

JAPAN ECONOMIC COOPERATION AGENCY
INTERNATIONAL WATER AND POWER BOARD
INTERNATIONAL TECHNICAL ASSISTANCE AND EQUIPMENT
FINANCING CORPORATION
FOR COOPERATION AND TECHNICAL ASSISTANCE OF THE ECONOMIES

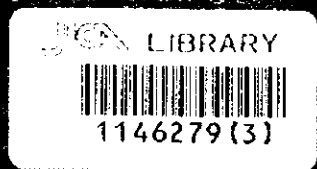
MASTER PLAN STUDY
OF
WATER RESOURCE USES MANAGERMENT
IN
THE MURUMURI RIVER BASIN, ZAMBIA

FINAL REPORT

Volume 1 of 2
Final Report

Prepared by the International Water and Power Board
under the technical assistance of the International
Technical Assistance and Equipment Financing Corporation

August 1975



INTERNATIONAL COOPERATION, TOKYO, JAPAN
国際協力機構 (ICG) 東京, 日本

1146279

JAPAN INTERNATIONAL COOPERATION AGENCY
NATIONAL WATER RESOURCES BOARD
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
THE GOVERNMENT OF THE REPUBLIC OF THE PHILIPPINES

**MASTER PLAN STUDY
ON
WATER RESOURCES MANAGEMENT
IN
THE REPUBLIC OF THE PHILIPPINES**

FINAL REPORT

**VOLUME III-2
SUPPORTING REPORT**

Part-E : Municipal and Industrial Water Demand
Part-F : Agricultural Water Demand
Part-G : Groundwater Resources Development Planning

AUGUST 1998

NIPPON KOEI CO., LTD., TOKYO, JAPAN
NIPPON JOGESUIDO SEKKEI CO., LTD., TOKYO, JAPAN

Composition of the Final Report

Volume I : Executive Summary

Volume II : Main Report

Volume III-1 :Supporting Report

Part -- A : Socio-Economy

Part -- B : Hydrology

Part -- C : Groundwater Resources

Part -- D : Dam and Related Facility Engineering

Volume III-2 :Supporting Report

Part -- E : Municipal and Industrial Water Demand

Part -- F : Agricultural Water Demand

Part -- G : Groundwater Resources Development Planning

Volume III-3 :Supporting Report

Part -- H : Surface Water Resources Planning

Part -- I : Environmental Study

Part -- J : Institutional Framework for Water Resources Management

Part -- K : Database

Part -- L : Workshop Using Project Cycle Management (PCM)

Part -- M : Water Demand by Administrative Region

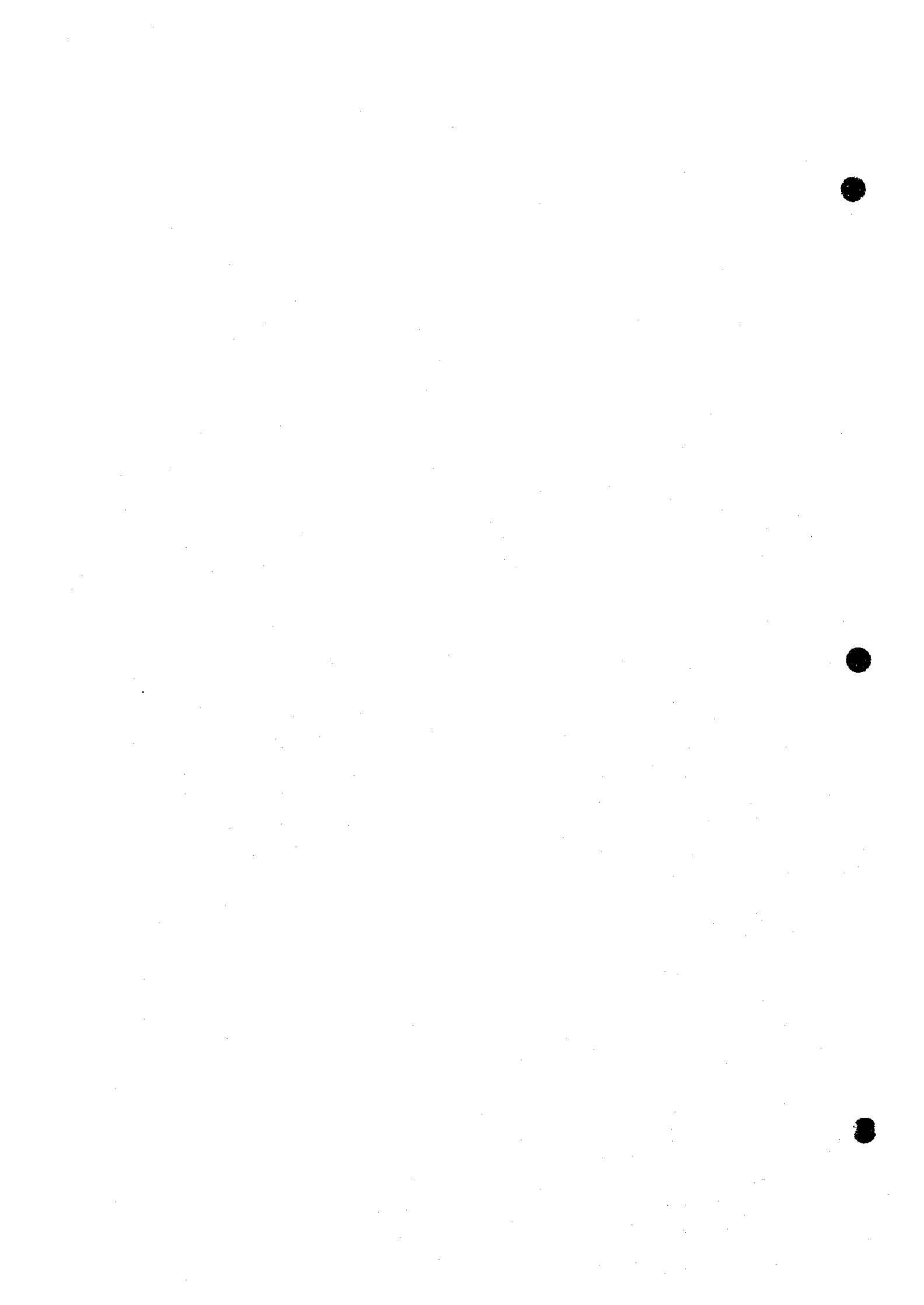
Volume IV : Data Book



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Part - E

MUNICIPAL AND INDUSTRIAL WATER DEMAND



Part – E MUNICIPAL AND INDUSTRIAL WATER DEMAND

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Part-E MUNICIPAL AND INDUSTRIAL WATER DEMAND

E1 General

E1.1 General Water Use

E1.1.1 Registered Water Rights

The water rights of water resource have been granted by the NWRB, before applicants utilize a water source by their own facilities. The granted water right data have been stored in a database of NWRB with respect to the purpose of water use, quantity of water, etc. The NWRB's database is the only source to grasp the state of use of water resources on a nation wide. The propriety of each water right application is evaluated by the NWRB based on pooled data on available water sources and the standard criterion for each of water use sectors. The standard criterion or procedure for water rights grant is as follows:

<u>Water Use Sector</u>	<u>Standard Criterion or Procedure for Water Rights Grant</u>
Domestic	0.0029 lps per capita
Commercial	The application shall be examined and approved by NWRB, while WD issues a clearance for processing water permit.
Industrial	The application shall be examined and approved by NWRB, while DENR issues a clearance for processing water permit.
Irrigation	1.5 lps per ha for paddy field (Other crops and plants have the different standard values.)
Livestock	0.00024 lps per head for cattle and swine, and 0.0000146 lps per head for poultry
Recreation	0.6 lps per ha for the planned golf course area
Fishery	3.15 and 6.30 lps per ha for prawns in freshwater and brackish water respectively, and 0.9259 lps per ha for other than prawns
Hydropower	The application shall be examined and approved by NWRB, while NPC issues a clearance for processing water permit.

E1.1.2 Types of Water Source

The water resource is generally categorized largely into two types, namely "surface water" and "groundwater". The groundwater is classified into "wells" and "springs" in accordance with the mode of its extraction. In the NWRB's database on water right, the water resources for which water rights are applied are classified one of those three types. In case of well, on the other hand, it is noted not different kind of structures, namely "shallow and deep wells", "dug and driven wells", "infiltration wells and galleries" and so on, are utilized to extract groundwater.

It might be advantageous for water rights applicants to develop surface water, if it is sufficiently available in quality and quantity. Especially in case of large-scale municipal, industrial and irrigation water supply, development of surface water is preferred to groundwater to due to the lower cost. On the other hand, generally, groundwater is assessed to have higher quality (suitable as drinking water) than surface water and it is distributed more widely in populated area. Especially in an area it is costly to develop surface water due to the specific topographic condition which does not allow where has topographical disadvantage such as non-gravity surface water supply area, water supply by gravity flow groundwater consisting chiefly of spring source could be developed at adequate cost.

E1.1.3 Water Usage

In the aforesaid NWRB's database, the water use sectors are classified into eight categories, namely domestic, commercial, industrial, irrigation, power, livestock, recreation and fishery sector. All of the water rights applications are classified into one of the eight sectors. In this study, registered data in the NWRB's database were analyzed statistically under the following conditions:

- Municipal water comprises domestic and commercial and industrial water.
- Some of commercial and industrial water is categorized into domestic water concerning (L-III water supply system).
- Un-utilized surface water amount for water rights which were granted to MWSS and Leyte Metro WD were excepted from the present water use based on the information obtained from concerned agencies.
- Water for hydropower is utilized for energy generation only. Therefore, it isn't consumed actually.

Other water uses take place in the livestock, recreation and fishery sectors except for irrigation sector. In this study, the water use in other sectors than irrigation sector is categorized into municipal, industrial and other water use taking into account the present situations of the public water supply and privately owned systems as shown below:

Water Use Sector	Allotment of Water Use		
	Public Water Supply System		Privately Owned Facility
	Level-III	Level-II and -I	
Domestic water	Municipal	Municipal	Municipal
Commercial water	Municipal	-none-	Municipal
Industrial water	Municipal	-none-	Industrial
Other usage	Municipal	-none-	Other water use
Irrigation water	-none-		Irrigation

Table E-1 represents the registered water rights by water use sector. The features of sectoral water use are seen from the water right data:

- The irrigation water reaches about 56,000 MCM/year, accounting for 91.8% of total water amount granted water right.
- Municipal and industrial water occupies only 6.7% of the total granted water amount.
- 52.6% of municipal water relies on surface water, while remaining 47.4% on groundwater.
- The granted municipal water amount is closely related with population.
- In WRR III, there is a large amount of surface water granted water right, including that for "Angat River". The river water is utilized for water supply to service area of MWSS which is located within WRR IV.
- WRR IV has a large amount of the granted groundwater for municipal water which is mainly utilized in the outskirts of Metro Manila.
- More than 40% of municipal water grants is occupied by the NCR and its outskirts.
- The majority of source of industrial water is surface water, which accounts for 85.3% of total industrial water grants.
- The granted industrial water amount is closely correlated with GRDP.

- In WRR VI, X, XI and XII, a larger proportion of the granted surface water for industrial water use is applied for the use in mining (includes refinery), milling and manufacturing.
- The majority of irrigation water relies on surface water, accounting for 98.8% of the total granted irrigation water.

E1.2 Data Availability and Basis of Demand Forecast

E1.2.1 Data Availability

As for municipal water supply, the data and information gathered from MWSS and LWUA were utilized to clarify a general outline of the present water supply conditions. However, it appears that those from DPWH and DILG are not necessarily useful for the same purpose, since both agencies were in the midst of transferring the administrative decentralization regarding rural water supply from DPWH to DILG.

As for industrial water supply, the database on water rights managed by NWRB is a key data source to grasp the amount of the present water use. The available data and information applied to the municipal and industrial water demand projection are summarized below:

- 1) From NWRB
 - Registered water right data in Database
- 2) From MWSS
 - Level-III water production & Wells Information
 - Water demand projection
- 3) From LWUA
 - Population served, unit water consumption, etc. in the respective water supply systems
 - Future expansion plan for water supply systems
- 4) From DPWH
 - Information on constructed Level-I wells and status
 - Status of Level-II water supply systems
- 5) From DILG
 - Provincial water supply systems and facilities in Region I, II and III
 - Future construction plan for Level-I & II water supply systems and facilities
- 6) From PEZA(DTI)
 - Information on existing economic zones
 - Information on planned and studied economic zones
- 7) From NEDA
 - GDP and GRDP projected

- 8) From NSO
- Population Census 1995

E1.2.2 Basis of Demand Forecast

The million cubic meters per year expressed in MCM/year is used to show an annual water volume of water demand in consideration of its magnitude. The target year for this study is the year 2025. The base year is set at the year 1995. The long-term water demand projection is made for the years 2000, 2005, 2010, 2015, 2020 and 2025. The future population and GDP derived through the socio-economic projection are fully utilized.

E1.3 Study Area for Water Demand Forecast

E1.3.1 Water Resources Region

The existing water resources regions are divided by the river watershed boundaries. While, a groundwater basin boundary is usually defined by the different conditions including as geohydrologic characteristics depending on permeability and storage efficiency. In addition, the municipal water and/or industrial water supply is in general managed and controlled within a administrative zone. The NWRB also has adopted provincial boundaries for the water right registration. It seems that the administrative boundaries are more convenient for the management of water use and supply. Accordingly, the hybrid water resource region used the NWRB's database might be more useful for users from the realistic point of view.

E1.3.2 Major River Basin

On the other hand, from the viewpoint of surface water development, river basin boundaries need to be fully considered. In this study, the water demand projection was also carried out for the twenty (20) major river basins taking into account the river basin boundaries.

E2 Present Condition

E2.1 Municipal Water Supply

In this study, municipal water supply is categorized to comprise the public water supply for urban and rural areas and privately owned water sources for domestic and commercial use. On the other hand, this study focuses on the water demand projection for public water supply.

E2.1.1 Present Water Supply System and Service Coverage

(1) Types of facilities and Definition of Service Level Standard

The National Sector Plan defines the service levels and system components of water supply systems and facilities as shown in Table E-2.

(a) Level-III System

The Level-III system, individual house connection system, at the municipal level is usually established and operated by the Water Districts under the technical and financial assistance of LWUA. Presently, the number of water supply systems in operation reaches 404 systems all over the country. Table E-3 shows them by water resource region. Meanwhile, MWSS, which is the largest water supply system in the Philippines, provides water to about 7.1 million persons as of 1995 in Metro Manila and its adjoining area.

(b) Level-II System

The Level-II system, communal faucet system, is designed to cater for barangay level water supply with a limited service coverage and supply capacity. These systems have been implemented by different agencies such as DPWH, LWUA, DENR, DILG/LGU's, relying mainly on spring sources. These facilities are operated by LGU's, RWSA's or NGO's. The following table shows the number of Level-II systems relating to DPWH:

Number of Level-II Water Supply Systems

Region	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Total
Operational	-	18	15	67	176	52	54	18	247	230	65	-	942
Non-Operational	-	-	-	3	8	9	4	-	34	10	6	1	75
Total	-	18	15	70	184	61	58	18	281	240	71	1	1017

Data Source: Spring Development for Water Supply Level-II System, as of January 1997 (DPWH/PMO)

(c) Level-I Facility

Level-I facility, point source system, is common in rural barangays, the majority of which are owned privately. Major facilities are different types of wells equipped with hand-pumps or developed springs with conveyance pipes and one communal faucet.

(2) Classification of Urban and Rural Areas

The NSO classifies a barangay as urban when it satisfies any of the following conditions on the economic and social functions:

- (a) In their entirety, all municipal jurisdictions which, whether designed as chartered

cities, provincial capital or not, have a population density of at least 1,000 persons per square kilometer.

- (b) Poblaciones or central districts of municipalities and cities which have a population density of at least 500 persons per square kilometer.
- (c) Poblaciones or central districts (not included in nos. 1 and 2) regardless of population size which have the following:
 - Street pattern, i.e., network of streets either at parallel or in right angle orientation,
 - At least six establishments (commercial, manufacturing, recreational and/or personal services), and
 - At least three of the following:
 - i) a town hall, church or chapel with religious services carried on at least one month,
 - ii) a public plaza, park or cemetery,
 - iii) a market place or building where trading activities are carried on at least once a week, and
 - iv) a public building like school, hospital, culture and health center or library.
 - Barrios/Barangays having at least 1,000 inhabitants which meet the conditions set forth in No. 3 above, and in which the occupation of inhabitants is predominantly non-farming/fishing.

All areas not falling under the urban classification are defined as rural area.

(3) Service Coverage

In this Study, service coverage was classified into two groups, namely Level-III system and Level-I system including II system, since the Level-II system is limited in service coverage and supply capacity utilizing spring sources.

The service coverage of Level-III system in both urban and rural areas was clarified based on the data obtained from MWSS and LWUA. That of Level-I facility, including Level-II system was estimated considering several provincial sector plans prepared by DILG and the report prepared by DPWH.

Table E-4 shows existing service coverage of urban and rural areas of the provinces which are referred in the provincial sector plan. Table E-5 tabulates the nationwide Level-I service coverage.

As for the provinces which are not included by the provincial sector plan, an average service coverage of the plan of 69% was applied to urban areas and likewise an average service coverage of 73% was applied to rural areas. The existing service coverages by water resource region are shown in the following table and Figure E-1:

<i>Service Coverage by Water Resource Region (%)</i>													
<i>Region</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>	<i>VII</i>	<i>VIII</i>	<i>IX</i>	<i>X</i>	<i>XI</i>	<i>XII</i>	<i>Total</i>
<i>Urban</i>	74	64	64	66	67	69	69	69	69	69	84	69	68
<i>Rural</i>	75	67	67	69	79	80	77	80	76	78	77	74	75
<i>Total</i>	74	67	67	66	76	73	73	77	73	74	80	72	72

The overall existing service coverage is summarized in following table:

Overall Service Coverage

	<i>Metro Manila</i>	<i>Other Urban Area</i>	<i>Urban Area Sub total</i>	<i>Rural Area</i>	<i>Total</i>
<i>Level III system</i>	62%	30%	39%	5%	22%
<i>Level I, II system</i>	-	40%	29%	70%	49%
<i>Total</i>	62%	70%	68%	75%	72%

As of 1995, around 72 % of the total population was assumed to have access to public water supply systems. The service coverage reaches 62% in Metro Manila, 70% in other urban areas and 75% in the rural areas. The remaining 28% of the population was uncovered by public water supply and were considered to have utilized privately owned water sources.

E2.1.2 Present Water Demand

The present water demand of Level-III system was estimated based on the data collected from MWSS and LWUA, while that of Level-I facility including Level-II system was estimated by multiplying the population served by an assumed unit water consumption of 30 lpcd. Tables E-6 and E-7 show the present water demand of MWSS and the WDs.

Table E-8, together with Figures E-2 and E-3, represent the present water demand for municipal water supply by water resource region. The total amount of water was estimated to be 1,958 MFCM/year. Among them, water demand in WRR IV including Metro Manila was estimated at 1,131 MCM/year, which accounts for 57 % of the total water demand for public water supply.

Adding the water demand for the above privately owned water sources to that for public water supply, the total water amount for domestic use comes to be 2,172 MCM/year applying the same unit water consumption rate of 30 lpcd to the domestic use as shown in Table E-9.

Further, if the privately owned commercial water which is shown below is added to the above total water amount, the total amount of municipal water was estimated to be 2,187 MCM/year:

<i>Privately Owned Commercial Water by WRR</i>												<i>(Unit: MCM/year)</i>
<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>	<i>VII</i>	<i>VIII</i>	<i>IX</i>	<i>X</i>	<i>XI</i>	<i>XII</i>	<i>Total</i>
0.2	0.0	0.4	8.9	0.0	2.4	0.5	0.6	0.0	0.0	0.3	1.7	15.0

Data Source: NWRB

E2.1.3 Present Problems

(1) Metro Manila

The water shortage in Metro Manila, in particular, is critical because of the high population density and brisk economic activities therein. Further, the unaccounted-for water shares more than half of the total water production as shown in Table E-6. The operation and management of water supply system of Metro Manila has been just turned over to the private sector from MWSS. The key issue would be how to expand and improve the system covering from water source to distribution facilities to meet the water demand.

(2) Metro Cebu

According to the annual report of the Metro Cebu Water District (MCWD), as of December 1995, MCWD was able to serve 36% of total demand and produced water of 11,220 m³/day on an average. Even with these figures, demand still far outweighs supply. Hence, a series of water resource development projects need to be studied to solve the gap between the supply and demand. These projects include the Mananga Phase I and II, Lusaran Dam, and Inabanga I and II. Yet, despite these projects, the need for more water continues.

(3) Davao City

On the other hand, regarding water source for Davao City, the water district is planning surface water development. Davao City is expected to get rid of its water shortage.

E2.2 Industrial Water Supply

E2.2.1 Industrial Water Supply System

Industrial water is classified into two groups; the water supplied by municipal water supply system and privately owned water sources (self-supplied industrial water). However, industrial water through municipal water supply systems generally occupies a small proportion. Accordingly, in this study, the privately owned water sources are focused on as industrial water.

Likewise, registration of water rights for other water uses is required in utilizing water sources for industrial purposes. However, many factories/facilities seem to utilize the water sources, especially ground water, without registration.

E2.2.2 Present Industrial Water Demand

Table E-10 represents past water rights granted for industrial use. Based on these water rights, the existing industrial water demand was estimated to be 2,335 MCM/year as shown in Table E-11 and Figures E-4 and E-5.

The water demand in WRR IV including Metro Manila and WRR VI, among them, occupied 28% and 25 % of the total volume, respectively. Especially in WRR VI, there exist milling facilities and sugar factories which consume a large amount of surface water.

E3 Preliminary Water Demand Forecast

E3.1 Municipal Water Supply

E3.1.1 Methodology and Conditions for Forecast

In the estimation of future water demand, the following factors are considered:

- (1) The future population projected through socio-economic study stated in Part-A of the Supporting Report is adopted.
- (2) The service coverages of the provinces with provincial sector plans are projected referring to them in principle, while those of the provinces without their sector plans are based on the National Medium Term Development Plan and Long Term Sector Plan. The service coverage in Metro Manila is projected referring to the Master Plan formulated by MWSS.
- (3) As for service level, future trend is forecast based on provincial sector plan as shown in Figures E-6 to E-11. It is assumed that the service coverage of urban areas is to be expanded by Level-III system and that present coverage of Level-I and II systems will be decreased to zero by the target year. While those of rural areas are expanded by increasing Level-I facilities, however, the existing population served by Level-III system will be maintained until the target year.
- (4) Unit water consumption for Level-III system is dependent on domestic water use and non-domestic water use such as commercial, industrial and institutional use. In addition to these, unaccounted for water needs to considered. The unit water consumption for MWSS is projected based on the Master Plan, and those for other provinces shall be projected on the basis of the Design Criteria of LWUA. The unit consumption for Level-I and Level-II systems are set up at 40 lpcd in the target year and are applied commonly to all provinces.

Based on the above the water demand for public water supply is estimated.

E3.1.2 Water Supply System and Service Coverage

In preparing the target service coverage, those presented in the Medium Term Philippine Development Plan are fully taken into consideration, which aims to increase the coverage up to 71% for urban areas and 85% for rural areas by the target year of 1998. Likewise, in the long term develop plan, 93% and 95% are projected respectively in 2010.

On the other hand, in this study, considering present condition, the service coverage was set at 75% for urban areas and at 79% for rural areas in 2000. Furthermore, they were set at 95% and 93% respectively in 2020.

Finally, service coverage was set up at 95% for both urban and rural areas in the target year 2025.

Following table shows the projected service coverage as a model case. If the existing coverage exceeded in the base year, the interim target shall be skipped.

Service Coverage (Mode Case)

	1995	2000	2005	2010	2015	2020	2025
<i>Urban</i>	69%	75%	80%	85%	90%	93%	95%
<i>Rural</i>	73%	79%	85%	91%	93%	95%	95%

Based on the above, the population served and service coverage used for water demand by water resource region and province are project as shown in Table E-14.

E3.1.3 Unit Water Consumption

Municipal water demand is commonly classified according to the nature of the user. The ordinary classifications are: domestic use, commercial use, industrial use and institutional use. The unit consumption for Level-III is set up for MWSS and the WDs respectively.

As for MWSS, Table E-12 shows the present water use. The domestic water use occupied about 80%, while, non-domestic water for commercial and industrial use occupied 20%. However, unaccounted for water has not decreased in the past decade, although the target of the MWSS's Master Plan was set at 30% in 2015. This target rate is adopted in 2020 in this Study so that the master plan to be formulated could have a safety factor. Thus, unit water consumption for MWSS is set up as shown in Table E-13.

As for the Water Districts, unit water consumption was modified as shown in Table E-14 which is based on the design criteria of LWUA. The values in this table were also used as the unit water consumption of respective province considering their present conditions. Generally, domestic water occupies about 85%, and non-domestic water composed of commercial, industrial and institutional use occupies about 15%. Figure E-12 depicts the tendency of future unit water consumption for Level-III system.

The unit water consumption for Level-I as well as Level-II systems was projected to increase from the presently estimated 30 lpcd to 40 lpcd in 2025 with an increment of 2 lpcd at average every five year.

E3.1.4 Municipal Water Demand

Based on the aforesaid procedures and assumptions, the water demands for public water supply by water resource region and province were estimated as shown in Table E-15 and Figure E-13. The water amount of public water supply in the year 2025 was estimated to be 7,289 MCM/year which corresponds to 3.7 times of the present water consumption.

Finally, the total amount of municipal water demand including privately owned water source was projected to be 7,430 MCM/year in the target year.

E3.2 Industrial Water Supply

E3.2.1 Methodology

- (1) In the estimation of future water demand, the past trend of water volume granted water rights and GDP for industrial sector was first examined. Figure E-14 shows the relation

between these factors. In this regression analysis, 0.88 of correlation coefficient was obtained and it was considered that the industrial water demand is relative to GDP. Accordingly, the following regression formula obtained through analysis of correlation between past water consumption and GDP was applied to the estimation of the industrial water demand:

$$WD = 0.00485 \times GDP + 525.275$$

WD: Water Demand (MCM/year)

GDP: GDP for Industrial sector (Million Pesos)

- (2) In succession to obtain the water demand regionally, GDP contribution rates were estimated.
- (3) Further, the water resources management is considered. The present granted surface water for industrial use is 1,719.1 MCM/year, while that of ground water is 514.4 MCM/year. Here, the required surface water is assumed to be maintained at the level of existing consumption, since main users are mining companies including those suspending the operation.
- (4) In addition to this, the re-use of groundwater was also considered. It is assumed that, among the industrial sector, water required for manufacturing sub-sector is recycled and re-used up to 50% by the target year. Since the GDP for manufacturing sub-sector is expected to account for 60% of the total GDP of the industrial sector, 30% of the groundwater required for industrial use is assumed to be saved.

Rate of Re-use						
1995	2000	2005	2010	2015	2020	2025
0%	5%	10%	15%	20%	25%	30%

Aside from the above, it is assumed that recycle use of industrial water for Metro Manila and Metro Cebu be much more strengthened to the maximum level, because serious water shortage in the said area is projected to take place. In this context, industrial water demand for Pasig-Laguna Bay basin in which Metro Manila is situated is projected on the same condition with Metro Manila.

E 3.2.2 Industrial Water Demand

Based on the above, industrial water demand was estimated by applying two kinds of industrial GDP; namely GDP resulting from the high and low economic growth scenarios, as shown in Tables E-16 and E-17 and Figures E-15 and E-16.

In the scenario of high economic growth, the amount of industrial water demand was estimated at 4,997.6 MCM/year in 2025 which corresponds to 2.24 times of the present consumption. In the low economic growth scenario, the industrial water demand was estimated to be 3,310.1 MCM/year, which corresponds to 1.48 times of the present water consumption.

As for industrial development, PEZA has managed and/or approved the development of economic zones. Table E-18 shows the existing and planned ones. In this Study, 55

m³/day/ha was given to each economic zone as unit water consumption referring to the Cavite EPZ. Projected water amount for PEZA was estimated at 137 MCM/year in the year 2025, which corresponds to 2.7% only of the total industrial water demand in high economic growth and 4.1% only in low economic growth. Thus, such a water amount is considered as a insignificantly small part of the above water demand in the context of economic growth.

E 3.2.3 Total Municipal and Industrial Water Demand

Based on the above, the total water demand for municipal and industrial use in year 2025 was estimated at 12,427.6 MCM/year in high economic growth and 10,740.1 MCM/year in low economic growth respectively, which correspond to 2.81 times and 2.43 times of the present water consumption. Tables E-19 and E-20 tabulate them by water resource region. Likewise, Tables E-21 and E-22 represent those by major river basin.

E 3.2.4 Municipal and Industrial Water Demand Forecast for Major Cities

In the second stage field investigation the water demand forecast for the selected nine (9) cities, namely Metro Manila, Metro Cebu, Davao City, Baguio City, Angeles City, Bacolodo City, Iloilo City, Cagayan de Oro City and Zamboanga City, were carried out.

In estimation of municipal water demand, population served and water demand component according to usage were determined with reference mainly to the collected data from the concerned Water Districts, however, unit water consumption and NRW ratio were based on the Design Criteria of LWUA, relevant reports and others. Industrial water demand in high economic growth for each city was estimated principally in the same manner with that used for the regional projection.

Table E-23 summarizes the water demands projected for these major cities.

(1) Metro Manila

The area of which municipal water is supplied by MWSS, although its operation has been presently transferred to two water companies, includes Metro Manila and its adjacent municipalities such as Bacoor, Cavite City, Imus, Kawit, Noveleta and Rosario in Cavite Province and Angono, Antipolo, Baras, Binangonan, Cainta, Cardona, Jaia-Jala, Roderiguez, San Mateo and Taytay in Rizal Province. Table E-24 represents the projected water demand. The municipal water demand was estimated on the basis of the Master Plan of MWSS and applying the modified NRW ratio in consideration of the present condition. The projected water demand including privately owned industrial water in year 2025 would be 2,883.2 MCM/year corresponding to 2.7 times of the present water consumption.

(2) Metro Cebu

The area of which municipal water is supplied by Metropolitan Cebu Water District includes Cebu City, Compostela, Consolacion, Talisai, Lapu-Lapu City, Liloan and Mandaue City. Table E-25 represents the projected water demand. The municipal water demand was projected based on the data provided by MCWD. The water demand including privately owned industrial water in year 2025 was estimated at 342.3 MCM/year corresponding to 6.0 times of the present water consumption. Such a large figure is considered as a result of drastically increasing population served as well as expansion of service coverage.

(3) Davao City

Table E-26 shows the projected municipal water demand on the basis of the technical report

prepared under PCW3SP project financially assisted by OECD, applying the modified unit water consumption in this study as well as considering the present condition. The water demand in year 2025 was estimated to be 152.5 MCM/year corresponding to 3.1 times of the present water consumption.

(4) Baguio City

Table E-27 shows the municipal water demand for Baguio City, which was projected mainly on the basis of the data/report provided by Baguio Water District. However, the unit water consumption for domestic use was determined with reference to the LWUA Design Criteria, and NRW ratio was namely set up in this study. The water demand in the year 2025 was estimated at 239,000 m³/day or 87.3 MCM/year corresponding to 7.3 times of the present water consumption. Such a large figure is considered as a result of drastically increasing population served and service coverage and unit water consumption for domestic use as well as water demand for commercial and industrial use in Baguio City.

(5) Angeles City

Table E-28 shows the projected water demand for Angeles City. The municipal water demand was referred to the technical report of PCWS3 financially assisted by OECD. The industrial water demand was estimated considering development plan of PEZA. The water demand in year 2025 was estimated at 85,651 m³/day or 31.3 MCM/year corresponding to 2.8 times of the present consumption.

(6) Bacolod City

Table E-29 shows the projected water demand for Bacolod City. The municipal water demand was projected with reference to the report prepared by LWUA-ADB. The water demand including privately owned industrial water demand in the year 2025 was estimated to be 303,378 m³/day (110.7 MCM/year) corresponding to 3.3 times of the present water consumption.

(7) Iloilo City

The area of which municipal water is supplied by Metro Iloilo Water District includes Iloilo City, Cabatuan, Maasin, Pavia, San Miguel, Santa Barbara and Oton. Table E-30 shows the projected water demand. The municipal water demand was projected with reference to the data provided by MIWD. The projected water demand including privately owned industrial water in the year 2025 was estimated at 127,788 m³/day (46.6 MCM/year) corresponding to 5.1 times of the present consumption. Such a large figure is considered as a result of drastically increasing population served and service coverage in Metro Iloilo.

(8) Cagayan de Oro City

The area of which projected water demand for municipal and industrial water supply includes Cagayan de Oro City and Opol. Table E-31 shows the projected water demand. The municipal water demand was projected based mainly on the technical report prepared by LWUA. The water demand including privately owned industrial water in the year 2025 was estimated at 269,305 m³/day (98.3 MCM/year) corresponding to 3.4 times of the present water consumption.

(9) Zamboanga City

As for the municipal water demand forecast for Zamboanga City, service coverage in the year 2025 was set up at 95% and unit water consumption was based on the Design Criteria of LWUA, since the available data/information have not been obtained except for the present condition. The water demand including privately owned industrial water in year the 2025 was estimated at 556,148 m³/day (203.0 MCM/year) corresponding to 7.4 times of the present

water consumption as shown in Table B-32. Such a large figure is considered as a result of drastically increasing population served and service coverage and industrial water demand in Zamboanga City.

E 3.2.5 Some Matters to be Considered in Water Resources Management for Municipal and Industrial Water Supply and Use

Water is limited resource that must be conserved and managed effectively, and water has an economic value in all its competing uses and shall be treated as an economic good. Capacity and willingness to pay must therefore be taken into consideration in pricing water.

Following measures are to be recommended to be taken from a viewpoint of water resources management for municipal and industrial water supply and use:

- 1) Make double effort for NRW reduction
- 2) Prevent illegal use and improve metering efficiency
- 3) Promote water leakage prevention
- 4) Encourage the recycling and re-use of water especially in industrial use
- 5) Expand market-based instruments for the adoption of water recycling and re-use.

Part - E

Tables

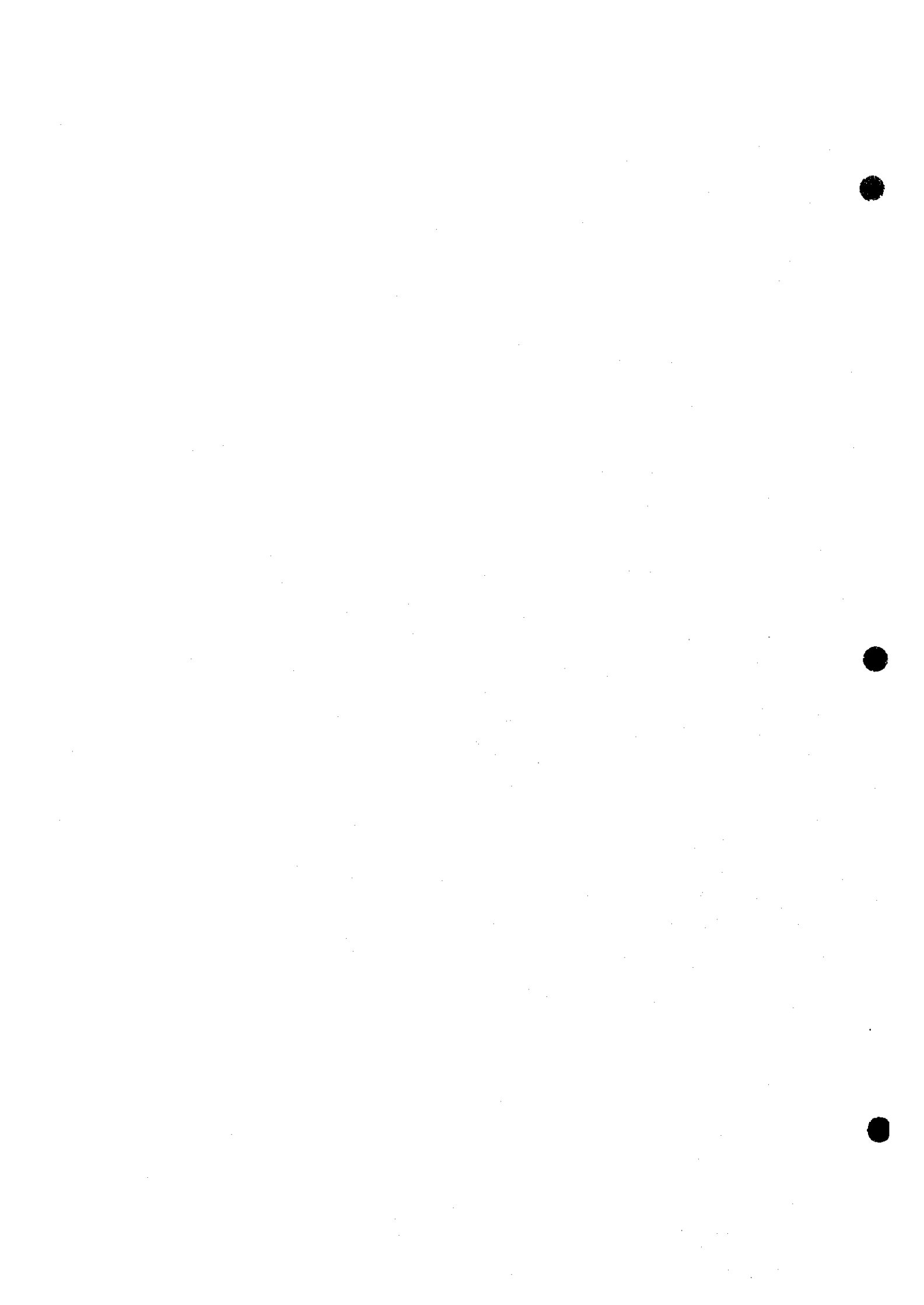


Table E-1 WATER RIGHTS BY USAGE-WISE

Water Use Sector	Type	Water Resources Region												Sub-total
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Municipal (MCM/year)	W/s	29.1	13.0	95.1	243.9	18.1	45.2	77.8	3.5	2.9	10.7	55.3	26.2	620.8
	Sp	120.5	1.8	4.2	82.6	46.8	16.8	15.5	11.8	4.5	26.3	8.8	61.7	401.3
	SW	29.1	1.4	909.7	47.4	0.7	8.5	24.0	32.5	15.7	6.8	44.0	14.9	1,134.7
	Sub-Total	178.6	16.2	1,009.0	373.9	65.7	70.4	117.3	47.8	23.1	43.8	108.2	102.8	2,156.8
Industrial (MCM/year)	W/s	2.5	0.4	41.9	98.4	0.4	17.8	42.9	8.4	0.7	6.8	8.0	2.9	231.1
	Sp	1.1	-	-	0.1	0.8	9.9	2.1	3.7	-	29.6	-	0.5	47.9
	SW	67.7	15.4	125.6	321.8	18.2	523.6	77.8	11.0	4.3	167.1	199.1	85.7	1,617.3
Irrigation (MCM/year)	Sub-Total	71.3	15.8	167.4	420.3	19.4	551.4	122.8	23.0	5.0	203.6	207.1	89.1	1,896.3
	W/s	2.3	11.5	187.4	57.8	11.1	46.9	5.8	2.5	-	1.1	5.5	22.7	354.8
	Sp	57.6	11.8	15.6	26.6	12.0	19.3	59.3	7.7	5.1	19.8	35.6	74.2	344.6
Other Usage (MCM/year)	SW	3,309.6	8,122.0	12,396.4	6,503.4	2,693.0	4,636.4	1,588.4	2,062.0	1,037.6	4,091.5	3,460.3	5,413.5	55,313.9
	Sub-Total	3,369.5	8,145.3	12,599.4	6,587.8	2,716.1	4,702.5	1,653.6	2,072.2	1,042.7	4,112.4	3,501.4	5,510.4	56,013.3
	W/s	0.0	-	2.1	6.8	-	13.2	11.6	-	0.0	0.1	0.1	0.1	34.9
Total (MCM/year)	Sp	0.0	0.2	-	6.5	0.6	8.5	6.4	0.2	0.1	3.9	26.3	0.8	53.3
	SW	0.2	9.5	8.2	389.4	73.5	109.8	138.9	1.8	45.2	6.9	48.5	0.8	832.8
	Sub-Total	0.2	9.7	10.3	402.7	74.1	131.4	156.9	1.9	45.4	10.9	74.9	2.5	921.0
Total (MCM/year)	W/s	33.9	24.8	326.5	406.9	29.7	123.1	138.2	14.3	3.7	18.8	69.0	52.7	1,241.6
	Sp	179.2	13.7	19.8	115.9	60.2	54.4	83.3	23.3	9.7	79.6	70.7	137.2	847.1
	SW	3,406.6	8,148.4	13,439.9	7,261.9	2,785.4	5,278.3	1,829.2	2,107.2	1,102.7	4,272.3	3,751.9	5,514.9	58,898.7
Total	3,619.7	8,187.0	13,786.2	7,784.7	2,875.3	5,455.8	2,050.6	2,144.9	1,116.1	4,370.7	3,891.6	5,704.8	60,987.4	

Data Source : Database for Water Right (NWRB), as of 31 March 1997

Note

- W/S: Well
- Sp : Spring
- SW: Surface water

**Table E-2 COMPOSITION OF WATER SUPPLY SYSTEM AND FACILITY
BY SERVICE LEVEL**

Discription	Level-I (Point Source Facility)	Level-II (Communal Faucet System)	Level-III (Individual House Connection)
1. Water Sources	<ul style="list-style-type: none"> - Drilled/driven shallow well - Drilled/driven deep well - Dug well - Spring - Rain collector 	<ul style="list-style-type: none"> - Drilled/driven shallow well - Spring - Infiltration gallery 	<ul style="list-style-type: none"> - Drilled deep well - Spring - Infiltration gallery - Surface water intake
2. Water Treatment	<ul style="list-style-type: none"> - Generally none. - Disinfection of well is conducted periodically by local health authorities. - Iron removal facilities are provided in problem areas. 	<ul style="list-style-type: none"> - Generally none. - Disinfection facility is provided at some places. 	<ul style="list-style-type: none"> - Disinfection is provided. - The system with a surface water source has a series of water treatment facilities.
3. Distribution System	None	Piped system provided with reservoir's.	Piped system provided with reservoirs and pumping facilities.
4. Delivery and Service Level	At point (within 250 m)	Communal faucets (within 25 m)	Individual house connection/ household tap
5. Consumption Rate (Adequately served)	at least 20 lpcd	at least 60 lpcd	at least 100 lpcd

Data Source: National Sector Plan

Table E-3 NUMBER OF LEVEL-III SYSTEM

Water Resources		Number of Municipal Water Supply Systems by Population Served									
Region (WRR)	Number of Province	Total	no system	4,999 or less	5,000 9,999	10,000 14,999	15,000 19,999	20,000 49,999	50,000 99,999	100,000 or more	
I	5	29	9	8	4	2	2	1	2	1	
II	8	42	26	10	2	2	0	2	0	0	
III	7	120	34	22	20	8	9	18	5	4	
IV	12	74	6	28	16	10	2	4	4	4	
V	6	43	6	17	8	2	1	7	2	0	
VI	6	75	22	31	8	5	3	2	2	2	
VII	4	23	4	5	8	1	1	2	1	1	
VIII	6	35	13	12	4	0	4	1	0	1	
IX	5	26	8	11	1	0	1	4	0	1	
X	7	29	6	9	4	2	0	6	1	1	
XI	4	28	7	8	4	4	2	1	1	1	
XII	7	32	11	12	4	0	2	2	0	1	
Total	77	556	152	173	83	36	27	50	18	17	

Table E-4 EXISTING SERVICE COVERAGE BY PROVINCIAL SECTOR PLANS

Region	Province	Urban Water Supply			Rural Water Supply		
		Urban Population (x1,000)	Served Population (x1,000)	(%)	Urban Population (x1,000)	Served Population (x1,000)	(%)
I	Abra	42	38	91%	154	119	77%
	Benguet	310	214	69%	231	164	71%
	Ilocos Norte	138	115	83%	345	224	65%
	Ilocos Sur	128	97	76%	417	296	71%
II	Batanes	5	5	92%	9	8	90%
	Ifugao	16	9	56%	134	103	77%
	Isabela	295	159	54%	866	520	60%
	Kalinga-Apayao	45	28	62%	193	137	71%
	Nueva Vizcaya	97	83	86%	237	137	58%
III	Quirino	33	20	61%	98	62	63%
	Bataan	346	266	77%	146	117	80%
	Bulacan	1,453	1,046	72%	322	235	73%
	Nueva Ecija	443	288	65%	1,063	840	79%
	Pampanga	1,189	702	59%	447	353	79%
	Pangasinan	911	592	65%	1,268	938	74%
	Tarlac	273	188	69%	672	538	80%
	Zambales	319	287	90%	250	100	40%
	Batangas	831	582	70%	828	530	64%
	Marinduque	28	21	75%	172	52	30%
IV	Occidental Mindoro	178	125	70%	160	70	44%
	Oriental Mindoro	91	75	82%	517	326	63%
	Palawan	230	184	80%	411	275	67%
	Rizal	1,257	855	68%	55	40	73%
	Romblon	49	33	68%	195	94	48%
V	Albay	262	160	61%	743	557	75%
	Camarines Norte	118	73	62%	321	257	80%
	Camarines Sur	501	356	71%	931	745	80%
Total		9,588	6,601	69%	11,185	7,836	70%

Data Source: Provincial Water Supply, Sewerage and Sanitation Sector Plan, DILG as of 1996

Table E-5 RURAL WATER SUPPLY ESTIMATE OF NEEDS

Year	Rural Population	Population Served *		Population Served (functioning)** (%)	No. of Wells
		Annual	Cummulative		
1987	24,356,294	0	15,379,999	47.36%	667,808
1988	29,585,433	918,710	16,298,709	55.09%	674,875
1989	30,354,655	2,445,430	18,744,139	61.75%	693,686
1990	31,158,409	3,354,780	22,098,919	70.92%	719,492
1991	32,694,430	2,990,910	25,089,829	76.74%	742,499
1992	33,539,939	1,892,930	26,982,759	80.45%	757,060
1993	34,383,134	659,490	27,642,249	80.39%	762,133
1994	35,226,334	1,134,250	28,776,499	81.69%	770,858
1995	36,069,531	1,371,370	30,147,869	83.58%	781,407
1996	36,907,406	522,600	30,670,469	83.10%	785,427
1997	37,742,994	1,230,580	31,901,049	84.52%	794,893
1998	38,578,581	1,246,960	33,148,009	85.92%	804,485
1999	39,414,169	1,240,720	34,388,729	87.25%	814,029
2000	40,252,044	1,280,110	35,668,839	88.61%	823,876

Data Source: DPWH

Note: * Percent Population Coverage at 130 persons per well

** Population Served to account non-functioning wells 25% of stock

Table E-6 WATER PRODUCTION AND VOLUME SOLD BY MWSS

Year	Water Production					Total (mld)	Total (MCM/year)	year	Volume Sold		Revenued	Non-
	Ground- Water (MCM/year)	Ground- Water (mld)	Surface Water (MCM/year)	Surface Water (mld)	Total (mld)				Total (MCM/year)	(%)	Revenued Water (%)	Revenued Water (%)
1985	30	81	757	2,075	2,156	787	303	830	303	38	62	
1986	30	83	874	2,395	2,478	905	311	851	311	34	66	
1987	28	76	835	2,287	2,364	863	337	922	337	39	61	
1988	30	81	849	2,327	2,408	879	359	985	359	41	59	
1989	29	79	859	2,354	2,433	888	376	1,030	376	42	58	
1990	33	91	876	2,399	2,491	909	385	1,054	385	42	58	
1991	34	93	780	2,136	2,229	814	386	1,059	386	48	52	
1992	28	77	823	2,256	2,333	851	383	1,049	383	45	55	
1993	26	70	907	2,485	2,556	933	397	1,088	397	43	57	
1994	27	73	983	2,693	2,766	1,010	419	1,148	419	42	59	
1995	27	75	949	2,599	2,674	976	426	1,168	426	44	56	
1996	30	82	1,100	3,013	3,095	1,130	436	1,194	436	39	61	

Data Source : MWSS

Table E-7 EXISTING WATER DEMAND FOR WATER DISTRICTS

Water Resources Region (WRR)	Number of WDs	Q (m ³ /day)	Q (MCM/year)	Population Served	lpcd	Population '95	Service Ratio
I	20	71,726	26.18	440,160	162.95	1,227,180	36%
II	10	19,829	7.24	128,920	153.81	956,460	13%
III	86	375,037	136.89	1,865,560	201.03	6,258,060	30%
IV	67	291,111	106.26	1,153,980	252.27	4,664,170	25%
V	37	96,781	35.33	489,310	197.79	2,351,140	21%
VI	54	132,175	48.24	695,740	189.98	3,617,330	19%
VII	19	202,897	74.06	516,330	392.96	2,097,800	25%
VIII	22	47,788	17.44	328,750	145.36	1,429,280	23%
IX	18	107,733	39.32	488,270	220.64	1,372,940	36%
X	23	130,646	47.69	716,550	182.33	1,944,090	37%
XI	21	160,894	58.73	1,028,500	156.44	2,139,650	48%
XII	22	42,692	15.58	251,540	169.72	1,906,570	13%
Total	399.00	1,679,309	612.95	8,103,610	207.23	29,964,670	27%

Data Source : List of WDs as of Jan. 1997 and LWUA's Annual Reports as of 1995 & 1996

Table E-8 WATER DEMAND FOR PUBLIC WATER SUPPLY IN 1995

WRR	Type	Water Demand (MCM/year)		
		Total	Urban Area	Rural Area
I	L-III	26	15	11
	L-I, II	14	4	11
	Sub-total	41	18	22
II	L-III	7	5	3
	L-I, II	21	4	17
	Sub-total	28	8	20
III	L-III	137	111	26
	L-I, II	51	21	30
	Sub-total	188	131	56
IV	L-III	1,082	1,053	29
	L-I, II	48	20	28
	Sub-total	1,131	1,073	58
V	L-III	35	22	13
	L-I, II	30	6	25
	Sub-total	66	28	38
VI	L-III	48	31	17
	L-I, II	40	13	27
	Sub-total	89	44	44
VII	L-III	74	60	14
	L-I, II	35	13	22
	Sub-total	109	73	36
VIII	L-III	17	9	8
	L-I, II	25	6	19
	Sub-total	42	15	27
IX	L-III	39	34	5
	L-I, II	23	5	19
	Sub-total	63	39	24
X	L-III	48	40	8
	L-I, II	24	6	18
	Sub-total	72	46	26
XI	L-III	59	55	4
	L-I, II	22	3	18
	Sub-total	80	58	22
XII	L-III	16	15	1
	L-I, II	36	10	26
	Sub-total	52	25	27
Total	L-III	1,589	1,448	141
	L-I, II	369	110	259
	Total	1,958	1,558	400

Table E-9 EXISTING SERVICE COVERAGE AND WATER DEMAND FOR PUBLIC WATER SUPPLY SYSTEM AND PRIVATE WATER SOURCE - 1995 (1/2)

Region	Type	Coverage/ Demand	Total	Urban	Rural
I	Public	Population (x 1,000)	2,362	775	1,587
		Pop. Served (x 1,000)	1,757	571	1,186
		Coverage (%)	74%	74%	75%
	Private	Water Demand (MCM/year)	41	18	22
		Pop. Served (x 1,000)	606	204	401
		Coverage (%)	26%	26%	25%
	Total	Water Demand (MCM/year)	6.63	2.24	4.40
Total	Water Demand	47	20	27	
II	Public	Population (x 1,000)	3,054	640	2,414
		Pop. Served (x 1,000)	2,028	406	1,622
		Coverage (%)	66%	63%	67%
	Private	Water Demand (MCM/year)	28	8	20
		Pop. Served (x 1,000)	1,026	234	792
		Coverage (%)	34%	37%	33%
	Total	Water Demand (MCM/year)	11.23	2.56	8.67
Total	Water Demand	39	11	29	
III	Public	Population (x 1,000)	9,111	4,933	4,178
		Pop. Served (x 1,000)	6,497	3,369	3,128
		Coverage (%)	71%	68%	75%
	Private	Water Demand (MCM/year)	188	131	56
		Pop. Served (x 1,000)	2,614	1,564	1,050
		Coverage (%)	29%	32%	25%
	Total	Water Demand (MCM/year)	28.63	17.13	11.50
Total	Water Demand	216	148	68	
IV	Public	Population (x 1,000)	19,395	15,210	4,185
		Pop. Served (x 1,000)	12,866	9,982	2,883
		Coverage (%)	66%	66%	69%
	Private	Water Demand (MCM/year)	1,131	1,073	58
		Pop. Served (x 1,000)	6,529	5,228	1,301
		Coverage (%)	34%	34%	31%
	Total	Water Demand (MCM/year)	71.49	57.25	14.25
Total	Water Demand	1,202	1,130	72	
V	Public	Population (x 1,000)	4,325	1,221	3,105
		Pop. Served (x 1,000)	3,265	823	2,442
		Coverage (%)	75%	67%	79%
	Private	Water Demand (MCM/year)	66	28	38
		Pop. Served (x 1,000)	1,061	398	663
		Coverage (%)	25%	33%	21%
	Total	Water Demand (MCM/year)	11.61	4.35	7.26
Total	Water Demand	77	32	45	
VI	Public	Population (x 1,000)	5,777	2,359	3,418
		Pop. Served (x 1,000)	4,371	1,626	2,744
		Coverage (%)	76%	69%	80%
	Private	Water Demand (MCM/year)	89	44	44
		Pop. Served (x 1,000)	1,406	732	674
		Coverage (%)	24%	31%	20%
	Total	Water Demand (MCM/year)	15.40	8.02	7.38
Total	Water Demand	104	52	51	
VII	Public	Population (x 1,000)	5,015	2,298	2,716
		Pop. Served (x 1,000)	3,672	1,586	2,086
		Coverage (%)	73%	69%	77%
		Water Demand (MCM/year)	108.59	72.57	36.02

Table E-9 EXISTING SERVICE COVERAGE AND WATER DEMAND FOR PUBLIC WATER SUPPLY SYSTEM AND PRIVATE WATER SOURCE - 1995 (2/2)

	Private	Pop. Served	(x 1,000)	1,343	712	630
		Coverage	(%)	27%	31%	23%
		Water Demand	(MCM/year)	15	8	7
	Total	Water Demand		123	80	43
VIII		Population	(x 1,000)	3,367	1,013	2,354
	Public	Pop. Served	(x 1,000)	2,576	699	1,877
		Coverage	(%)	77%	69%	80%
		Water Demand	(MCM/year)	42	15	27
	Private	Pop. Served	(x 1,000)	791	314	477
		Coverage	(%)	23%	31%	20%
		Water Demand	(MCM/year)	8.66	3.44	5.22
	Total	Water Demand		51	18	32
IX		Population	(x 1,000)	3,581.63	1,252.21	2,329.43
	Public	Pop. Served	(x 1,000)	2,629.70	864.02	1,765.68
		Coverage	(%)	73%	69%	76%
		Water Demand	(MCM/year)	62.76	38.78	23.99
	Private	Pop. Served	(x 1,000)	951.94	388.18	563.75
		Coverage	(%)	27%	31%	24%
		Water Demand	(MCM/year)	10.42	4.25	6.17
	Total	Water Demand		73.19	43.03	30.16
X		Population	(x 1,000)	3,954.76	1,724.81	2,229.95
	Public	Pop. Served	(x 1,000)	2,926.51	1,190.12	1,736.40
		Coverage	(%)	74%	69%	78%
		Water Demand	(MCM/year)	71.84	46.25	25.59
	Private	Pop. Served	(x 1,000)	1,028.25	534.69	493.56
		Coverage	(%)	26%	31%	22%
		Water Demand	(MCM/year)	11.26	5.85	5.40
	Total	Water Demand		83.10	52.11	31.00
XI		Population	(x 1,000)	5,777	2,359	3,418
	Public	Pop. Served	(x 1,000)	4,371	1,626	2,744
		Coverage	(%)	76%	69%	80%
		Water Demand	(MCM/year)	89	44	44
	Private	Pop. Served	(x 1,000)	1,406	732	674
		Coverage	(%)	24%	31%	20%
		Water Demand	(MCM/year)	15.40	8.02	7.38
	Total	Water Demand		104	52	51
XII		Population	(x 1,000)	4,909	1,701	3,208
	Public	Pop. Served	(x 1,000)	3,533	1,174	2,359
		Coverage	(%)	72%	69%	74%
		Water Demand	(MCM/year)	52	25	27
	Private	Pop. Served	(x 1,000)	1,376	527	849
		Coverage	(%)	28%	31%	26%
		Water Demand	(MCM/year)	15.07	5.78	9.29
	Total	Water Demand		67	31	36
Total		Population	(x 1,000)	68,613	34,619	33,994
	Public	Pop. Served	(x 1,000)	49,120	23,548	25,572
		Coverage	(%)	72%	68%	75%
		Water Demand	(MCM/year)	1,958	1,558	400
	Private	Pop. Served	(x 1,000)	19,493	11,070	8,422
		Coverage	(%)	28%	32%	25%
		Water Demand	(MCM/year)	213.44	121.22	92.22
	Total	Water Demand		2,172	1,679	492

Table E-10 WATER RIGHTS FOR INDUSTRIAL WATER (1/3)

(Unit: lps)

WRR	1986			1987			1988			1989		
	GW	SW	Total	GW	SW	Total	GW	SW	Total	GW	SW	Total
I	579	911	1,490	579	911	1,490	580	1,117	1,698	580	1,315	1,896
II	1	489	490	1	489	490	1	489	490	1	489	490
III	1,178	3,880	5,058	1,178	3,880	5,058	1,210	4,015	5,225	1,225	4,015	5,240
IV	1,040	7,748	8,788	1,040	7,751	8,791	1,040	7,751	8,791	1,043	7,751	8,794
V	172	444	616	172	444	616	172	444	616	172	444	616
VI	755	16,202	16,957	755	16,202	16,957	755	16,202	16,957	757	16,202	16,959
VII	1,140	1,905	3,045	1,140	1,905	3,045	1,140	1,905	3,045	1,140	1,905	3,045
VIII	382	348	730	382	348	730	382	348	730	382	348	730
IX	13	134	147	13	134	147	13	134	147	13	134	147
X	1	6,408	6,408	1	6,408	6,408	1	6,408	6,408	1	6,408	6,408
XI	0	4,912	4,913	0	4,912	4,913	0	5,182	5,182	0	5,182	5,182
XII	0	2,819	2,819	0	2,819	2,819	0	2,819	2,819	0	2,819	2,819
Total	5,261	46,201	51,462	5,261	46,204	51,465	5,294	46,815	52,108	5,313	47,013	52,326

Table E-10 WATER RIGHTS FOR INDUSTRIAL WATER (2/3)

(Unit: lps)

WRR	1990			1991			1992			1993		
	GW	SW	Total	GW	SW	Total	GW	SW	Total	GW	SW	Total
I	580	1,565	2,146	580	1,645	2,226	582	1,645	2,227	617	1,645	2,262
II	366	489	855	366	489	855	366	489	855	377	489	866
III	1,226	4,015	5,241	1,226	4,015	5,241	1,226	4,045	5,271	1,255	4,045	5,300
IV	1,090	7,751	8,842	1,100	7,751	8,851	1,132	7,810	8,943	1,142	7,813	8,956
V	172	444	616	172	444	616	172	444	616	172	444	616
VI	757	16,202	16,959	758	16,202	16,960	833	16,452	17,285	852	16,452	17,305
VII	1,140	1,905	3,045	1,140	1,905	3,045	1,225	2,016	3,241	1,249	2,016	3,265
VIII	382	348	730	382	348	730	382	348	730	382	348	730
IX	13	134	147	13	134	147	17	134	151	17	134	151
X	2	6,408	6,410	2	6,408	6,410	2	6,408	6,410	2	6,408	6,410
XI	0	5,182	5,182	0	5,182	5,182	13	5,182	5,195	13	5,740	5,753
XII	0	2,819	2,819	0	2,819	2,819	0	2,819	2,819	0	2,819	2,819
Total	5,729	47,263	52,992	5,740	47,343	53,083	5,950	47,793	53,743	6,079	48,354	54,434

Table E-10 WATER RIGHTS FOR INDUSTRIAL WATER (3/3)

(Unit: lps)

WRR	1994			1995			1996		
	GW	SW	Total	GW	SW	Total	GW	SW	Total
I	617	1,645	2,262	617	1,645	2,262	647	1,645	2,292
II	498	489	987	498	489	987	498	489	987
III	1,255	4,045	5,300	1,263	4,045	5,308	1,466	4,045	5,512
IV	1,157	7,813	8,970	2,897	13,053	15,950	3,463	13,093	16,557
V	172	444	616	172	503	675	172	562	734
VI	881	16,602	17,483	881	16,605	17,485	899	16,725	17,624
VII	1,407	2,442	3,849	1,418	2,476	3,895	1,430	2,511	3,941
VIII	382	348	730	382	348	730	389	365	755
IX	22	135	157	22	135	157	22	135	157
X	93	6,456	6,549	93	6,456	6,549	102	6,456	6,558
XI	64	6,567	6,632	94	6,567	6,661	220	6,567	6,787
XII	0	2,819	2,819	0	2,824	2,824	63	3,965	4,027
Total	6,548	49,807	56,355	8,337	55,147	63,485	9,372	56,559	65,931

Data Source: NWRB

Note: GW--Ground Water, SW--Surface Water

Table E-11 INDUSTRIAL WATER DEMAND IN 1995

(Unit : MCM/year)

WRR	Ground Water	Surface Water	Total
I	5.3	67.7	72.9
II	0.7	15.4	16.1
III	83.7	125.6	209.3
IV	202.2	423.6	625.8
V	1.6	18.2	19.8
VI	45.6	523.6	569.3
VII	88.0	77.8	165.8
VIII	20.4	11.0	31.4
IX	1.4	4.3	5.7
X	43.3	167.1	210.4
XI	16.0	199.1	215.1
XII	6.3	85.7	92.0
Total	514.4	1,719.1	2,233.5

Table E-12 WATER USE (MWSS)

Year	Pop. under MWSS (x 1,000)	Domestic				Commercial				Industrial				Grand Total						
		Volume Sold (mld)	Pop. with House Connec. (x 1,000)	% Public Faucets (x 1,000)	Pop. with Water (x 1,000)	Volume Sold (mld)	% Lpced (x 1,000)	Pop. Served (x 1,000)	Volume Sold (mld)	% Lpced (x 1,000)	Pop. Served (x 1,000)	Volume Sold (mld)	% Lpced (x 1,000)	Pop. Served (x 1,000)	Volume Sold (mld)	% Lpced (x 1,000)				
1985	7,968	503	3,050	38	460	6	3,510	44	287	36	218	3	41	5	10	0.2	851	3,738	47	177
1986	8,223	536	3,580	44	470	6	4,050	49	276	34	215	3	40	5	10	0.2	851	4,275	52	189
1987	8,491	599	3,970	48	500	6	4,470	54	279	33	214	3	45	5	10	0.2	922	4,694	56	189
1988	8,774	619	4,160	47	550	6	4,710	54	309	35	269	3	57	6	30	0.4	985	5,009	57	191
1989	9,070	646	4,450	49	600	7	5,050	56	314	35	336	4	69	8	50	0.5	1,030	5,436	60	190
1990	9,383	671	4,850	52	650	7	5,500	59	312	33	348	4	69	8	50	0.5	1,052	5,898	63	179
1991	9,616	694	5,170	54	680	7	5,850	61	296	31	360	4	69	7	50	0.5	1,059	6,260	65	172
1992	9,854	701	5,470	56	710	7	6,180	63	281	28	372	4	67	7	50	0.6	1,049	6,602	67	169
1993	10,099	731	5,780	57	740	7	6,570	65	290	29	378	4	67	7	60	0.6	1,038	6,958	69	162
1994	10,350	770	6,050	59	800	8	6,850	66	306	29	388	4	71	7	60	0.6	1,148	7,298	71	163
1995	11,426	800	6,270	55	830	7	7,100	62	300	26	393	3	69	6	60	0.6	1,169	7,553	66	159
1996	11,906	811	6,460	54	840	7	7,300	61	310	26	399	3	73	6	70	0.6	1,194	7,769	65	158

Data Source: MWSS

Table E-13 UNIT WATER CONSUMPTION (MWSS)

(Unit: Lpcd)

Year	Domestic	Commercial	Industrial	Sub-total	Revenued Water	Non Revenued Water	Total
1995	127	26	6	159	44%	56%	361
2000	148	30	7	185	50%	50%	370
2005	161	32	8	201	55%	45%	366
2010	173	35	9	217	60%	40%	362
2015	186	37	9	232	65%	35%	357
2020	196	39	10	245	70%	30%	350
2025	206	41	10	258	70%	30%	368

Data Source: MWSS (For the year of 1995). Study on Water Supply and Sewerage Master Plan of Metro Manila in the Republic of the Philippines (for the year of 2000-2015)

Note: Unit water consumptions for 2020-2020 were projected on the basis of trend described in the Master Plan. Non-Revenued water ratio was modified referring to the present condition.

Table E-14 UNIT WATER CONSUMPTION FOR WATER DISTRICTS

Group	Item	1990	1995	2000	2005	2010	2015	2020	2025
1	Domestic use	155	165	175	184	193	203	214	224
	Commercial/Industrial/Institutional	33	34	35	37	39	41	43	45
	Accounted-for-water	188	199	210	221	232	244	257	269
	Unaccounted-for-water	73	98	90	86	77	69	64	67
	Total	261	297	300	307	310	313	321	337
2	Domestic use	135	143	150	158	166	174	183	192
	Commercial/Industrial/Institutional	23	27	30	32	33	34	36	38
	Accounted-for-water	158	170	180	190	199	208	219	230
	Unaccounted-for-water	62	84	77	74	66	59	55	58
	Total	220	254	257	263	265	267	274	288
3	Domestic use	120	128	135	142	149	157	165	173
	Commercial/Industrial/Institutional	19	23	24	27	29	31	33	35
	Accounted-for-water	139	151	159	169	178	188	198	208
	Unaccounted-for-water	54	74	68	66	59	53	49	52
	Total	193	225	227	235	237	241	247	260
4	Domestic use	110	118	125	131	138	145	153	160
	Commercial/Industrial/Institutional	15	18	20	23	26	29	31	32
	Accounted-for-water	125	136	145	154	164	174	184	192
	Unaccounted-for-water	49	67	62	60	55	49	46	48
	Total	174	203	207	214	219	223	229	240
5	Domestic use	100	105	110	116	122	128	134	141
	Commercial/Industrial/Institutional	13	15	17	20	22	24	26	28
	Accounted-for-water	113	120	127	136	144	152	160	169
	Unaccounted-for-water	44	59	54	53	48	43	40	42
	Total	157	179	181	188	191	194	200	211

Note: Annual rate of increase of unit water consumption of domestic use: 1.5% in 2000, 1% in 2000-2010 (LWUA Design Criteria)

NRW Rate (%)	1990	1995	2000	2005	2010	2015	2020	2025
	40	33	30	28	25	22	20	20

Table E-15 SERVICE COVERAGE AND WATER DEMAND FOR PUBLIC WATER SUPPLY BY WATER RESOURCES REGION AND PROVINCE (U7)

WRR	Province	Type	1995			2000			2010			2015			2020				
			Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural		
1	Iloilo	Public Water Supply	146	42	104	177	51	126	233	59	177	241	60	183	250	61	189	255	
		Coverage Demand (x 1,000)	17	17	0	17	17	0	17	17	0	17	17	0	17	17	0	17	17
		Population	17	17	0	17	17	0	17	17	0	17	17	0	17	17	0	17	17
		Coverage (%)	94	94	0	94	94	0	94	94	0	94	94	0	94	94	0	94	94
		Water Demand (MCM/year)	174	174	0	174	174	0	174	174	0	174	174	0	174	174	0	174	174
		Water Demand (MCM/year)	130	130	0	130	130	0	130	130	0	130	130	0	130	130	0	130	130
		Coverage (%)	75	75	0	75	75	0	75	75	0	75	75	0	75	75	0	75	75
		Water Demand (MCM/year)	153	153	0	153	153	0	153	153	0	153	153	0	153	153	0	153	153
		Water Demand (MCM/year)	157	157	0	157	157	0	157	157	0	157	157	0	157	157	0	157	157
		Coverage (%)	90	90	0	90	90	0	90	90	0	90	90	0	90	90	0	90	90
1	Iloilo Sur	Public Water Supply	241	310	231	310	310	231	310	310	231	310	310	231	310	310	231	310	310
		Coverage Demand (x 1,000)	191	191	0	191	191	0	191	191	0	191	191	0	191	191	0	191	191
		Population	191	191	0	191	191	0	191	191	0	191	191	0	191	191	0	191	191
		Coverage (%)	35	35	0	35	35	0	35	35	0	35	35	0	35	35	0	35	35
		Water Demand (MCM/year)	1134	1134	0	1134	1134	0	1134	1134	0	1134	1134	0	1134	1134	0	1134	1134
		Water Demand (MCM/year)	183	183	0	183	183	0	183	183	0	183	183	0	183	183	0	183	183
		Coverage (%)	16	16	0	16	16	0	16	16	0	16	16	0	16	16	0	16	16
		Water Demand (MCM/year)	358	358	0	358	358	0	358	358	0	358	358	0	358	358	0	358	358
		Water Demand (MCM/year)	205	205	0	205	205	0	205	205	0	205	205	0	205	205	0	205	205
		Coverage (%)	60	60	0	60	60	0	60	60	0	60	60	0	60	60	0	60	60
1	Iloilo Norte	Public Water Supply	485	138	345	485	138	345	485	138	345	485	138	345	485	138	345	485	485
		Coverage Demand (x 1,000)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Population	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
1	Iloilo Sibuyan	Public Water Supply	45	45	0	45	45	0	45	45	0	45	45	0	45	45	0	45	45
		Coverage Demand (x 1,000)	45	45	0	45	45	0	45	45	0	45	45	0	45	45	0	45	45
		Population	45	45	0	45	45	0	45	45	0	45	45	0	45	45	0	45	45
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	45	45	0	45	45	0	45	45	0	45	45	0	45	45	0	45	45
		Water Demand (MCM/year)	45	45	0	45	45	0	45	45	0	45	45	0	45	45	0	45	45
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	45	45	0	45	45	0	45	45	0	45	45	0	45	45	0	45	45
		Water Demand (MCM/year)	45	45	0	45	45	0	45	45	0	45	45	0	45	45	0	45	45
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
1	Iloilo West	Public Water Supply	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Coverage Demand (x 1,000)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Population	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
2	Cebu	Public Water Supply	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage Demand (x 1,000)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Population	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
2	Cebu	Public Water Supply	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage Demand (x 1,000)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Population	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
2	Cebu	Public Water Supply	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage Demand (x 1,000)	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Population	112	112	0	112	112	0	112	112	0	112	112	0	112	112	0	112	112
		Coverage (%)	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
		Water Demand (MCM/year)	112	112	0	112	112	0	112	112	0	112	112	0	112				

Table E-15 SERVICE COVERAGE AND WATER DEMAND FOR PUBLIC WATER SUPPLY BY WATER RESOURCES REGION AND PROVINCE (27)

WRR	Province	Type	1995			2000			2015			2020			Urban	Rural	Total	
			Pop.	Urban	Rural	Total	Pop.	Urban	Rural	Total	Pop.	Urban	Rural	Total				
WRR-I	Batang	Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
WRR-II	Bantul	Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
WRR-III	Banyuwangi	Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120
		Water Demand (MCM/year)	120	104	16	120	104	16	120	104	16	120	104	16	120	104	16	120

Table E-15 SERVICE COVERAGE AND WATER DEMAND FOR PUBLIC WATER SUPPLY BY WATER RESOURCES REGION AND PROVINCE (6/7)

WRK	Province	Type	1995			2000			2005			2010			2015			2020			
			Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	
10 Iloilo	Iloilo	Public Water Supply	940	339	602	1,120	473	647	1,233	512	721	1,435	570	865	1,565	625	940	1,705	642	1,063	
		Coverage Demand (x 1,000)	940	339	602	1,120	473	647	1,233	512	721	1,435	570	865	1,565	625	940	1,705	642	1,063	
		Population	87	72	15	174	138	36	236	240	16	46	448	48	69	63	16	612	897	16	1,177
		Coverage	97	318	65	154	334	21	235	466	32	134	596	38	154	742	29	334	839	24	644
		Water Demand (MCM/year)	4.3	3.7	0.6	7.8	3.8	4.0	11.6	16.7	0.8	20.6	31.6	1.6	45.9	44.2	1.0	60.3	65.9	1.4	100.6
		Total Pop. Served	64	46	18	112	82	30	142	109	39	70	179	59	119	182	60	112	292	58	383
		Coverage	64	46	18	112	82	30	142	109	39	70	179	59	119	182	60	112	292	58	383
		Water Demand (MCM/year)	6.1	5.1	1.0	11.2	8.1	3.1	11.2	16.7	0.8	20.6	31.6	1.6	45.9	44.2	1.0	60.3	65.9	1.4	100.6
		Total Pop. Served	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	100
		Coverage	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	100
10 Cebu	Cebu	Public Water Supply	1,114	540	565	1,347	611	736	1,458	671	887	1,745	714	1,031	2,016	828	1,188	2,844	1,016	1,828	
		Coverage Demand (x 1,000)	1,114	540	565	1,347	611	736	1,458	671	887	1,745	714	1,031	2,016	828	1,188	2,844	1,016	1,828	
		Population	68	41	27	134	90	44	134	81	41	119	40	79	144	51	93	193	68	125	
		Coverage	139	64	75	278	194	84	362	158	74	232	82	150	312	112	202	414	152	264	
		Water Demand (MCM/year)	1.3	0.6	0.7	2.6	1.8	0.9	2.7	1.8	0.9	2.7	1.0	1.4	2.1	0.9	1.3	1.9	2.9	1.1	1.6
		Total Pop. Served	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Coverage	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Water Demand (MCM/year)	6.1	5.1	1.0	11.2	8.1	3.1	11.2	16.7	0.8	20.6	31.6	1.6	45.9	44.2	1.0	60.3	65.9	1.4	100.6
		Total Pop. Served	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	100
		Coverage	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	100
10 Misamis Occidental	Misamis Occidental	Public Water Supply	360	306	54	468	494	4	651	651	4	651	651	4	651	651	4	651	651	4	
		Coverage Demand (x 1,000)	360	306	54	468	494	4	651	651	4	651	651	4	651	651	4	651	651	4	
		Population	9	9	0	17	17	0	35	35	0	70	70	0	140	140	0	280	280	0	
		Coverage	18	18	0	36	36	0	72	72	0	144	144	0	288	288	0	576	576	0	
		Water Demand (MCM/year)	1.3	0.6	0.7	2.6	1.8	0.9	2.7	1.8	0.9	2.7	1.0	1.4	2.1	0.9	1.3	1.9	2.9	1.1	
		Total Pop. Served	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Coverage	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Water Demand (MCM/year)	6.1	5.1	1.0	11.2	8.1	3.1	11.2	16.7	0.8	20.6	31.6	1.6	45.9	44.2	1.0	60.3	65.9	1.4	
		Total Pop. Served	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	
		Coverage	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	
10 Misamis Oriental	Misamis Oriental	Public Water Supply	1,016	682	334	1,062	784	278	1,161	838	323	1,261	961	300	1,461	1,061	400	1,661	1,061	600	
		Coverage Demand (x 1,000)	1,016	682	334	1,062	784	278	1,161	838	323	1,261	961	300	1,461	1,061	400	1,661	1,061	600	
		Population	360	306	54	468	494	4	651	651	4	651	651	4	651	651	4	651	651	4	
		Coverage	720	612	108	936	988	8	1302	1302	8	1302	1302	8	1302	1302	8	1302	1302	8	
		Water Demand (MCM/year)	1.3	0.6	0.7	2.6	1.8	0.9	2.7	1.8	0.9	2.7	1.0	1.4	2.1	0.9	1.3	1.9	2.9	1.1	
		Total Pop. Served	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Coverage	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Water Demand (MCM/year)	6.1	5.1	1.0	11.2	8.1	3.1	11.2	16.7	0.8	20.6	31.6	1.6	45.9	44.2	1.0	60.3	65.9	1.4	
		Total Pop. Served	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	
		Coverage	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	
11 Davao del Norte	Davao del Norte	Public Water Supply	1,114	540	565	1,347	611	736	1,458	671	887	1,745	714	1,031	2,016	828	1,188	2,844	1,016	1,828	
		Coverage Demand (x 1,000)	1,114	540	565	1,347	611	736	1,458	671	887	1,745	714	1,031	2,016	828	1,188	2,844	1,016	1,828	
		Population	68	41	27	134	90	44	134	81	41	119	40	79	144	51	93	193	68	125	
		Coverage	139	64	75	278	194	84	362	158	74	232	82	150	312	112	202	414	152	264	
		Water Demand (MCM/year)	1.3	0.6	0.7	2.6	1.8	0.9	2.7	1.8	0.9	2.7	1.0	1.4	2.1	0.9	1.3	1.9	2.9	1.1	
		Total Pop. Served	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Coverage	46	28	18	84	57	29	86	57	29	86	57	29	86	57	29	86	57	29	
		Water Demand (MCM/year)	6.1	5.1	1.0	11.2	8.1	3.1	11.2	16.7	0.8	20.6	31.6	1.6	45.9	44.2	1.0	60.3	65.9	1.4	
		Total Pop. Served	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	
		Coverage	60	43	17	103	74	27	101	100	36	64	166	50	100	150	50	100	150	50	

