is in a developing stage, local contractors often have limited skills. Contractors registered with the Government can only undertake work for which they are qualified. Most contract work should be intensively supervised by appropriate practical professionals. This concern will be magnified with the Government's planned decentralization policy. The impact on proposed programs will be reduced if substantial contractor training programs are introduced.

294. In the outer provinces, further problems are experienced during project implementation with intermittent shortages of specified materials and equipment. Often substantial delays can occur. These potential supply issues should be considered during the selection of technologies appropriate for these more remote locations.

C. Institutional Issues

1. Human Resource Development

295. Human resource development issues appear to be one of the major constraints within the dynamics of the decentralization policies proposed within Repelita V and the provision of urban water supply and sanitation programs through IUIDP. The processes when considered together, require a considerable strengthening of Local Government capability in planning, management and implementation.

296. The Ministry of Public Works (MPW) is the major agency within the Government providing infrastructure support to a range of activities including water supply and sanitation. Current staffing structure of MPW is presented in Table 38.

Table 38. 1988 Staffing Levels

	Permanent Centrally	Full Time Provincial and Local Funded	Total Temporary Project Staff	Total
DFU Central	16,711	-	10,975	27,686
DFU Kanwil <u>a/</u>	12,071	357	2,024	15,172
Provincial and Local Government Offices	-	27,957	16,535	44,491
Totals	29,502	28,314	29,534	87,350

a/ This excludes approximately 29,600 public works staff paid by Level I Governments and an unknown number paid by Level II Governments.

Source: Bureau of Personnel, MPW, 1989.

297. Since Repelita III, MPW has undertaken an ambitious program of human resource development through the provision of manpower development and training to upgrade the institutional capability by:

- (i) strengthening the capability of the Bureau of Personnel to forecast, plan and identify the skills needs of staff employed in the Department, through the introduction of an integrated manpower planning system;
- (ii) strengthening the capability of the training and education organization (Pusdiklat) to provide training courses appropriate to the needs identified by the manpower planning system, including the construction and equipping of six regional training centers;
- (iii) upgrading the polytechnic system (LPPU) to provide courses through which secondary school graduates currently employed in Public Works Service Agency (DPU) can be upgraded to diploma level and operate as assistant engineers in the field; and
- (iv) strengthening support structures and services within DPU, especially at provincial level to improve the capability of provincial DPU staff to carry out their required functions.

298. Most of these activities are being undertaken with funding supplied by the World Bank ^{1/} and the Asian Development Bank ^{2/} on two loan funded manpower planning, education and training project. The results of these institutional strengthening and human resource development programs should become apparent during the life of Repelita V, with improved performance of staff employed within MPW. The above programs do not however, include the public works staff employed at Tingkat II levels in local government.

299. The development of staff capability and skills within the water supply subsector originate from the Subdirectorate of Technical Development (STD) in the Directorate of Water Supply (DAB), DJCK. Training programs are either "on the job" or "off the job" depending on the scope and type of training required, and are conducted by either consultants, PPSAB offices or water enterprise staff. Since 1983 the Human Resource Development Project (HRDP) has supported STD to design and develop a range of modular course units including examples, instructors kit, notes and reference material.

300. The organization of training programs is managed from the main centre at Pejompongan Jakarta, although this will be transferred to a new training centre at Bekasi. In addition to the Jakarta facilities a regional training centre exists at Surabaya and the IBRD funded East Java Water Supply has funds for the development of additional centers in Bandung, Semarang, Medan and Ujung Pandang. The extension and re-equipping of the major MPW training centers, ^{3/} and the upgrading of Pusdiklat PU as a coordinating and accrediting body within PU suggests that adequate training venues already exist within MPW and further development of training centers exclusive to DAB use is seriously questioned. In 1985, the HRDP project produced a "Plan for Human Resource Development to meet the needs of Repelita IV Program". This addressed the development of training facilities, training programs for trainers and support structures to parallel DAB plans for physical development of water resources during Repelita IV, i.e, an increase from 1,100,000 house connections (HC) to 3,030,000 HC. The actual attainment of Repelita IV was approximately 1,500,000 HC, therefore, revised plan needs to be developed for Repelita V.

2. IUIDP

301. Water supply and sanitation issues in urban areas are now dealt with as part of the Integrated Urban Infrastructure Development process (IUIDP) while the responsible authority remains either within the Dinas PU system or in a Badan Pengelola Air Minum (BPAM). The issues are a little different where a Perusahaan Daerah Air Minum (PDAM) exists as these water companies are theoretically independent self-financing institutions. In many cases technical issues are related to financial/institutional issues (for example declining service levels, leading to declining income, leading to even lower service levels, etc). In nearly all cases financial, institutional and manpower issues are intimately interrelated.

^{1/} World Bank Loan No. 2258: Manpower Development Project I. Pipeline Loan: Public Works Institutional Development and Training Project (Manpower Development II).

^{2/} Asian Development Bank Loan No. 804-INO: Ministry of Public Works Manpower Education and Training Project approved for \$29.0 million in November 1986. Proposed Loan: Urban Public Works Institutional Development Project.

^{3/} World Bank Loan No. 2258: Manpower Development Project I.

302. The linkage of financial, institutional and manpower issues in IUIDP can be considered in relation to the provision of urban services in the following ways. The IUIDP program is focussed on the Pemerintah Daerah Tingkat II level (Pemda II, the second level of local government or Kabupaten, where the first level of local government is the Province). However, all Pemda II staff are employed and paid by Central Government. Administratively, (position, promotion, etc.) Pemda II staff are controlled by Pemda I (Province). Functionally, they report to Pemda II. When the demands of IUIDP are placed upon this system, structural and continuing problems are inevitable. They are complicated by the money flows associated with urban development, which usually come through the Central Government, and are controlled and disbursed by Central Government, through employees paid by Central Government (and often responsible to Central Government). However, repayment of such funds is expected to become the responsibility of Pemda II. It must be expected that this system will produce difficulties. Any systems which separates authority from the responsibility of the consequences of the exercise of that authority will inevitably produce major problems of various kinds. Such systems can never have accountability.

303. The IBRD funded Urban Institutional Manpower Development Study (UIMDS) ^{1/} further develop these issues, and the findings, which are supported by this study, are summarized as follows:

- (i) Local governments should be able to develop their own capability for IUIDP planning activities, provided adequate support and time is given to develop the skills and knowledge of Tk. II staff. This usually takes three years including training, in service support programs and workshops.
- (ii) The source of the change process in Local government is a critical factor in affecting the outcome of the process. In the case of IUIDP the source of this change has been Direktorat General Cipta Karya, MPW, and while they are recognized as a legitimate authority in the field of public works, they do not have similar authority in the fields of local revenue, budgeting and the broader aspects of IUIDP.
- (iii) The principal targets for all technical assistance and training projects for IUIDP has been the Public Works Dinas, both Level I and II, effectively bypassing Bappeda Levels I and II, the planning board with the interdepartmental coordination authority necessary to integrate all aspects of IUIDP. The constraints imposed by this targeting has led to the establishment of IUIDP steering committees, technical committees and task forces at Levels I and II of Government in many provinces. While this provides a temporary solution, in the long term the tasks of such committees and task forces will have to be allocated unambiguously to standing organizations.

^{1/} PT. Hasfarm Dian Consultant in association with DHV Consulting Engineers, 1988; Ministry of Home Affairs, Secretariate General, Bureau of Planning.

- (iv) The sectoral activities implicit in the IUIDP approach aimed at enhancing local government capability in planning, financial and technical areas should be directed through the department responsible for Local government, i.e., the Department of Home Affairs.
- (v) Whatever the problems encountered at Tk I and Tk II, the really fundamental problems discovered during the initial implementation of IUIDP are located in the Central Government. Essential issues, (such as how to let sectorally divided departments appraise integrated project proposals generated by Tk II) still have to be solved. Local government is often very much aware of these problems at central level. During a survey in West Java at the start of the introduction of IUIDP in Tk II, it appeared that the main concern of local government officials was not what could go wrong at Tk I or Tk II but constraints this program would face at central level government.
- (vi) The prospects for introduction of an integrated medium term planning mechanism in Tk II are very good. The basic concept for such a mechanism has been developed in IUIDP. This concept is largely developed "on the work floor", i.e., in close cooperation with Tk I and Tk II. It is, therefore, a practical and implementable mechanism. The extension of IUIDP to include other urban services (educational facilities, etc.) is not very complicated as the mechanism developed for IUIDP allows for the integration of technical aspects with spatial and financial aspects of urban development in a medium term time frame.

3. Institutional Development

(a) Water Enterprises

304. The manning levels of water enterprises and the organization structure to which they are related is derived from the 1980 Pedoman Organisasi PAM and is reflected in the current staff levels of water enterprises. The decreed organizational structure is not well suited to the organizational needs, in particular to PDAMs with a large number of branch offices (cabangs) or IKK units, which need to be serviced from the main centre.

305. Proposed staffing levels for PDAMs is based on a standard of 1 employee per 100 house connections (HCs), giving an index of 1. An analysis of data from 160 towns, ranging in size from category 1 to 4 ^{1/} demonstrate a

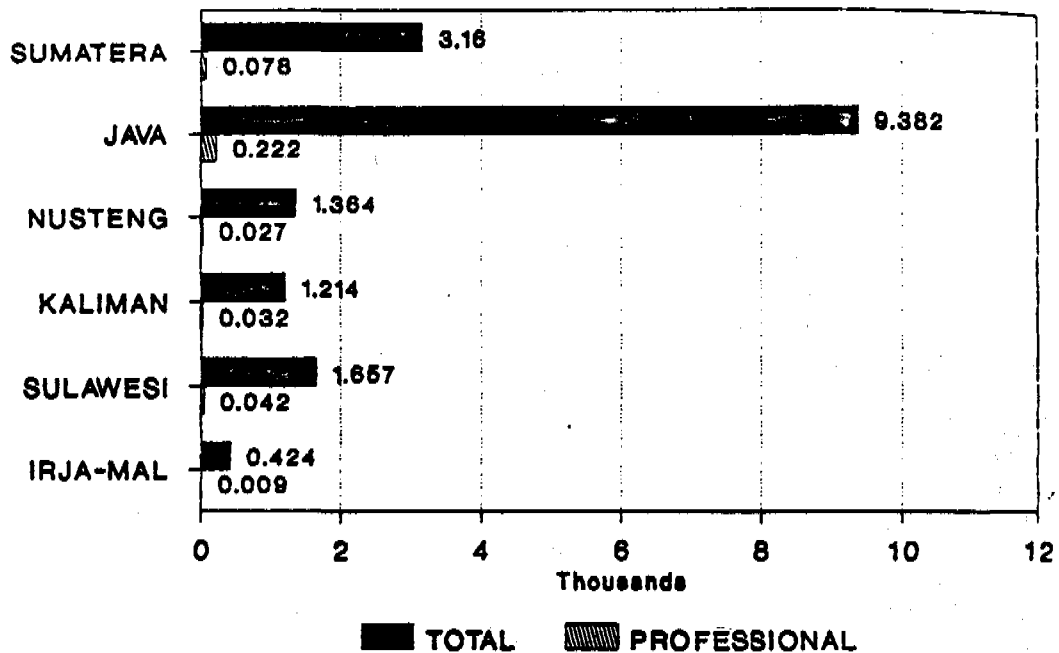
1/ Category Population:

1.	<20,000	IKK and Rural Town
2.	20 - 100,000	Small Town
3.	100 - 500,000	Medium Town
4.	>500,000	Large and Metropolitan City

wide range of manning levels (see Figure 4). The average range from 2.2/100 HC in Category 1 to 1.2/100 in Category 4, but it can be seen that on a national level the total number of employees is higher than desirable. The number of professionally qualified staff is very low (2-2.5 per cent) ^{1/}.

306. The quality, skills and career status of water enterprise staff are critical issues relating to the overall strengthening of the institutions. The recruitment of staff from the local area, while desirable, often leads to the employment of personnel without the appropriate skills, hence the need to conduct extensive in service training to upgrade skills in management, technical, and financial areas. A more active recruitment policy, via schools and colleges, together with clearly defined job descriptions is needed.

Figure 4. Water Enterprises, Staff Composition



Source: Directorate General of Human Settlement, 1989.

^{1/} PT. Indah Karya et al; 1988 Cipta Karya; Support Study for Master Planning for Water Supply Subsector Policy.

307. The water enterprises also need to develop capability (probably in the personnel section) to identify the training needs of the staff and to translate these training needs either as "on the job" training for artisan type skills or to enroll in Kabupaten or provincially based training courses for management skills development. The current training programs are project based and conducted by PPSAB staff or consultants.

308. While not necessarily representative of the total national situation this example highlights the manpower development issues confronting many water enterprises. Analysis of the tables shows that the courses, while well targetted to the heads of the organization, do not upgrade the bulk of personnel with many of the skills essential to the daily operation of the water enterprise. The results of a series of training needs interviews conducted with staff of the four BPAMs in NTT, NTB found that:

- (i) Many of the training courses as conducted were too theoretical, especially in areas of technical skill, such as genset operation, accounting, bookkeeping & pipelaying.
- (ii) The need to conduct a much more "hands on" approach to these skill areas, using data or equipment sourced from their own enterprise.
- (iii) Training tended to be compartmentalized and recipients were not aware of how the total system operated, e.g., bookkeepers did not understand how accounts/billing staff used their information.

309. Therefore, training needs capacity and capability to conduct appropriate programs are critical issues. The recommended development of cadres of provincially based trainers, capable of developing standardized curricula and providing accredited courses for all water enterprises is supported. The potential for this to happen is greatly improved by the HRD programs currently initiated within Directorate of Water Supply (DAB) and ideally the program should be validated by Public Works Centre for Training and Education (Pusdiklat PU), but managed by Subdirectorate for Training Development within DGCK (Bidang Diklat Air Bersih) using trainers qualified and skilled in their subject area. This may be expedited by establishing closer links with the Vocational Education system as has been proposed in the Eastern Islands IKK Water Supply 1/. Participants in training courses should be given recognition for skills attained by award of competency certificates. These could be used as stepping stones in staff career development.

(b) Management and Coordination

310. Bappeda Tk I and Tk II are the key agencies required to exercise leadership in coordination and management of rural water supply and sanitation programs. These programs will involve several departments and agencies including Department of Public Works, both PAB and PU Tk II, Department of Health, PDAM and Department of Rural Development. A Consultant Community Development Organization is being recommended as the trainee and facilitator of Community Participation and Management. Financial institutions will be involved for the development of credit facilities.

1/ Scott & Furphy; 1988; Cipta Karya; Eastern Islands IKK Water Supply Design Project.

311. The program will rest on the ability by each agency to plan coordinate and manage the necessary services and ensure at all times that the principles and policy of community self reliance and community participation are supported in the way services are provided to the rural community. This principle for the rural programs is consistent with those concerning the IUIDP approach.

312. The establishment of PMDUs as functional units is supported by this and several other studies 1/ 2/ but differ in view as to their structural position in the GOI organization, either as an autonomous body providing support to other urban services, as well as water supply or remaining within DPUP essentially, for water supply advice only. With the current status of IUIDP, the units should concentrate on water supply issues in the short term. Guidelines for the establishment, operation and responsibilities of PMDU exist, although some further development will be necessary. Support programs such as computerized Management Information Systems (MIS) and Water Enterprise Performance Assessment have been developed and operated.

D. Financial Issues

1. Introduction

313. The provision of adequate and affordable urban services requires the effective coordination of construction, and operation and maintenance from both a physical and financial viewpoint. With the implementation of decentralization the roles and responsibilities of central, provincial and local governments will need to change relative to one another. To effect these changes requires the financial and administrative systems currently in place to also change. Thus, the financial capacity and capability of Tk. II level government must be increased by removing structural and procedural bottlenecks, which includes changes in the sources and uses of funds as well as procedural changes in the annual budgeting process.

2. Financial Budgeting

314. A recent Study 3/ which has reviewed this process draws attention to the fact that maintenance projects are routinely included within the development budget leading to difficulties in identifying funds used for O&M activities, and similarly the existing routine budget processes make no allowance for inclusion of O&M items. Therefore, one of the major difficulties

1/ PT. Hasfarm Dian Konsultan; Dec 1988; Urban Institutional & Manpower Development Study MHA.

2/ PT. Indah Karya et al; Support Study for Master Planning for Water Supply Subsector Policy.

3/ PT. Perencana Aneka Sarana, De Leuw Cather International; 1987; PUOD Ministry of Home Affairs; Extension of Study on the Operation and Maintenance of City Infrastructure, Final Report.

in the current budget process is the inability of local governments to distinguish between investment and recurrent funding. Thus, the development budget contains not only investment items but also expenditures of a recurrent nature. This situation leads to difficulties in determining actual O&M and rehabilitation funding requirements for urban infrastructure.

3. Tariff Structures

315. Tariff setting (pricing) in relation to the provision of urban water supply and sanitation services continues to be an issue of some importance. The usual conflicts remain between capacity to pay (affordability), willingness to pay, and its relationship with the level of service being provided, and the financial viability of the enterprise supplying the service. In general terms the thrust of GOI policy is supported. This policy is directed towards providing a level of service, which the consumers have the ability to pay for, and is accompanied by a policy of full cost recovery. However, specific pricing issues continue to arise in various ways. Typical of these are: application of the National Standard Water Rate Structure (NSWRS, see following paragraph) in particular circumstances; pricing and methods of funding of household connections for water supply; pricing and methods of funding of sanitation facilities (connections, septic tanks etc.); pricing for extractive use of groundwater, particularly where the resource is being over exploited; and so on. As experience is being gained in the application of existing policies they are progressively being refined. However, a general comment would be that the policy debates could sometimes be better informed by appropriate economic principles. One example would be that the demand for water is often discussed without reference to its price, thereby implicitly assuming a completely inelastic demand (the same quantity will be demanded irrespective of price), whereas demand is actually quite elastic (demand will rise as price falls and vice versa). Another example would be that when a resource is being over exploited, sometimes with accompanying adverse effects upon the whole community (that is, there are "public good" and "externality" problems), then utilization of the resource is obviously under-priced. Thus, solutions to an array of problems in the sector can often be looked for in pricing, rather than in "standards" or regulation.

316. A number of issues have arisen in relation to the NSWRS. For example suggestions have been made that the lowest tariff block should be 0 to 5 cum/month for which the tariff could be 0.5A 1/. It is argued that this would help the poorer people to obtain up to about 30 lpcd at a lower total price. The same tariff would also apply to water from a standpipe. A change of this nature might be investigated. However, the household saving is likely to be very small (perhaps in the range of Rp 150 to Rp 300 per month per household) and is unlikely to be a critical factor in affordability. On the other hand, suggestions have also been made that the cross-subsidy from high volume users could be increased by further changing the structure above, say, 20 cum/month or 30 cum/month. At 30 cum/month the household tariff is already 3A in small, medium and large towns while it goes to 5A above 50 cum/month in large towns. It is considered that this structure is already providing a substantial cross-subsidy and, for the moment, should probably remain unchanged.

1/ See para 82 and Table 8. The factor "A" is to be determined by the water enterprise as the ratio of total cost divided by total water consumption which has been weighted by the tariff structure.

317. A number of issues have also arisen, particularly in smaller urban areas, in relation to "bulk" supply to small communities from either transmission pipelines or distribution mains. There are no procedures established for making supply agreements with such communities and no established tariff. Clearly, such arrangements would be advantageous to all concerned. The water enterprise would not have responsibility for operation, maintenance, billing and collection (except for one bulk bill) beyond the metering point. The community would have the flexibility to make their own distribution and revenue collection arrangements. The water enterprise should encourage such arrangements. The appropriate tariff may be that applicable to public standpipes (0.8 A for all supply).

318. Generally, the NSWRS applies in most BPAM. However, if change is required the BPAM management must make a request to the Bupati or Wali Kota (heads of Level II governments in rural or urban areas, respectively). In relation to the autonomous PDAMs, regulations require a change in either the NSWRS or the tariff factor "A" to be submitted through the Bupati or Wali Kota to the Dewan Perwakilan Rakyat II (DPR II) or local parliament. The procedure is lengthy, taking perhaps one year, and hence many administrations are cautious about putting in the effort required to obtain change. This situation of an inability to respond quickly and appropriately does not create the correct attitude in the PDAM administration. The autonomous PDAMs should be free to set the Tariff Factor "A" at a level which covers all operation, maintenance, administration, debt servicing and depreciation costs, without approval from local government but with local government retaining the power to direct that the Tariff Factor "A" be changed.

4. Revenue Collection

319. A continuing issue is the need to improve the revenue collection performance of public water enterprises. Suggestions made in recent studies for improving performance ^{1/} included: (i) establishment of local cash offices where consumers can pay during a stipulated period each month; and (ii) employment of private debt collecting firms. Apart from consumers who have received bills there are others who should receive bills but do not. These comprise illegal connections and connections which have been "lost" in the administrative system. In accordance with the study findings it is believed that more could be done in this area including:

- (i) penalty free grace period for consumers to apply for registration, followed by;
- (ii) selective situation enquiries and well publicized disconnections and penalties.

320. In addition, further changes in management approach will be necessary in some enterprises in order to contain costs. More funding needs to be made available for operation and maintenance of works. It is likely that substantial cost savings could often be possible on overhead items including administrative salaries. Study conclusions advise that: "For this to happen

^{1/} PT. Indah Karya et al; 1988; Directorate General of Human Settlements; Support Study for Master Planning for Water Supply Subsector Policy. Alternative Strategy Report.

it should be understood that water enterprises are expected to act on a commercial basis and that no part of their responsibilities is to provide employment for as many people as possible."

321. Revenue collections remain below achievable levels in some organizations because of structural reasons associated with the bookkeeping and accounting systems used. Thus, in some cases, customer ledgers are not kept when no effective record is kept of the payment performance of individual customers. The obvious problems inherent in this situation are compounded if a late paying customer pays after the close of an accounting period when the non-payment has already been written off as "bad debt". In such systems there is no effective means of accounting for the payment. Some effort is required to obtain change in enterprises which are still using such practices.

5. Onlending Policies

322. Following from the financial, institutional and manpower issues described in paragraphs 314 to 316 above, an emerging issue is the onlending of developmental funds from the Central Government to the Local Government (Levels I and II). This may arise in relation to rural programs particularly, where a component of the funding coming from the Central Government is loan. The specific concern for the Local Government is the interest rates being charged by the Central Government. These rates are usually significantly less than commercial rates.

6. Affordability

323. A recent World Bank document ^{1/} commences discussion of the issues and problems of the subsector with these words: "It has generally been assumed that much of the rural population is too poor to pay for adequate water supply and sanitation services. The available guidance suggests otherwise, most rural areas can afford to pay for improved services, provided appropriate technologies and delivery mechanisms are used". The key is to use the appropriate technologies and the appropriate mechanisms by which the services are delivered.

324. In Indonesia some detailed studies ^{2/} of household income, expenditure and saving pattern revealed some interesting characteristics of affordability or capacity to pay. Detailed data were collected of cash and non-cash incomes and expenditures from which a calculation of the amount saved was made. However, respondents were questioned separately on savings. For high income groups calculated savings exceeded stated savings. This is almost certainly due to imperfect recall of the details of expenditures leading to under estimates thereof. Such situations are normal where incomes are such that household budgets do not have to be very strictly controlled. However, for low income groups the reverse applied. For this group the stated savings exceeded the calculated savings (income minus expenditure). Again, this result

^{1/} Anthony A. Churchill, 1987, World Bank; Rural Water Supply and Sanitation, Time for A Change, World Bank Discussion Paper No. 18.

^{2/} Scott & Furphy, Dwyer Leslie; 1987; AIDAB, IBRD; Irian Jaya Water Supply Project, detailed studies conducted in 1,255 households in nine towns.

is plausible as some small items (cash or non-cash) of household income tend to be left out while the necessary household expenditures are obviously clear in the minds of poorer people. However, households with zero savings were less than five per cent of the total. If the ability to save is equated with some ability to pay for services, and it would seem difficult to refute this assumption, then it can be concluded that most rural households have some ability to pay.

E. Community Issues

1. Community Awareness

325. The suggestion, which frequently appears in reports, that there is a lack of community awareness of the need for clean water resulting in a low level of community participation and responsibility is an assumption and correlation which requires further consideration. Low levels of community participation have been shown to relate to several other factors:

- (i) the lack of consultation with the water management group (Kelompok Pengelola Air - KPA) in order to hear their proposals, needs and problems relating to design, location, water availability methods of management 1/;
- (ii) the lack of precise information given to the water management group about the material and labor inputs to be provided; and
- (iii) the directive approach taken during the construction of community facilities in contrast to a helping (facilitating) approach in recognition of the community water management group. 2/

326. A large proportion of rural people display behavior indicating awareness of the importance of clean water, e.g., boiling drinking water, protection of well water through the use of clean, special buckets and restrictions on the use of soap at the well. It is overcoming the problems related to the community constructing or improving their own facilities which needs consideration requiring a problem solving approach. Convenience and time saved through the availability of better facilities should be given more importance as motivating factors.

1/ Akademi Penilik Kesehatan Tehnologi Sanitasi Jakarta and Yayasan Indonesia Sejahtera, 1987; UNICEF and WHO, Evaluation of the INPRES Water Supply and Sanitation Program.

2/ The Lombok RWS&S project was based on community proposals prepared with designs, costings and estimates of community inputs and requested assistance from outside. Proposals were reviewed by the technical team, however very few required alteration.

2. Community Skills Required for Planning and Management

327. The present "bottom up" planning procedures rarely involves the user groups in plan preparation. The proposals put forward by the Desa Head and Desa Council are frequently referred to as "wish lists" due to lack of skill in precise planning and lack of information about available resources. 1/

328. Community planning has been shown to be effective when a trained village level facilitator (Kader) guides the plan development with collection of data, assessment of needs and priorities and proposals to meet that need related to available resources, both community and external assistance. Management skills can be developed in the water management group appropriate for the type of water supply facility. 2/

329. Community Organizers skilled in the process of community participation are required as trainers and facilitators. These skills are available in the Community Development Organizations (LPSM) Kader, as village level motivators trained in the process of community participation are required to work also in the community.

3. Community Inputs

330. Several rural water supply and sanitation projects have achieved levels of community contribution above 50 per cent. The principles which have been important in achieving this result include:

- (i) accurate information about external assistance to be provided;
- (ii) trust that the arrangements whether through grant or credit will in fact occur;
- (iii) prompt delivery of materials or labor or funding to be provided according to the schedule prepared by the water management group; 3/ and
- (iv) skilled facilitators.

4. Approach to Technical Support

331. Community groups have expressed dissatisfaction when the project has been planned as a community project but is then handled like a government project:

- (i) It is directed rather than facilitated by government personnel.

1/ AIDAB: Lombok Rural Water Supply and Sanitation Projects Community Self Survey, Community Development Specialist 1988 and 1989.

2/ M. Judd, 1989; CARE, USAID. "Community Self-Financing for Water and Sanitation System (CSFW), FY 89 Third Trimester Report.

3/ AIDAB, Lombok Rural Water Supply and Sanitation Project Final Report of Community Development Specialist Phase 1, 1988.

- (ii) It is handed over to the people as though it belongs to the government ^{1/}.
- (iii) Frequently, government logos appear on the facilities again suggesting government ownership.

5. Involvement of Women

332. Women are very concerned with the improvement of water supply and sanitation facilities. The need for women to be involved in planning, implementation and management is recognized. Special attention is still needed to ensure that this will happen. Most technical personnel, government and consultants, are men and thus work in the male communication channels of community meetings. The voice of women and their ideas will be presented through women's groups. The national women's organization, PKK, is given the task of developing the role of women in water supply and sanitation. While the communication between PKK leaders and the women of the community is good in some places, there is still a tendency for the leaders to show attitudes and choices of more highly educated women. The home industry group (Kelompok Usaha Bersama - KUB) of women offers another channel for the development of the role of women in water supply as their group management and business management skills can be utilized as in the Lombok RWS&S project. Women Kader have been appointed to work specifically with women to trial methods for increasing their involvement.

6. Poverty Alleviation

333. Improved water supply and sanitation requires financial contributions to be made by users. The improved facilities usually enable women to save time from collecting water which can be used for income generating activity. The development of income generating activities in poor communities can be integrated with water supply and sanitation development. The PKK has income generating activities. The KUB program of the Lombok RWS&S project has introduced such a component. The advantages are:

- (i) women increase family income. Family expenditure includes payments for water and sanitation both tariff and credit;
- (ii) women have a group which gives them a voice; and
- (iii) women learn skills appropriate to water supply management.

334. Cost sharing in the community according to means is common in rural areas. Community management is more likely to ensure this type of cost sharing. Cross subsidization policies enables poor communities to be assisted by wealthier areas. Tariff setting should ensure such cross subsidization.

^{1/} AIDAB, 1989; Lombok Rural Water Supply and Sanitation Project. "The Role of Women".

F. Reduction of Non-Revenue Water

335. Given that approximately 43 per cent of the water produced in Indonesia for urban piped public supply is non-revenue water (NRW), indicates that this is an area where major improvements in levels of efficiency should be achievable. This fact has been recognized by the Government and programs are presently planned to attempt to reduce both physical 1/ and non-physical 2/ losses. As an example, PAM Jaya is planning to reduce its NRW to 40 per cent of production by 1995 and 30 per cent by the year 2005. It is considered that this timetable for effective reduction could be accelerated.

336. Nationally, it is estimated that some 25,500 liters of water produced for urban piped systems is lost every second. This represented a national cost within the Repelita IV period of some Rp1.9 trillion 3/ or more than twice the total urban piped supply investment during this period. An immediate action program is needed to address this situation. It is possible that considerable progress could be made simply with the mobilization of present local resources. Major rehabilitation and leakage management programs will require external assistance for hardware and software and this cannot be provided in the very short term. With technical assistance support from DGCK, each water enterprise with present NRW rates greater than 30 per cent could implement the following immediate programs:

- (i) updating of information and records of system networks, to include accurate indications of all pipelines, fittings and connections (legal and illegal);
- (ii) pipeline patrolling, leak detection and repair;
- (iii) formalizing of illegal connections; and
- (iv) providing a public information campaign to promote better consumer understanding of wastage control including repair replacement of poor quality water fittings used in some domestic and industrial premises.

337. Implementation of this program would provide a strong basis on which to introduce further specialized technical assistance programs utilizing external assistance. Further higher level programs are required which would include the provision of hardware, training and technical assistance to water enterprises. These programs need to establish the following within each enterprise:

- (i) all enterprises to have reliable method of measurement of bulk production;
- (ii) all connections, private, institutional, commercial and neighborhood (public) taps to be metered;
- (iii) access to water meter testing facilities.

1/ Physical loss is water lost through leakage.

2/ "Non-physical" loss is water consumed but not recorded by consumer's meters or otherwise accounted for by government or other public use. It includes water consumed through illegal connections.

3/ Address by Director - General, General Affairs and Regional Autonomy; Bandung; July 1989.

338. The Bank's proposed Water Loss Reduction project scheduled for implementation in 1990/1991 will assist considerably in addressing this issue. This project is aimed at reducing over a four year period the water losses in some 20 towns and cities.

339. In the rural regions PDAMs, BPAMs and DGCK through their PAB offices should provide community based water user management groups with information and technical assistance aimed at helping them reduce NRW in their own systems. However, it is likely with systems operated and maintained by the water consumers themselves that this level of maintenance is already higher than that existing in publicly managed enterprises.

G. Operation and Maintenance

340. For the past twenty years, there has been rapid development and expansion of the urban services throughout Indonesia. Water supply and sanitation facilities have been important components of this work. Much of the money to fund the capital works associated with this development has been obtained in the form of grants or loans from external multilateral and bilateral agencies. Planning, design, and construction has generally been carried out by skilled professionals (foreign or Indonesian consultants and contractors). Throughout the construction of urban water supply and sanitation systems has been undertaken quite successfully. A crude estimate of present value of assets in the subsector is Rp1,300 billion. ^{1/}

341. In contrast, operation and maintenance activities are in general:

- (i) undertaken using local funds only; and
- (ii) carried out by local authority employees having limited knowledge and skills relating to water supply practice.

At present, annual expenditure on O&M is slightly in excess of Rp100 billion.

342. Typically, following the completion of a water supply construction programme, there is a "hand-over" of the completed works by the construction agency to the operation and maintenance agency (water enterprise). Often this handover is rudimentary. Members of the organizational and manpower requirements for management, operation and maintenance as it is a special field quite different to their own.

343. Consequently, the O&M activities undertaken are often only those which can be seen to have an immediate impact on system performance. This level of O&M is seldom sufficient to fully support the business objective of the enterprise. The emphasis tends to be on day-to-day needs, with too little attention paid to activities keyed to the long-term situation, such as forward planning and preventive maintenance program. This situation also reflects the low level of professional engineering skills available within most water enterprises.

^{1/} PT. Indah Karya, Sir M. Macdonald and Partners Asia, DHV, PT. Bromo Maserang, 1988; Support Study for Master Planning for Water Supply Subsector Policy, Alternative Strategy Report.

344. The management of water enterprises are often aware of the limitations or short coming apparent in their O&M operations but they also have other problems which restrict the options available to correctly address O&M. These additional major concerns include:

- (i) Insufficient revenue to properly cover realistic O&M costs (often a result of too low tariff levels, or low efficiency in collection of unpaid bills).
- (ii) There is no pressure from external sources to make changes and a lack of awareness about what constitutes good water supply management.
- (iii) A high level of bureaucracy is associated with organization structures and manning levels in water enterprises, and the director has not always got total freedom to act.
- (iv) Limited number of technical staff.

345. While the situation in most enterprises will not be identical, it is necessary that efficient O&M systems be developed quickly. Failure to address this issue will see services continuing to deteriorate within subsequent loss of revenue. It is unlikely that one solution will solve all problems but a combination of some of the following comments may lead to the development of a solution that suits a particular enterprise:

- (i) use of contractors may, in appropriate circumstances, help to improve levels of O&M;
- (ii) institutional strengthening external to the water enterprise should be carried out to provide stronger managerial, technical and career support and performance monitoring;
- (iii) internal support should be given to water enterprises to strengthen their capabilities regarding O&M. Such activities should be carried out by PMDU staff together with consultants;
- (iv) central Government to assist water enterprises with grants to purchase and install the full range of equipment necessary for adequate levels of O&M.

346. In the past rural sanitation has been operated and maintained by the users. With the inclusion of small IKK towns in the rural category more care will be required in operation and maintenance for Repelita programs. Combined with the linking of sanitation and water supply and the increased emphasis on sanitation in Repelita V, this will require considerable efforts to be made if operation and maintenance systems are to be effective.

347. Household sanitation facilities and household drainage will continue to be maintained by the owners with little, if any, technical assistance required.

348. At the desa level solid waste management will be limited to serve market areas. Desa markets are managed by market committees (mantri pasar) who are responsible to the village head (Kepala Desa). A small weekly fee is charged to stall holders, which is held by the Kepala Desa. If necessary, this fee could be increased to provide the Kepala Desa with sufficient funds to operate and maintain the market solid waste service.

349. Public or communal toilet facilities at desa level will be limited to latrines for mosques, markets and schools, and MCKs. Mosques and schools would be expected to maintain their own facilities. Maintenance of market facilities could be funded in a similar manner to the solid waste services. It is expected that MCKs would only be constructed at desa level upon request from a group of users. These users would also be responsible for maintenance of their facility.

350. Operation and maintenance of sanitation and solid waste facilities within rural IKK Towns is more difficult and institutional changes will need to be made to accomplish this. With the inclusion of sanitation with water supply it is logical that the committee set up to manage the water supply also take responsibility for sanitation, including solid waste. These schemes are under the general management of BPAMs (or PDAMs) at the Kabupaten level and it is logical that their role also increases to cover sanitation and solid waste. These groups at both IKK and Kabupaten levels could fund and manage the market sanitation and IKK solid waste facilities in the same manner as they fund manage, operate and maintain water systems.

351. The above suggested arrangements are attractive in that they do not require additional institutions or management groups to be set up. These existing bodies will need strengthening to help them to understand and cope with their new responsibilities.

H. Private Sector Involvement

352. The numbers of operators and administrative personnel in IKK Units are not always consistent with Cipta Karya instructions. Skill and quality should be improved. Provision of working manuals and training are necessary. Working equipment such as tools, and stock of spare parts in required quantities and appropriate types should be ensured.

1. Consultant, Contractors, Suppliers

353. The Government decrees Kepres 29/30 April 1984 has stimulated the growth of the consulting and contracting sector, but this growth has also created a number of problems.

354. Within the water and sanitation sector, the quality of a number of projects has suffered by the poor standard of workmanship. These are related to a number of issues including the lack of a sufficient number of qualified personnel on the contractors staff, inexperience of the local consultants, lack of adequate supervision by project office staff, and inadequate quality control measures. The resolution of these issues need to addressed by:

- (i) strictly enforcing prequalification of local contractors and consultants as to financial capability and experience;

- (ii) assist local contractors to upgrade their skills by training in management and technical areas 1/ many projects already include provision for this type of training 2/ 3/ although in some instances contractors have failed to attend; and
- (iii) project management capability should be enhanced by providing appropriate training through the Pusdiklat organization of MPW.

355. In addition, all tender documents for projects to be carried out should state clearly which standards are accepted. As far as applicable the standards of Standards Industri Indonesia (SII) should be used, otherwise, preference should be given to international standards, such as the International Standards Organization (ISO). In all other cases the National Standards of suppliers which are recognized and accepted by the Government should be declared valid.

356. The rural water supply and sanitation program, with its emphasis on community ownership is faced with the dilemma that the existing regulations relating to government expenditure on projects require that a project costing more than Rp.1,000,000 be contracted to a private contractor. This applies to piped systems including the construction of the neighborhood taps, and deep bores. Under these conditions community participation in planning and construction are severely limited. The "swakelola" (force account) is an alternative method of funding.

2. Private Sector Operation

357. The issue of full privatisation of water enterprises requires further detailed investigation as regulations on clean water supply stipulate that only public water enterprises can operate and distribute water supplies. However, there is a strong case for the introduction of systems of partial privatisation into water and sanitation sector enterprises. The objective is to create systems which reward performance whilst simultaneously providing some regulation or control. Systems which meet these objectives should be readily available for functions, such as:

- (i) meter reading;
- (ii) bill preparation, which can be undertaken as a separate function, or it can be undertaken conjointly with meter reading; and
- (iii) collection of payments, which could easily have a self-checking incentive or penalty systems incorporated within it and linked to the meter reading/bill preparation system. (Note that some water enterprises presently use the banking system for this purpose).

1/ HRDP Training Module.

2/ Scott & Furphy Pty Ltd., 1987; Cipta Karya, Eastern Island IKK Water Supply Design Project.

3/ Sinotech Engineering Consultants et al, 1989, Report on second IKK Water Supply Sector Program in Central Java and Jogjakarta, ADB Loan No. 731-INO.

358. The options for privatisation of aspects of the sanitation sector, such as solid waste in large urban centers, has as yet not been promoted but for similar reasons this should be considered in the future.

I. Water Quality Monitoring

1. General Considerations

359. Repelita V targets are bold, particularly in the implications they have for staffing, training and on-going operating expenditures. Water sampling requires skilled labor to ensure that samples are uncontaminated, held at the correct temperature and delivered to the laboratory within a certain time. The actual testing process requires skilled technicians, and the laboratories need to have continuous supplies of fresh chemical agents. Most of these skilled personnel are not currently available and the DEPKES program will need to incorporate substantial allowance for manpower training and development.

360. The establishment of a large number of new laboratories, regardless of who owns and operates them, will require effort to be put into construction of the physical facilities as well as operational methodologies, test method standardization and supply logistics for chemical reagents.

361. Recent reports 1/ noted that while water quality testing equipment is available in some 60 per cent of urban areas the extent of testing is small. Testing for chlorine residual, a simple common and essential test, is only performed in 57 per cent of enterprises. For those enterprises that do test for chlorine residual the frequency of testing is generally inadequate. The situation is expected to be similar or worse for all other physical or chemical testing.

362. With respect to bacteriological testing the extent and frequency of testing is even less. Bacteriological tests are not done at all by PDAM or BPAM enterprises. As the size of systems increases, more bacteriological test need to be done, however, many of the larger enterprises still do not possess their own equipment, and the tests if done are carried out by the Ministry of Health (MOH).

2. Location and Operation of Laboratories

363. Under current proposals MOH is to be responsible for water quality monitoring, sampling, testing and reporting. This implies that individual water enterprises are not responsible for these matters. A recent study 2/ recommended that urban water enterprises, particularly the larger

1/ Indah Karya et al; 1988; Cipta Karya; Support Study for Master Planning for Water Supply Subsector Policy, Volumes 1 and 2.

2/ Indah Karya et al; 1988; Cipta Karya; Support Study for Master Planning for Water Supply Subsector Policy, Volumes 1 and 2.
PT Indah Karya et al; 1988; Cipta Karya; Support Study for Master Planning for Water Supply Sub-Sector Policy, Alternative Strategy Report, Volume 2.

ones, be responsible for and perform their own water quality monitoring and testing. This principle is agreed with since quality monitoring is a day to day part of system operation. It is unrealistic to expect rural communities, including rural IKKs, to monitor the quality of their water and the DEPKES role in this area is considered appropriate.

364. Difficulties are foreseen in the urban areas. In principle it is appropriate that all urban enterprises should perform their own monitoring and this should be adopted as a long term goal. In practice it is unrealistic to expect urban IKK systems, and BPAM systems to perform monitoring and testing functions, and it is therefore appropriate that DEPKES take responsibility in this area for the foreseeable future. For larger urban enterprises, 1/ there is benefit in using resources to provide facilities, manpower and training, to enable monitoring to be performed by those responsible for the operation of the water supply.

3. Water Quality Standards

365. Potable water quality standards currently adopted by MOH are similar to WHO standards except for total hardness where the MOH standard is 178.5 mg/L against a WHO standard of 500 mg/L. The appropriateness of the MOH water quality standards can be questioned for certain areas of the water subsector.

366. For IKK and small town piped water schemes, adherence to these standards has resulted in schemes utilizing surface or spring sources with disinfection. These communities have generally boiled their drinking water and the expectation is that upon implementation of piped water, boiling of water can cease.

367. In practice the operation of the disinfection and treatment facilities is often of an intermittent nature. This means that micro-biologically safe water cannot be guaranteed. In these circumstances not boiling drinking water could adversely affect public health. Given this fact the rationale for disinfection diminishes.

368. It is recommended that disinfection not be provided for small urban or rural water supplies, where boiling of drinking water is widespread. Disinfection of these systems should only be practiced when operation and maintenance skills have been developed to the level where adequate disinfection can be operated and maintained at all times.

369. For point source rural water supply schemes the standards often have no direct application. The available source must be used regardless of the quality. In these areas the MOH standards should be used to select between alternative affordable sources, all else being equal or to prepare advice to the communities as to how to use the water.

1 PDAMs and larger.

4. Differential Water Quality Standards

370. Some areas of Indonesia have inadequate quantity of water resources, particularly in the Eastern Islands region and Kalimantan. Water supply schemes, particularly in rural areas, often have difficulty in sourcing the necessary quantity of water of any quality. In these situations a multiplicity of very small sources are often developed to provide the necessary quantity, and these sources are often of different qualities.

371. It will be essential to allow sufficient flexibility in the design and operation of these schemes for the higher quality sources to be used solely for drinking and cooking and the other sources for all other purposes. The MOH inspection and monitoring program will be most valuable to allow accurate quality discrimination between the alternatives sources.

J. Environmental Issues

1. Groundwater

372. Because of a multitude of different users of groundwater it has become difficult to monitor and control abstraction with existing organizational arrangements. In addition, current legislation does not adequately (if at all) cover abstraction of shallow (less than 15m deep) groundwater.

373. In a recent move to halt further deterioration of groundwater in North Jakarta, the city administration has itself taken over responsibility for control of groundwater. This will not however help the situation in Tangerang or Bekasi, which are outside the city limits, or other affected parts of Indonesia.

374. It would appear there is a need for further action at a central level to improve monitoring and control of groundwater. In view of the direct relationships between shallow and deep groundwater, it is desirable that the one agency be given overall responsibility.

2. Surface Water

375. In recent years there has been noticeable increase in pollution of many major rivers, caused by both industrial effluents and by human waste. The problems created by this situation become particularly acute when the river is used as a source of public drinking water. Areas where such problems already are or are becoming felt include Jabotabek, Bandung, Surabaya, Semarang and Surakarta.

376. Also, it should be remembered that many of the urban poor use the rivers as their bathing places. Recently there have been many incidents reported in the press concerning people contracting skin diseases as a result of bathing in rivers which have become polluted.

377. There is clearly a need for some action to remedy the situation and to prevent the rivers becoming even more polluted.

3. Rehabilitation of Polluted Resources

378. The rehabilitation of polluted resources will be very costly. However, the Government is moving towards the introduction of tougher environmental protection regulations. Pollution problems have arisen due to recent industrialization and difficulties with the enforcement of existing regulation. Several efforts for rehabilitation works are limited mainly to the big cities where more serious problems occur.

379. A novel effort being promoted in Jakarta currently suggests that people privately construct infiltration galleries to infiltrate the rain water from their roof into the ground with the main purposes of: (i) supporting the on-site drainage; (ii) supporting the soil conservation; and (iii) water reservoir in case of fire, plant watering, yard watering and others. Literature has been prepared to assist the community construct these units. It is proposed that a mass effort for these activities will reduce the penetration of salty water polluted the groundwater. Further studies are proposed.

K. Health Education Issues

1. Approach to Health Education

380. Effective Health Education programs include information, education and motivation components. Within communities both urban and rural water borne disease continues to occur. From this, it is deduced that the community is still not aware of the health aspects of water supply and sanitation. While this is undoubtedly true for some people, in many instances the community knows what should be done to ensure clean water is used for drinking, etc., and that sanitation facilities should be used. That is, they have been given the information, understood and accepted it.

381. However, to actually carry out the instruction a problem is encountered frequently which is difficult to overcome. For example, the cost of buying fuel for boiling water, access to water for latrines, access to suitable credit facilities, to build improved water supply or sanitation facilities. A problem solving approach is therefore required together with motivation to change behavior patterns and attitudes.

382. The information component has received considerable attention in developing appropriate materials (UNICEF, Yayasan Indonesia Sejahtera (YIS) and foreign projects ^{1/} for communicating messages about clean water, sanitation and health using a range of media. Although some problems exist in the dissemination of this material through lack of funds to produce adequate copies, the information component of the health education is generally well developed. In the areas of problem solving and motivation health educators require considerable skills strengthening to ensure that the problems will be solved and behavioral and attitudinal changes will result.

^{1/} WHO, RWS&S Project, Lampung and Bengkulu and IWACO RWSS Project, West Java.

2. School Program

383. Within the overall health education program particular attention should be directed to a parallel and complementary program in schools, particularly junior schools, where the children are receptive to the introduction of simple personal hygiene practices, as part of their daily activities. For such a program to be fully effective schools need adequate water and functioning latrines to allow habits, such as cleansing hands before food and after toilet use, to become part of a child's daily activity. The objectives of the program should be to : provide schools in Indonesia with adequate water and latrines to service the school population; the inclusion of personal hygienic practice as part of the curriculum; to provide teachers with sufficient materials and in service training to conduct this program. Strategies for development would require: (i) acceptance of this proposal as National Policy; (ii) development of appropriate curriculum; (iii) identification of water resource and latrine requirements at schools. Initially the program should be directed to schools servicing those communities involved in improving their own water supply and sanitation facilities with construction of demonstration units at schools used as part of the skills training for community groups. The present UNICEF water supply and sanitation program includes construction of facilities at schools supported by health and environmental education component.

L. Energy Issues

1. General

384. While comments about the energy subsector may appear unrelated to the water supply and sanitation subsector there are a number of issues which link them. These are discussed below:

(a) Household Fuel

385. Many households, particularly, in rural areas boil drinking water using wood or kerosene as fuel. In these households this is probably one of the major uses of energy and in aggregate nationwide would represent a very significant cost. This study recommends that this practice should continue until water supply systems can be made to operate more effectively and provide the consumer with safe, potable water (see para 368). However, once this stage of service is reached the community can achieve significant savings through discontinuing this practice.

386. In areas where wood is used as fuel there can be adverse environmental effects due to deforestation. Cessation of water boiling would be a significant step in alleviating this serious problem.

(b) Urban Solid Waste

387. Indonesia is a relatively energy rich country with its existing oil and gas reserves and the developing coal industry. A source of energy often overlooked is solid waste particularly that generated in the metropolitan cities.

388. It is likely that current economics would not support the development of a waste fired power station, given the relative cheapness and proximity of alternative fuels and the relatively high moisture content of the waste. The economics of energy recovery from solid waste should be reviewed whenever there are major changes in the cost of oil, gas or coal or whenever solid waste disposal costs become excessive. This latter situation could arise when existing landfill sites become full and new sites are available only at a considerable haulage distance from the waste generating area.

(c) Sewerage Treatment Policy

389. While there is currently very little sewage treatment in the metropolitan cities, it is likely that major facilities will be constructed over the next decade. There will arise in the planning for these facilities a conflict between technologies, that will, to a degree be influenced by questions of energy use. In a broad context, treatment plants may be either high technology, small land area plants or low technology, large land area lagoon plants. Lagoon plants will need to be located on the fringes of the urban areas where adequate land space is available. This will often imply a high energy cost for sewerage transportation if gravity sewers cannot be used.

390. The tradeoff is thus between:

- (i) high capital and energy cost of delivery, large land area and simple, low cost operation; and
- (ii) lower capital and energy cost of delivery, smaller land area required and complex, high cost operation and maintenance of the plant.

391. It is firmly considered that complex physical/chemical sewage treatment plants are not yet appropriate for Indonesia and that lagoon processes should continue to be universally used.

(d) Rural Electrification

392. The extent of electrification of rural towns and desa is relatively small when compared with some other countries in the region (Thailand, Malaysia). Although being an island nation further compounds the difficulties and cost, there is little doubt, that acceleration of this program would have profound influence on the extent and rate of rural development. Beneficial influences are likely to include:

- (i) availability of electric power for boiling water; and
- (ii) availability of television as a powerful media tool enabling the more effective dissemination of community and health education material.

393. The communication improvement realized would result in the rural community rapidly achieving higher levels of knowledge and sophistication, and thus, be more receptive to water supply and sanitation programs. Rural electrification would thus be a seed for an enhanced rate of development in many areas including public health, water and sanitation.

IV. SECTOR ACTION PLAN

A. General

394. The Government continues to express its concern over the availability of local funds for foreign assisted projects. In the past, some projects have been delayed because of insufficient local counterpart funds. This situation will probably prevail in the coming years due to pressure on the central government development budget. If the targets of Repelita V are to be reached, a larger share of the total project costs should come from foreign sources than the usual 60 per cent. Recently, GOI has been able to increase this share for major development projects to 80 per cent. This implies a larger share of the local cost being foreign financed.

395. Early in 1984, Presidential Decrees were issued (KEPRES 29/30) confirming policy guidelines on the use of local consultancy and local contractors in the preparation and implementation of development projects. The decrees require a preferential treatment of the local private sector in order to promote the development of local companies. The Government, also aims for maximization of local inputs for foreign assisted projects with respect to consultants for technical assistance projects and contractors for loan projects. Given the present delays in the timely implementation of some foreign assisted project the implications of this policy as it relates to Bank projects need to be further studied.

396. Many bilateral donors, multilateral agencies and other development organizations are involved in the water supply and sanitation subsector in Indonesia. The great demand for further development has resulted in a geographical scattering of aid and foreign financed projects. These increased demands have resulted in a policy of regionalization, i.e., each donor and development agency should concentrate its funds in particular regions and provinces. Recent practice in the Bank's involvement in the subsector has been that funds are mainly directed at the provinces of West and Central Java and North and South Sumatra. The Government intends to further pursue this geographical policy.

B. Recommendations for Water Supply and Sanitation Implementation Strategy

1. General

397. From an analysis of the sector and discussion of issues in Section III (B to L) above, a number of recommendations emerge which will assist Government in the delivery of more effective and sustainable water supply and sanitation facilities. Recommendations which need to be emphasized are presented below:

- (i) Government procurement systems be strengthened and more closely managed to ensure that where appropriate, only factory tested and quality assured materials and equipment be accepted for use on future projects. These materials and equipment should be supported with operation and spare parts manuals in Bahasa Indonesia.

- (ii) The Government consider the need for curriculum enhancement for tertiary training to develop an awareness and sensitivity for the need for community participation methodology and appropriate technology.
- (iii) A National Water Resources Master Plan be prepared in conjunction with all future urban and rural water supply projects. For rural areas data will be collected as a component of community water supply proposal development.

2. Urban Water Supply and Sanitation

398. Considerable progress has been made in the development of the IUIDP approach, which has been actively supported by external agencies including the Bank. To further enhance the delivery and effectiveness of urban services it is recommended that:

- (i) Water enterprises, with the technical support of Central Government undertake an immediate national program to reduce NRW.
- (ii) The IUIDP approach continue to be developed and supported. To speed up project implementation, review present policy and investigate the potential for allowing water supply and sanitation facilities development to occur concurrently with preparation and within the framework of the local integrated plan.
- (iii) Career structure and opportunities for the staff of regional and local governments and their agencies should be further enhanced through the development of more appropriate organization structures. National compatibility should be an objective.
- (iv) Training courses targetted at improving the skills of lower level technical and skilled labor staff in water enterprises need to be upgraded and increased in frequency. Ideally, these should be integrated into the vocational education system.
- (v) Where water enterprises are lacking manpower and skills for particular system operation and maintenance tasks, the potential of having these services provided through a period contract with a private sector organization be investigated.
- (vi) Central, regional and local government take concerted action to address the increasing environmental damage and pollution of water resources throughout the country. Further efforts be applied to the enforcement of present regulations.

- (vii) A higher planning priority be given to the reduction and rehabilitation of polluted surface and groundwater resources surrounding major cities, particularly Jakarta. For example, as argued in para 315, there are many policy issues which could be assisted by application of appropriate economic principles. Thus, over use of extracted groundwater might be better controlled by raising the price rather than by regulation to the benefit of those who have no other water source and to the benefit of the water enterprise which can profitably sell more water. Urgent development of alternative non-groundwater supplies within Jakarta should be investigated.

3. Rural Water Supply and Sanitation

399. Efforts within past development plans have been less than successful because the responsible Government agencies have failed to implement sufficiently the developing concept of "community/consumer ownership". This has subsequently resulted in the community failing to use installed facilities or to neglect maintenance and repair, because it was perceived to be the Government's responsibility. Results of projects directly supported by external bilateral agencies and incorporating strong community participation principles have been far more encouraging for the development of long term sustainability of water supply and sanitation facilities.

400. Because of less than satisfactory past performances, a substantial amount of financial resources have had to be directed within the Repelita V plan to the rehabilitation of or repair of previously installed facilities. This limits the ability of the Government to provide services to a growing population. To improve the effectiveness of investment it is recommended that:

- (i) A development approach for rural programs paralleling in principle that of IUIDP be followed as long term goal. The approach would incorporate IKIDP ^{1/} and a modified P2LDT.
- (ii) Central government should undertake macro resource allocation down to kabupaten level. Micro site selection and resource allocation should be from kabupaten level using a flexible approach based on National Government priorities and guidelines and community needs.
- (iii) The resource allocation process should ensure that resources are directed towards villages exhibiting a high level of need.
- (iv) Selected MHA data should be used for macro resource allocation with additional criteria as necessary.

^{1/} IKIDP - Integrated Kabupaten Infrastructure Development Plan.

- (v) LPSM should be engaged to develop community participation in consultation with and cooperation from PKK, LKMD, Kaders and traditional community leaders.
- (vi) More training is required in the processes of community participation within MPW, MOH and BAPPEDA.
- (vii) More assistance should be given to communities to plan, construct and operate their own facilities via development of community proposal guidelines, with Kaders available for assistance.
- (viii) Community ownership of facilities should be promoted through changes to implementation methodologies that maximize community participation and minimize contracting on small piped and non-piped water supply systems.
- (ix) Effective community credit systems should be developed to assist the community to finance their contribution.
- (x) Water source surveys should be performed by the community as an integral part of their project proposal preparation and development.

C. Rural Water Supply and Sanitation Strategy

1. General

401. The financial resources required to achieve a significant increase in the standard of rural water supply and sanitation services is small in relation to the proposed total program cost. Major constraints to an effective rural program are likely to be:

- (i) the method of delivery of the program (top-down or bottom-up, government or community ownership, etc.); and
- (ii) the institutional system and manpower resources necessary to deliver an effective annual program.

402. Thus, successful implementation of rural water supply and sanitation programs is all about users and ownership. If community ownership can be achieved, it follows that community resources will be mobilized to ensure effective construction and maintenance are carried out. This means that the likelihood of long term sustainability is significantly increased. At a financial level community ownership means permitting communities to make their own decisions. Typically, this will mean permitting the community to generate its own tradeoffs between what they want and what they can afford to pay. It is counter-productive for Governments to attempt to make these decisions on behalf of communities. It also follows that once a community has made a decision on the facilities it is prepared to pay for and own, and these proposals are technically and financially feasible, then the Government should

accept the project without further modification. Government support, rather than approval for a community proposal is required. For the Government to approve of a community's proposal is to imply that the Government owns the facility and not the community. This negates the principle of community ownership.

2. Strategy Development

(a) Introduction

403. Successful implementation of reliable, sustainable programs for rural water supply and sanitation requires the following three major policy elements to be effectively in place:

- (i) **Consumer Participation:** Failure to effectively assess community preferences is a major reason for project failure. Unless consumers (the community) participate actively in the selection of service levels, the location of projects and in the "how" and "why" decisions of cost sharing, projects will have a very high probability of failure.
- (ii) **Cost Recovery or Self Financing:** Without a high level of cost recovery or self financing, it is unlikely that programs will be replicable or sustainable. There is considerable evidence that rural communities are both willing to pay for improved services and have the capacity to do so if given the opportunity.
- (iii) **Credit:** Many communities will need access to borrowed funds to meet the requirements for investment in improved water supply and sanitation. Credit institutions have little experience in providing finance for such services. Rural borrowers have little knowledge of credit and even less experience. Effective credit facilities therefore need to be put in place, either through an existing institution or financial intermediaries.

404. With all the above factors in mind, the following principles should be adopted in relation to rural water supply and sanitation programs.

- (i) The focus of activity should be on providing the community organization, technical support and the financial intermediaries, all of which assist in giving effect to community aspirations.
- (ii) Where possible, assistance should be provided to small sized, locally based, water management groups who would be able to construct manage and maintain systems for their rural communities.
- (iii) As far as possible, the financial goal should be full cost recovery, that is, full community self-financing of constructed facilities with the assistance of low-cost credit.

405. There should be four major components, or sub-programs, of the overall rural water supply and sanitation program. They are the community processes, technical support, credit and the support grant components. The purpose of each program and responsibility for oversight of the program are as follows.

(b) Community Processes

406. A sub-program is required to assist the community to identify the scope and service levels of required water supply and sanitation facilities; assist the community to decide how, by whom and in what way the required facilities are to be paid for; to train the community in the organizational and financial skills necessary to collect, account for and disburse the required inputs (cash, credit, labor, land, materials); and to support the community in any required application for credit. In accordance with the requirements of Repelita V Pemerintah Daerah II (the second level of local government or Regency level) will be responsible for the sub-program.

(c) Technical Support

407. A sub-program is required to provide technical support to the community processes in relation to construction and maintenance of wells, handpumps, small piped water supply systems and sanitation, including leaching pit latrines, septic tanks, MCKs and other sanitation facilities. This technical assistance is to encompass design of the technical components of the required water supply and sanitation systems plus advice and training on construction and maintenance techniques (hand pump maintenance and repair, cement and concrete manufacture and usage, pipelaying and joining, bricklaying, operation and maintenance of septic tanks and so on). This sub-program will not include implementation of construction of the required facilities but only the advice and training referred to above. In accordance with Government policy, as reflected in Repelita V, the Directorate-General of Human Settlements (Cipta Karya, MPW) is responsible for organizing the provision of these technical support services, which should be provided by Dinas Pekerjaan Umum (the Public Works Service Office at Regency/Municipality level).

(d) Credit

408. As many communities will require access to borrowed funds to fulfill their contribution to the identified projects, and as both borrowers and existing lending institutions have little experience in such borrowing/lending, a sub-program will be necessary to ensure that suitable credit is available when required. All required institutions, credit systems and/or financial intermediaries already exist. The sub-program will be required to expand their utilization, assist, in overcoming particular problems (such as the banking systems usual requirement for collateral) and to provide a source of lower cost funds to the rural community (usual interest rates range from 12 to 18 per cent per annum). The basic credit concept is that low cost funds would be provided through the existing banking system (for example Bank Rakyat Indonesia (BRI) or Bank Pembangunan Daerah (BPD)) to borrowers whose proposals for village based community development projects (including water supply and sanitation) meet the

criteria to be established. Existing packages which may be appropriate (with minor modification to their terms) include Kredit Model Kerja Permanen (KMKP or Permanent Working Capital Credit) and Kredit Umum Pedesaan (KUPEDES or General Village Credit Program). The Ministry of Finance, through the Bank of Indonesia, would be responsible for the sub-program. It would also be an effective way of channeling lower cost funds to the community.

(e) Support Grants

409. It is unlikely that rural communities will have the capacity to provide 100 per cent of the inputs required to complete the necessary investment program. Therefore, this sub-program will be designed to provide support grants to the community in proportion to the inputs provided by the community itself. For example, the community will provide project inputs in the form of labor, materials, cash, credit and perhaps the most important local input of all; land. A support grant will be provided for projects meeting the established criteria in proportion to the total of the inputs provided by the community. The proportion of the total project cost to be met by this support grant needs to be decided. However, an appropriate figure may be 50 per cent. Alternatively, figures as low as 25 per cent could be considered. Whatever proportion is decided, it should be consistent throughout the program. The appropriate authority for management of the support grant sub-program is Pemerintah Daerah Tingkat II (Penda II or Local Government at Regency level).

3. Advantages of the RWS&S Strategy

410. The preceding strategy for approaching the Repelita V rural water supply and sanitation program has a number of advantages over the approaches which are more usually applied. These include:

- (i) Approaches based upon demonstration projects do not usually have any mechanism to induce other villages to adopt the demonstration project and complete it for themselves. If a project is constructed free of charge in one village, what incentive is there for a neighboring village to also do the same? It would seem that the incentive would be to wait and let the Government be responsible rather than spend the money and do the work for yourself.
- (ii) The demonstration project concept assumes that neighboring villages know and understand the demonstration. This is unlikely to be the case without a specific major program to ensure that it happens.
- (iii) Again, the demonstration project concept assumes that villages have skills in community organization, bookkeeping, financial management, use of cement, bricklaying, pipelaying, etc. all of which are necessary if each village is to repeat the demonstration project. These skills are unlikely to be fully available unless specific training programs are carried out in each village.

411. The proposed strategy avoids most of the problems described in the preceding paragraph because it specifically incorporates training and funds used to stimulate and assist all villages rather than a selected few demonstration ones. Thus, the principal function of the approach being proposed is to use government funds to provide a very broadly spread development stimulus, rather than just to provide construction costs at a limited number of locations.

412. Some qualifications to the proposed strategy are appropriate. While it has been adequately demonstrated to be successful, the following specific cases may warrant a higher level of funding support:

- (i) at religious institutions and schools where full government support may be appropriate; and
- (ii) in poorer villages, which cannot provide the required amount of input, referral to bilateral or NGO programs may be appropriate. (For example, support for a group of poorer villages in a particular province could be requested from a bilateral donor).

4. Implementation of the RW&S Strategy

(a) Functional Responsibilities

413. Priorities for implementation of the rural program for water supply and sanitation should be established in a two stage process. The Directorate General of Regional Development (BANGDA) within the Ministry of Home Affairs maintains a data base at Regency Level (Kabupaten), which contains the following socio-economic data in either absolute or relative terms: population density; productive wealth; relative isolation; per capita income; level of dependence; level of community participation; health levels; education; and order and discipline. This data base, in association with definition of criteria based upon it is capable of being used together with the data bases of other government technical agencies to select high priority districts (Kabupaten) for implementation of the rural water supply and sanitation program. It includes Repelita V priority rating criteria (poorer and less developed areas, growth centers, border villages and fishermen villages).

414. Prioritization of rural settlements (that is, individual settlements within the Desa administrative unit) for implementation of the rural water supply and sanitation program should be undertaken by the second level of Local Government (Pemda II), by officials of that government in consultation with the community. Prioritization criteria should include the Repelita V criteria plus specific local criteria. In determining and applying local criteria, substantial weight should be placed upon what is potentially the most important single criterion, namely, the willingness of the community to participate in the program. The Repelita V policy position is that provision of clean water supply in the rural areas is the responsibility of the rural community itself. Government input is for assistance to the community to define their needs in

relation to their capacity to pay. Willingness to participate is a very direct indicator and subsumes a range of otherwise, indirect criteria, such as: capacity to pay; organizational skills within the community; knowledge of the benefits of clean water supply and sanitation; and the need to improve existing supplies. Unfortunately, this criterion is not often included in prioritization.

415. The functional responsibilities necessary to implement the proposed RWS&S program are presented in Figure 5. It is essential that the responsibility for coordination of Government inputs with community proposals remain strongly based at Local Government Level II. Functionally, the program will rely on the Government's ability to effectively manage and coordinate funds, credit and technical inputs to match proposals from the community groups.

416. Final detailed design for selected rural locations should be undertaken by technical support officials of the Government in consultation with the community only when funds are available in the Kecamatan for the project to proceed. These technical support officials would remain associated with the project in an advisory capacity until construction was complete and the community confident with their operation and maintenance role.

417. Monitoring of the program should remain the responsibility of BANGDA Tk. I, but some technical monitoring may be required from Cipta Karya, MPW. However, as the program will be largely operated at Local Government Level II, most monitoring responsibility should be undertaken by Local Government Level I with a reporting function to the Central Government.

(b) Institutional Arrangements

418. As the responsibility for the program implementation lies mainly at Local Government Level II, the program is designed to function within existing institutions, thereby obviating the need for special project based institutions, such as Project Steering Committee and other similar project support groups. Overall coordination of the project will remain the responsibility of BANGDA Level I, while the monitoring of project activities will lie with BANGDA Level I and Central Government. Some strengthening of local government Level II organizations will be necessary, particularly BANGDES in its community liaison functions and possibly Dinas PU for technical support. The role of the community facilitator is crucial to the success of the program and for this reason, recognized community development organizations are included for this function.

(c) Indicative Costing Model

419. Table 39 shows an indicative cost structure for the proposed rural water supply and sanitation program. The per capita cost has assumed that a certain mix of appropriate technologies will be used and the weighting factors for these are shown. The per capita cost of construction varies considerably, depending on the technology used. There are also some differences between unit costs estimated by this Study and those used by DAB/Cipta Karya for their program budgeting.

Figure 5. Proposed Functional Responsibilities for RWS&S Strategy

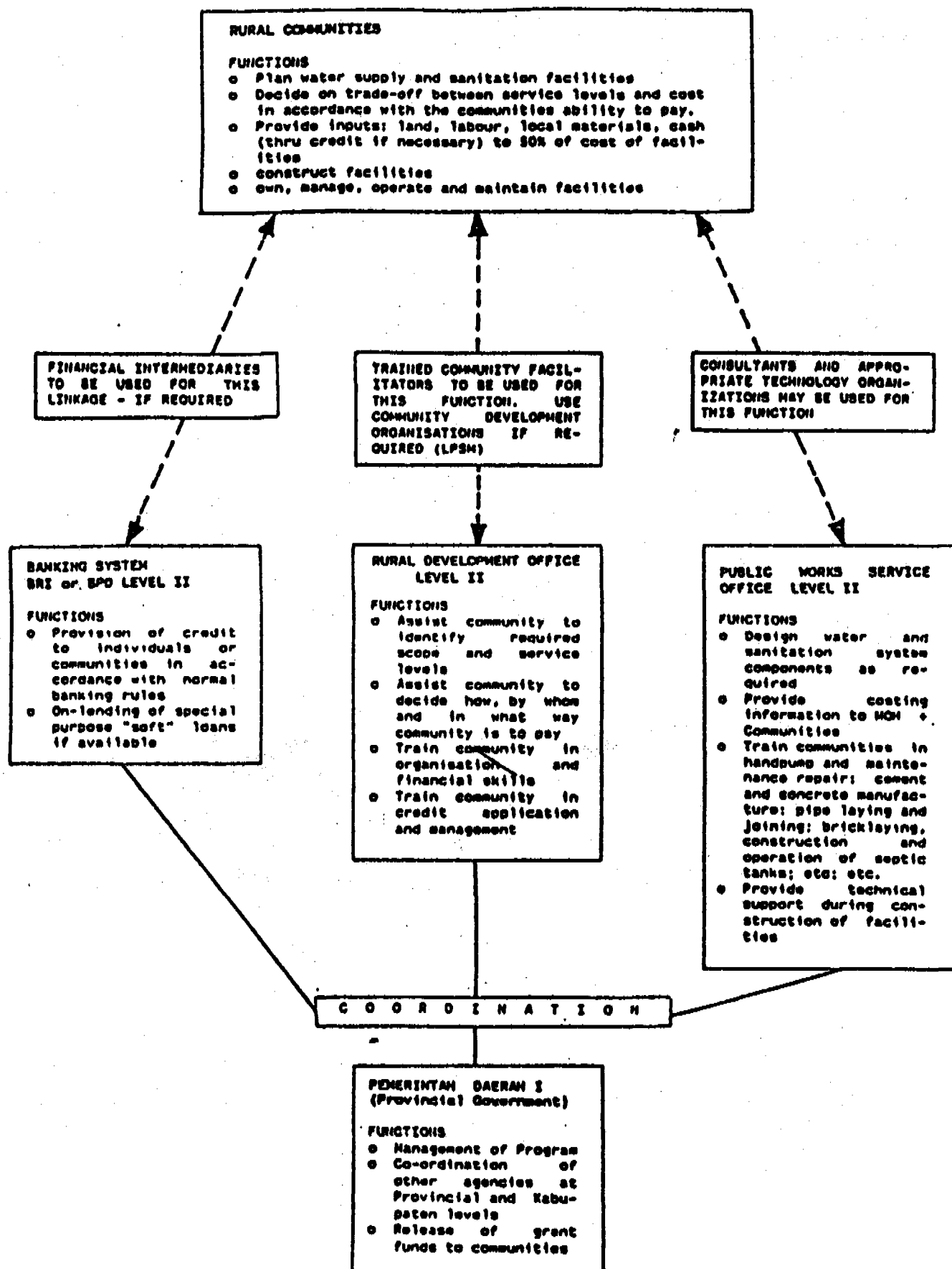


Table 39. Indicative RWS&S Program Cost

		Weighted Cost	Assumed Cost	Sharing b/
		Rp/capita	Government	Community
			Rp/capita	Rp/capita
Water Supplies a/		17,000	10,500	6,500
Sanitation		25,000	5,000	20,000
Management/Coordination		1,000	1,000	0
Technical Design/Support		4,500	4,500	0
Community Organization		1,500	1,500	0
Financial Intermediary		500	500	0
Subtotals	Rp	49,500	23,000	26,500
	\$	28.00	13.00	15.00
National Program Administration		11,000	11,000	0
Totals	Rp	60,500	34,000	26,500
	\$	34.20	19.20	15.00

a/ Application of available technologies has been weighted in accordance with the proposed Repelita V DJCK/DAB rural program.

Rural IKK

Pumped bore, pipes, house connections	16
Spring, gravity, pipes, house connections	4

Rural, Others

Deepwell, handpumps	6
Rainwater Tanks	7
Dugwells	19
Water Filters	26
Handpump rehabilitation	16
Spring water reservoir	6
Total	<u>100</u>

b/ The cost sharing ratio between Government and the community will vary depending on the circumstances of each project and location. The figures shown are indicative only.

420. The Consultant estimates that construction of deepwells with handpumps will cost some Rp17,500 per capita, whereas the DAB figure is Rp60,000 per capita. This difference is probably due to differing assumptions in the methods of constructing the well and in the standard of facility to be achieved. A more significant difference occurs in the construction cost of piped water supply systems for rural IKK towns, where the DAB estimate is Rp110,000 per capita compared to the Study figure of some Rp15,000 per capita. It is considered that the DAB figure includes allowances for community organization, health education and National program administration. The lower figure has been used to derive the indicative figures in Table 39 since it is assumed that recurrent administrative costs would not be financed by external borrowings.

421. Overall, these costs are lower than those usually put forward by the Government for the provision of water and sanitation service. However, when communities substantial contribution towards the cost of facilities, the type and quality of the facilities required becomes more realistic. Also, if the community are responsible for construction of the facilities, it will be undertaken with a high degree of efficiency. Two recent achievements utilizing this approach are:

- (i) In the district of Sintong Marnipi, province of North Sumatera a piped water supply was organized by the Village Community Self Reliance Organization (LKMD) for approximately 2,000 people at a total cost of \$12.70 per capita 35 per cent of which come from the Provincial Budget (APBD I) and 65 per cent (\$8 - 40 per capita) of which come from the community.
- (ii) The Non-Governmental Organization (NGO), Cooperative for American Relief Everywhere (CARE) in Indonesia have assisted in the installation of 25 piped water supply systems, serving 68,495 people (ranging from 300 persons to 9,376 persons) in the provinces of East Java, West Java and NTB, at a total average cost of \$10.49 per capita of which \$2.38 per capita was produced directly by the community, \$5.04 per capita was funded through normal commercial loans to the community and \$3.07 per capita was inputs from CARE (including community motivation, technical support and cash contribution).

422. The indicative costs identified in Table 39 will vary according to the specific situation in each community, but are appropriate for broad scale national program planning. Factors which will influence costs include: the proximity of suitable water sources to the community to be served, the type of connection proposed, the relative population density of the community, and the type of sanitation facilities required. However, it must be emphasized that the cost of servicing rural populations will be approximately as listed above provided that the community pays a share of the cost, and decides the level of service required, taking into account their capacity to pay.

423. Using the indicative costs shown in Table 39, a typical rural water supply and sanitation program designed to meet Repelita V targets, would require the following external funding support:

(i) Total project cost	\$50 million
(ii) Foreign loan/credit	40 million
(iii) Population to be served at \$13.00/capita	3,800,000
(iv) Number of projects to meet Repelita V target	11
(v) Total cost for Repelita V	\$550 million
(vi) Total foreign loan/credit required	\$440 million

424. The indicative costs and external funding support estimates developed for the Repelita V program reflect heavily the simple technology proposed. Only 22 per cent of the proposed programs new facilities use mechanized technology. Programs utilizing a higher proportion of mechanized systems would naturally have higher indicative costs.

D. Potential for External Assistance - Repelita V

425. The sector presents a large number of potentially attractive packages for external assistance. The Government has looked to this study for direction and advice on methods of project identification and development which might be able to guarantee external assistance. Discussions with a majority of donors in particular to the rural subsector indicate that firm guarantees, can not be given due to the donors inability to provide a confirmed long term commitment or assured level of funding and their desire to analyze each project on a project by project basis. It seems that there can be no guaranteed formula laid down which can assure that a Government proposal will be funded by a particular donor. However, these are some developing trends and requirements in the donor communities policies worldwide which are common and include:

- (i) a growing acceptance that investment in rural water supply and sanitation programs is feasible and that the community generally has an ability to pay at least O&M costs;
- (ii) a requirement that the consumers or beneficiaries of the project should be involved in all phases from planning through implementation to operation and maintenance of facilities;
- (iii) a reluctance to support projects which require a substantial resumption of land which is presently settled and requires the relocation of large group of the community;
- (iv) an increasing requirement that water and sanitation agencies move towards being semi-autonomous, local operations outside of the direct control of central government ministries or departments;

- (v) on increasing desire to see project consumer groups or operating enterprises gradually evolve into businesslike commercial organizations with an awareness and need for financial viability and accountability.

426. With specific reference to Indonesia donors are very supportive of a number of the policy developments which are presently underway. There is broad acceptance that the Government policies of: (i) shifting project implementation responsibility to local governments; (ii) increasing levels of community participation; (iii) seeking higher levels of management accountability; and (iv) addressing the impact of development on the environment are positive advances which will encourage further donor involvement. A number of donors are confident and optimistic that the present direction of Government policy revisions will assist sustainable development of water supply and sanitation facilities and the realisation of Repelita V targets. To accelerate the rate of attainment of these targets and to increase further donor involvement they see that the Government may need to place further emphasis on: (i) the availability and flow of Government funds as counterpart budget; (ii) the acceleration of Government procedures and negotiations associated with Government contracts for services and supplies; (iii) the containment of project contract costs; and (iv) the improvement of work quality standards and supervisory practices.

427. It is also apparent that some of policies of external assistance agencies could be further refined to assist the rate of implementation of project development in Indonesia. These include a possible streamlining of the pre-project identification, appraisal and feasibility procedures and the introduction of funding policies which may allow further flexibility and, alignment with Governments fiscal procedures.

E. Potential Areas for Bank Assistance in the Sector

1. IUIDP Investment Projects

428. The IUIDP proposals present potentially attractive packages for external assistance. As growing numbers of IUIDPs are prepared, the complication and identification of support requirements at the provincial level, with potential packaging (for example, large-scale procurement of materials, equipment, and engineering services) should provide an attractive basis for donor participation. However, mechanisms for the planning, coordination and evaluation of external assistance need to be strengthened substantially. There already is an abundance of assistance programs. But it is by no means clear that all of that assistance is well-targeted. The risk of unproductive overlaps is high. The task of coordination already is formidable. It is likely to become even more demanding as the implementation of the IUIDP proceeds and as additional offers of assistance are made in recognition of the importance of these urban programs.

429. Bank assistance for IUIDP has so far been quite substantial and considerable scope remains for increased involvement in this area. The World Bank has had and will continue to have significant involvement with IUIDP.

Even if the Bank and the Government continue to adopt the present geographical limits (West and Central Java, DKI Jakarta and North and South Sumatera) there still exists good potential for Bank assistance. It would seem appropriate for the Bank to develop its interest in the following projects:

- (i) Bandar Lampung Development (\$52.5 million loan in 1991).
- (ii) Botabek Urban Development (\$60 million loan in 1990/1991).
- (iii) Bogor and Palembang Urban Development (\$50 million loan in 1991).
- (iv) Central Java and Yogyakarta Secondary Cities Urban Development (\$140 million loan in 1992, Project Preparation Technical Assistance (PPTA) for \$600,000 in 1990).
- (v) Second West Java/Sumatra Secondary Cities Urban Development (\$150 million loan in 1993, project to be prepared under Loan No. 983: Secondary Cities Urban Development (Sector) for \$70 million approved in November 1989).

430. Good potential exists for further projects under IUIDP as the preparation of IUIDP proposals is continuing. Local Governments will increasingly move towards self development of these proposals, but there may be an interim need for the provision of further technical assistance services, possibly piggy-backed to some of the loan projects.

2. Rural Water Supply and Sanitation Investment Projects

431. Almost no investment proposals have been prepared for rural programs. Significant potential exists, throughout the entire country for Bank assistance and as discussed in para 423 an investment of \$550 million is required if Repelita V targets are to be attained. A good opportunity exists for the Bank to prepare under its proposed Second IKK Water Supply Sector Project (\$56 million loan in 1991/1992) a Rural Water Supply and Sanitation Sector Project, which will have substantial impact and significance in Indonesia.

432. Therefore, a Project Preparation Technical Assistance (PPTA) is proposed to prepare a technical and financial feasibility study of the proposed Rural Water Supply and Sanitation Sector Project (loan in 1993). The PPTA will include detailed planning guidelines, resource allocation models, institutional restructuring and financial mechanisms. The PPTA Rural Water Supply and Sanitation Sector for \$400,000 is required to be piggy-backed to the Second IKK Water Supply Sector loan in 1991/1992.

433. In addition, an Advisory Technical Assistance (ADTA) for Strengthening Community Planning and Inputs is required, since project proposals originating from the community in rural areas have been seen to need further strengthening. The ADTA will develop and strengthen community planning and resource mobilization skills along with the development and training of water enterprises staff in the planning, implementation and management of rural water supply systems. The ADTA for \$350,000 is proposed to be piggy-backed to the Rural Water Supply and Sanitation Sector Project in 1993.

434. In summary, it is considered most appropriate for the Bank to develop its interest in the following IKK and rural water supply and sanitation sector projects:

- (i) Second IKK Water Supply Sector (\$56 million loan in 1991/1992). Piggy-backed PPTA for \$400,000 for preparation of Rural Water Supply and Sanitation Sector Project in 1993.
- (ii) Rural Water Supply and Sanitation Sector (\$100 million loan in 1993, project to be prepared under Second IKK Water Supply Sector Project). Piggy-backed ADTA for \$350,000 for Strengthening Community Planning and Inputs.

3. Rehabilitation Projects

435. Control or reduction of NRW remains a high priority. The Bank has recently financed a study of water loss reduction and it is certain that a number of potential investment subproject will arise. A Water Loss Reduction Sector Project is proposed (\$50 million loan in 1990/1991). There is considerable scope for the Bank also to be involved with both the rehabilitation of IKK systems and INPRES funded rural systems. A significant amount of rehabilitation work is necessary but as yet there are no detailed inventories of the condition of IKK and rural water supply systems and no detailed rehabilitation programs.

4. Institutional Strengthening

436. With regard to urban water supply and sanitation services considered work is yet to be done on the development of assets registers and O&M practices for local government/water enterprises. With World Bank assistance, assets management and O&M systems for all other local government service components except water supply and sanitation have recently been completed. Scope exists for the Bank to develop these aspects of the water enterprises operations. Additionally, with the requirement for the strengthening of managerial and financial control skills in local government water enterprises, there is further scope for Bank involvement. An ADTA for Institutional Support to Water Enterprises is proposed for \$600,000 in 1990/1991. The ADTA is proposed to be piggy-backed to Water Loss Reduction Sector Project for \$50 million loan in 1990/1991.

5. Water Quality Surveillance and Monitoring

437. At present, considerable strengthening is required to develop the capacity and capabilities of water quality testing laboratories as well develop and implement water quality and bacteriological quality surveillance and monitoring program. Little Government funding is available for the large program proposed. Yet, there is considerable need at least in the urban areas to substantially improve the level of services the water enterprises are able to offer. Significant scope exists for the Bank to assist in both the development of the hardware and software components of such programs. A Water Quality Management Project is proposed for a \$40 million loan in 1991.

6. Environmental Monitoring

438. The Bank already is a significant contributor to the development in Indonesia of an increased awareness and concern for damage which is being implicated upon the living environment. However, as pollution levels worsen, considerable scope exists for the development of more effective environmental policies and management regulations, the development of clean up and rehabilitation strategies and the development of were appropriate technologies for human, solid and industrial waste handling and treatment processes which have minimal environmental impact. Population densities in some of the major Indonesian cities are amongst the highest in the world and an opportunity exists for the development and trialling of environmental monitoring/controlling technologies which could be applied throughout Indonesia as well as other large cities of the world. These activities can be built in under proposed IUIDP Projects (see para 429).

7. Poverty Alleviation

439. In line with the Government's strong Repelita V objectives of equity distribution and poverty alleviation, a study is required within the sector to identify the need of consumers and in particular the extent and characteristics of the poorest groups of consumers. A study aimed at urban poverty alleviation is proposed. It would assist in the identification and classification of affordable technologies and lead to a more accurate targetting of grants towards those who cannot meet their basic needs. An ADTA is required for Urban Poverty Alleviation Study for \$300,000 in 1991/1992.