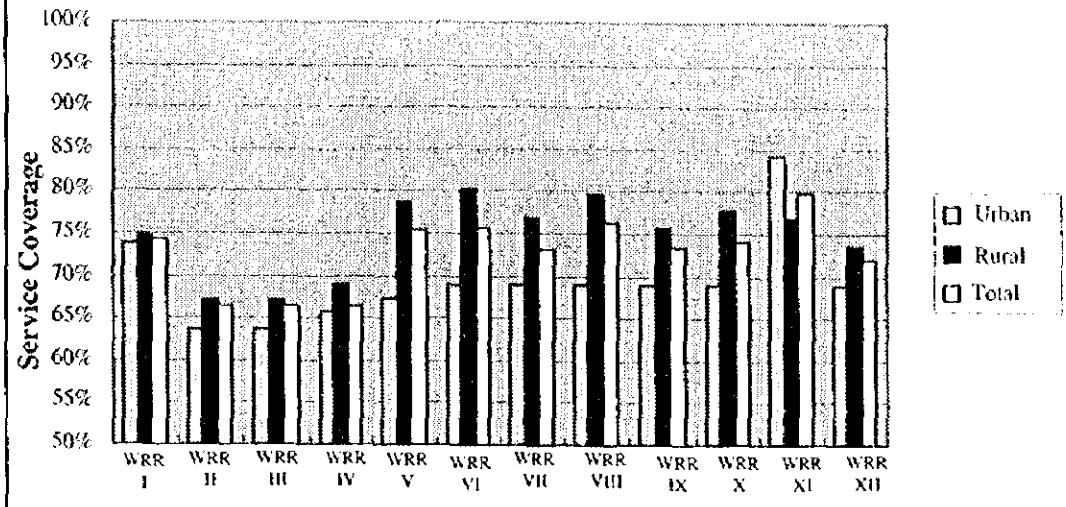


Figure 3-1 PRESENT SERVICE COVERAGE

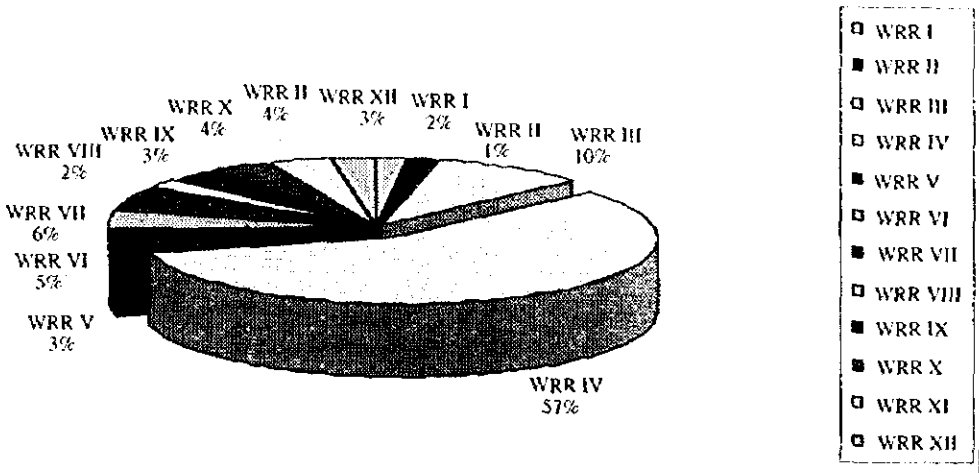


Figure 3-2 PROPORTION OF PUBLIC WATER DEMAND (1995)

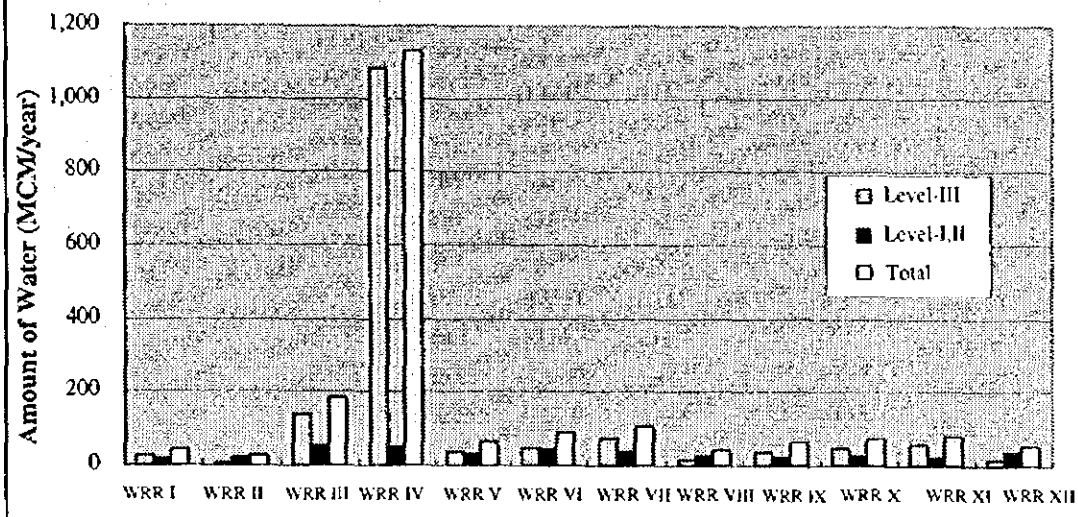


Figure 3-3 PRESENT WATER DEMAND OF PUBLIC WATER SUPPLY SYSTEM

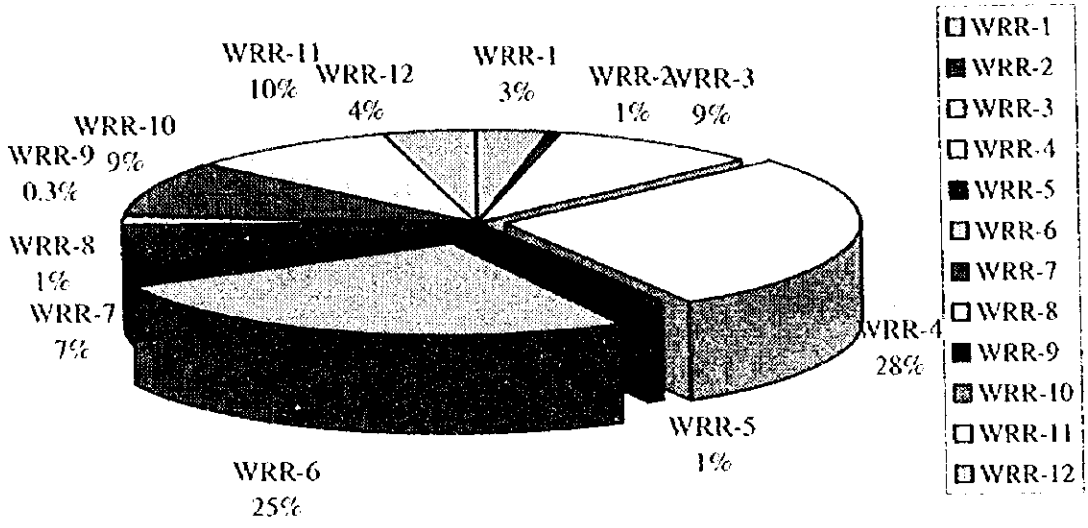


Figure 3-4 INDUSTRIAL WATER USE BY WRR (1995)

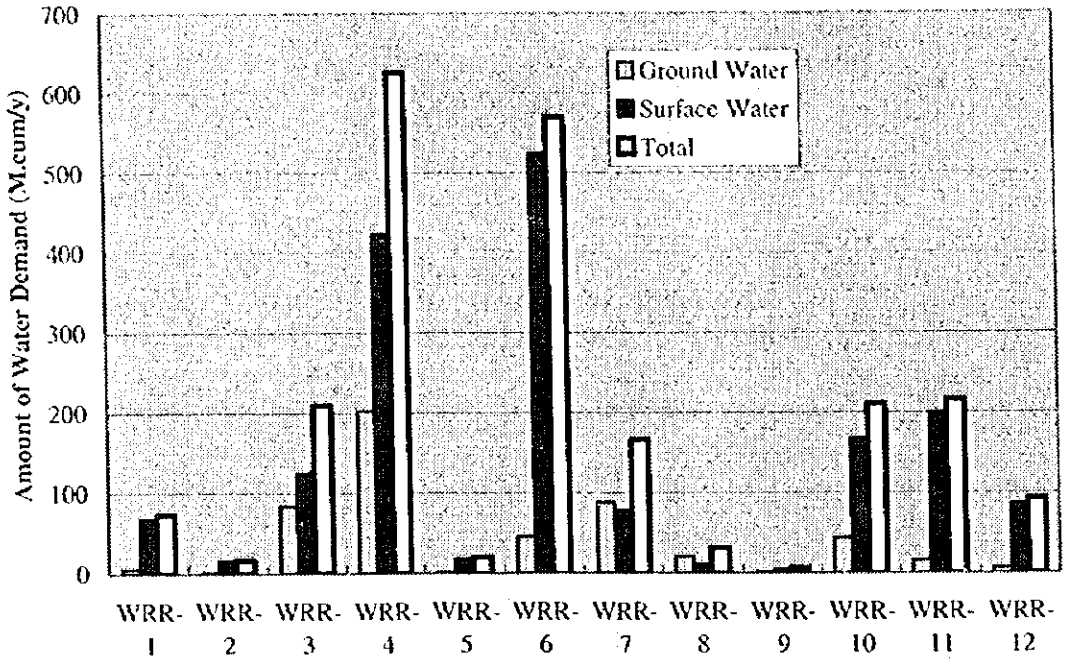
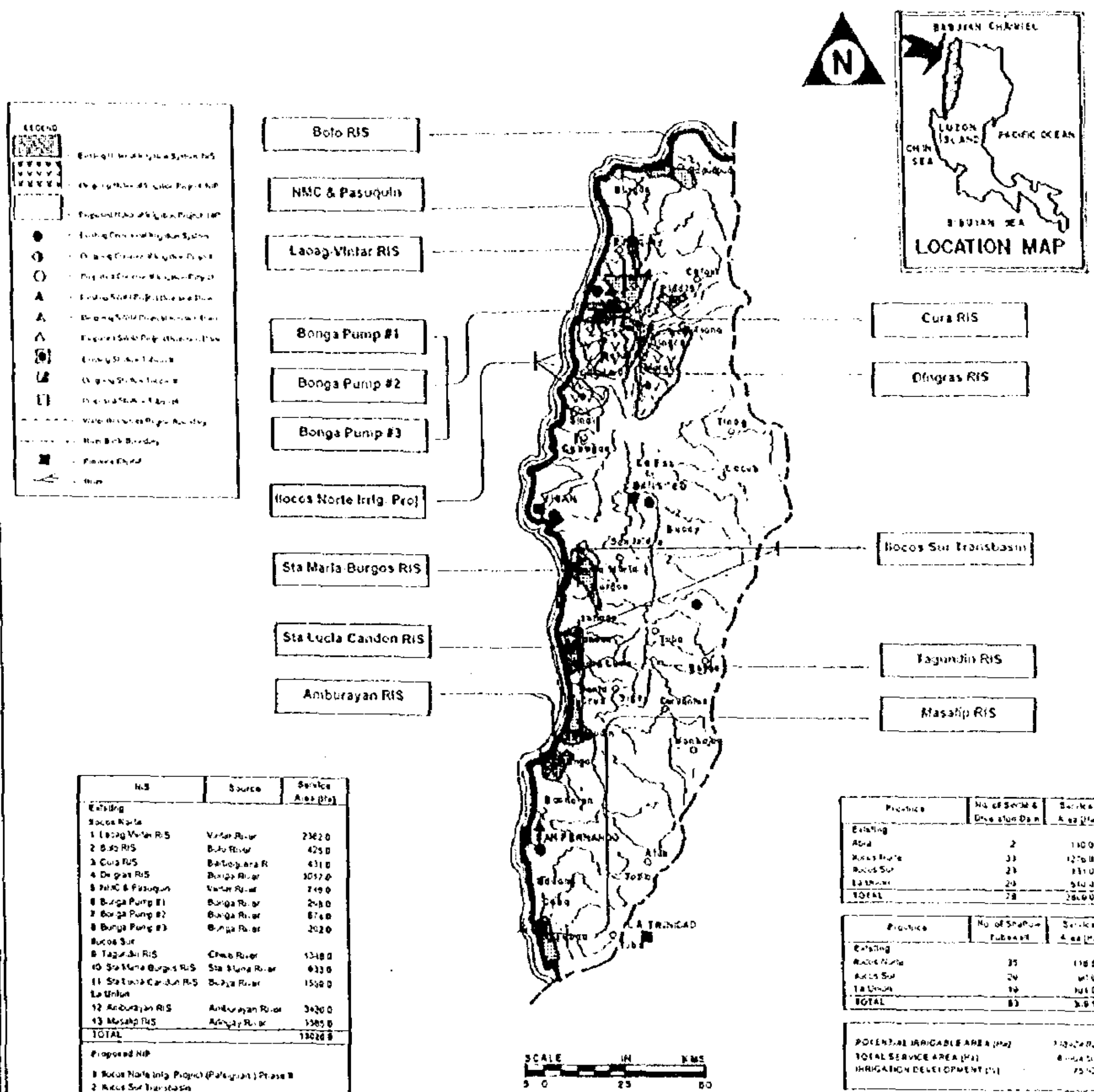


Figure 3-5 INDUSTRIAL WATER DEMAND (1995)



NIS	Source	Service Area (Ha)
Existing		
Ilocos Norte		
1 Laoag-Vintar RIS	Vintar River	2382.0
2 Bolo RIS	Bolo River	425.0
3 Cura RIS	Barbaguara R.	431.0
4 Dingras RIS	Bonga River	3037.0
5 NMC & Pasuquin	Vintar River	749.0
6 Bonga Pump #1	Bonga River	240.0
7 Bonga Pump #2	Bonga River	674.0
8 Bonga Pump #3	Bonga River	202.0
Ilocos Sur		
9 Tagudin RIS	Chico River	1348.0
10 Sta Maria-Burgos RIS	Sta Maria River	633.0
11 Sta Lucia Candon RIS	Bonga River	1559.0
La Union		
12 Amburayan RIS	Amburayan River	3430.0
13 Masalip RIS	Aringay River	3385.0
TOTAL		13026.0
Proposed NIP		
1 Ilocos Norte Irrig. Project (Palsiguan) Phase II		
2 Ilocos Sur Transbasin		

Province	No. of CIS	Service Area (Ha)
Existing		
Abra	273	12823.0
Benguet	338	8450.0
Ilocos Norte	798	30081.0
Ilocos Sur	232	12662.0
La Union	209	8413.0
TOTAL	1850	73708.0

Province	No. of Small & Diversion Dam	Service Area (Ha)
Existing		
Abra	2	100.0
Ilocos Norte	33	1276.0
Ilocos Sur	23	831.0
La Union	20	563.0
TOTAL	78	2860.0

Province	No. of Shallow Tubewell	Service Area (Ha)
Existing		
Ilocos Norte	35	118.5
Ilocos Sur	29	412.0
La Union	19	163.0
TOTAL	83	3.93

POTENTIAL IRRIGABLE AREA (Ha)	113,524.00
TOTAL SERVICE AREA (Ha)	85,424.50
IRRIGATION DEVELOPMENT (%)	75.42

Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-6 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES : WATER RESOURCES REGION I

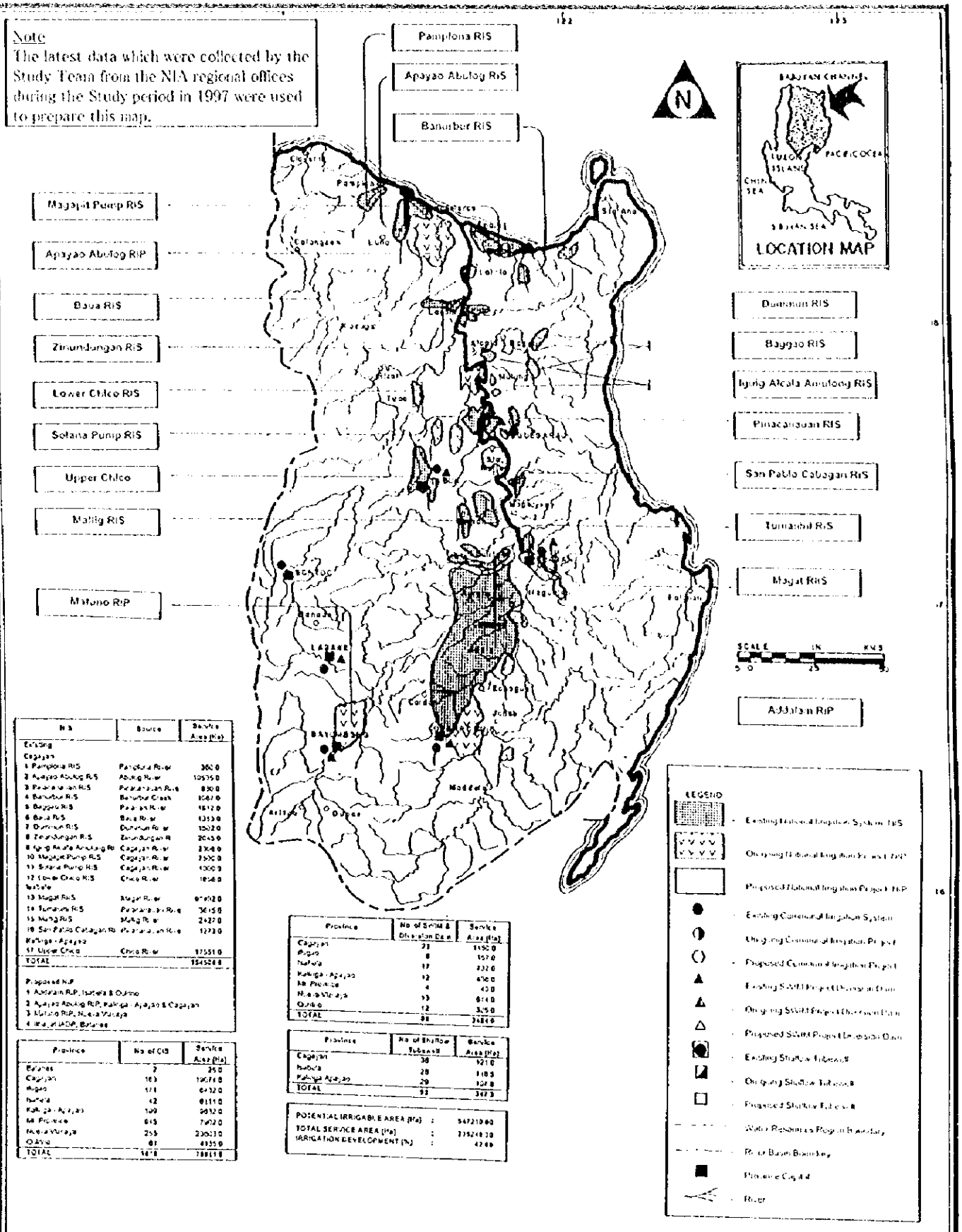
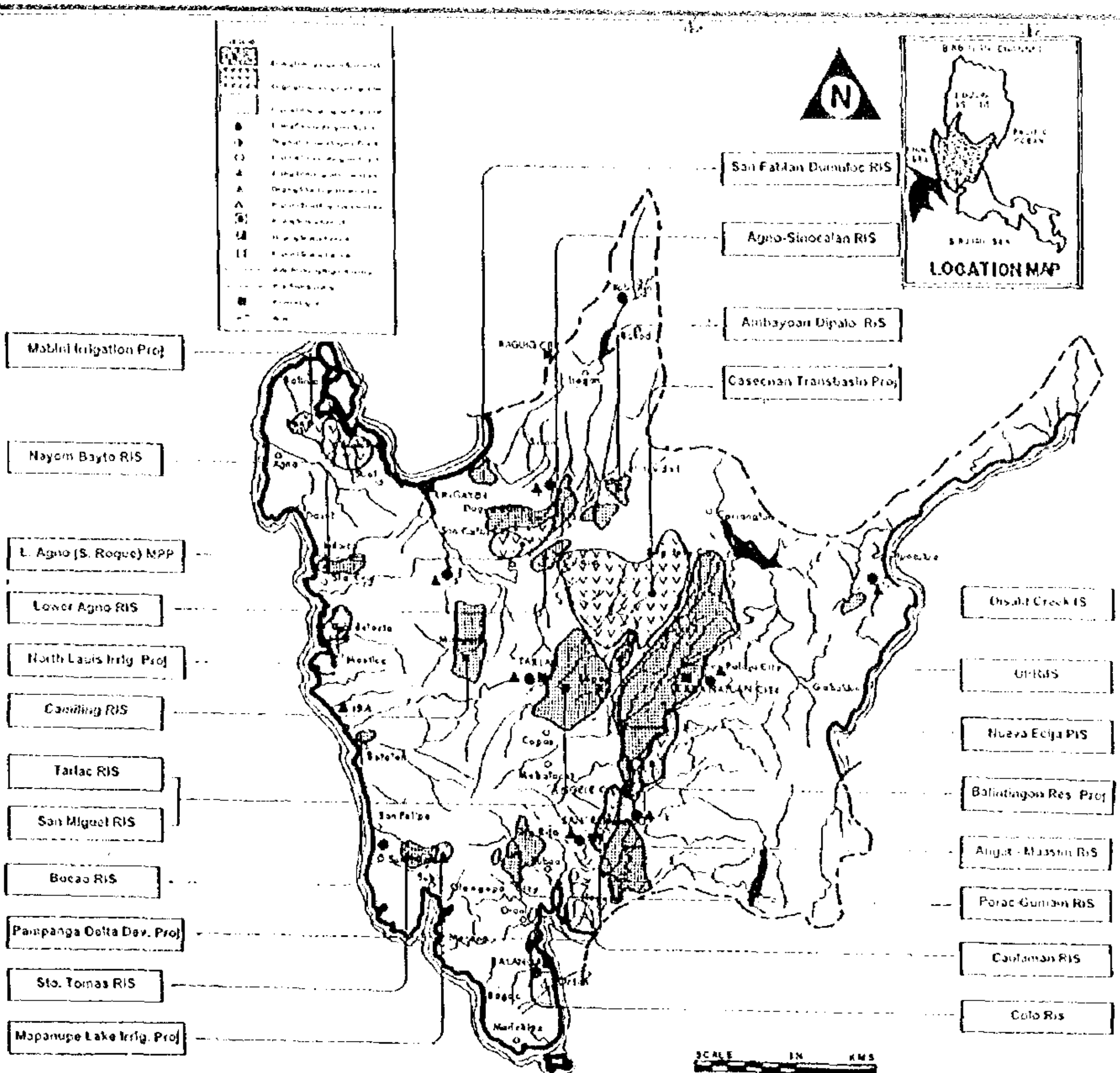


Figure 3-7 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION II



RIS	Source	Service Area (Ha)
Existing		
Aurora		
1 Dinalt Creek IS	Dinalt Creek	455.0
Bataan		
2 Colo RIS	Colo River	521.0
Bulacan		
3 Angat - Maasim RIS	Angat, Maasim R.	31485.0
Nueva Ecija		
4 UPRIIS	Pampanga, Talavera, Penaranda R.	102532.0
5 Nueva Ecija PIS	Groundwater	1313.0
Pampanga		
6 Porac Gumain RIS	Gumain River	4405.0
7 Caulaman RIS	Caulaman River	508.0
Pangasinan		
8 Lower Agno RIS	Agno River	7500.0
9 San Fabian Dumuloc RIS	Bued River	3584.0
10 Agno Sinocalan RIS	Agno, Sinocalan R.	12130.0
11 Ambayoan Dipalo RIS	Ambayoan, Dipalo	4302.0
Tarlac		
12 Tarlac RIS	Tarlac River	6282.0
13 San Miguel RIS	O'Donell River	7894.0
14 Camiling RIS	Camiling River	6900.0
Zambales		
15 Bucao RIS	Bucao River	1231.0
16 Sto. Tomas RIS	Sto. Tomas River	3624.0
17 Nayom Bayto RIS	Nayom River	1648.0
TOTAL		206632.0

Proposed RIP
1 Casecnan Transbasin Project, Nueva Ecija
2 Pampanga Delta Dev. Project, I.C., Pampanga
3 Lower Agno (San Roque) Multi Purpose Project, Pangasinan
4 Mapanupe Lake Irrigation Project, Zambales
5 Balintingon Reservoir Project, Nueva Ecija
6 Mabini Irrigation Project, Pangasinan
7 North Laois Irrigation Project, Zambales
8 Rehabilitation of Central Luzon Groundwater Irrig. Proj., Tarlac

PROVINCES	No. of CIS	Service Area (Ha)
Bataan	83	11058.0
Aurora	84	6045.0
Benguet	275	4244.0
Bulacan	81	8015.0
Nueva Ecija	95	24356.0
Pampanga	133	22461.0
Pangasinan	454	60432.0
Tarlac	55	13555.0
Zambales	87	7217.0
TOTAL	1327	159358.6

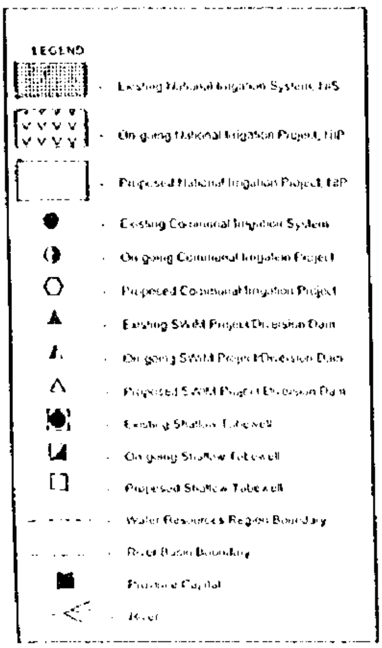
PROVINCES	No. of SWIP & Diversion Dam	Service Area (Ha)
Aurora	1	30.0
Bulacan	8	1633.0
Nueva Ecija	10	1454.0
Pampanga	2	210.0
Pangasinan	10	410.0
Tarlac	6	1075.0
Zambales	1	53.0
TOTAL	38	4788.0

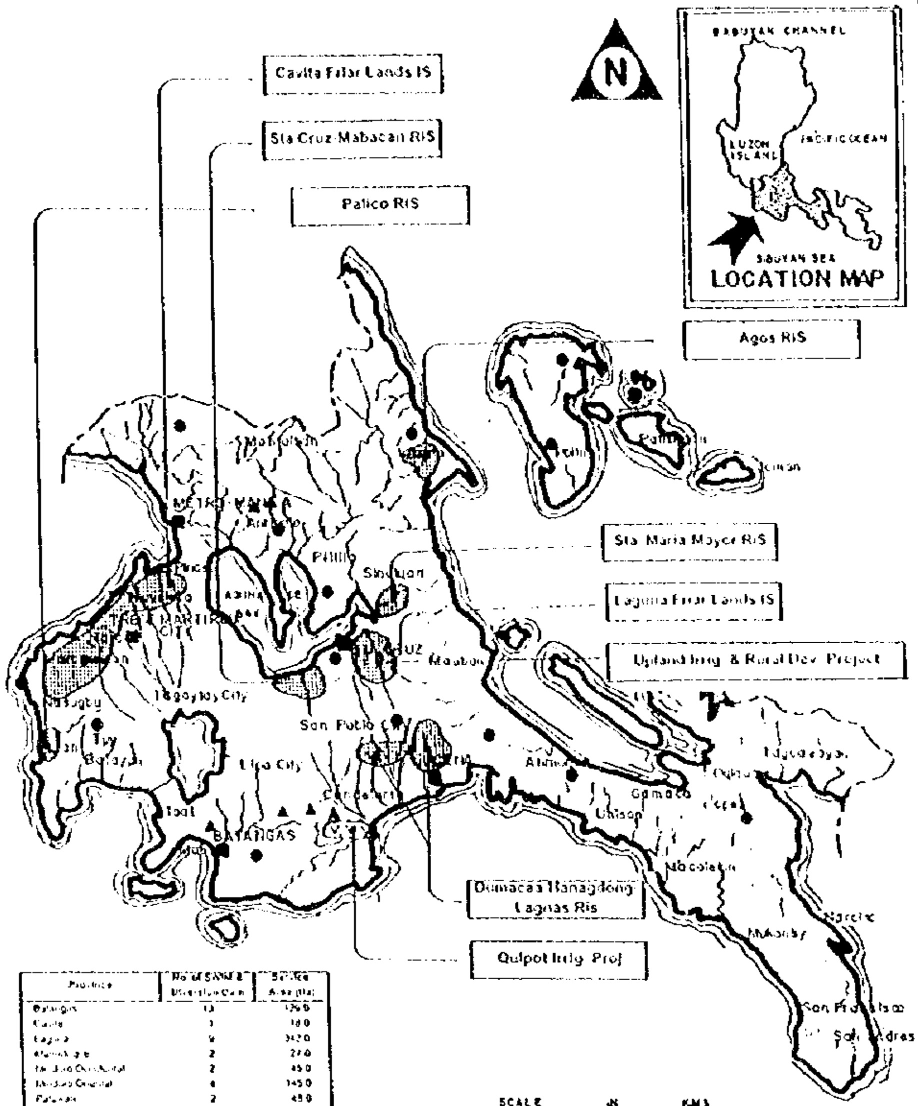
PROVINCES	No. of Shallow Tubewells	Service Area (Ha)
Bataan	18	36.0
Bulacan	29	51.5
Nueva Ecija	47	61.0
Pampanga	50	120.6
Pangasinan	54	141.8
Tarlac	42	79.7
Zambales	26	58.9
TOTAL	392	381.0

POTENTIAL IRRIGABLE AREA (Ha)	:	492616.00
TOTAL SERVICE AREA (Ha)	:	375408.00
IRRIGATION DEVELOPMENT (%)	:	54.81

Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-8 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION III


LEGEND
Existing National Irrigation System, NIS
On-going National Irrigation Project, NIP
Proposed National Irrigation Project, NIP
Existing Communal Irrigation System
On-going Communal Irrigation Project
Proposed Communal Irrigation Project
Existing SWIM Project Diversion Dam
On-going SWIM Project Diversion Dam
Proposed SWIM Project Diversion Dam
Existing Shallow Tubewell
On-going Shallow Tubewell
Proposed Shallow Tubewell
Water Resources Region Boundary
River Basin Boundary
Province Capital
River


Cavite Friar Lands IS
Sta Cruz-Mabacan RIS
Palico RIS
LOCATION MAP
LUZON ISLAND
PACIFIC OCEAN
Agos RIS
METRO MANILA
Sta. Maria Mayor RIS
Laguna Friar Lands IS
Upland Irrig. & Rural Dev. Project
Tagaytay City
San Pablo City
Lipa City
BATANGAS
Dumacaa Hanagdong Lagnas Ris
Quipot Irrig. Proj.
Gumaca
Unisan
Mulanay
San Francisco
San Andres
SCALE
KMS

RIS	Source	Service Area (Ha)
Existing		
Cavite		
1 Cavite Friar Lands IS		[illegible]
Romblon		
2 Cabugas RIS		250.0
Batangas		
3 Palico RIS	Palico River	620.0
Quezon		
4 Dumacaa Hanagdong Lagnas RIS	[illegible]	[illegible]
5 Agos RIS	Agos River	[illegible]
Mindoro Oriental		
6 Baco Bucayao Mag. Asawang Tubig RIS	Baco Bucayao	[illegible]
7 Pula - Bansud RIS	Pula Mag-asawang Tubig R.	[illegible]
Mindoro Occidental		
8 Pagbahan RIS	Pagbahan River	[illegible]
9 Lumintao RIS	Lumintao River	[illegible]
10 Amnay Patrick RIS	Amnay River	[illegible]
11 Caguray RIS	Caguray River	[illegible]
Palawan		
12 Batang Batang RIS		625.0
13 Malatgao RIS		[illegible]
Laguna		
14 Laguna Friar Lands IS	[illegible]	[illegible]
15 Sta Cruz-Mabacan RIS	Sta Cruz Mabacan	[illegible]
16 Sta Maria Mayor RIS	Sta Maria Mayor	[illegible]
TOTAL		[illegible]

Proposed NIP
1 Palawan Integrated Area Dev Proj. [illegible] Palawan
2 Upland Irrig. & Rural Dev. Proj. Laguna
3 [illegible] Irrig. Proj. Batangas

Province	No. of CIS	Service Area (Ha)
Batangas	[illegible]	[illegible]
Cavite	5	[illegible]
Laguna	[illegible]	[illegible]
Marinduque	[illegible]	[illegible]
Mindoro Occidental	70	[illegible]
Mindoro Oriental	50	[illegible]
Palawan	[illegible]	[illegible]
Quezon	226	[illegible]
Rizal	[illegible]	[illegible]
Romblon	50	[illegible]
TOTAL	[illegible]	[illegible]

Province	No. of SWIM & Diversion Dam	Service Area (Ha)
Batangas	13	[illegible]
Cavite	1	10.0
Laguna	[illegible]	[illegible]
Marinduque	2	27.0
Mindoro Occidental	2	45.0
Mindoro Oriental	4	145.0
Palawan	2	45.0
Quezon	29	[illegible]
Rizal	3	120.0
Romblon	2	22.0
TOTAL	[illegible]	[illegible]

Province	No. of Shallow Tubewell	Service Area (Ha)
Batangas	9	14.5
Mindoro Oriental	45	60.0
TOTAL	54	[illegible]

POTENTIAL IRRIGABLE AREA (Ha)	:	[illegible]
TOTAL SERVICE AREA (Ha)	:	[illegible]
IRRIGATION DEVELOPMENT (%)	:	[illegible]

Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-9 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION IV (1/3)

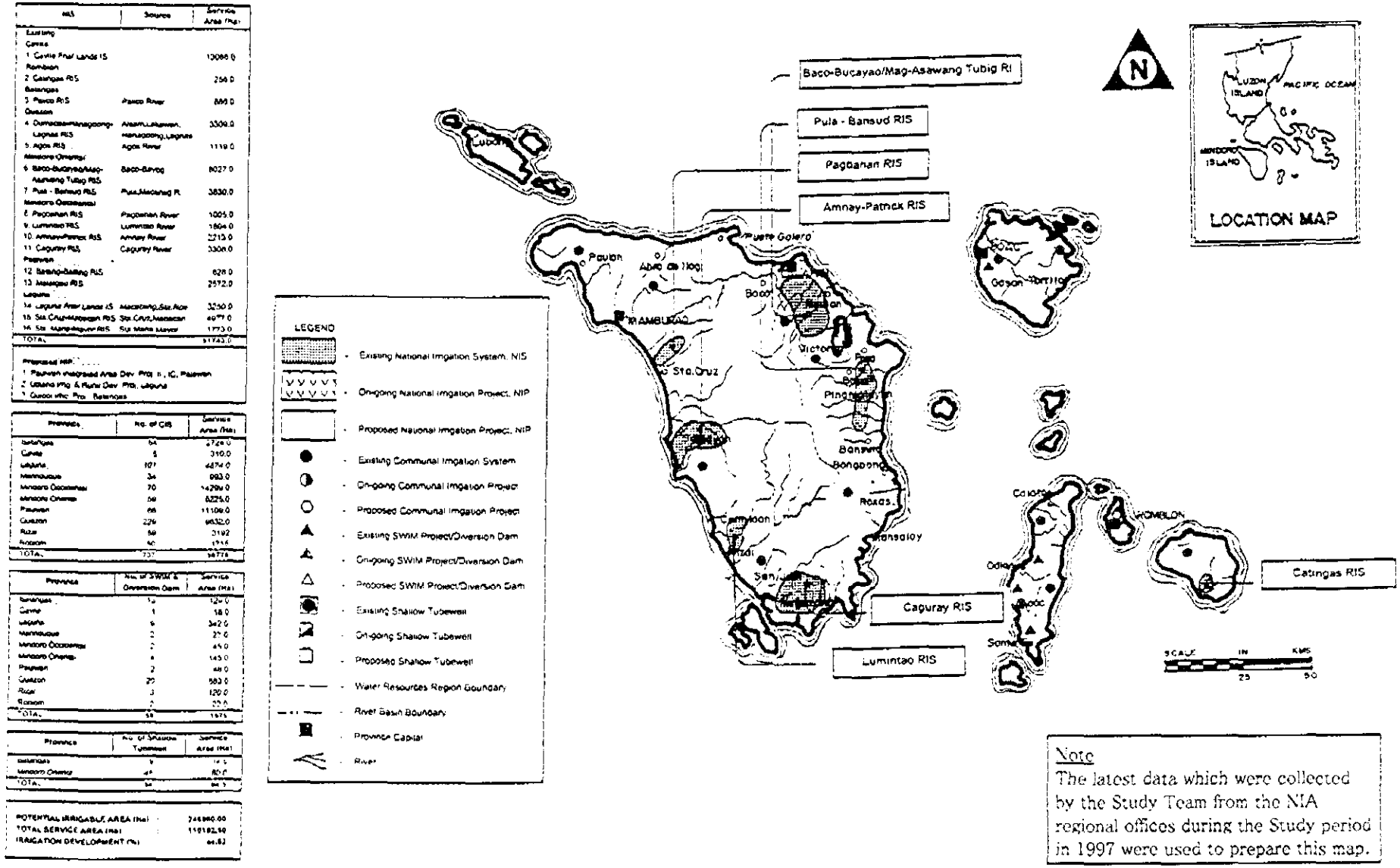


Figure 3-9 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION IV (2/3)

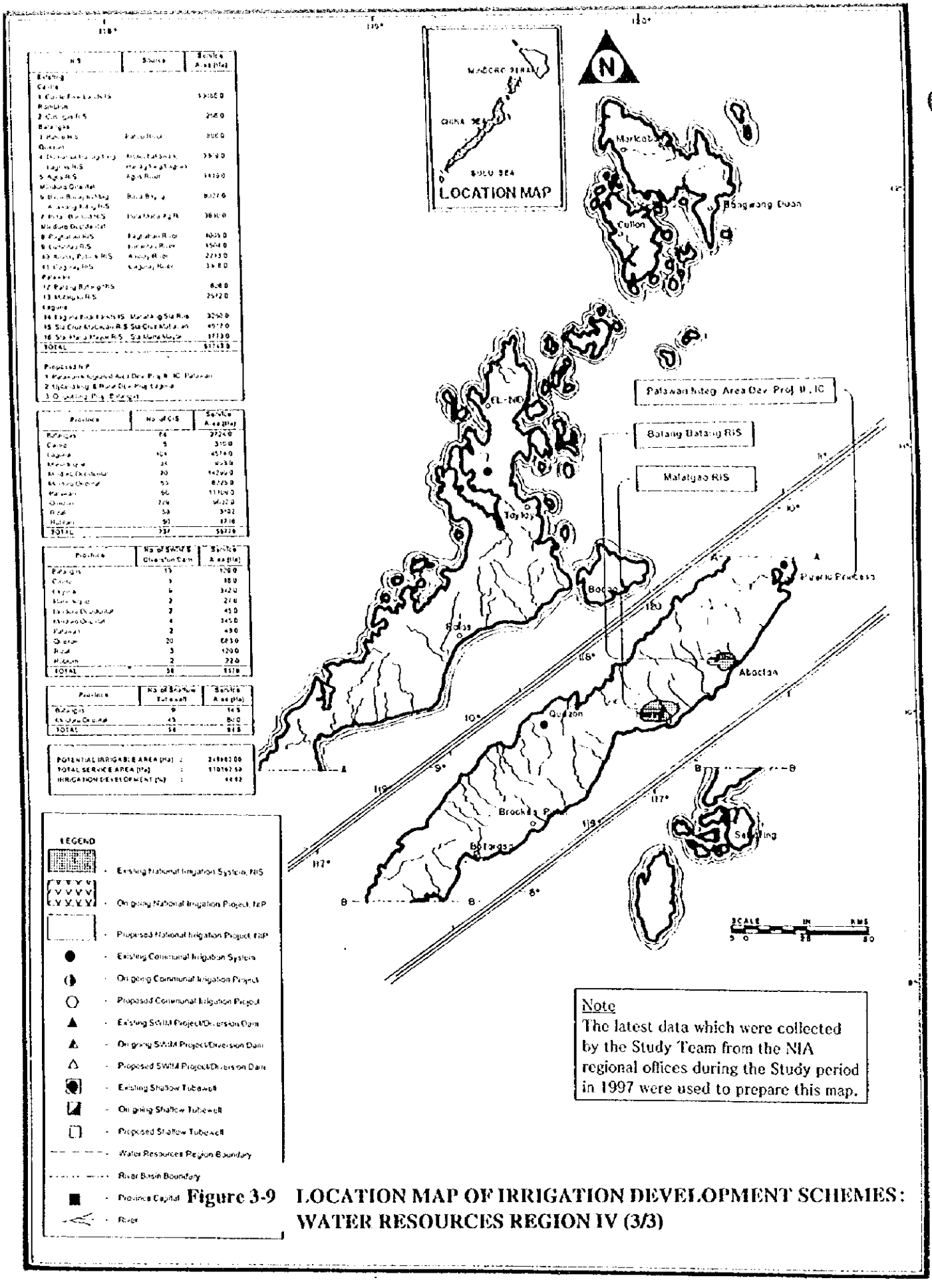
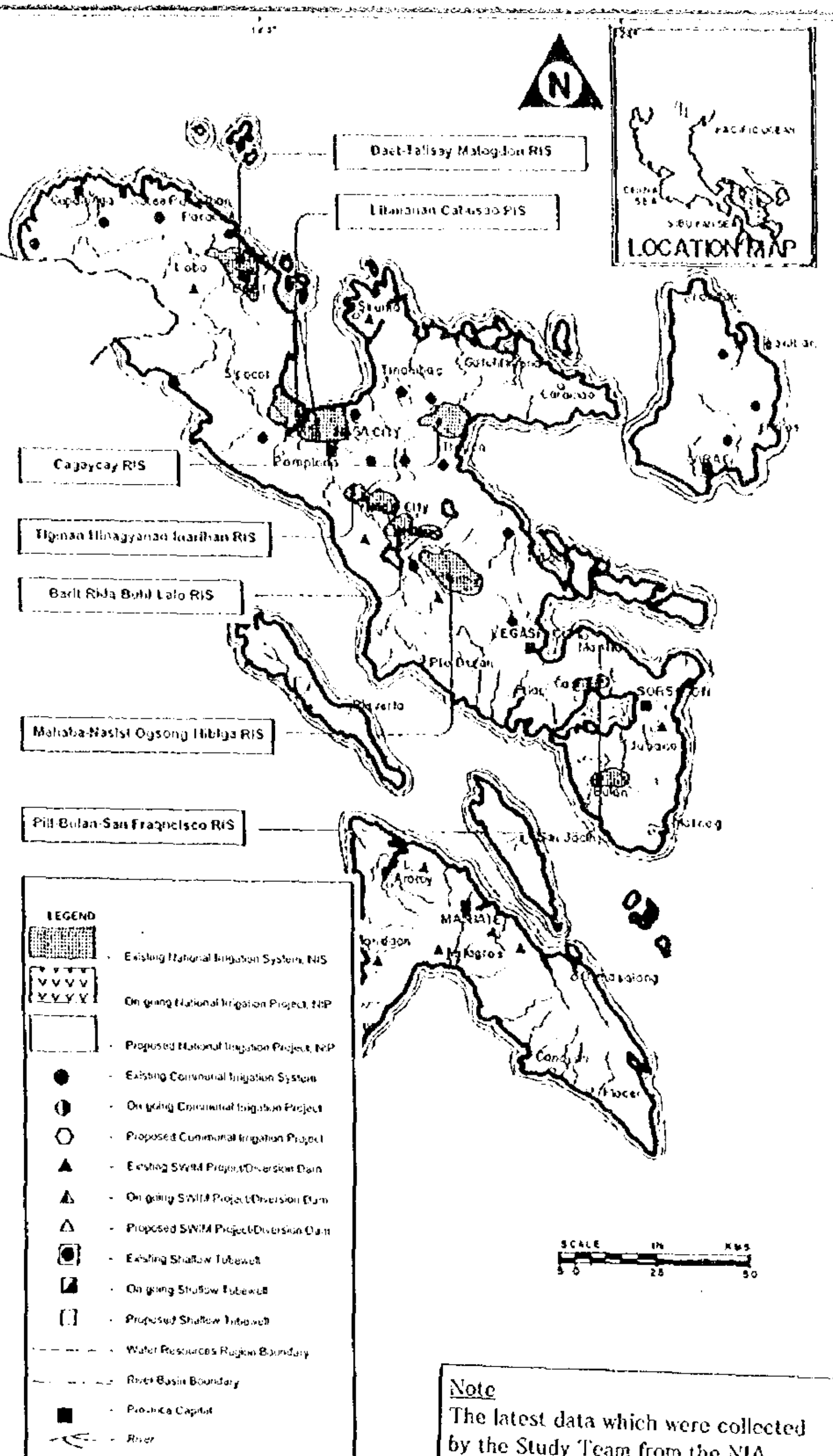


Figure 3-9 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION IV (3/3)



N
LOCATION MAP
PACIFIC OCEAN
Daet-Talisay Malogdon RIS
Libmanan Cabusao RIS
Cagaycay RIS
Tigman Hinagyanan Inarihan RIS
Barit Rida Buhi Lalo RIS
Mahaba-Nasisi Ogsong Hibiga RIS
Pili-Bulan-San Francisco RIS
Sipocot
Tinambac
Goa
Pamplona
Tabaco
Bulan
Juban
Irosin
Matnog
Bacon
Masbate
Mandaon
Milagros
Cataingan
Placer
LEGEND
Existing National Irrigation System, NIS
On-going National Irrigation Project, NIP
Proposed National Irrigation Project, NIP
Existing Communal Irrigation System
On-going Communal Irrigation Project
Proposed Communal Irrigation Project
Existing SWIM Project/Diversion Dam
On-going SWIM Project/Diversion Dam
Proposed SWIM Project/Diversion Dam
Existing Shallow Tubewell
On-going Shallow Tubewell
Proposed Shallow Tubewell
Water Resources Region Boundary
River Basin Boundary
Province Capital
River
SCALE IN KMS
0 25 50

NIS	Source	Service Area (Ha)
Existing		
Albay		
1 Mahaba-Nasisi Ogsong Hibiga RIS	Mahaba-Nasisi, Ogsong Hibiga R.	3016.0
Camarines Norte		
2 Daet-Talisay Malogdon RIS	Daet Talisay, Malogdon Rivers	2146.0
Camarines Sur		
3 Tigman Hinagyanan Inarihan RIS	Inarihan River, Hinagyanan RIS	3542.0
4 Cagaycay RIS	Cagaycay River	1755.0
5 Barit Rida Buhi Lalo RIS	Barit, Cubao Lalo Lake Buhi	9720.0
6 Libmanan Cabusao RIS	Libmanan River	[illegible]
Sorsogon		
7 Pili Bulan San Francisco RIS	Pili, San Ramon, S. Francisco Matangad	1210.0
TOTAL		[illegible]
Proposed NIP		
1 Bicol River Basin Development Project Irrigation Component, Camarines Sur		

Province	No. of CIS	Service Area (Ha)
Existing		
Albay	304	31393.0
Camarines Norte	101	3156.0
Camarines Sur	288	37386.0
Catanduanes	45	1562.0
Masbate	147	3072.0
Sorsogon	178	8560.0
TOTAL	1121	85142.0

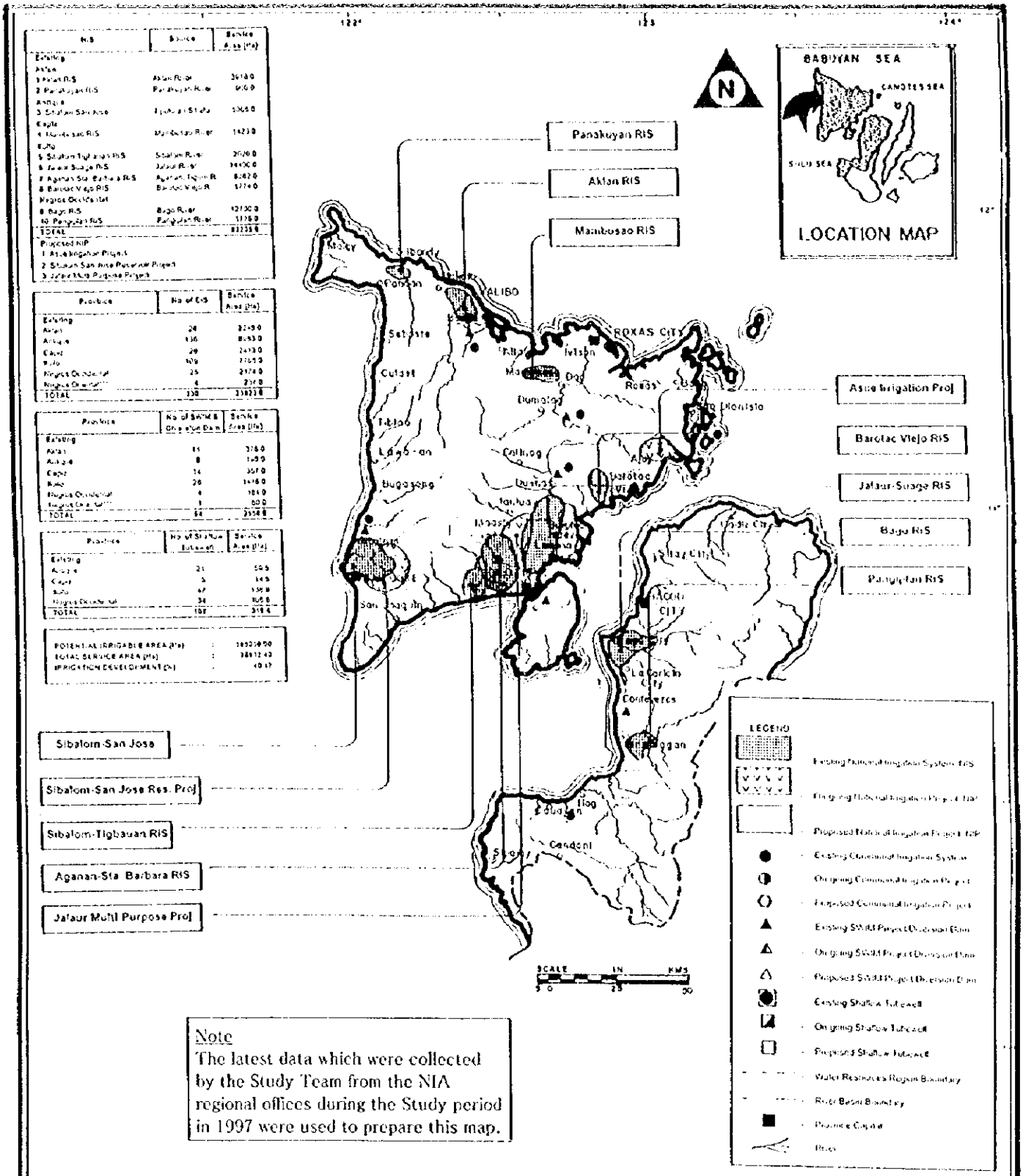
Province	No. of SWIM & Diversion Dam	Service Area (Ha)
Existing		
Albay	8	874.0
Camarines Norte	7	152.0
Camarines Sur	17	1043.0
Catanduanes	9	220.0
Masbate	7	854.0
Sorsogon	11	279.0
TOTAL	59	[illegible]

Province	No. of Shallow Tubewell	Service Area (Ha)
Existing		
Camarines Sur	49	150.5
Sorsogon	11	39.0
TOTAL	60	189.5

POTENTIAL IRRIGABLE AREA (Ha)	:	230465.00
TOTAL SERVICE AREA (Ha)	:	113510.30
IRRIGATION DEVELOPMENT (%)	:	48.98

Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-10 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION V



Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-11 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION VI

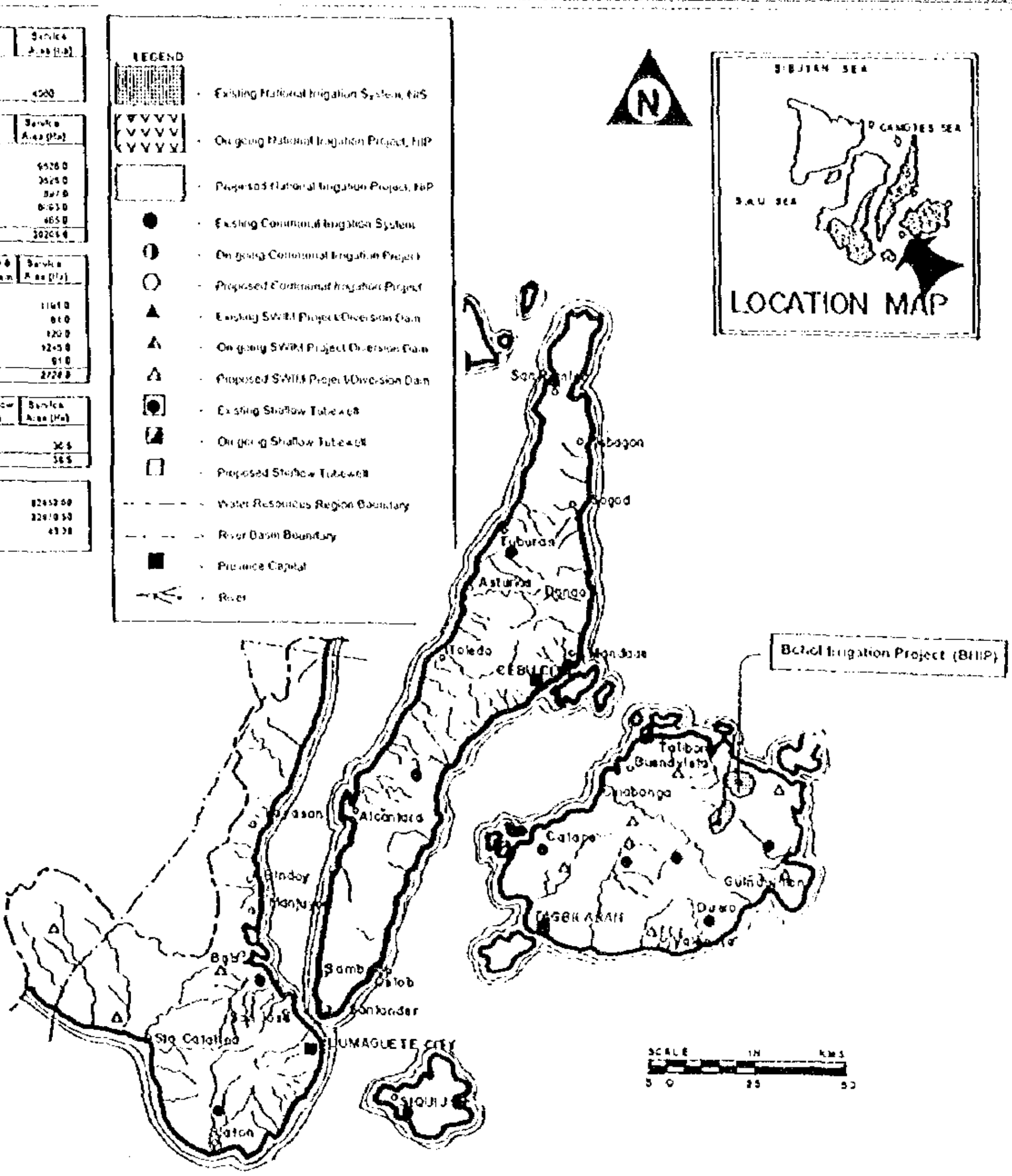
NIP	Source	Service Area (Ha)
On-going		
Bohol		
1. Bohol Irrigation Project (BIIP)		4500

Province	No. of CIS	Service Area (Ha)
Existing		
Bohol	270	[illegible]
Cebu	50	3525.0
Negros Occ.	2	[illegible]
Negros Oriental	55	[illegible]
Siquijor	20	465.0
TOTAL	355	[illegible]

Province	No. of SWIM & Diversion Dam	Service Area (Ha)
Existing		
Bohol	45	1161.0
Cebu	5	61.0
Negros Occ.	2	120.0
Negros Oriental	9	1245.0
Siquijor	4	91.0
TOTAL	65	2728.0

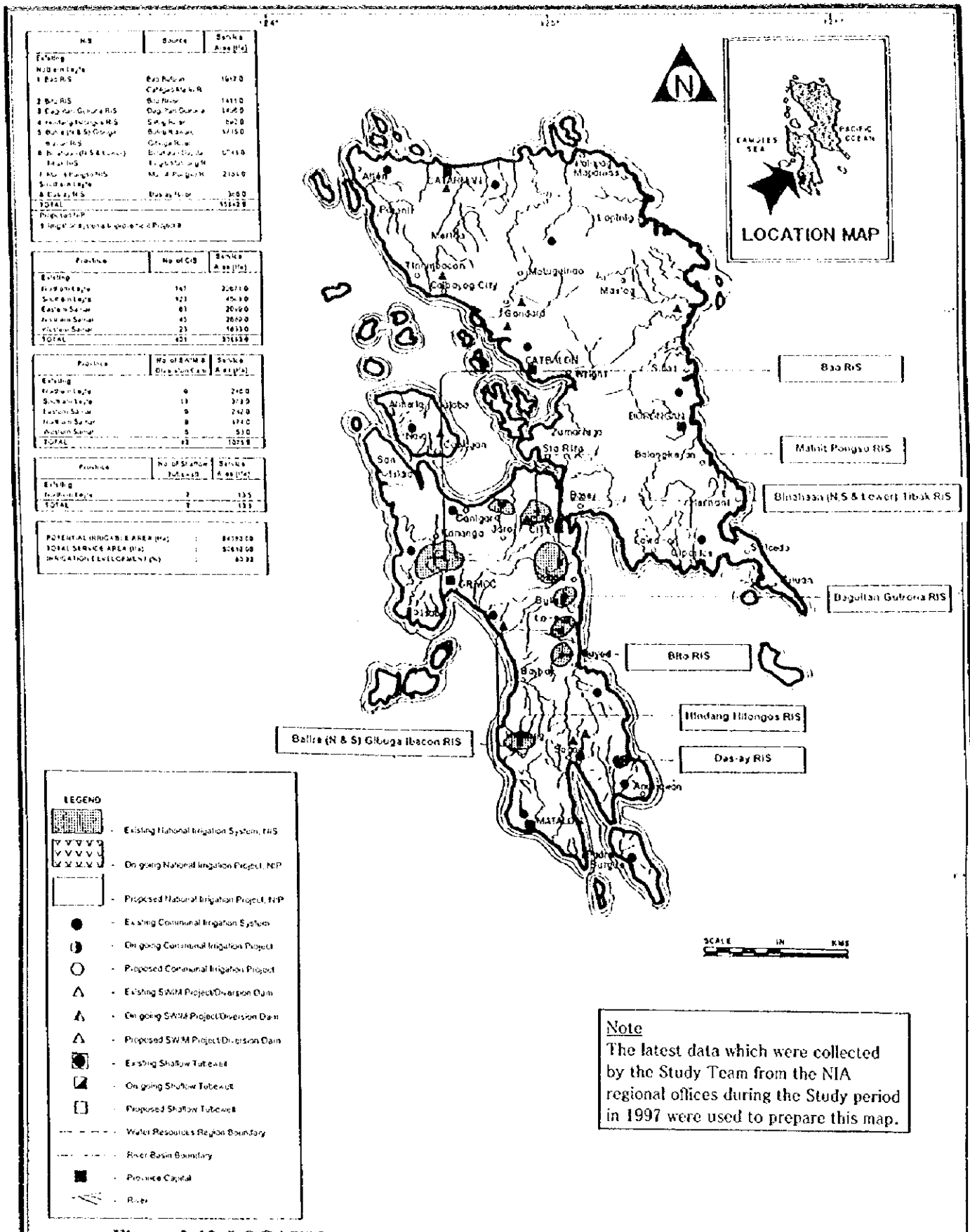
Province	No. of Shallow Tubewell	Service Area (Ha)
Existing		
Bohol	10	36.5
TOTAL	10	36.5

POTENTIAL IRRIGABLE AREA (Ha)	:	[illegible]
TOTAL SERVICE AREA (Ha)	:	[illegible]
IRRIGATION DEVELOPMENT (%)	:	[illegible]



Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-12 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION VII



Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-13 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION VIII

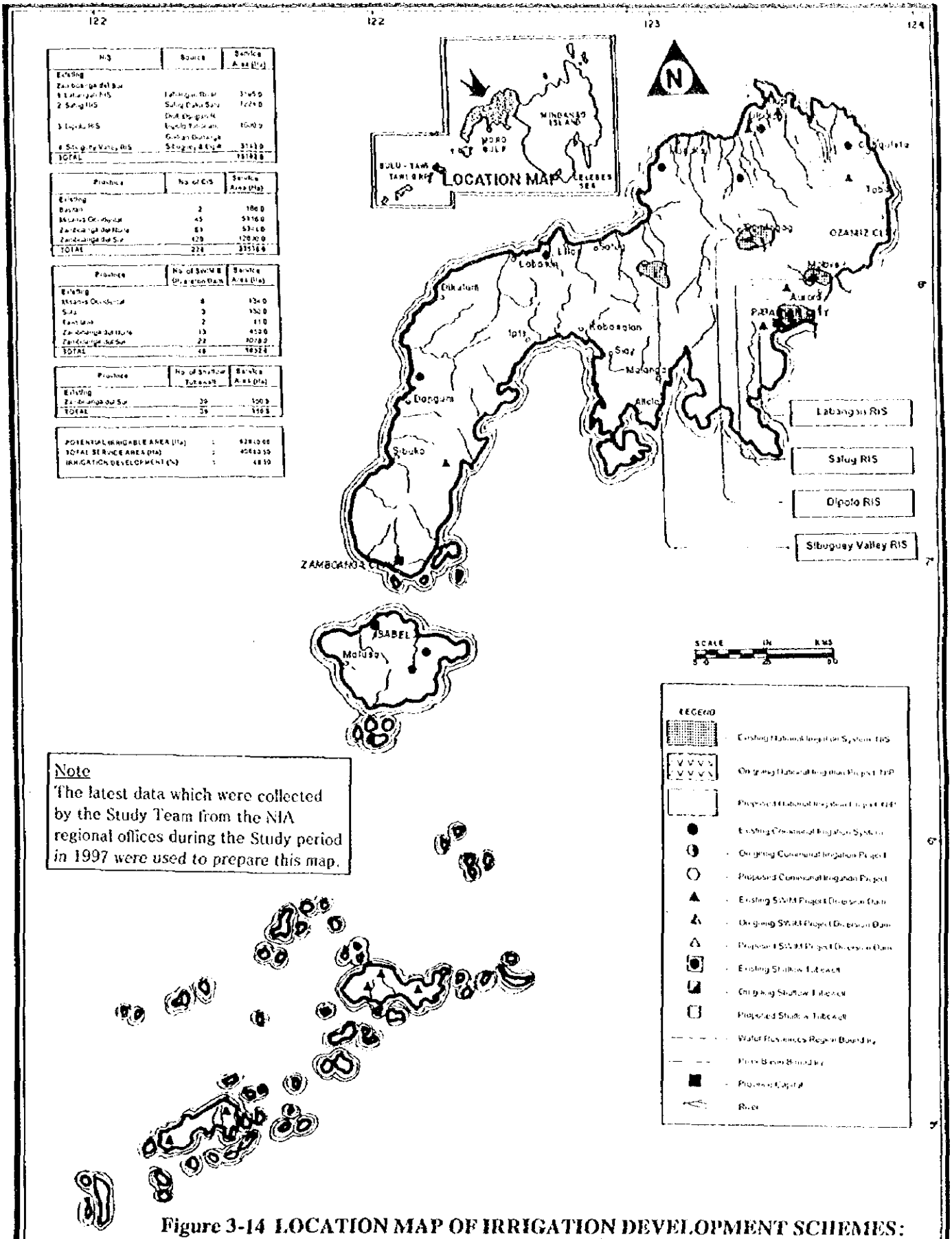
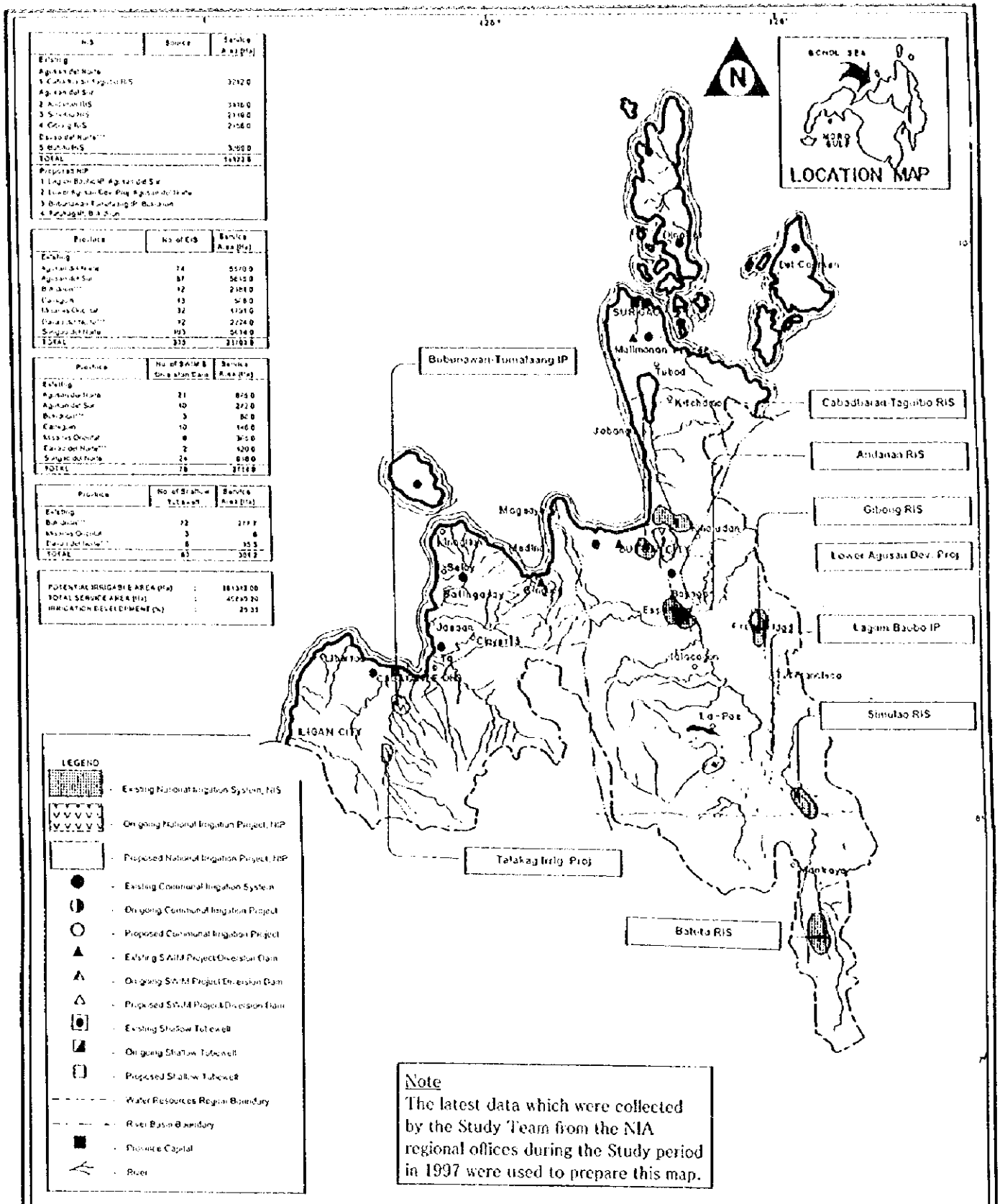


Figure 3-14 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION IX



Note
The latest data which were collected by the Study Team from the NIA regional offices during the Study period in 1997 were used to prepare this map.

Figure 3-15 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION X

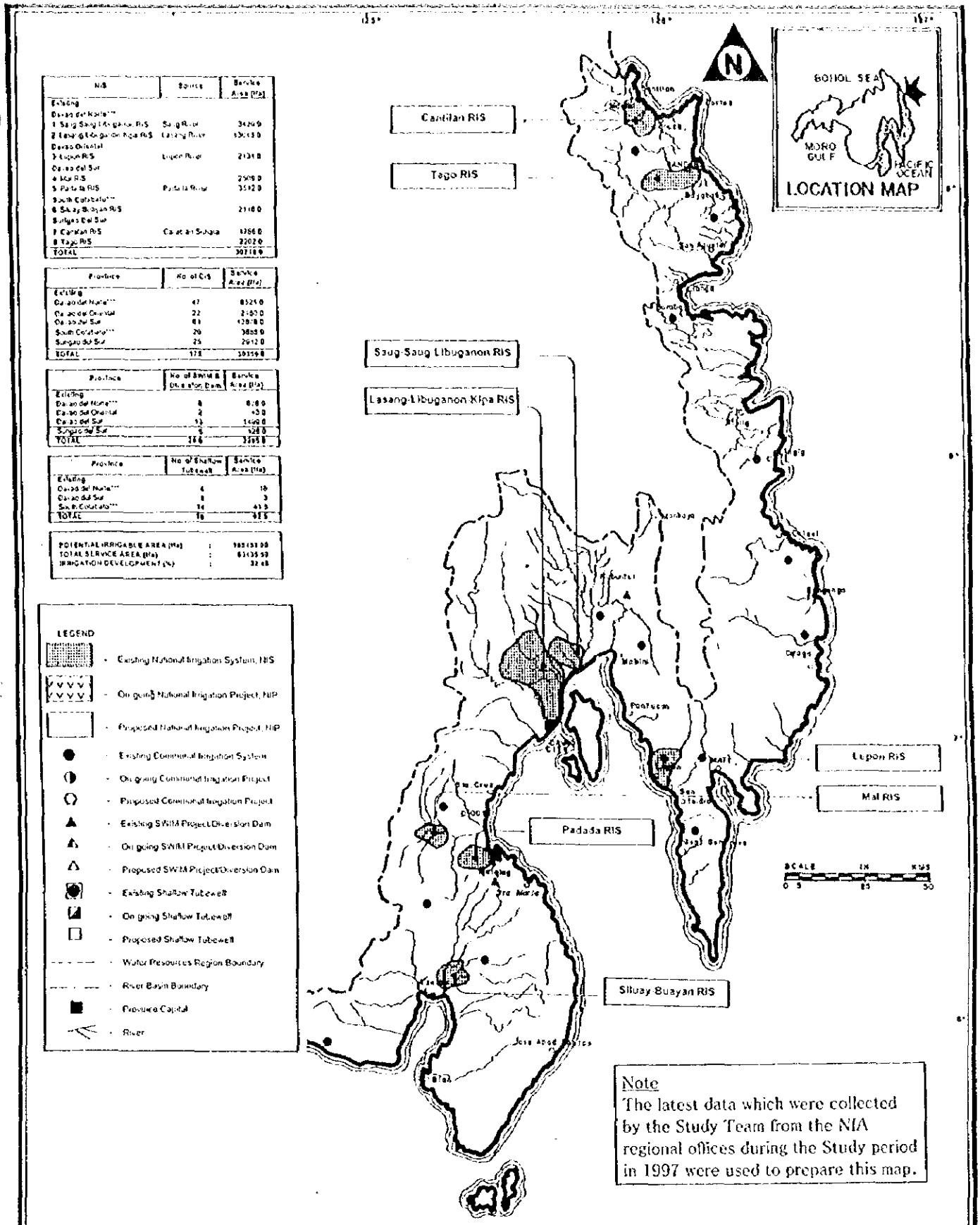


Figure 3-16 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION XI

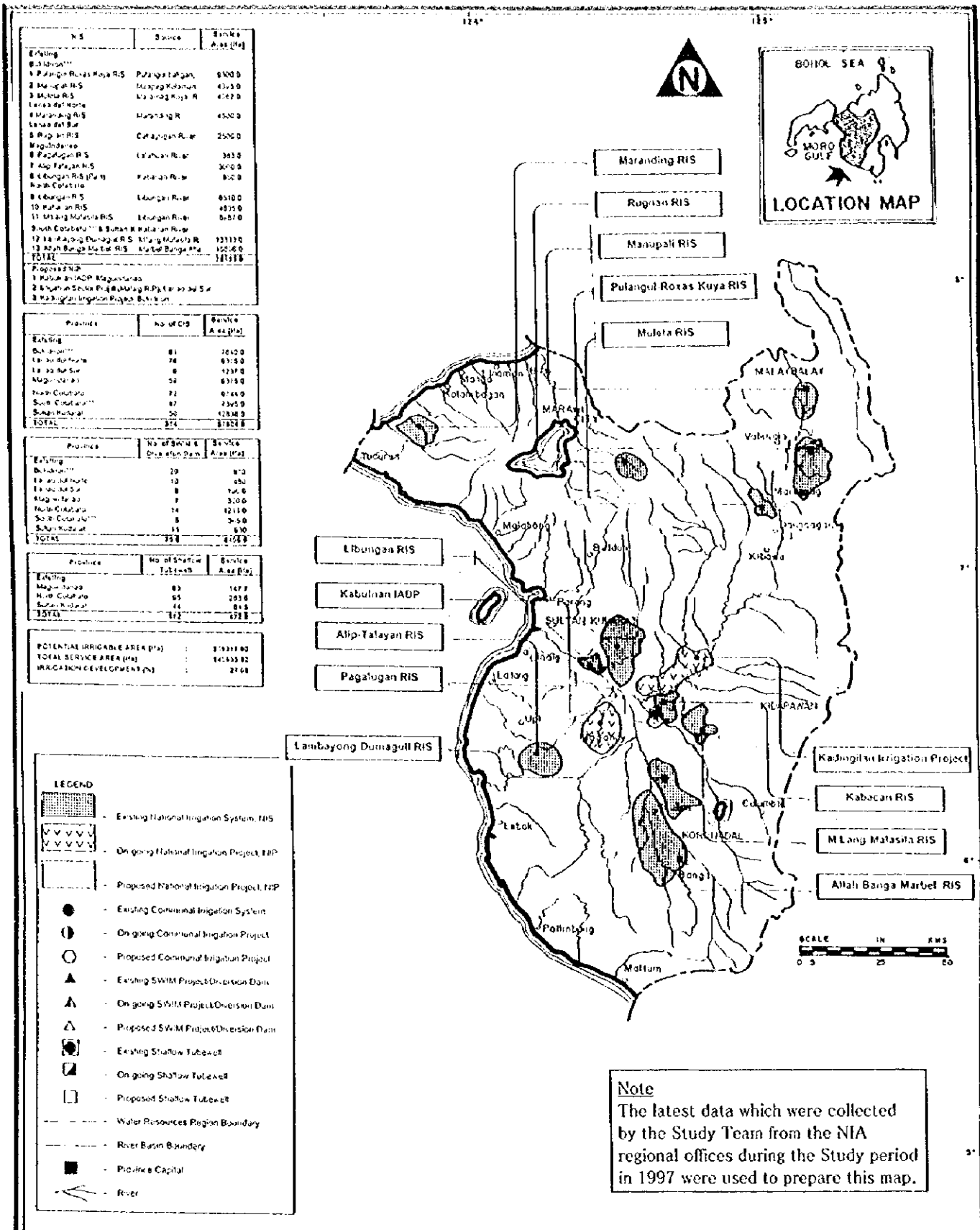


Figure 3-17 LOCATION MAP OF IRRIGATION DEVELOPMENT SCHEMES: WATER RESOURCES REGION XII

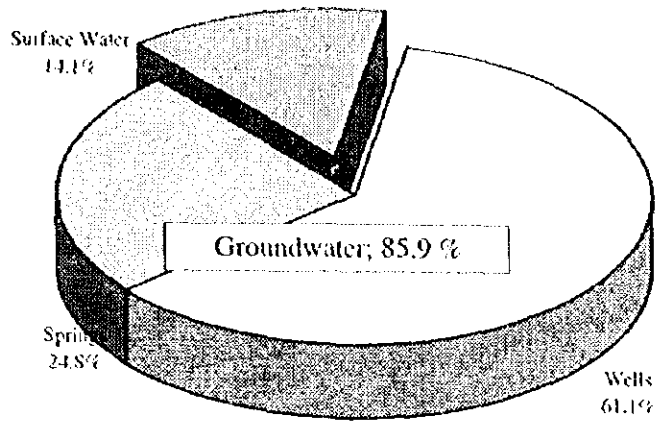


Figure 3-18 AMOUNT RATIO OF MUNICIPAL WATER WRs

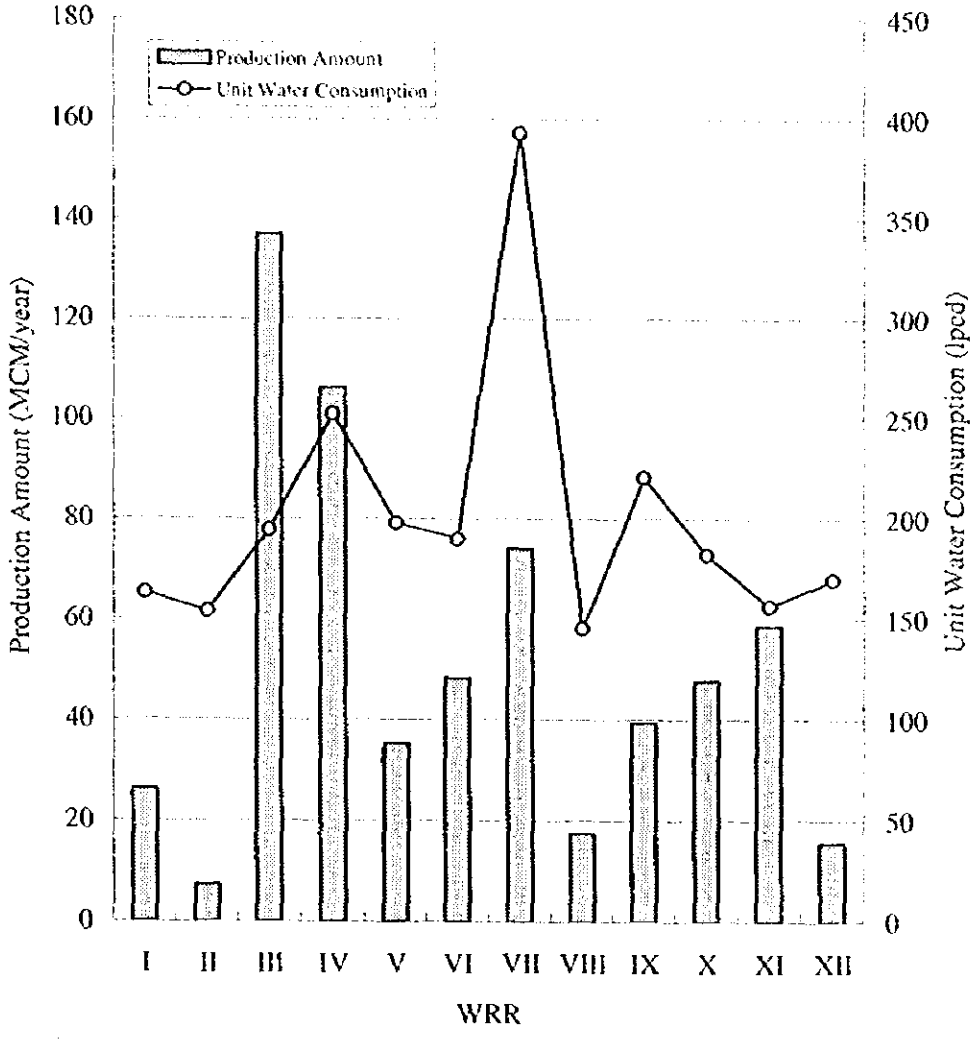


Figure 3-19 AMOUNT RATIO OF MUNICIPAL WATER WRs (LWUA)

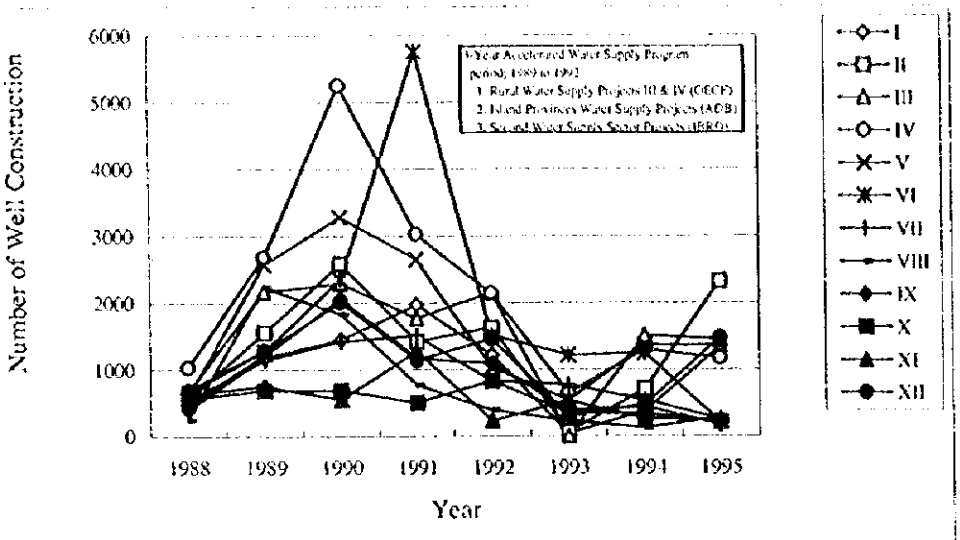


Figure-20 L-I WELL CONSTRUCTION (DPWH)

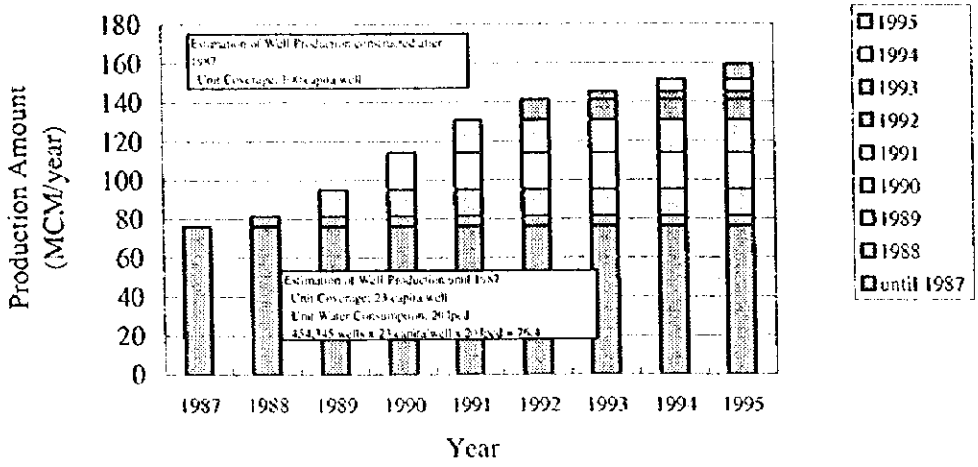


Figure 3-21 PRODUCTION AMOUNT OF L-I WELLS (DPWH)

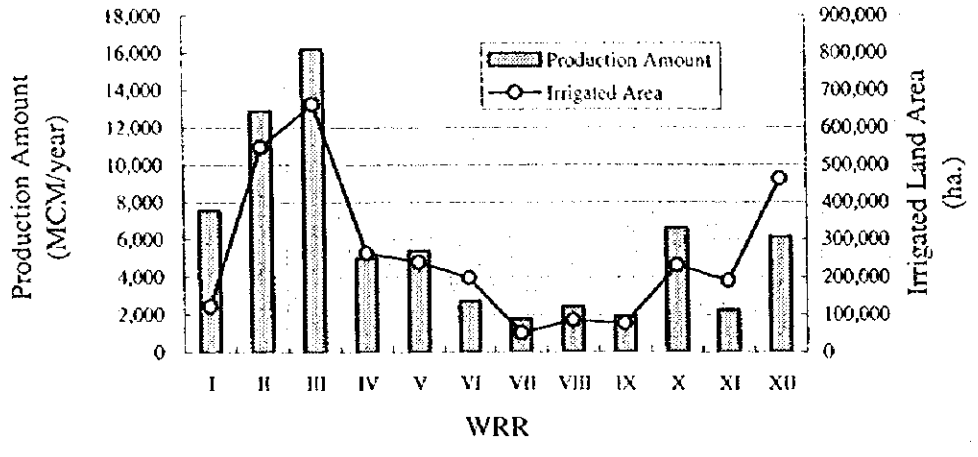


Figure 3-22 IRRIGATION WATER PRODUCTION (NIA & NWRB)

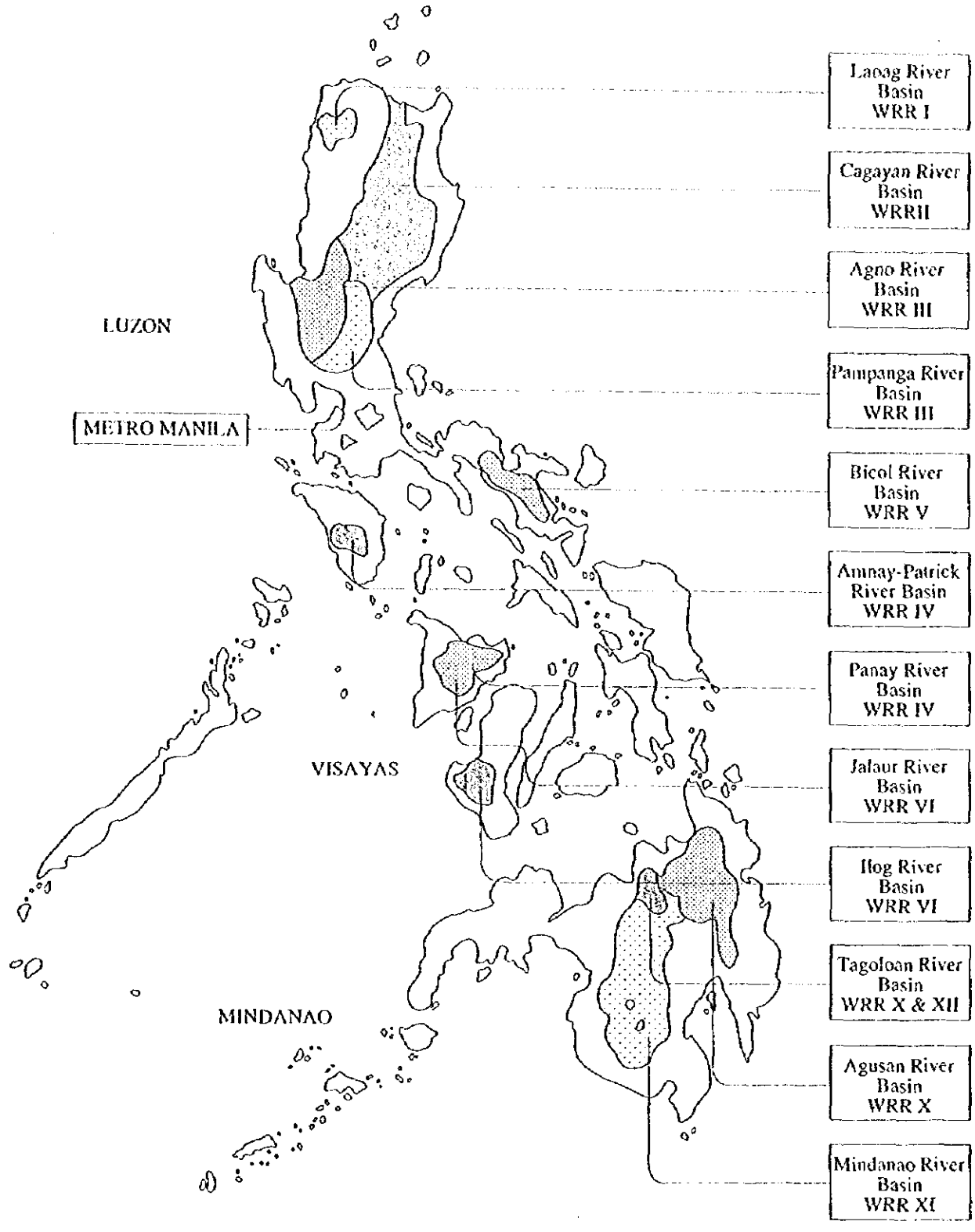


Figure 3-23 FLOOD CONTROL AND DRAINAGE PROJECTS IN 12 MAJOR RIVER BASINS AND IN METRO MANILA

CHAPTER IV

WATER DEMAND PROJECTION AND REGIONAL GROUNDWATER DEVELOPMENT PLAN

IV WATER DEMAND PROJECTION AND REGIONAL GROUNDWATER DEVELOPMENT PLAN

4.1 Socio-Economic Framework Based on NEDA's Preliminary Development Plan

4.1.1 Population Projection

(1) Nation and Region

In making the population projection, the base year for population projection was set at 1995 which is the year when the last Philippine census was conducted. The population was projected for the years of 2000, 2005, 2010, 2015, 2020 and 2025.

Concerning the projection method, the total population of the Philippines is projected so that it is used as a control total for the regional population projection. The population during the period from 2000 to 2025 has already been projected and reviewed by the "Technical Committee on Population and Housing Statistics Technical Working Group On Population Projections". The methodology applied to the population projection by NSO is quite agreeable so that the "medium level" projection was adopted for the study as a control total. With regard to population by region, the result of "geometrical" regional population projection of medium level conducted by NSO up to year 2020 was applied to this study. The methodology adopted by NSO is outlined as follows:

- To project population by region on the basis of annual average growth rate (AAGR) for the period from 2015 to 2020,
- To estimate a sum of population of all the regions, and
- To adjust population of each region so that a sum of the regional population estimated above becomes equal to the total population of the Philippines, which is projected as a control total in advance.

In the same manner, the regional population for the year of 2025 was projected, but the provincial population has not yet been figured out by NSO on the basis of 1995 population census. The following procedures were adopted to project the provincial population:

- To estimate the average annual growth rate on the basis of 1990 population census,
- To project the provincial population during the period from 1995 to 2020 applying provincial average annual growth rate,
- To estimate a sum of population of all the provinces which lie in the region, and
- To adjust population of each province so that a sum of the provincial population estimated above becomes equal to the total population of the region projected through the above procedure.

The future population of municipality was assumed to increase at the same growth rate as that of the province in which the municipality is situated.

(2) Population of the Study Area

For population projection of the study area, the population of each province and municipality/city was first classified into water resources region and major river basin. Population by major river basin was calculated by accumulating the population of provinces which belong to the river basin.

(3) Urban and Rural Population

The increase rates of urban and rural population for each province were projected in consideration of the past trend clarified based on the population census for the Study Area. The rates were applied to total population for each province so that the total urban and rural population by major river basin was estimated by accumulation of urban and rural population by region and by province which belong to each river basin.

(4) Results of Projection

Total Population and Population by Administrative Region

The total population of the Philippines was projected to increase from 68.6 million to 111.1 million in 2025 at an annual average growth rate (AAGR) of 1.6% as shown in Table 4-1. The highest AAGR of 2.4% is expected to take place in Southern Tagalog (Region IV) during thirty years from 1995 to 2025, followed by Southern Mindanao (Region XI) of 1.9% and Northern Mindanao (Region X) of 1.8%. On the contrary, NCR will increase at the lowest growth rate of 1.2% as shown in Table 4-1 and Figure 4-1. It was projected that the share of Region IV would increase from 14.5% in 1995 to 17.9% in 2025, but that of NCR would decrease from 13.8% in 1995 to 12.0% in 2025. The results of population projection by province are shown in Table 4-2.

Population by Water Resources Region and Major River Basin

Concerning population by the water resources region (WRR), the Southern Mindanao (WRR XII) is projected to increase from 4.0 million in 1995 to 7.3 million in 2025 at the highest growth rate of 2.0 % per annum, followed by the Northern Mindanao (WRR X) where population is projected to increase from 3.2 million to 5.7 million at an AAGR of 1.9%. The Southern Tagalog (WRR IV) including NCR occupies the highest share to the total population of the country of 28.1% in 1995 and 29.6% in 2025. The least share in 1995 is 3.1% in the Ilocos (WRR I). The Agusan river basin (WRR I) is projected to bring about the lowest growth rate of 1.0% per annum during the period from 1995 to 2025 among the 20 major river basins as shown in Table 4-3.

The rate of urban population of the study area is projected to increase from 51.0% in 1995 to 66.0% in 2025. The higher rates of urbanization in the period of 1995 to 2025 are predicted to take place in the Southern Tagalog (WRR IV), Central Luzon (WRR III); and Southwestern Mindanao (WRR IX). The rates of these major river basins are projected to increase from 79.0% to 84.0%, from 54.0% to 72.0% and from 34.0% to 66.0% for the period, respectively.

It is projected that the highest urbanized major river basins in 2025 would be the Amnay

Patrick (WRR IV) of 100%, followed by Pasig Laguna de Bay (WRR IV) of 99.0% in terms of the urbanization rate.

4.1.2 GDP Projection in Higher Economic Growth Scenario

(1) Methodology Adopted

The projection of GDP was conducted for (i) total GDP, (ii) total GRDP, (iii) total GDP by sector, (iv) total GRDP by sub-sector, (v) GRDP by region and by sector and (vi) GRDP by major river basin, and those by sector and sub-sector in each major river basin.

Total GDP of the Philippines during the target period was projected on the basis of the AAGR in the revised Medium-Term Development Plan covering the period from 1997 to 2001 and the Long-Term Development Plan covering the period from 2001 to 2025 which was tentatively prepared by the Policy and Planning Division of NEDA.

The total GRDP by region was projected based on GDP used as the control total. The process to project the GRDP is as follows:

- To set up the AAGR of each region taking into consideration the AAGR in the past ten years between 1985 and 1995, the revised Medium-Term Development Plan and the tentative Long-Term Development Plan prepared by NEDA,
- To accumulate GRDP of all the regions
- To adjust the GRDP of the respective regions so that the accumulated GRDP of all regions coincides with the total GDP of the Philippines used as a control total
- To check balanced contribution rate of GRDP by region to the total GDP
- To readjust the AAGR of each region to make the contribution rate of each region balance, if there are some regions of which contribution rates are abnormally increased or decreased, taking account of past trend of the contribution rate of GRDP by region.

Other factors required for projection of GDP were derived in principle by means of the same methodology as that for total GRDP.

(2) Results of Projection

GDP

The total GDP of the Philippines was projected to increase from 803,450 million pesos in 1995 to 6,849,796 million pesos in 2025 at a high AAGR of 7.4 %. The sectoral growth rate for the period is characterized so that the highest growth rate is expected to be 8.7% in industrial sector, followed by 7.2 % in service sector and 4.4% in agricultural sector. The highest AAGRs of sub-sectors in each sector is projected to be 10.8 % in construction sub-sector of industrial sector, 8.5 % in finance sub-sector of service sector and 6.3 % in livestock sub-sector of agricultural sector as shown in Table 4-7.

Tables 4-8 and 4-9 show the self-sufficiency ratios in the future with respect to major agricultural commodities. The production was estimated by conversion ratio from GVA

forecast as the framework on production. The conversion ratio was calculated by dividing the production by GDP or GVA by kind of commodity in 1995. It was assumed that this ratio would be constant in the future.

GRDP by Administrative Region

The sectoral GRDPs are shown in Table 4-10. The GRDP of ARMM is expected to increase from 7,965 million pesos in 1995 to 116,147 million pesos in 2025 at the highest AAGR of 9.3 %, followed by Eastern Valleys (Region VIII) and Central Visayas (Region XII). The lowest growth ratio of 5.6 % is projected to take place in West Mindanao (Region IX). The projection results are summarized below:

(Unit : Million Pesos)

Year	Administrative Region																Total
	NCR	CAR	I Ilocos	II Cagayan Valley	III Central Luzon	IV Sooothern Tagalog	V Bicol	VI Western Visayas	VII Central Visayas	VIII Eastern Visayas	IX Western Mindanao	X Northern Mindana o	XI Southern Mindana o	XII Central Mindana o	ARMM	
1995	240,121	16,762	24,021	16,485	78,383	126,303	23,520	58,227	52,650	19,374	21,599	41,358	54,200	22,052	7,965	803,450
2025	2,019,087	140,452	213,471	165,659	631,294	1,270,987	142,489	380,337	549,534	265,561	108,755	376,354	347,634	149,029	116,147	6,849,796
AAGR(%)	7.36	7.34	7.55	8.00	7.72	8.00	6.19	6.46	8.33	9.12	5.54	7.60	6.39	5.78	9.34	7.40

As for the per capita GRDP, ARMM is projected to increase at the highest AAGR of 7.9 % for the period from 1995 to 2025, followed by Eastern Visayas (Region VIII), Central Visayas (Region VII) and Cagayan Valleys (Region II). On the contrary, Western Mindanao (IX) is projected to increase at the lowest AAGR of 3.7 %. NCR is projected to still keep the highest level of 91,593 pesos in the amount, followed by Central Visayas (Region II) of 81,952 pesos and CAR as shown in Table 4-11. The projection results are summarized below:

(Unit: Pesos Per Capita)

Year	Administrative Region															Total
	NCR	CAR	I Ilocos	II Cagayan Valley	III Central Luzon	IV Sooothern Tagalog	V Bicol	VI Western Visayas	VII Central Visayas	VIII Eastern Visayas	IX Western Mindanao	X Northern Mindanao	XI Southeen Mindanao	XII Central Mindanao	ARMM	
1995	25,399	13,346	6,316	6,500	11,306	12,704	5,437	10,079	10,507	5,756	7,728	10,561	10,682	9,344	3,941	11,710
2025	151,254	67,930	38,522	42,628	59,643	63,771	21,919	43,714	70,771	47,670	22,697	55,230	39,007	30,653	38,073	61,448
AAGR(%)	6.13	5.57	6.22	6.47	5.70	5.53	4.76	5.01	6.56	7.30	3.66	5.67	4.41	3.97	7.85	5.65

The results of projection of regional and sectoral GVA are summarized in Tables 4-12 to 4-14 and Figures 4-2 to 4-4.

GRDP by Water Resources Region and Major River Basin

Concerning the agricultural sector by water resource region, the GRDP of the Cagayan Valley (WRR II) is projected to increase from 10,688 million pesos to 70,447 million pesos at the highest AAGR of 6.5 % for the period from 1995 to 2025, followed by 5.9 % in the Eastern Visayas (WRR VIII). On the other hand, Southwestern Mindanao (WRR IX) would increase at the lowest AAGR of 3.0 %. NCR is projected to keep the highest level of 151,254 pesos in the amount, followed by Central Visayas (Region VII) and CAR as shown in Table 4-11.

Concerning the river basin, the Cagayan river basin is predicted to increase from 7,865 million pesos to 54,088 million pesos at the highest AAGR of 6.6 %, followed by 6.0 % in the Abulug river basin (WRR II) and 5.7% in the Laoag river basin (WRR I). The lowest growth rate of 2.8 % is projected to take place in the Davao, Tagum-Libuganon and Buayan-Malungum river basins (WRR XI). The following tables show the results of the projection:

(Unit : Million Pesos)

Year	No. and Name of Water Resources Region (WRR)												Total
	WRR I Ilocos	WRR II Cagayan Valley	WRR III Central Luzon	WRR IV Southern Tagalog	WRR V Bicol	WRR VI Western Visayas	WRR VII Central Visayas	WRR VIII Eastern Visayas	WRR IX Southwester n Mindanao	WRR X Northern Mindanao	WRR XI Southeastern Mindanao	WRR XII Southern Mindanao	
1995	7,003	10,688	24,292	30,367	8,692	20,712	6,184	6,074	13,111	12,592	18,559	14,324	172,998
2025	36,456	70,447	93,945	112,138	25,374	70,934	15,191	33,905	31,776	46,423	46,893	40,051	623,535
AAGR(%)	5.65	6.49	4.61	4.45	3.64	4.19	3.04	5.90	2.99	4.34	3.14	3.49	4.37

(Unit : Million Pesos)

Year	Major River Basin										
	Abra (WRR I)	Laoag (WRR I)	Cagayan (WRR II)	Abulug (WRR II)	Pampanga (WRR III)	Agno (WRR III)	Pasig-Laguna Bay (WRR IV)	Amnay-Patrick (WRR IV)	Bicol (WRR V)	Panay (WRR VI)	Ilog-Hilabangan (WRR VI)
1995	1,395	1,350	7,565	837	9,132	4,741	2,631	2,009	2,111	2,437	2,147
2025	6,789	7,191	54,088	4,787	32,241	20,968	9,702	7,420	6,162	8,659	7,431
AAGR(%)	5.42	5.74	6.64	5.99	4.28	5.08	4.45	4.45	3.64	4.26	4.23

Year	Major River Basin									
	Jalaur (WRR VI)	Agusan (WRR X)	Tagoloan (WRR X)	Cagayan De Oro (WRR X)	Tagum-Libuganon (WRR XI)	Buayan-Malungun (WRR XI)	Davao (WRR XI)	Mindanao (WRR XII)	Agus (WRR XII)	Total
1995	1,541	6,554	1,399	1,314	2,493	1,092	1,417	11,780	779	65,104
2025	5,388	22,687	5,158	4,846	5,687	2,491	3,232	33,407	2,619	250,956
AAGR(%)	4.26	4.23	4.45	4.45	2.79	2.79	2.79	3.54	4.12	4.60

With regard to the industrial sector, the GRDP of the Eastern Visayas region (WRR VIII) is projected to attain the highest AAGR of 11.7 % during the period from 1995 to 2025, followed by Cagayan Valley (WRR II) of 10.6 % and Northern Mindanao (WRR X) of 9.9 %. Of the major river basins, the Laoag river basin (WRR I) would increase at the highest AAGR of 11.3 %, followed by the Cagayan (WRR II) of 11.0 %, Cagayan De Oro and Tagoloan (WRR X) of 10.0% which are all ranked at the high yielding river basins. The lowest growth rate of 7.9 % would occur in Western Visayas (WRR VI) concerning the water resources region and that of 7.5% in the Abra river basin (WRR I) concerning the major river basin. The growth rates of each WRR and river basin(s) belonging to the WRR have no big difference. Most of the AAGRs are more than 7.0 %.

In the service sector, the highest growth ratio of 7.9% is projected to take place in Central Visayas (WRR VII) and the lowest one of 6.3 % in Bicol (WRR V). The highest growth 8.5 % is projected for the Abra river basin (WRR I), while the lowest one of 6.3 % in the Bicol river basin (WRR V).

It is expected that the concentration of GVA in service sector for water resources region will be more progressed in the future than industrial sector. In 2025, Southern Tagalong (WRR IV) will expand its share from 51.8 % in 1995 to 52.6 %, followed by Central Visayas (WRR VII) of 9.2 % and Central Luzon (WRR III) of 8.8 %. With regard to the

major river basin, the Pasig-Laguna Bay (WRR IV) also is projected to attain the highest AAGR of 45.3 %, followed by the Pampanga (WRR III) of 4.9 %. The AAGRs of other water resources regions and major river basins are less than 2.0 %.

Concerning the total GVA of the water resources region, the highest growth is projected for Eastern Visayas (WRR VIII) which would increase from 19,373 million pesos in 1995 to 265,561 million pesos in 2025 at an AAGR of 9.1 %, followed by Central Visayas (WRR VII) of 8.2 %. For the major river basins, the highest growth rate of 7.9 % is projected to be attained in the Cagayan (WRR II), followed by the Pasig-Laguna Bay (WRR IV) of 7.6 %. The lowest growth rate is projected to 6.2 % in the Bicol (WRR V), followed by 6.0 % in the Amnay Patrick (WRR II).

Judging from the results of projection for GVA by water resources region and by major river basin, it is obvious that most part of GVA in all sectors is occupied by a very limited number of water resources regions of WRRs III, IV, VII, VIII and X and major river basins of the Pasig-Laguna Bay, Pampanga, Mindanao and Cagayan. It is strongly desired that the balanced development should be attained all over the water resources regions and major river basins.

With regard to per capita GVA for water resources region, the most rapid growth rate is projected to take place in Eastern Visayas (WRR VIII) where it would increase from 5,754 pesos in 1995 to 47,660 pesos in 2025 at an AAGR of 7.3 %, followed by Central Visayas (WRR VII) of 6.6 % (10,538 pesos to 70,806 pesos). The slowest growth rate is projected to take place in Southern Mindanao (WRR XII) at an AAGR of 4.4 % (8,490 pesos to 30,436 pesos).

For major river basin, the highest growth of 6.3 % would emerge in the Cagayan (WRR II) (6,718 pesos to 42,262 pesos). The lowest growth is projected to take place in the Tagum-Libuganon (WRR XI) of 3.6 % (8,336 pesos to 22,375 pesos). The highest level of 116,889 pesos in 2025 is projected to be attained by the Pasig-Laguna Bay (WRR IV), which is 1.9 times of the regional average of 61,448 pesos. The second highest level of 61,925 pesos is projected to be attained by the Pampanga (WRR III).

4.1.3 Projection of Labor Employment

(1) Method Adopted

The national total employment in the Philippines was projected by applying the projected AAGR for each five year period up to 2025. The AAGRs were fixed by taking into consideration; (i) the past tendency of total employment after 1987, (ii) the Updated Medium-Development Plan and (iii) the projected AAGRs of population in the future.

The employment by sector was projected by setting up the AAGR for each five year period till 2025 on the basis of the same kind of factors. The employment by region and by province for each sector was also projected through the estimate of the future AAGR. It was assumed that the AAGRs of each province were the same as those of the region where

the province is located. The results of projection for the sectoral and provincial employment were applied to classify the gross value added of industrial sector and service sector into those of the water resource region and major river basin.

(2) Results of Projection

The total employment of the Philippines is projected to increase from 26.1 million in 1995 to 49.3 million in 2025 at an AAGR of 2.1 %. Out of the sectoral average annual growth rates, the highest one is projected to be 3.1 % in industrial sector as shown in Table 4-4. The high growth rate of 4.2% in industrial sector is projected for Southeastern Mindanao (WRR XI) and Western Mindanao (WRR IX), followed by 4.1 % in Ilocos (WRR I) and Central Luzon (WRR III) as shown in Table 4-5. In service sector, the total employment of Southwestern Mindanao (WRR IX) would increase from 377,000 in 1995 to 1,155 in 2025 at the highest AAGR of 3.8 % as shown in Table 4-6.

4.2 Socio-Economic Framework for Low Economic Growth Scenario

4.2.1 Purpose of Setting up Lower Economic Growth Scenario

As discussed in the foregoing Section 4.1, GDP of the Philippines was projected for the period up to the target year 2025 based on the NEDA's tentative Long-Term Development Plan. Consequently, the average annual growth rate for the period from 1995 to 2025 was estimated to be 7.4 %. In this study, the projected GDP is defined to be the higher economic growth scenario, while the lower economic growth scenario is set up in consideration of the three (3) aspects explained below:

(1) Uncertainty of Economic Growth in Future

There is a possibility that in the future smooth economic growth will be hampered by natural disaster such as drought, volcanic eruption and typhoon, and economic instability like inflation and devaluation of currency. The Philippines has already experienced some of them. Thus, the high economic growth is associated with the uncertainty to some extent. But it is very difficult to predict accurately in advance how, where and when these incidents will happen. Hence, it is meaningful to set up the low economic growth scenario as the alternative case to the high economic growth in consideration of the occurrence of unknown incidents in the future.

(2) Necessity of Taking Account of Sustainability

As pointed out by many people many times till now, industrial development has serious influence on the environment. It is needed to strictly recognize that the natural resources are scarce and that too rapid growth might result in shortage of resources and degradation of environment. Hence, it is considered necessary to set up sustainable development which may be attained under the low economic growth by eliminating environmental deterioration caused by rapid development as far as possible.

(3) Screening of Short-term Water Resources Development Project

This factor has the most direct linkage with the purpose to set up the low economic growth scenario in this study. In general, it takes a long time to complete the construction of such facilities for water resources development as dams, its appurtenant structures and water supply facilities. But for the short-term development, it is necessary to clarify the urgently required projects. For the purpose, it is useful to set up the low economic growth, since the minimum and urgent needs of development can be measured under the condition of the low economic growth scenario. Furthermore, the minimum level of development will smoothly lead to the action plan, which will come out from this study.

4.2.2 Basic Assumption and Projection

(1) Medium-Term Growth

During the period from 1996 to 2000, the average annual growth rate was set at 6 % at real price, which is lower by 1.1 % than that based on the NEDA's development plans. To set up the growth rate, the following factors were taken into consideration:

- After 1992, the annual growth rate at 1985 constant price has increased from 0.34 % in 1992 to 5.45 % in 1996. After 1996, it can be expected that at least 6 % of the annual growth will be attained, in spite of recent devaluation of peso, as shown in Figure 4-5.

- The international organizations including ADB and PECC (Pacific Economic Cooperation Council) have forecast the economic growth rates of the Philippines, which are slightly lower than that of the NEDA's development plans for the period from 1996 to 1998 as shown in Table 4-16.

(2) Long-term Growth

During the period from 2000 to 2025, the average annual growth rate was predicted to decline gradually at five-year intervals. The main factors used to set the growth rate are as follows:

- Some Japanese economic analysts forecasted that the Asian countries' economy will be stabilized at annual growth rates of around 4 % to 5 % from the viewpoint of sustainability. Since the recent economic growth in Asian countries seems to have been too high, there is some possibility that the economic growth rate of the Philippines will be smaller than 5% in the long-term.

- According to the World Development Report, 1992 by World Bank, it is projected that the average annual growth rate of Asia and Pacific area including the Philippines will be 4.4% for the period from 1990 to 2030 as shown in Table 4-17.

- Japan, the most developed country in Asia, experienced the highest economic growth rate of 10.4% per annum at real price in 1960's, but the growth rate has been slowed

down to 2.2% per annum in 1990's as shown in Figures 4-6 and 4-7. The same phenomenon is foreseeable for other developed countries.

As the lower economic growth scenario, the average annual economic growth rate of the Philippines in this study was set at 5% for the period from 2000 to 2025 and 4.8% for the period from 1996 to 2025 taking into account the aforesaid projection and past trend of economic growth in the development countries, as shown in Figure 4-8.

(3) Projection

The GDP and GRDP in the lower economic growth scenario were projected applying the same methods as those adopted in the higher economic growth which is discussed in the foregoing Section 4.1.

In case of the lower economic growth scenario, total GDP was projected to increase from 571,883 million pesos in 1995 to 3,212,920 million pesos in 2025 at an AAGR of 4.7%. Also in the lower economic growth scenario, the highest growth rate of 5.9% is projected to be attained by industrial sector, followed by service sector of 5.8% and agricultural sector of 1.8%. The highest AAGRs of sub-sector in each sub-sector would be 8.0% of the construction sub-sector in industrial sector, 5.8% of finance sub-sector in service sector with 5.8% and 3.4% of livestock sub-sector in agricultural sector as shown in Table 4-18.

Tables 4-19 and 4-20 show the self-sufficiency ratios in future for major agricultural commodities. The production was estimated based on the conversion ratio derived from GVA forecast as framework on production.

The GRDPs of all the sectors are shown in Table 4-21. Eastern Visayas (VIII) is expected to increase from 19,734 million pesos in 1995 to 105,136 million pesos in 2025 at the highest AAGR of 5.8 %, followed by ARMM and Central Visayas (VII). The lowest growth rate of 2.9% is projected to take place in West Mindanao (IX).

(Unit : Million Pesos)

Year	Administrative Region															Total
	NCR	CAR	I Ilocos	II Cagayan Valley	III Central Luzon	IV Southern Tagalog	V Bicol	VI Western Visayas	VII Central Visayas	VIII Eastern Visayas	IX Western Mindanao	X Northern Mindana	XI Southern Mindana	XII Central Mindana	ARMM	
1995	240,121	16,762	24,021	16,485	79,383	126,303	23,520	58,227	52,680	19,374	21,599	41,758	54,200	22,052	7,965	803,450
2025	992,538	67,343	92,205	66,562	306,992	575,454	70,912	186,129	246,848	105,136	55,840	168,575	171,873	64,724	41,789	3,212,92
AAGR(%	4.84	4.74	4.59	4.76	4.66	5.18	3.75	3.95	5.28	5.80	3.22	4.76	3.92	3.65	5.68	4.73

As for the per capita GRDP at the constant 1985 price, the highest AAGR of 4.2% is projected to take place ARMM for the period from 1995 to 2025, followed by Eastern Visayas (VIII) and Central Visayas (VII). It is projected that NCR will keep the highest level of 74,324 pesos. On the contrary, it is projected that Wester Mindanao (X) would exhibit the lowest AAGR of 1.4%, followed by Central Mindanao (IX) and Southern Mindanao (XI) as shown in Table 4-22.

(Unit Peso Per Capita)

Year	Administrative Region															Total
	NCR	CAR	I Ilocos	II Cagayan Valley	III Central Luzon	IV Southern Tagalog	V Bicol	VI Western Visayas	VII Central Visayas	VIII Eastern Visayas	IX Western Mindana	X Northern Mindana	XI Southern Mindana	XII Central Mindana	ARMM	
1995	25,39	13,346	6,316	6,500	11,306	12,704	5,437	10,079	10,507	5,756	7,728	10,561	10,682	9,344	3,941	11,710
2025	74,32	32,540	16,668	17,087	28,888	28,933	10,912	21,408	31,802	18,889	11,639	24,719	19,259	16,309	13,669	28,823
AAGR(%	3.64	3.02	3.29	3.27	3.18	2.78	2.35	2.54	3.76	4.04	1.37	2.88	1.98	1.87	4.23	3.05

Concerning GVA in the water resources regions and major river basins, the highest growth rate is projected to take place in Eastern Visayas (WRR VIII) of which GVA of the sectors will increase from 19,373 million pesos in 1995 to 124,561 million pesos in 2025 at an AAGR of 6.4%, followed by Central Visayas (WRR VII) of 5.5%. With respect to the major river basins, the highest growth rate is projected to be attained by the Cagayan river basin (WRR II) of 5.21%, followed by the Pasig-Laguna Bay river basin (WRR IV) of 4.90%. The lowest growth rate would be 3.5% in the Bicol (V), followed by 3.3% in the Amnay Patrick (WRR II), as shown in Table 4-23.

(Unit : Million Pesos)

Year	No. and Name of Water Resources Region (WRR)											Total
	WRR I Ilocos	WRR II Cagayan Valley	WRR III Central Luzon	WRR IV Southern Tagalog	WRR V Bicol	WRR VI Western Visayas	WRR VII Central Visayas	WRR VIII Eastern Visayas	WRR IX Southwestern Mindanao	WRR X Northern Mindanao	WRR XI Southeastern Mindanao	WRR XII Southern Mindanao	
1995	19,034	21,581	98,254	363,410	23,520	63,599	47,307	19,373	27,508	35,459	50,481	34,130	803,456
2025	72,978	95,959	381,621	1,533,870	66,835	200,877	235,270	124,561	82,392	149,648	164,276	104,602	3,212,919
AAGR(%)	4.58	5.13	4.63	4.92	3.54	3.91	5.49	6.40	3.72	4.92	4.01	3.80	4.73

Year	Major River Basin										
	Abra (WRR I)	Laoag (WRR I)	Cagayan (WRR II)	Abuleg (WRR II)	Pampanga (WRR III)	Agno (WRR III)	Pasig-Laguna Bay (WRR IV)	Amnay-Patrick (WRR IV)	Bicol (WRR V)	Panay (WRR VI)	Ilog-Hilabangan (WRR VI)
1995	3,620	2,164	15,464	1,722	54,161	17,419	284,459	2,860	6,395	5,478	7,079
2025	13,804	7,590	70,967	7,169	215,114	69,568	1,396,432	7,641	18,487	15,441	22,329
AAGR(%)	4.56	4.27	5.21	4.87	4.70	4.72	4.90	3.33	3.60	3.52	3.90

Year	Major River Basin									Total
	Jalaur (WRR VI)	Aguasan (WRR X)	Tagoloan (WRR X)	Cagayan De Oro (WRR X)	Tagun-Libeganon (WRR XI)	Buayan-Malungun (WRR XI)	Davao (WRR XI)	Mindanao (WRR XII)	Agus (WRR XII)	
1995	5,828	10,922	3,562	3,408	4,602	2,745	6,803	25,724	3,975	468,387
2025	18,629	33,971	14,855	14,177	13,439	8,091	24,203	76,622	14,898	1,861,453
AAGR(%)	3.95	3.85	4.88	4.87	3.08	3.67	4.32	3.71	4.50	4.71

4.3 Municipal and Industrial Water

4.3.1 Available Data and Basis of Demand Forecast

(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.

(2) Objective Areas and Target Years of Demand Projection

The existing water resources regions are delineated by the river watershed boundaries. While, a groundwater basin boundary is usually defined by the different conditions including hydrogeological characteristics depending on permeability and storage efficiency. In addition, the municipal water and/or industrial water supply is in general managed and controlled within an 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 boundaries used in the NWRB's database might be more useful for users from the realistic point of view.

On the other hand, for 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 major river basins taking into account their boundaries.

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.

4.3.2 Municipal Water Demand Projection

In the estimation of municipal water demand, the following factors were considered:

(1) Methodology and Conditions for Forecast

(i) The future population projected through socio-economic study stated in the Supporting Report Part-A is adopted.

(ii) The service coverage of the provinces are projected referring to them in the provincial sector plans 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.

(iii) As for service level, future trend is forecast based on provincial sector plan as shown in Figures 4-9 to 4-14. It is assumed that the service coverage of urban areas is to be expanded by the Level-III system and that the 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 the Level-I facility, however, the existing population served by Level-III system will be maintained until the target year.

(iv) Unit water consumption for the 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, the unaccounted-for water needs to be considered. The unit water consumption for the service area of MWSS is projected based on the Master Plan, and those for other provinces are projected on the basis of the Design Criteria of LWUA. The unit consumption for Level-I and Level-II systems are set at 40 lpcd in the target year and are applied commonly to all the provinces.

(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% in 2010 are projected, respectively.

On the other hand, in this study, considering the 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% in 2020, respectively. Finally, the service coverage was set at 95% for both urban and rural areas in the target year 2025.

The following table shows the projected service coverage as a model case.

Service Coverage (Model Case)

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

Based on the above, the population served and service coverage used by water resource region and province were projected.

(3) Unit Water Consumption

The 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 the Level-III system is set up for MWSS and the Water Districts, respectively.

As for MWSS, Table 4-24 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 determined as shown in Table 4-25.

As for the water districts, unit water consumption was modified as shown in Table 4-26,

which is based on the design criteria of LWUA. The values in this table were also used as the unit water consumption of respective provinces 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 4-15 depicts the tendency of future unit water consumption for the Level-III system.

The unit water consumption for the Level-I facility as well as the Level-II system 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.

(4) Municipal Water Demand

Based on the above procedures and assumptions, the water demands for public water supply by water resource region and province were estimated as shown in Table 4-27 and Figure 4-16. 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 demand for the public water supply and privately owned water source was projected to be 7,430 MCM/year in the target year of 2025.

4.3.3 Industrial Water Demand Projection

In the estimate of the industrial water demand, the following factors were considered:

(1) Methodology

(i) In the estimation of the future water demand, the past trend of water volume for the granted water rights and GDP for industrial sector was first examined. Figure 4-17 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 the correlation analysis between the 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)

(ii) In succession, to obtain the water demand regionally, the GDP contribution rates were estimated.

(iii) Further, the water resources management is considered. The present granted surface water for industrial use is 1,719.1 MCM/year, while that of groundwater is 514.4

MCM/year. Here, the required surface water is assumed to maintain at the level of the present consumption, since main users are mining companies including those suspending the operation.

(iv) In addition to this, the re-use of ground water 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 ground water 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 will be much more strengthened to the maximum level, because serious water shortage in this 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.

(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 4-28 and 4-29 and Figures 4-18 and 4-19.

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 4-30 shows the existing and planned ones. In this study, 55 m^3/day/ha was given to each economic zone as unit water consumption referring to the Cavite EPZ. The projected water amount for PEZA was estimated at 137 MCM/year in the year 2025, which corresponds to only 2.7 % of the total industrial water demand in high economic growth and only 4.1 % in low economic growth. Thus, such a water amount is considered as a insignificantly small part for the aforesaid total water demand.

4.3.4 Total of Municipal and Industrial Water Demand

Based on the above, the total water demand for municipal and industrial use in the year 2025 was estimated at 12,427.6 MCM/year in high economic growth and 10,740.1

MCM/year in low economic growth, which correspond to 2.81 times and 2.43 times of the present water consumption. Tables 4-31 and 4-32 tabulate them by water resources region. Likewise, Tables 4-33 and 4-34 represent those by major river basin.

4.4 Agricultural Water Demand

4.4.1 Available Data and Methodology

Many of the basic data used for the projection were gathered from study reports on irrigation development projects, which were prepared under the National Irrigation Administration (NIA). Besides, the Department of Public Works and Highways (DPWH) and the Bureau of Soils and Water Management (BSWM) also provided the Study Team with the useful data for the agricultural water demand projection. These data were reviewed and used in the evaluation and estimation of irrigation water demand that was finalized in this study.

The existing irrigation service areas total about 1.36 million ha in the Philippines. The existing national and communal irrigation systems are listed in Tables 4-36 and 4-37, respectively. In locating the existing irrigation systems in the Water Resources Region Maps, the 1989 Edition of the NIA Provincial Irrigation Profile, obtained from the NWRB Library, was used as a reference. However, the maps presented in this report were not drawn to scale and most of the major waterways were not indicated. Hence, the approximate delineation of the existing irrigation systems was made in preparing the maps that shows the existing and proposed irrigation areas.

Obtained from the NIA-CORPLAN are data on updated status of irrigation development, potential irrigable areas and the NIA 10-year Irrigation Development Program covering the period from 1997 to 2006. The distribution of physical targets areas by province and by water resources region for the 1999 to 2006 programs was determined from these data on a proportional basis.

The BSWM, on the other hand, provided the Study Team with the 10-year Irrigation Development Program for the period from 1997 to 2006. The target irrigation areas on a regional basis as well as the inventory of completed irrigation projects of BSWM were collated from this program.

The new irrigation areas planned to be developed by NIA and BSWM are tabulated in Table 4-38.

For the livestock and poultry, data and information were obtained from concerned bureaus of the Department of Agriculture (DA). These are the Bureau of Agricultural Statistics (BAS), Bureau of Animal Industry (BAI), and Livestock Development Council (LDC). The data on fisheries were gathered from the Bureau of Fisheries and Aquatic Resources (BFAR) and also from BAS. The Medium-Term Agricultural Development Plan for 1993-1998 is the only agricultural development plan available at present.

On the other hand, the 10-day irrigation water requirement data for each of the provinces under respective water resources regions were computed using the BASIC program being used by NIA. These data were used in the computation of future water demand on a provincial basis.

4.4.2 NIA's Policy on New Irrigation Development after Year 2010

Beyond the 10-year period (1997 to 2006) of its Irrigation Development Program, NIA is mandated to continue the country's irrigation development program. This would include the program for the acceleration of the completion of its projects, adequate packaging of future projects and introducing improved management systems and practices. NIA shall continue implementing the irrigation component of CARP and pursue the development of small reservoir irrigation projects. In O&M, focus will be on improving the quality of service, restoring areas damaged by natural calamities, introducing measures to reduce negative environmental impacts, ensuring safety of dams, developing a dynamic and viable NIA-IA partnership in systems management and irrigation of diversified crops.

The agency will maintain the intensified generation of income from existing and other sources. It shall develop an effective organization responsive to the future needs and changes in the irrigation environment.

These future thrusts and strategies of NIA are hinged on the newly enacted Agriculture and Fisheries Modernization Act of 1997 (R.A. 8435). This law prescribed the urgent measures relative to the modernization of the agriculture and fisheries sectors of the country in order to enhance their profitability. It was provided in this law that NIA shall continue to plan, design, develop, rehabilitate and improve the NISs. It shall continue its O&M activities on major irrigation structures and to gradually turn over the O&M of secondary facilities of NISs to IAs. It was also provided in the law that the government shall also encourage the construction of irrigation facilities through other viable schemes such as build-operate-transfer, build-transfer, and other schemes that fast-track the development of irrigation systems. The law further provided that the DA shall review all irrigation systems every four (4) years to determine their viability or ineffectiveness.

At present, there is no concrete irrigation development plan beyond year 2006. The Study projected new irrigation areas from 2010 to 2025 in order to pursue the mandates of NIA, although the Progress Report (2) on the Study which was prepared in February 1998 revealed that no new irrigation developments would be needed after 2006 in order to suffice the GDP assigned to the irrigation subsector until the year 2025.

4.4.3 Irrigation Water Demand Projection

The projection of irrigation water demand was made in accordance with two scenarios

adopted for the study. These are the high economic growth scenario, designated as Case 1, and the low economic growth scenario, designated as Case 2. Aside from these two scenarios, the projected irrigation water demand was further grouped either by province and water resources region or by water resources region and major river basin. The irrigation water demand by water resources region and major river basin are discussed in detail in Part-F of the Supporting Report.

As discussed in the foregoing Subsection 3.2.3, NIA and BSWM prepared the 10-year Irrigation Development Programs covering the period until the year 2006. The Study attempted to project new irrigation areas to be developed for the period from 2010 to 2025 in order to follow the policy of NIA. In line with the NIA's policy on new irrigation development beyond 2006, the projection was made on the assumption that the future irrigation development program for the period would follow the same rate of new irrigation area as that in the current ten-year program. As a conclusion, it was estimated that a total of 1.5 million ha of new irrigation areas would developed within the period of 1997 to 2025 as shown in Table 4-39. It is defined in this study that the development of new irrigation area of 1.5 million ha until the year 2025 corresponds to Case 1 or high economic growth scenario.

The total irrigation area to be irrigated in Case 1 is 2.86 million ha, which includes the existing areas and new areas to be developed for the period from 1997 to 2025. In Case 2, it is assumed that there will be no development beyond 2006.

Identification of existing irrigation systems and proposed irrigation projects with water sources falling under major river basins was also conducted in the study. Further, the total irrigation area under the category of water resources region and major river basin for Case 1 was also determined for each corresponding area. In order to determine the total area, these areas were accordingly summed. The schematic diagram of the major river basins showing major rivers and irrigation development schemes are shown in Figures 4-20 to 4-39.

The study assumed cropping intensity of 200 % for the new irrigation areas to be developed and to remain constant throughout the study period. The assumption adopted in the previous studies on irrigation projects, which were conducted by NIA, have been reviewed and generally applied to the irrigation water demand projection. The cropping intensities of NIS service areas were taken from the projected values presented in the 1992 NIA-CORPLAN Annual Report and the 1996 Report on Actual Irrigated Area and Cropping Intensity obtained from NIA as shown in Table 4-36. The values presented in the NIA-CORPLAN report ranges from 152 % in 1997 to 163 % in 2002. The Study adopted the higher cropping intensity value from among these data. In the analysis, it was assumed that the projected cropping intensity of 163 % in 2002 is constant up to 2010. In the year 2015, however, it was assumed that the cropping intensity would increase to 175 percent until 2025. Similarly, for areas served by CIS and BSWM irrigation systems, the cropping intensity adopted is the highest among the actual cropping intensity as shown in Table 4-37 and the projected values that ranges from 107.22 % in 1996 to 130 % in 2000. By the year

2005 up to year 2010, the value will increase to 140 %. In 2015, however, the cropping intensity is expected to increase to 150 % until the target year 2025.

The adopted cropping intensities were in turn multiplied with the service areas in order to determine the irrigated areas of the NIS, CIS and BSWM irrigation systems, respectively.

The irrigation water demands were projected for each of provinces, the water resources regions and major river basins by multiplying the projected irrigation service areas by the unit water requirement on a 10-day basin, which were provided by NIA during the field investigation. Consequently, the irrigation water demands in 2025 were projected at 59,884 MCM and 38,836 MCM in Case 1 and Case 2, respectively.

4.4.4 Projection of Agricultural Water Demand Other than Irrigation

Other future agricultural water demand was projected for each of the two agricultural sub-sectors other than irrigation, namely livestock/poultry and fishery. In the preliminary report of this study, both sub-sectors were discussed and data were thoroughly presented. Since significant revisions were made, water demand projections concerning the livestock and fishery sub-sectors were undertaken considering the high and low economic growth scenarios.

The projected livestock and chicken population by province and water resources region and by water resources region and major river basin under Case 1 (higher economic growth scenario) or Case 2 (lower economic growth scenario) was broken down on the basis of the ratios of cattle, carabao, hog and chicken in the 1996 inventories as shown in Tables 4-40 and 4-41. respectively. In Case 1 (higher economic growth scenario), consequently, the livestock and poultry population nationwide was projected to be 44.7 million heads and 2,517 million heads, respectively. In Case 2 (lower economic growth scenario), they were estimated at 23.2 and 1,108 million heads for livestock and poultry, respectively.

The Study adopted the water requirement of 2.4×10^{-4} LPS per head for livestock raising and 1.46×10^{-6} LPS per head for poultry. This was based on NWRB criteria in determining the amount of water in granting water rights. The water demand for livestock and chicken by province and by water resources region under Case 1 was estimated at 107 MCM in 1996 and 434 MCM in 2025. For Case 2, the water demand was also estimated at 107 MCM in 1996 and 218 MCM in 2025. On the other hand, the water demand for livestock and chicken this time by water resources region and by major river basin, under Case 1, was estimated at 58 MCM in 1996 and 237 MCM in 2025. Meanwhile, under Case 2, the water demand for livestock and chicken, again by water resources region and by major river basin was estimated at 58 MCM and 113 MCM in 2025.

The estimated water demand for livestock and poultry by province and by water resources region under Case 1 and Case 2 are shown in Tables 4-42 and 4-43.

The total fish production in 1996 is 2.69 million tons. The commercial fishery accounted for 893,210 tons or 33 percent of the total production. Municipal inland production accounts for 186,670 tons or 7 percent of total production, while municipal marine is 785,720 tons or 29 percent of the total production. The aquaculture production accounted for 825,390 tons or 31 percent of the total production.

The Study determined the water requirement only for the municipal inland fisheries and aquaculture. Municipal inland fisheries utilize freshwater while aquaculture use man-made fishponds, brackish water, freshwater or marine water.

Estimates were based on the Medium-Term Fisheries Management and Development Program for the period from 1993 to 1998. The said program aims to achieve aquaculture productivity of 2.4 tons per ha per year by 1998. The projected total fishpond area for aquaculture (*Bangus* and *Sugpo*), under Case 1 scenario and categorized by province and water resources region, amounted to 139,832 ha in 1996 and 245,967 ha in 2025. Similarly, the projected total fishpond area for aquaculture, under Case 2 scenario and of the same category, amounted to 139,832 in 1996 and 210,038 in 2025.

Total water demand for fisheries under Case1 and Case 2 scenarios, categorized by province and water resources region, are shown in Tables 4-44 and 4-45, respectively.

4.4.5 Total Agricultural Water Demand

The projected water demands between 1996 and 2025 are summarized below:

Total Agricultural Water Demand in Case-1 (High Economic Growth Scenario)

(Unit: MCM)

Sub-sector	Year						
	1996	2000	2005	2010	2015	2020	2025
-Irrigation	18,527	28,214	36,014	41,260	48,393	54,139	59,885
-Livestock	107	147	157	197	250	322	434
-Fishery	6,899	9,805	10,493	10,962	11,360	11,494	12,655
	25,533	38,166	46,664	52,419	60,003	65,955	72,974

Total Agricultural Water Demand in Case 2 (Low Economic Growth Scenario)

(Unit: MCM)

Sub-sector	Year						
	1996	2000	2005	2010	2015	2020	2025
-Irrigation	18,527	28,214	36,014	37,447	38,837	38,837	38,837
-Livestock	107	146	153	157	177	198	218
-Fishery	6,899	9,413	9,855	10,216	10,488	10,689	10,805
	25,533	37,773	46,022	47,820	49,502	49,724	49,860

The present total agricultural water demand nationwide, as of 1996, is estimated at 25,533 MCM or 69.95 MCM/day. About 18,527 MCM or 72.6 percent is shared by irrigation sub-sector. The livestock/poultry sub-sector accounted for 107 MCM or 0.42 percent of the total agricultural water demand. For the fishery sub-sector, the water demand is estimated at 6,899 MCM or 27 percent of the total agricultural water demand.

In the Case 1, the agricultural water demand is expected to reach 72,973 MCM or 200 MCM/day in 2025. About 59,884 MCM would be required for irrigation. Livestock and poultry would require 434 MCM and fisheries would need 12,655 MCM. Likewise, in the Case 2, the total agricultural water demand nationwide is expected to reach 49,860 MCM or 100.24 MCM/day in 2025. Irrigation would require 38,836 MCM and 218 MCM for livestock and poultry. About 10,806 MCM would be needed for fisheries.

The agricultural water demand to be shared by groundwater was estimated at 4,694 MCM in year 2006 and it was assumed to remain constant until year 2025. Thus, the projection assumed that there would be no new areas to be irrigated by groundwater source beyond 2006.

The projected total agricultural water demands between 1996 and 2025 in the high economic growth scenarios are summarized by the water resources region in Table 4-46.

4.5 Demarcation of Future Water Demand into Groundwater and Surface Water

The demarcation of the future water demand into groundwater and surface water was made for each of the municipal, industrial and irrigation water demands based on the present water use conditions clarified through the analyses of the water right data of NWRB as well as the data and information on future groundwater development plans in each of those sectors.

(1) Municipal Water

In the Philippines, the water supply systems for the municipal sector is divided into two categories, namely public and privately owned ones. For each, the water supply systems were categorized in accordance with the service level and/or the water resource on which they rely, as shown below:

Public
(i) Level-III urban water supply systems; groundwater and surface water
(ii) Level-II rural water supply systems; groundwater
(iii) Level-I rural water supply systems; groundwater

Private
(i) Privately owned Level-I water supply facilities; groundwater
(ii) Privately owned commercial water supply facilities; groundwater

(2) Water Source Demarcation for Future Development

Out of the different three water supply systems of Level-I, Level-II and Level-III, only the Level-III water supply systems rely on both sources of groundwater and surface water. The Level-III water supply system is further divided into the following four categories:

Type	Water Source	Future Water Source Development
A	groundwater source only	GW
B	surface water source only	SW
C	groundwater source is larger than surface water source	SW
D	surface water source is larger than groundwater source	SW

Notes: Type A is located in GW available area.
Type B is located in GW unavailable area.
Type C &D are located in GW & SW available area.
GW : groundwater, SW : surface water

The total number of Level III water supply systems registered by LWUA was 404. Of the total number, 36 systems or approximately 9 % of the total number have surface water sources (Type B, C and D). The water production for municipal water was estimated based on the classification. However, in case of the Type C and D categories, the WDs had no possibility of groundwater development in the past. Therefore, it is forecast that these WDs will develop surface water sources for their future water supply. Based on the demarcations outlined above, the municipal demand for water was calculated for each of the water resources regions and major river basins.

Tables 4-47 and 4-48 show the municipal water demand and share of groundwater and surface water for the municipal water demand by the water resource region. It can be seen in the table that the total municipal demands of all the water resources regions exceed 100 MCM/year by the year 2025. Most significantly, the total demand for water resources regions inclusive of Metro Manila area exceeds 3,500 MCM/year in 2025.

Tables 4-49 and 4-50, on the other hand, show the municipal water demand by the major river basin(s) and the other area in each of the water resources regions. The Pasig-Laguna Bay and the other basins of WRR-IV covering the Metro Manila area clearly have the highest demand of 2,318 and 951 MCM/year in 2025, respectively.

(3) Industrial Water

The data on the water rights were the only available ones for the projection of industrial water demand. Therefore, future development sources were demarcated using the ratio of the present production amount of groundwater and surface water, which was obtained from the NWRB's water right data. Concerning the Pasig Laguna Bay basin inclusive of Metro Manila and Metro Cebu, it is assumed that the concept of intensive recycling use of groundwater is introduced in consideration of the limited availability of water resources and high demand growth. The procedure for estimating the net water demand in the use of recycling of the industrial water is explained in Part-G of the Supporting Report.

In order to reflect the uncertainty associated with predicting economic trends, the industrial water demand was divided into two scenarios, namely the high and low economic growth scenarios, as discussed in the foregoing Sections 4.1 and 4.2. Table 4-47 shows the industrial water demand by the water resources region in case of the high economic growth scenario, while Table 4-48 does the same in case of the high economic growth scenario. The difference between these two scenarios is significant. The total industrial demand in the year 2025 is 2,762 MCM/year and 2,319 MCM/year under the low and high economic growth scenarios, respectively. Tables 4-49 and 4-50 exhibit the shares of groundwater and surface water by the major river basin. Again, the major river basins including the Pasig-Laguna Bay basin in WRR-IV far outstrip the others with respect to future municipal water demand.

4.6 Groundwater Development Plan

The groundwater development plans were preliminarily formulated for each of the water resources regions and major river basins so as to meet the future water demands to be shared by groundwater, which are discussed in the foregoing Section 4.5. Besides, the requirement of new groundwater development was clarified by each of the water use sectors and the different water supply systems of the Level-I, Level-II and Level-III. The procedures, methodologies and assumptions applied to the formulation of the nation-wide groundwater development plans are described in detail in Part-G of the Supporting Report.

In this study, the typical deepwell structures are designed with reference to the design standards thereof utilized in this country as shown in Figure 4-40. In addition, the life of the facilities as well as the annual reduction of groundwater production were taken into account in determining the requirement of the future groundwater development. Likewise, the hydrogeological conditions which differ by the region were reflected in the estimate of the requirement of new groundwater requirement.

The new deepwells required to be constructed until the year 2025 are shown in Table 4-67 and Figure 4-41. As seen in this table and figure, the water resources regions III and IV require the largest quantity of new deepwells for the Level-III water supply systems.

The construction cost estimate for the new groundwater development was made in consideration of the necessity of the relevant structures such as water transmission facilities, treatment facilities mainly for chlorination and distribution facilities. The typical water supply systems utilized for the cost estimate are depicted in Figure 4-42. The unit construction costs applied to the preliminary cost estimate are summarized in Table 4-68. Consequently, the total investment costs required for new groundwater development in the country were estimated at a 5-year interval as summarized below:

GWRD (Well Construction) Program Cost

(Unit: Billion Peso per 5 years)

Year	2000	2005	2010	2015	2020	2025
High	47.5	54.1	49.9	57.0	46.0	51.7
Low	47.3	53.4	48.9	55.5	44.2	48.9

The investment costs for the 12 water resources regions are illustrated in Figure 4-42.

Table 4-1 RESULT OF POPULATION PROJECTION BY REGION

(Unit : Person)

Region No.	Administrative Region	1995	2000	2005	2010	2015	2020	2025	Annual Average Growth Rate (%) (1995~2000)	(2000~2005)	(2005~2010)	(2010~2015)	(2015~2020)	(2020~2025)
	NCR	9,421,134	10,405,479	11,289,368	12,020,405	12,590,106	13,025,085	13,354,238	2.01	1.64	1.26	0.93	0.68	0.50
	CAR	1,249,332	1,400,490	1,553,173	1,701,556	1,836,951	1,958,321	2,068,986	2.31	2.09	1.84	1.54	1.29	1.11
1	Ilocos	3,791,683	4,140,531	4,481,820	4,802,027	5,086,178	5,328,297	5,531,879	1.78	1.60	1.39	1.16	0.93	0.75
2	Cagayan Valley	2,525,814	2,812,589	3,086,812	3,341,083	3,560,659	3,741,170	3,895,578	2.17	1.88	1.60	1.28	0.99	0.81
3	Central Luzon	6,906,819	7,686,845	8,426,578	9,101,473	9,687,697	10,193,769	10,630,076	2.16	1.85	1.55	1.26	1.02	0.84
4	So. Tagalog	9,903,972	11,301,272	12,810,064	14,441,165	16,233,025	18,055,608	19,902,706	2.67	2.54	2.43	2.37	2.15	1.97
5	Bicol	4,309,488	4,755,820	5,165,243	5,560,622	5,920,227	6,230,565	6,498,361	1.99	1.67	1.49	1.26	1.03	0.85
6	Western Visayas	5,756,625	6,324,098	6,884,429	7,421,267	7,905,982	8,328,251	8,694,391	1.90	1.71	1.51	1.27	1.05	0.86
7	Central Visayas	4,997,998	5,539,177	6,068,238	6,566,845	7,018,122	7,414,063	7,762,096	2.08	1.84	1.59	1.34	1.10	0.92
8	Eastern Visayas	3,356,854	3,743,895	4,133,242	4,523,762	4,898,176	5,245,032	5,566,078	2.21	2.00	1.82	1.60	1.38	1.20
9	Western Mindanao	2,782,363	3,152,009	3,522,722	3,883,061	4,216,134	4,517,814	4,797,662	2.53	2.25	1.97	1.66	1.39	1.21
10	Nothern Mindanao	3,938,252	4,441,739	4,955,545	5,465,272	5,951,777	6,399,698	6,819,612	2.44	2.21	1.98	1.72	1.46	1.28
11	Southern Mindanao	5,052,730	5,749,821	6,456,464	7,146,889	7,787,983	8,374,403	8,924,216	2.62	2.35	2.05	1.73	1.46	1.28
12	Central Mindanao	2,348,224	2,660,270	2,971,763	3,267,367	3,529,247	3,759,381	3,968,606	2.53	2.24	1.91	1.55	1.27	1.09
	ARMM	2,008,166	2,206,106	2,409,317	2,608,497	2,785,333	2,931,709	3,058,102	1.90	1.78	1.60	1.32	1.03	0.85
	Total	68,349,454	76,320,141	84,214,778	91,851,291	99,007,597	105,503,166	111,472,586	2.23	1.99	1.75	1.51	1.28	1.11

Data Sources : 1. Total population : National Statistics Office for the period from 1995 to 2025
2. Regional population : National Statistics Office for the period from 1995 to 2020.

Note : The regional population for the year of 2025 was projected by the Study Team.

Table 4-2 RESULT OF POPULATION PROJECTION BY REGION AND BY PROVINCE

(Unit of Population : 1000 persons)

No.	Administrative Region	Province	1970 (May 6)	1975 (May 1)	1980 (May 1)	1990 (May 1)	1995 (Sept. 1)	2000	2005	2010	2015	2020	2025	1970-1975	1975-1980	1980-1990	1990-1995	1995-2000	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025
														Annual Average Growth Ratio (%)									
	NCR		3,964	4,970	5,926	7,949	9,454	10,405	11,259	12,020	12,590	13,025	13,349	4.63	3.58	2.98	3.53	1.94	1.64	1.26	0.93	0.68	0.49
	CAR	Abra	136	147	160	185	196	208	222	234	241	251	256	0.14	1.71	1.46	1.16	1.16	1.31	1.02	0.83	0.53	0.39
		Benguet	264	302	355	486	541	626	709	792	874	950	1,023	2.73	3.29	3.19	2.17	2.95	2.53	2.25	1.92	1.70	1.47
		Ifugao	92	105	111	147	150	179	199	219	237	252	266	2.68	1.12	2.85	0.40	3.54	2.19	1.93	1.54	1.28	1.10
		Kalinga Apayao	136	163	185	212	238	253	277	298	315	328	339	3.69	2.56	1.37	2.34	1.21	1.85	1.49	1.07	0.83	0.65
		Mt. Province	93	94	103	117	131	135	146	158	168	176	183	0.21	1.85	1.28	2.29	0.65	1.55	1.54	1.24	0.99	0.81
		Sub-total	731	811	914	1,147	1,256	1,400	1,553	1,702	1,837	1,958	2,068	2.10	2.42	2.30	1.83	2.19	2.10	1.85	1.54	1.28	1.10
1	Ilocos	Ilocos Norte	343	372	391	462	483	525	562	598	628	652	674	1.64	1.00	1.68	0.89	1.70	1.37	1.24	0.98	0.76	0.64
		Ilocos Sur	385	420	444	520	545	581	622	657	686	708	726	1.76	1.12	1.59	0.91	1.41	1.23	1.09	0.86	0.64	0.49
		La Union	374	415	453	549	597	643	703	755	804	848	886	2.10	1.77	1.94	1.63	1.63	1.67	1.45	1.27	1.05	0.90
		Pangasinan	1,386	1,520	1,636	2,020	2,208	2,383	2,604	2,791	2,968	3,129	3,293	1.85	1.48	2.33	1.52	1.81	1.71	1.48	1.23	1.01	0.83
		Sub-total	2,488	2,727	2,924	3,551	3,833	4,130	4,492	4,802	5,086	5,338	5,537	1.85	1.40	1.96	1.29	1.71	1.60	1.39	1.16	0.93	0.77
		Batanes	11	12	12	15	14	17	18	20	20	21	22	1.76	0.00	2.26	-1.37	3.66	1.10	2.03	0.92	0.81	0.79
		Cagayan	581	644	711	859	895	965	1,046	1,123	1,192	1,249	1,297	2.08	2.00	1.86	1.52	1.52	1.62	1.43	1.20	0.94	0.76
2	Cagayan Valley	Isabela	648	730	871	1,080	1,161	1,317	1,450	1,566	1,656	1,726	1,779	2.41	3.60	2.17	1.46	2.56	1.95	1.54	1.13	0.83	0.60
		Nueva Vizcaya	222	213	242	301	335	366	405	435	453	517	544	-0.82	2.59	2.21	2.16	1.73	2.07	1.87	1.69	1.34	1.05
		Quirino	50	66	83	114	131	147	168	188	209	227	244	5.71	4.69	3.22	2.82	2.34	2.66	2.31	2.08	1.72	1.44
		Sub-total	1,512	1,665	1,919	2,369	2,536	2,812	3,087	3,341	3,561	3,741	3,887	1.93	1.90	1.96	1.29	2.09	1.88	1.59	1.28	0.99	0.77
		Aurora	216	263	323	436	492	538	591	639	678	710	738	4.02	4.20	2.81	2.92	1.80	1.91	1.57	1.18	0.91	0.77
		Bataan	836	900	1,096	1,505	1,784	1,924	2,148	2,372	2,588	2,789	2,978	1.49	4.02	3.22	3.46	1.53	2.23	2.09	1.76	1.51	1.32
		Nueva Ecija	851	948	1,069	1,313	1,506	1,589	1,723	1,835	1,926	1,998	2,056	2.18	2.43	2.06	2.78	1.08	1.62	1.28	0.97	0.74	0.57
3	Central Luzon	Pampanga	907	1,042	1,182	1,533	1,686	1,907	2,087	2,245	2,376	2,484	2,574	2.81	2.55	2.63	1.31	2.11	1.82	1.47	1.14	0.90	0.72
		Tarlac	560	631	689	860	936	1,045	1,135	1,215	1,281	1,334	1,377	2.74	1.45	2.24	1.92	2.01	1.67	1.38	1.06	0.81	0.63
		Zambales	343	416	481	563	569	684	742	794	839	878	912	3.93	3.31	2.40	0.21	3.74	1.66	1.36	1.11	0.91	0.77
		Sub-total	3,711	4,210	4,801	6,200	6,933	7,667	8,427	9,101	9,688	10,194	10,635	1.85	1.40	1.96	1.29	2.09	1.86	1.55	1.26	1.02	0.85
		Aurora	90	90	107	140	160	197	229	261	298	334	371	2.35	3.52	2.72	2.71	4.28	3.03	2.68	2.63	2.15	2.12
		Batangas	926	1,032	1,173	1,473	1,659	1,843	2,047	2,179	2,348	2,501	2,642	2.19	2.61	2.32	2.35	2.12	1.82	1.56	1.51	1.27	1.10
		Cavite	520	628	771	1,153	1,410	1,708	1,823	2,058	2,320	2,587	2,859	3.85	4.19	4.11	6.91	1.19	1.31	2.45	2.43	2.30	2.03
		Laguna	700	804	973	1,370	1,631	1,933	2,305	2,658	3,011	3,371	3,740	2.81	3.89	3.48	3.55	3.46	3.58	2.89	2.53	2.28	2.10
		Marinduque	144	163	174	186	200	219	233	245	258	269	276	2.51	1.31	0.67	1.46	1.70	1.39	0.96	0.87	0.73	0.60
		Occ. Mindoro	141	156	222	283	337	374	413	465	517	568	618	5.25	3.60	2.45	3.55	1.95	2.30	2.18	2.14	1.89	1.70
4	Southern Tagalog	Or. Mindoro	328	389	447	550	609	724	814	902	992	1,087	1,172	3.47	2.82	2.10	2.06	3.52	2.36	2.08	2.02	1.74	1.53
		Palawan	233	300	372	528	610	747	877	1,021	1,192	1,376	1,577	4.83	4.40	3.56	3.92	3.15	3.25	3.08	3.15	2.92	2.76
		Quezon	983	1,115	1,129	1,372	1,538	1,729	1,937	2,106	2,273	2,532	2,768	2.57	0.23	1.97	2.31	2.95	2.13	1.85	1.84	1.63	1.48
		Rizal	2,845	414	556	977	1,313	1,499	1,809	2,152	2,556	3,001	3,491	-31.99	6.08	5.80	6.09	2.68	3.83	3.53	3.50	3.26	3.08
		Romblon	167	192	193	228	245	282	309	335	364	393	416	1.74	1.18	1.68	1.45	2.83	1.86	1.63	1.65	1.44	1.26
		Sub-total	7,074	5,304	6,118	8,364	9,042	11,301	12,810	14,411	16,233	18,056	19,931	1.85	1.40	1.96	1.29	2.69	2.54	2.43	2.37	2.15	2.00
		Albay	674	729	809	961	1,005	1,096	1,196	1,289	1,370	1,438	1,494	1.58	2.10	1.82	2.14	1.75	1.76	1.52	1.22	0.97	0.77
		Camarines Norte	262	288	308	391	430	511	579	647	713	777	837	1.91	1.35	2.41	2.34	3.10	2.50	2.26	1.97	1.72	1.51
		Camarines Sur	948	1,024	1,099	1,306	1,433	1,642	1,806	1,968	2,117	2,251	2,369	1.55	1.42	1.74	1.87	2.76	1.93	1.73	1.47	1.23	1.03
5	Bicol	Catanduanes	162	173	175	187	203	229	254	279	302	325	347	1.32	0.23	0.67	1.66	2.47	2.09	1.88	1.59	1.45	1.34
		Masbate	493	533	585	599	654	678	704	726	743	752	757	1.57	1.88	0.24	1.77	0.71	0.76	0.63	0.47	0.23	0.13
		Sorsogon	427	447	501	523	592	600	626	651	674	689	697	0.92	2.31	0.43	2.51	0.26	0.85	0.79	0.69	0.45	0.23
		Sub-total	2,966	3,194	3,477	3,910	4,326	4,756	5,165	5,561	5,920	6,231	6,501	1.85	1.40	1.96	1.29	1.91	1.66	1.49	1.26	1.03	0.85
		Aklan	263	293	325	388	411	441	480	519	556	588	617	2.18	2.09	1.60	1.53	1.40	1.71	1.59	1.38	1.14	0.96
		Antique	289	308	345	406	432	480	525	572	617	659	700	1.28	2.29	1.64	1.85	2.12	1.83	1.72	1.53	1.34	1.21
6	Western Visayas	Capiz	394	446	492	584	624	681	743	803	858	905	946	2.51	1.98	1.73	1.33	1.76	1.75	1.57	1.33	1.08	0.89
		Iloilo	1,168	1,313	1,434	1,765	1,876	2,062	2,246	2,417	2,574	2,718	2,834	2.37	1.78	2.10	1.23	1.96	1.67	1.48	1.26	1.04	0.89
		Negros Occ.	1,504	1,786	1,930	2,251	2,434	2,656	2,891	3,110	3,302	3,464	3,604	3.50	1.56	1.58	1.52	1.76	1.71	1.47	1.20	0.97	0.79
		Sub-total	3,618	4,146	4,526	5,393	5,777	6,324	6,884	7,421	7,906	8,328	8,701	1.85	1.40	1.96	1.29	1.83	1.71	1.51	1.27	1.05	0.88
		Bohol	683	759	806	948	994	1,139	1,256	1,367	1,471	1,567	1,657	2.13	1.24	1.64	0.85	2.76	1.97	1.71	1.48	1.27	1.12
		Cebu	1,514	1,818	2,092	2,636	2,921	3,246	3,586	3,908	4,196	4,451	4,678	3.16	2.85	2.38	2.00	2.13	2.02	1.73	1.44	1.19	1.00
7	Central Visayas	Negros Or.	715	740	819	925	1,025	1,072	1,140	1,203	1,257	1,299	1,332	0.69	2.65	1.22	2.07	0.90	1.24	1.08	0.89	0.65	0.50
		Siquijor	63	69	70	74	74	82	86	90	94	96	98	1.84	0.29	0.56	0.00	2.17	0.93	0.88	0.79	0.52	0.31
		Sub-total	3,095	3,386	3,787	4,593	5,014	5,539	6,068	6,567	7,018	7,414	7,765	1.85	1.40	1.96	1.29	2.01	1.84	1.59	1.34	1.10	0.93
		Leyte	1,111	1,203	1,303	1,568	1,643	1,827	2,048	2,255	2,460	2,654	2,839	1.60	1.61	0.49	3.73	2.15	2.31	1.91	1.76	1.52	1.36
		So. Leyte	251	276	296	322	338	403	455	506	556	604	650	1.92	1.41	0.85	-0.25	4.85	2.45	2.15	1.83	1.66	1.49
8	Eastern Visayas	E. Samar	221	287	321	329	362	389	426	456	480	500	516	5.15	2.26	0.25	1.93	1.44	1.84	1.38	1.03	0.80	0.63
		N. Samar	306	355	379	384	454	490	496	529	554	571	582	3.02	1.32	0.13	3.41	1.52	0.23	1.30	0.92	0.62	0.38
		W. Samar	442	478	501	534	589	635	707	777	849	916	981	1.58	0.94	0.64	1.98	1.53	2.15	1.90	1.76	1.53	1.43
		Sub-total	2,381	2,599	2,800	2,937	3,366	3,744	4,133	4,524	4,898	5,245	5,571	1.85	1.40	1.96	1.29	2.15	2.00	1.82	1.60	1.38	1.21
		Basilan	344	371	401	238	296	306	318	345	367	386	401	3.50	3.29	1.70	4.36	0.67	0.75	1.66	1.27	0.99	0.78
9	Western Mindanao	Zambo. N.	409	491	583	677	721	854	958	1,055	1,146	1,230	1,306	3.72	3.67	4.42	2.63	2.07	2.32	1.95	1.67	1.42	1.22
		Zambo. S.	890	1,003	1,184	1,545	1,728	1,992	2,247	2,483	2,702	2,902	3,084	2.42	3.37	2.70	2.26	2.88	2.43	2.02	1.71	1.41	1.22
		Sub-total	1,643	1,865	1,973	2,460	2,795	3,152	3,522	3,883	4,216	4,518	4,792	2.90	3.45	2.23	2.42	2.43	2.24	1.97	1.66	1.39	1.18
		Bukidnon	415	533	632	841	940	1,130	1,288	1,445	1,597	1,736	1,865	5.13	3.43	2.93	2.18	3.75	2.65	2.33	2.02	1.69	1.42
		Camiguin	54	53	57	64	68	74	80	86	91	93	97	-0.37	1.42	1.17	1.22	1.84	1.47	1.38	1.07	0.78	0.55
10	Northern Mindanao	Misamis Occ	320	356	386	424	459	492	525	554	576	591	599	2.16	1.63	0.94	1.60	1.39	1.30	1.10	0.79	0.51	0.28
		Misamis Or.	473	560	692	865	1,016	1,066	1,168	1,260	1,339	1,401	1,448	3.43	4.26	2.29	3.27	0.96	1.84	1.53	1.22	0.91	0.66
		Agusan del Norte	278	301	365	465	514	568	633	672	715	749	776	1.60	3.93	2.45	2.02	2.03	1.85	1.58	1.22	0.94	0.72
		Agusan del Sur	175	213	265	423	515	609	733	876	1,041	1,223	1,416	4.01	4.47	4.74	4.11	3.42	3.76	3.63	3.53	3.24	3.00
		Surigao del Norte	239	298	363	426	442	502	540	572	594	607	615	4.51	4.03	1.61	0.74	2.59	1.45	1.17	0.73	0.46	0.24
		Sub-total	1,954	2,314	2,758	3,509	3,954	4,442	4,966	5,465	5,952	6,400	6,814	1.85	1.40	1.96	1.29	2.35	2.21	1.97	1.72	1.46	1.26
		Davao	343	599	725	1,056	1,558	1,566	1,635	1,781	1,977	2,166	2,350	5.90	4.21	3.83	8.09	0.10	1.35	1.24	2.11	1.84	1.65
		Davao del Sur	785	936	1,134	1,493	1,684	1,767	1,969	2,163	2,299	2,410	2,498	3.58	3.91	2.72	2.57	0.96	2.29	1.99	1.23	0.94	0.72
11	Southern Mindanao	Davao Oriental	248	299	340	395	413	461	510	553	578	595	606	3.81	2.60	1.51	0.90	2.20	2.06	1.85	0.87	0.59	0.36
		So. Cotabato	466	567	770	1,073	948	1,418	1,697	1,981	2,218	2,448	2,674	4.33	5.58	3.33	-2.45	8.39	3.66	3.14	2.29	1.99	1.76
		Surigao del Sur	259	302	378	452	471	539	605	669	716	755	787	3.12	4.59	1.80	0.83	2.73	2.34	2.02	1.37	1.07	0.84
		Sub-total	2,101	2,704	3,347	4,469	5,074	5,950	6,856	7,847	8,788	9,374	9,932	1.85	1.40	1.96	1.29	2.53	2.34	2.05	1.73	1.36	1.25
		Lanao del Norte	350	381	461	614	714	795	890	976	1,053	1,119	1,175	1.71	3.89	2.91	3.06	2.26	2.19	1.87	1.52	1.22	0.98
		Cotabato	1,136	472	565	764	863	1,004	1,126	1,243	1,343	1,439	1,520	-16.11	3.66	3.06	2.47	3.08	2.32	1.99	1.62	1.33	1.11
12	Central Mindanao	Sultan Kudarat	191	239	304	436	522	573	644	712	775	830	877	4.59	4.93	3.67	3.67	1.88	2.36	2.03	1.71	1.38	1.12
		Cotabato City	61	67	84	127	147	166	183	196	207	217	227	1.89	4.63	4.22	2.97	2.51	1.89	1.42	1.07	0.95	0.89
		Marawi City	56	63	54	92	114	118	129	140	147	155	162	2.38	-3.04	5.47	4.38	0.72	1.84	1.53	1.10	0.97	0.91
		Sub-total	1,794	1,222	1,468	2,033	2,360	2,660	2,972	3,267	3,529	3,759	3,961	1.85	1.40	1.96	1.29	2.42	2.24	1.91	1.55	1.27	1.05
		Lanao del Sur	300	437	351	506	572	619	693	768	834	892	939	1.79	-4.29	3.77	2.40	1.59	2.28	2.09	1.67	1.35	1.09
		Maguindanao	415	411	453	631	662	787	884	977	1,059	1,132	1,193	-0.19	1.97	3.37	0.96	3.53	2.33	2.03	1.62	1.34	1.07
	ARMM	Sulu	315	240	361	470	536	543	558	570	580	595	593	-5.29	8.51	2.67	2.66	0.26	0.53	0.45	0.69	0.24	0.13
		Tawi-tawi	110	143	195	228	251	253	275	293	304	314	320	5.39	6.30	1.58	1.94	0.41	1.40	1.23	0.81	0.61	0.42
		Sub-total	1,240	1,231	1,360	1,837	2,021	2,206	2,409	2,608	2,785	2,932	3,051	1.85	1.40	1.96	1.29	1.77	1.78	1.60	1.32	1.03	0.80
	Total		40,174	42,158	48,100	60,580	68,613	76,322	84,218	91,854	99,011	105,506	111,476	0.97	2.67	2.33	2.52	2.15	1.99	1.75	1.53	1.28	1.11

Data Source : The Philippines Statistical Yearbook, 1996 National Statistic Coordination Office.

Note : The projection for total population for the period from 2000 to 2025 and for regional population for the period from 2000 to 2020 is based on the population projection conducted by NSO.

Table 4-3 RESULT OF PROJECTION FOR URBAN AND RURAL POPULATION BY WATER RESOURCE REGION AND RIVER BASIN

(Unit : 1000 persons)

No. of WRR	Water Resource Region (WRR)	River Basin	1995			2000			2005			2010			2015			2020			2025		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
I	Ilocos	Abra	99	316	415	114	330	444	128	348	476	143	362	505	157	372	529	169	379	548	180	384	564
		Lacag	68	177	245	75	191	266	82	203	285	88	215	303	93	224	317	97	232	329	100	240	340
		Sub-total	167	493	660	189	521	710	210	551	761	231	577	808	250	596	846	266	611	877	280	624	904
		Other Area	467	1,002	1,469	554	1,055	1,609	649	1,101	1,750	745	1,139	1,884	841	1,167	2,008	933	1,183	2,116	1,019	1,195	2,214
		Total	634	1,495	2,129	743	1,576	2,319	859	1,652	2,511	976	1,716	2,692	1,091	1,763	2,854	1,199	1,794	2,993	1,299	1,819	3,118
II	Cagayan Valley	Cagayan	505	1,797	2,302	589	1,976	2,565	675	2,147	2,822	757	2,304	3,061	830	2,439	3,269	890	2,550	3,440	937	2,643	3,580
		Abulug	36	174	210	41	184	225	47	198	245	54	209	263	60	219	279	67	224	291	72	230	302
		Sub-total	541	1,971	2,512	630	2,160	2,790	722	2,345	3,067	811	2,513	3,324	890	2,658	3,548	957	2,774	3,731	1,009	2,873	3,882
		Other Area	99	427	526	116	456	572	135	489	624	154	519	673	172	540	712	187	556	743	201	769	970
		Total	640	2,398	3,038	746	2,616	3,362	857	2,834	3,691	965	3,032	3,997	1,062	3,198	4,260	1,144	3,330	4,474	1,210	3,642	4,852
III	Central Luzon	Pampanga	3,013	1,779	4,792	3,556	1,722	5,278	4,145	1,656	5,801	4,731	1,550	6,281	5,209	1,499	6,708	5,620	1,458	7,078	5,996	1,410	7,406
		Agno	828	1,290	2,118	998	1,342	2,340	1,184	1,374	2,558	1,378	1,384	2,762	1,575	1,367	2,942	1,768	1,329	3,097	1,957	1,276	3,233
		Sub-total	3,841	3,069	6,910	4,554	3,064	7,618	5,329	3,030	8,359	6,109	2,934	9,043	6,784	2,866	9,650	7,388	2,787	10,175	7,953	2,686	10,639
		Other Area	1,251	1,296	2,547	1,494	1,376	2,870	1,724	1,417	3,141	1,953	1,438	3,391	2,173	1,442	3,615	2,380	1,431	3,811	2,571	1,414	3,985
		Total	5,092	4,365	9,457	6,048	4,440	10,488	7,053	4,447	11,500	8,062	4,372	12,434	8,957	4,308	13,265	9,768	4,218	13,986	10,524	4,100	14,624
IV	Southern Tagalog	Pasig-Laguna Bay	12,536	594	13,130	14,136	490	14,626	15,833	423	16,256	17,441	334	17,775	18,978	225	19,203	20,323	219	20,542	21,601	221	21,822
		Amnay-Patrick	87	78	165	110	71	181	140	64	204	176	51	227	218	34	252	265	12	277	302	0	302
		Sub-total	12,623	672	13,295	14,246	561	14,807	15,973	487	16,460	17,617	385	18,002	19,196	259	19,455	20,588	231	20,819	21,903	221	22,124
		Other Area	2,569	3,436	6,005	3,017	3,752	6,769	3,486	4,000	7,486	4,032	4,249	8,281	4,655	4,506	9,161	5,308	4,718	10,026	5,918	4,970	10,888
		Total	15,192	4,108	19,300	17,263	4,313	21,576	19,459	4,487	23,946	21,649	4,634	26,283	23,851	4,765	28,616	25,896	4,949	30,845	27,821	5,191	33,012
V	Bicol	Bicol	397	832	1,229	480	915	1,395	558	977	1,535	639	1,034	1,673	719	1,080	1,799	795	1,117	1,912	898	1,144	2,042
		Other Area	824	2,272	3,096	937	2,424	3,361	1,061	2,569	3,630	1,186	2,701	3,887	1,306	2,815	4,121	1,416	2,904	4,320	1,512	2,977	4,489
		Total	1,221	3,104	4,325	1,417	3,339	4,756	1,619	3,546	5,165	1,825	3,735	5,560	2,025	3,895	5,920	2,211	4,021	6,232	2,380	4,121	6,501
VI	Western Visaya	Panay	194	393	587	249	391	640	316	382	698	394	361	755	481	326	807	574	277	851	672	217	889
		Ilog-Hilabangan	329	344	673	383	350	733	439	358	797	489	368	857	531	379	910	561	393	954	586	406	992
		Jalaur	237	393	630	286	408	694	336	418	754	388	423	811	438	426	864	485	425	910	527	424	951
		Sub-total	760	1,130	1,890	918	1,149	2,067	1,091	1,158	2,250	1,271	1,152	2,423	1,450	1,131	2,581	1,620	1,095	2,715	1,785	1,047	2,832
		Other Area	1,766	2,646	4,412	2,085	2,721	4,806	2,428	2,790	5,218	2,770	2,842	5,612	3,090	2,879	5,969	3,374	2,904	6,278	3,638	2,912	6,550
		Total	2,526	3,776	6,302	3,003	3,870	6,873	3,518	3,950	7,468	4,041	3,994	8,035	4,540	4,010	8,550	4,994	3,999	8,993	5,423	3,959	9,382
VII	Central Visayas		2,132	2,357	4,489	2,524	2,466	4,990	2,951	2,533	5,484	3,392	2,558	5,950	3,830	2,544	6,374	4,256	2,492	6,748	4,610	2,474	7,084
VIII	Eastern Visayas		1,019	2,348	3,367	1,156	2,588	3,744	1,411	2,722	4,133	1,631	2,893	4,524	1,855	3,043	4,898	2,078	3,167	5,245	2,275	3,297	5,572
IX	Southwestern Mindanao		1,301	2,650	4,041	1,756	2,687	4,443	2,180	2,699	4,879	2,654	2,653	5,307	3,158	2,526	5,684	3,670	2,348	6,018	4,065	2,243	6,308
X	Northern Mindanao	Aguasan	306	666	972	351	813	1,164	409	923	1,332	473	1,043	1,516	546	1,194	1,740	622	1,349	1,971	700	1,515	2,215
		Tagoloan	141	208	349	182	223	405	226	230	456	273	232	505	321	231	552	365	228	593	402	228	630
		Cagayan De Oro	160	182	342	204	190	394	256	187	443	312	180	492	370	167	537	423	155	578	462	151	613
		Sub-total	607	1,056	1,663	737	1,226	1,963	891	1,340	2,231	1,058	1,455	2,513	1,237	1,592	2,829	1,410	1,732	3,142	1,564	1,894	3,458
		Other Area	883	691	1,574	1,028	676	1,704	1,208	647	1,855	1,392	599	1,991	1,570	530	2,100	1,709	475	2,184	1,767	478	2,245
		Total	1,490	1,747	3,237	1,765	1,902	3,667	2,099	1,987	4,086	2,450	2,054	4,504	2,807	2,122	4,929	3,119	2,207	5,326	3,331	2,372	5,703
XI	Southeastern Mind	Tagun-Labuganon	197	355	552	201	525	726	218	559	777	234	592	826	262	655	917	289	716	1,005	314	776	1,090
		Buayan-Malungun	103	196	299	165	158	323	210	176	386	260	190	450	308	196	504	357	200	557	400	207	607
		Davao	295	289	584	316	296	612	359	324	683	402	348	750	433	364	797	460	376	836	479	387	866
		Sub-total	595	840	1,435	682	979	1,661	787	1,059	1,846	896	1,130	2,026	1,003	1,215	2,218	1,106	1,292	2,398	1,193	1,370	2,563
		Other Area	1,391	2,080	3,471	1,614	2,278	3,892	1,918	2,401	4,319	2,235	2,491	4,726	2,530	2,548	5,078	2,801	2,576	5,377	3,031	2,397	5,428
		Total	1,986	2,920	4,906	2,296	3,257	5,553	2,705	3,460	6,165	3,131	3,621	6,752	3,533	3,763	7,296	3,907	3,868	7,775	4,224	3,767	7,991
XII	Southern Mindana	Mindanao	1,070	2,017	3,087	1,407	2,130	3,537	1,726	2,292	4,018	2,067	2,421	4,488	2,406	2,500	4,906	2,742	2,546	5,288	3,051	2,580	5,631
		Agus	227	223	450	267	222	489	326	217	543	388	208	596	449	191	640	506	174	680	558	156	714
		Sub-total	1,297	2,240	3,537	1,674	2,352	4,026	2,052	2,509	4,561	2,455	2,629	5,084	2,855	2,691	5,546	3,248	2,720	5,968	3,609	2,736	6,345
		Other Area	166	317	483	266	255	521	340	284	624	421	307	728	498	317	815	577	323	900	646	336	982
		Total	1,463	2,557	4,020	1,940	2,607	4,547	2,392	2,793	5,185	2,876	2,936	5,812	3,353	3,008	6,361	3,825	3,043	6,868	4,255	3,072	7,327
Grand Total			34,786	33,825	68,611	40,657	35,661	76,318	47,103	37,110	84,213	53,652	38,198	91,850	60,062	38,945	99,007	66,067	39,436	105,503	71,417	40,057	111,474

Table 4-4 RESULT OF PROJECTION FOR EMPLOYMENT BY SECTOR

(Unit of Employed Population : 1000 persons)

No.	Sector	1987	1990	1995	1998	2000	2005	2010	2015	2020	2025	1987~1990	1990~1995	1995~1998	2000~2005	2005~2010	2010~2015	2015~2020	2020~2025	1995~2025
1	Agriculture	10,087	10,008	11,467	11,378	11,451	12,131	13,305	14,179	14,956	15,618	-0.26	2.58	0.03	0.52	1.16	1.87	1.28	1.07	0.87	1.06
2	Industry	2,966	3,387	4,130	4,966	5,612	7,134	7,965	8,829	9,632	10,343	4.52	4.05	6.34	6.30	4.92	2.23	2.08	1.76	1.43	3.11
3	Service	7,816	8,793	10,579	12,171	13,135	15,060	17,154	19,350	21,426	23,291	4.00	3.77	4.78	3.88	2.77	2.64	2.44	2.06	1.68	2.67
	Total	20,869	22,188	26,076	28,515	30,198	34,324	38,424	42,359	46,014	49,252	2.06	3.28	3.03	2.91	2.60	2.28	1.97	1.67	1.57	0.23

Data Source : The figures until 1995 are provided by National Statistical Office.
Note : The figures until 1995 are the ones of July for each year.

Table 4-5 RESULT OF PROJECTION FOR EMPLOYMENT OF INDUSTRIAL SECTOR BY REGION

(Unit of Employed Population : 1000 persons)

No.	Administrative Region	1995	2000	2005	2010	2015	2020	2025	Annual Average Growth Rate (%) (1995~2000)	(2000~2005)	(2005~2010)	(2010~2015)	(2015~2020)	(2020~2025)	(1995~2025)
	NCR	798	928	1,122	1,222	1,323	1,414	1,492	3.07	3.86	1.72	1.66	1.34	1.08	2.11
	CAR	66	76	83	86	89	92	94	2.85	1.77	0.78	0.72	0.59	0.48	1.19
1	Ilocos	199	320	429	489	554	614	669	9.98	6.01	2.69	2.50	2.10	1.71	4.12
2	Cagayan Valley	85	98	107	111	115	118	121	2.85	1.77	0.78	0.72	0.59	0.48	1.19
3	Central Luzon	555	893	1,195	1,365	1,545	1,714	1,865	9.98	6.01	2.69	2.50	2.10	1.71	4.12
4	South Tagalog	819	1,091	1,418	1,597	1,784	1,957	2,111	5.90	5.38	2.41	2.24	1.88	1.52	3.21
5	Bicol	240	320	391	429	467	501	531	5.90	4.12	1.84	1.71	1.43	1.16	2.68
6	West Visayas	251	334	409	448	488	524	555	5.90	4.12	1.84	1.71	1.43	1.16	2.68
7	Central Visayas	382	563	745	847	953	1,054	1,143	8.05	5.78	2.59	2.41	2.02	1.64	3.72
8	East Visayas	121	146	166	176	185	193	200	3.87	2.55	1.13	1.05	0.87	0.71	1.69
9	West Mindanao	95	146	200	230	263	294	323	8.96	6.48	2.90	2.70	2.27	1.84	4.16
1	North Mindanao	186	214	234	243	252	259	266	2.85	1.77	0.78	0.72	0.59	0.48	1.19
11	South Mindanao	232	356	488	563	643	719	788	8.96	6.48	2.90	2.70	2.27	1.84	4.16
12	Central Mindanao	87	110	130	140	150	159	166	4.88	3.34	1.49	1.38	1.15	0.93	2.19
	ARMM	14	16	18	18	19	20	20	2.85	1.77	0.78	0.72	0.59	0.48	1.19
	Total	4,130	5,612	7,134	7,965	8,829	9,632	10,343	6.32	4.92	2.23	2.08	1.76	1.43	3.11

Data Source : The figures during the period from 1987 to1995 were provided by National Statistical Office.

Table 4-6 RESULT OF PROJECTION FOR EMPLOYMENT OF SERVICE SECTOR BY REGION

(Unit of Employed Population : 1000 persons)

No.	Administrative Region	1995	2000	2005	2010	2015	2020	2025	Annual Average Growth Rate (%) (1995~2000)	(2000~2005)	(2005~2010)	(2010~2015)	(2015~2020)	(2020~2025)	(1995~2025)
	NCR	2,277	2,891	3,355	3,861	4,392	4,893	5,344	4.89	3.02	2.85	2.61	2.19	1.78	2.88
	CAR	125	126	126	126	127	127	127	0.13	0.06	0.04	0.03	0.02	0.02	0.05
1	Ilocos	525	681	801	934	1,075	1,211	1,333	5.34	3.31	3.12	2.86	2.40	1.95	3.16
2	Cagayan Valley	338	415	471	530	592	649	699	4.17	2.57	2.42	2.21	1.85	1.50	2.45
3	Central Luzon	1,124	1,342	1,498	1,661	1,825	1,975	2,106	3.61	2.22	2.09	1.91	1.59	1.29	2.12
4	South Tagalog	1,415	1,779	2,052	2,347	2,655	2,944	3,203	4.68	2.89	2.73	2.50	2.09	1.70	2.76
5	Bicol	676	868	1,015	1,177	1,348	1,510	1,657	5.14	3.18	3.00	2.75	2.30	1.87	3.03
6	West Visayas	874	1,152	1,369	1,612	1,873	2,125	2,355	5.68	3.52	3.32	3.04	2.55	2.08	3.56
7	Central Visayas	662	733	780	826	871	909	941	2.06	1.25	1.16	1.05	0.87	0.70	1.18
8	East Visayas	477	558	615	673	731	783	828	3.18	1.95	1.83	1.67	1.39	1.13	1.86
9	West Mindanao	377	515	625	752	891	1,028	1,155	6.42	3.98	3.76	3.45	2.90	2.36	3.80
1	North Mindanao	549	642	707	774	840	900	952	3.17	1.95	1.82	1.66	1.39	1.12	1.85
11	South Mindanao	748	993	1,187	1,403	1,637	1,864	2,072	5.84	3.62	3.41	3.13	2.63	2.14	3.46
12	Central Mindanao	292	310	331	346	360	372	382	1.59	0.95	0.88	0.79	0.65	0.52	0.90
	ARMM	121	126	128	131	133	135	136	0.76	0.44	0.39	0.34	0.27	0.21	0.40
	Total	10,580	13,135	15,000	17,154	19,350	21,426	23,291	4.42	2.77	2.64	2.44	2.06	1.68	2.67

Data Source : The figures during the period from 1987 to1995 were provided by National Statistical Office.

Table 4-7 RESULT OF GDP PROJECTION BY SECTOR
(AT CONSTANT 1985 PRICES)

Unit of GDP : Million Pesos

No.	Sector	Subsector	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	2000	2005	2010	2015	2020	2025
I	Agriculture																			
		1. Agriculture Industry																		
		a. Agriculture																		
		Crops	80,709	80,470	79,664	84,067	86,541	85,870	88,694	87,662	89,660	92,857	93,092	96,620	112,217	136,707	166,293	206,850	263,066	338,791
		Livestock	10,972	12,552	13,700	14,532	16,334	16,854	17,061	17,195	17,996	18,858	19,839	21,146	26,181	34,916	46,496	63,316	88,153	124,265
		Poultry	6,771	7,072	7,595	9,990	11,082	12,215	12,626	13,999	14,866	15,255	16,056	17,866	20,791	27,209	35,554	47,508	64,903	89,791
		Agricultural activities & services	6,048	6,146	6,196	6,858	7,109	7,692	7,823	8,154	8,214	8,336	8,632	8,842	9,825	11,792	14,132	17,318	21,698	27,530
		Sub-total	104,499	106,240	107,155	115,447	121,066	122,631	126,204	127,010	130,736	135,306	137,619	144,474	169,015	210,623	262,475	334,992	437,821	580,396
		b. Fishery	27,058	29,246	30,920	28,581	29,028	30,783	32,001	32,375	32,820	33,195	33,853	32,936	32,730	35,026	36,590	37,918	38,366	42,237
		2. Forestry	8,997	10,239	12,339	11,264	9,270	7,320	4,732	4,186	3,497	2,971	1,527	900	900	900	900	900	900	900
		Sub-total	140,554	145,725	150,414	155,292	159,364	160,734	162,937	163,571	167,053	171,472	172,999	178,310	202,645	246,549	299,964	373,810	477,087	623,533
II	Industry	1. Mining & Quarrying	11,893	12,313	11,232	11,704	11,389	11,091	10,770	11,495	11,571	10,765	11,396	11,225	12,388	17,747	22,040	27,034	32,994	40,827
		2. Manufacturing	143,851	146,453	154,604	169,316	179,132	183,925	183,111	179,947	181,289	190,374	203,271	214,451	299,855	455,149	677,790	996,910	1,458,915	2,164,717
		3. Construction	29,037	28,547	31,742	33,235	39,878	41,858	35,285	26,261	28,344	41,774	44,492	49,342	76,932	125,787	210,482	347,866	572,037	953,746
		4. Electricity, Gas & Water	15,767	17,851	15,811	17,797	18,756	18,674	19,552	19,681	20,255	23,061	26,060	27,988	42,479	58,193	86,541	127,113	185,769	275,266
		Sub-total	200,548	205,164	213,389	232,052	249,175	255,548	248,718	247,384	251,459	265,972	285,219	303,006	431,655	656,875	996,852	1,498,923	2,249,715	3,434,556
III	Service	1. Transportation, Communication																		
		and Storage	31,666	33,075	35,086	37,898	40,243	41,108	41,291	41,870	42,941	44,764	47,366	50,861	69,028	103,021	154,574	229,438	349,243	538,194
		2. Trade	82,855	86,917	90,038	95,180	102,729	107,428	108,002	109,780	112,479	116,923	123,430	130,163	170,293	242,763	347,916	493,272	715,026	1,046,185
		3. Finance	17,123	18,517	21,465	23,845	27,261	29,068	29,114	29,217	29,909	31,546	33,852	38,522	64,576	96,938	135,062	192,296	269,559	394,601
		4. Ownership of Dwellings																		
		and Real Estate	32,132	33,205	34,759	36,691	39,083	40,146	40,242	40,534	41,269	42,473	43,765	45,570	53,645	67,018	84,170	104,578	131,676	165,886
		5. Private Services	39,121	40,120	42,060	45,301	47,534	49,353	49,273	49,551	50,984	53,159	55,461	58,229	71,231	93,362	123,022	160,366	212,536	282,743
		6. Government Services	27,904	28,700	29,712	32,322	33,459	36,405	36,945	37,034	38,062	40,141	41,358	42,601	50,907	69,655	98,831	143,503	221,950	364,097
		Sub-total	230,781	240,534	253,120	271,237	290,309	304,408	304,867	307,986	315,644	329,006	345,232	365,946	479,680	672,777	943,604	1,323,453	1,899,989	2,791,707
Total			571,883	591,423	616,923	658,581	699,448	720,690	716,522	718,941	734,156	766,450	803,450	847,262	1,113,981	1,576,201	2,240,421	3,196,187	4,626,790	6,849,796

Annual Average Growth Rate (%)

No.	Sector	Subsector	1985-1990	1990-1995	1990-1991	1991-1992	1993-1993	1994-1994	1995-1996	1996-2000	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025
I	Agriculture														
		1. Agriculture Industry													
		a. Agriculture													
		Crops	1.25	1.63	3.29	-1.16	2.26	3.57	0.25	3.79	3.81	4.03	4.00	4.46	4.95	5.19	4.60
		Livestock	8.99	3.31	1.23	0.79	4.66	4.79	5.20	6.59	5.48	5.93	5.90	6.37	6.84	7.11	6.31
		Poultry	12.52	5.62	3.36	10.87	6.19	2.62	5.25	11.27	5.86	5.55	5.50	5.97	6.44	6.71	5.91
		Agricultural activities & services	4.93	2.33	1.70	4.23	0.74	1.49	3.55	2.44	2.67	3.72	3.69	4.15	4.61	4.88	3.94
		Sub-total	3.25	2.33	2.91	0.64	2.93	3.50	1.71	4.08	4.00	4.50	4.50	5.00	5.50	5.80	4.91
		b. Fishery	2.61	1.92	3.96	1.17	1.37	1.14	1.98	-2.71	-0.16	1.36	0.88	0.72	0.24	1.94	0.74
		2. Forestry	-4.04	-26.91	-35.36	-11.54	-16.46	-15.04	-48.60	-41.06	0.00	0.00	0.00	0.00	0.00	0.00	-1.75
		Sub-total	2.72	1.48	1.37	0.59	2.13	2.65	0.89	3.07	3.25	4.00	4.00	4.50	5.00	5.50	4.37
II	Industry	1. Mining & Quarrying	-1.39	0.54	-2.89	6.73	0.66	-0.98	5.88	-1.50	2.50	7.45	4.43	4.17	4.00	4.35	4.35
		2. Manufacturing	5.04	2.02	-0.44	-1.73	0.75	5.01	6.77	5.50	8.74	8.70	8.29	8.02	7.91	8.21	8.20
		3. Construction	2.59	1.23	-15.70	2.77	5.74	8.95	6.51	10.90	11.74	10.33	10.84	10.57	10.46	10.76	10.76
		4. Electricity, Gas & Water	3.44	6.89	4.70	0.66	2.92	13.85	13.00	7.40	10.99	6.50	8.26	7.99	7.88	8.18	8.17
		Sub-total	4.97	2.22	-2.67	-0.56	1.65	5.77	7.24	6.24	9.25	8.76	8.70	8.50	8.46	8.83	8.65
III	Service	1. Transportation, Communication													
		and Storage	5.36	2.87	0.45	1.40	2.56	4.25	5.81	7.38	7.93	8.34	8.45	8.22	8.77	9.03	8.44
		2. Trade	5.34	2.82	0.53	1.65	2.46	3.95	5.57	5.45	6.95	7.35	7.46	7.23	7.71	7.91	7.38
		3. Finance	11.84	2.47	-2.85	0.35	2.37	5.47	7.31	13.80	13.79	8.47	6.86	7.32	6.99	7.92	8.53
		4. Ownership of Dwellings													
		and Real Estate	4.55	1.74	0.24	0.73	1.81	2.92	3.04	4.13	4.16	4.55	4.66	4.44	4.72	4.73	4.54
		5. Private Services	4.76	2.36	-0.16	0.56	2.89	4.27	4.33	4.99	5.17	5.56	5.67	5.45	5.79	5.87	5.58
		6. Government Services	5.46	2.58	1.48	0.24	2.78	5.46	3.03	3.00	4.55	5.47	7.25	7.74	9.11	10.41	7.52
		Sub-total	5.69	2.55	0.15	1.02	2.49	4.23	4.93	6.00	7.00	7.00	7.00	7.00	7.50	8.00	7.22
Total			4.73	2.20	-0.58	0.34	2.12	4.40	4.83	5.45	7.08	7.19	7.29	7.36	7.68	8.16	7.40

Data Sources : 1.The figures for the period from 1985 to 1995 were quoted from the Philippine Statistical Yearbook, 1996
2. The growth rate of 1996 by sector was provided by NEDA.

Note : The annual average growth ratios for agriculture, industry by subsector and services during the period from 1997 to 2025 were provided by NEDA as preliminary values.