

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF THE INTERIOR AND LOCAL GOVERNMENT
THE REPUBLIC OF THE PHILIPPINES

STUDY ON THE
PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

VOLUME III - 6

SUPPORTING AND DATA REPORT

PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
FOR THE PROVINCE OF

ILOCOS NORTE



FEBRUARY 1996

NIPPON JOGESUIDO SEKKEI CO., LTD.

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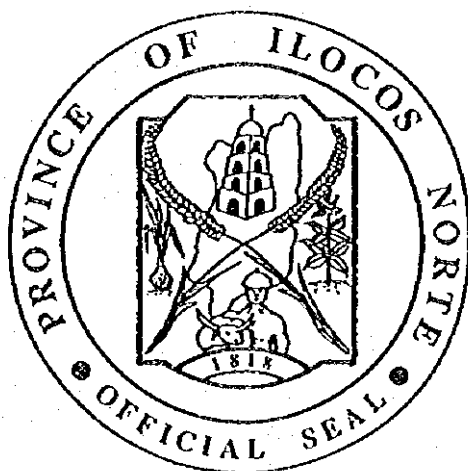
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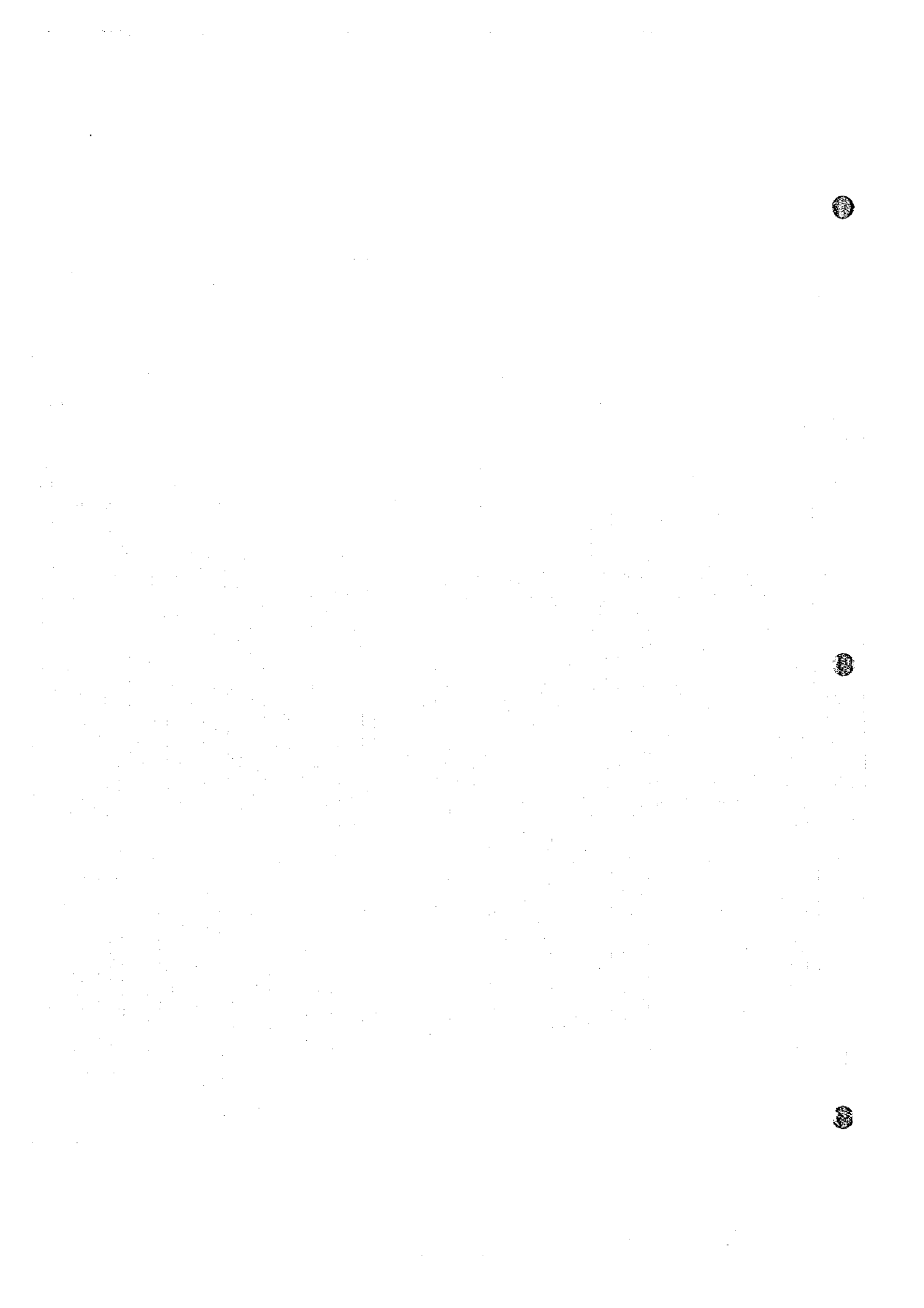
ILOCOS NORTE



FEBRUARY 1996

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**PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN**

VOLUME III - 6 SUPPORTING AND DATA REPORT

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SANITATION SECTOR PLAN**

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SUPPORTING REPORT


**A. BACKGROUND INFORMATION AND
EXISTING CONDITIONS**

1. INTRODUCTION
- 1.3 The Provincial Plan for the Province of Ilocos Norte
- 1.3.1 Preparation of the Plan

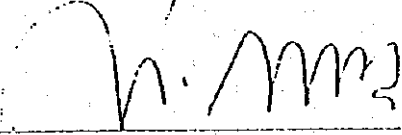
MINUTES OF DISCUSSIONS
ON
THE INCEPTION REPORT
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, SEPTEMBER 5, 1994



HON. YOLANDA MA. L. DE LEON
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Dept. of the Interior and Local Government



MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l Cooperation Agency

Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, dispatched the Study Team to the Republic of the Philippines on August 31, 1994 to conduct "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") in accordance with the Implementing Arrangement for the Study between the JICA and the Department of the Interior and Local Government (hereinafter referred to as "DILG") on November 19, 1993.

A series of discussions was made on the Inception Report for the Study between the Study Team and officials of DILG. In the course of discussions, both parties have agreed to the main items described in the Inception Report. The list of attendants in the series of discussions is presented in Appendix A.

1. Objectives and Scope of Work for the Study

- (1) Formulation of long-term provincial development plan for water supply, sewerage and sanitation sector to the year 2010 through technical assistance to the provincial staff; and
- (2) Preparation of medium-term (five year) sector investment plan based on the long-term development plan.

The Study will be conducted in two stages for the two batches.

2. Study Area

The study area covers the following nine (9) provinces and are grouped as follows:

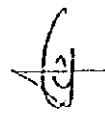
BATCH No. 1

- (1) Zambales
- (2) Rizal
- (3) Mindoro Oriental
- (4) Mindoro Occidental

BATCH No. 2

- (1) Abra
- (2) Ilocos Norte
- (3) Ilocos Sur
- (4) Nueva Vizcaya
- (5) Batanes

For Rizal province, four (4) municipalities covered by the MWSS will be excluded in the future plan. The conduct of the Study for Batch No. 2 shall be finally determined after ascertaining the peace and order conditions in the subject provinces by the end of the Batch No. 1 Study.



3. General Approach and Methodology to the Study

(1) Planning framework for future sector development

- a. Base years shall be determined after discussion with NEDA to conform with national plans and programs.
- b. The PW4SP shall be prepared within the context of existing plans and projects. However some modifications may be made where appropriate to reflect the updated information.
- c. Conformity and consistency of the Study with the national plans and programs such as the NEDA Board Resolutions Nos. 4 and 5 - Series 1994; the Water Sector Reforms Study and the National Urban Sewerage and Sanitation Strategy Plan for the Philippines.

(2) Establishment of data base

To maintain consistency and compatibility with the existing data base of previously developed PW4SPs, the Study will adopt the same in principle and will be modified if needed.

(3) Water source development

Water Availability Maps will be developed through update of the NWRB's Rapid Assessment Report and other studies.

(4) Community development and training

Training needs assessment will be undertaken to guide the Study in identifying manpower development strategies and programs. Existing local training resources and activities will be evaluated. A community development study will be undertaken entailing model studies for each of the three service levels in every province.

(5) Technology Transfer

Capacity building and technology transfer are important elements of the Study. To the extent possible, counterpart staff at the local and national levels shall participate actively in data collection and analysis, formulation of strategic recommendations, and the preparation of the PW4SP.

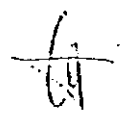
4. Implementation Set-Up for the Study

In accordance with the Implementing Arrangements between the DILG and the JICA, the DILG shall:

- (1) secure the safety of the JICA Study Team;
- (2) assign DILG counterpart staff members who will coordinate and assist PSPTs at the provincial level;
- (3) Set-up PSPTs by respective provincial governments in the study area and secure budget to carry out the Study;
- (4) through PSPT in each study area province; facilitate and coordinate in data gathering with municipal government and other agencies concerned, and participate in workshops and preparation of PW4SP.
- (5) facilitate coordination with concerned agencies like DPWH, DOH, NEDA, LWUA and with appropriate bodies such as PCC (FW4SP) and the like.

The JICA shall:

- (1) pursue technology transfer to the Philippine counterpart personnel in the course of the Study and;
- (2) assist PSPTs in the preparation of the PW4SP.



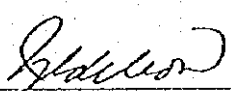
LIST OF ATTENDANTS IN THE SERIES OF DISCUSSIONS

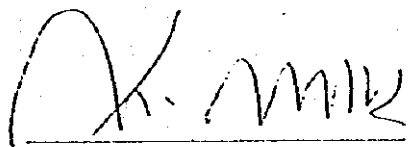
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2. MR. EIJI IWASAKI	Asst. Resident Representative, Phil. Office
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MINUTES OF DISCUSSIONS
ON
THE PROGRESS REPORT I
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, DECEMBER 20, 1994


HON. YOLANDA MA. L. DE LEON
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Dept. of the Interior and Local Government


MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l. Cooperation Agency

The Stage I field work for "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") started on August 31, 1994 and completed on December 28, 1994.

A series of discussions was held, through the course of the Study, between JICA Study Team and officials concerned including DILG, NEDA, DPWH, LWUA, other central agencies and provinces. General approach and methodologies, as presented in the Inception Report, have been employed for the planning work.

Progress Report I, which covers all outputs during the work period, was prepared entailing part of PW4SP for respective provinces. The contents of the report were basically agreed upon on December 20, 1994 between JICA Study Team and officials concerned in the Philippine side. The list of attendees to the meeting is presented in Appendix A. The following were confirmed and/or agreed upon by both parties.

1. Study Area Coverage

For Rizal province, four (4) municipalities covered by the MWSS were initially agreed to be excluded from the sector plan. However, inclusion of the Talim Island, part of Binangonan (rural area) which is one of the four municipalities, has been reconsidered upon request by the Governor.

2. Planning Conditions

(1) Table of Contents for PW4SP: referring to previous PW4SPs, some modifications were made.

(2) Planning Conditions:

a. Conformity and consistency of the Study shall be ensured especially with "Medium-Term Philippine Development Plan 1993-1998."

b. Planning base year is 1994, while target years are 2000 and 2010 for medium-term and long-term purposes, respectively. The start year of 5-year medium-term development is set to be 1996.


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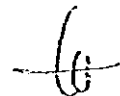
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- c. Population projection: NSO projection was basically adopted. However, some modifications on urban and rural population by municipality were made with reference to re-classification of barangays reviewed by respective PSPTs.
- d. Data management: outputs in tables and graphics are prepared in EXCEL spreadsheets for final analysis and presentation.
- e. Sector arrangements and institutional capacity: previous arrangements adopted and experiences learned by the central government agencies are discussed in detail for reference/basis of LGUs in coming up with sector plan.

(3) Future Arrangements by DILG

- a. Further arrangements with PSPTs will be done by DILG to catch up with the schedule to complete PW4SP within one month during February, 1995 after holding workshop at respective provinces.
- b. Arrangements with Batch No. 2 provinces will be initiated based on the experience in Batch No. 1 study, ascertaining the peace and order in the provinces.
- c. To ensure timely completion/finalization of the Plans, DILG shall work closely with the LGUs and other agencies in getting the comments and recommendations on the Draft Plans.
- d. Adoption of the Plans by the Provincial Council (Sangguniang Panlalawigan) shall also be facilitated by DILG.





LIST OF ATTENDANTS

<u>Attendants</u>	<u>Designation</u>
A. DILG	
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3. MS. ELLEN I. PASCUA	Chief, Admin. Div., PMO
4. MR. MARIO VERGEL DE DIOS	Chief, Operations Div., PMO
5. MS. FE CRISILLA M. BANLUTA	PW4SP Overall Coordinator, PMO
6. MS. JOSEPHINE RAMOS	DILG Coordinator, Oriental Mindoro
7. MS. LINA GRIEGO	DILG Coordinator, Occidental Mindoro
8. MS. MA. CONTESSA NAVARRO	DILG Coordinator, Rizal
9. MS. VIVIAN BIALA	DILG Coordinator, Zambales
B. OTHER AGENCIES	
1. MR. ROGELIO FLORES	Director, PMO-RWS, DPWH
2. MR. VIRGILIO GACUSANA	Chief, Planning Division, PMO, DPWH
3. MR. VICTOR SABANDEJA	Chief, Environmental Health Division, DOH
4. MR. ANIANO FORNELOS JR.	Sanitary Engineer II, DOH
C. JICA	
1. MR. EIJIE IWASAKI	Asst. Resident Representative, Philippine Office
D. JICA Study Team	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engineer
3. MS. YOLANDA M. MINGOA	Sanitary Engineer
4. MR. WILFRIDO C. BARREIRO	Institutional/CD/T Specialist
5. MR. ALLEN LOWE	System Engineer

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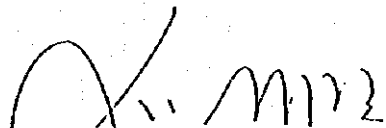
MINUTES OF DISCUSSIONS
ON
THE PROGRESS REPORT II
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, MARCH 8, 1995



HON. YOLANDA MA. L. DE LEON
Assistant Secretary
Dept. of the Interior and Local Government



MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l. Cooperation Agency

The Stage II field work for "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") resumed on January 14, 1995 and completed on March 14, 1995.

Conditions and assumptions for development of Medium-Term and Long-Term sector plans were discussed and finalized between respective PSPTs and JICA Study Team through the conduct of Workshop No. 3.

Progress Report II, as a draft of PW4SP, was prepared. In this connection, contents of the report were basically agreed upon on March 8, 1995 between JICA Study Team and officials concerned in the Philippine side. The list of attendees to the meeting is presented in Appendix A.

The following are future arrangements required by both parties:

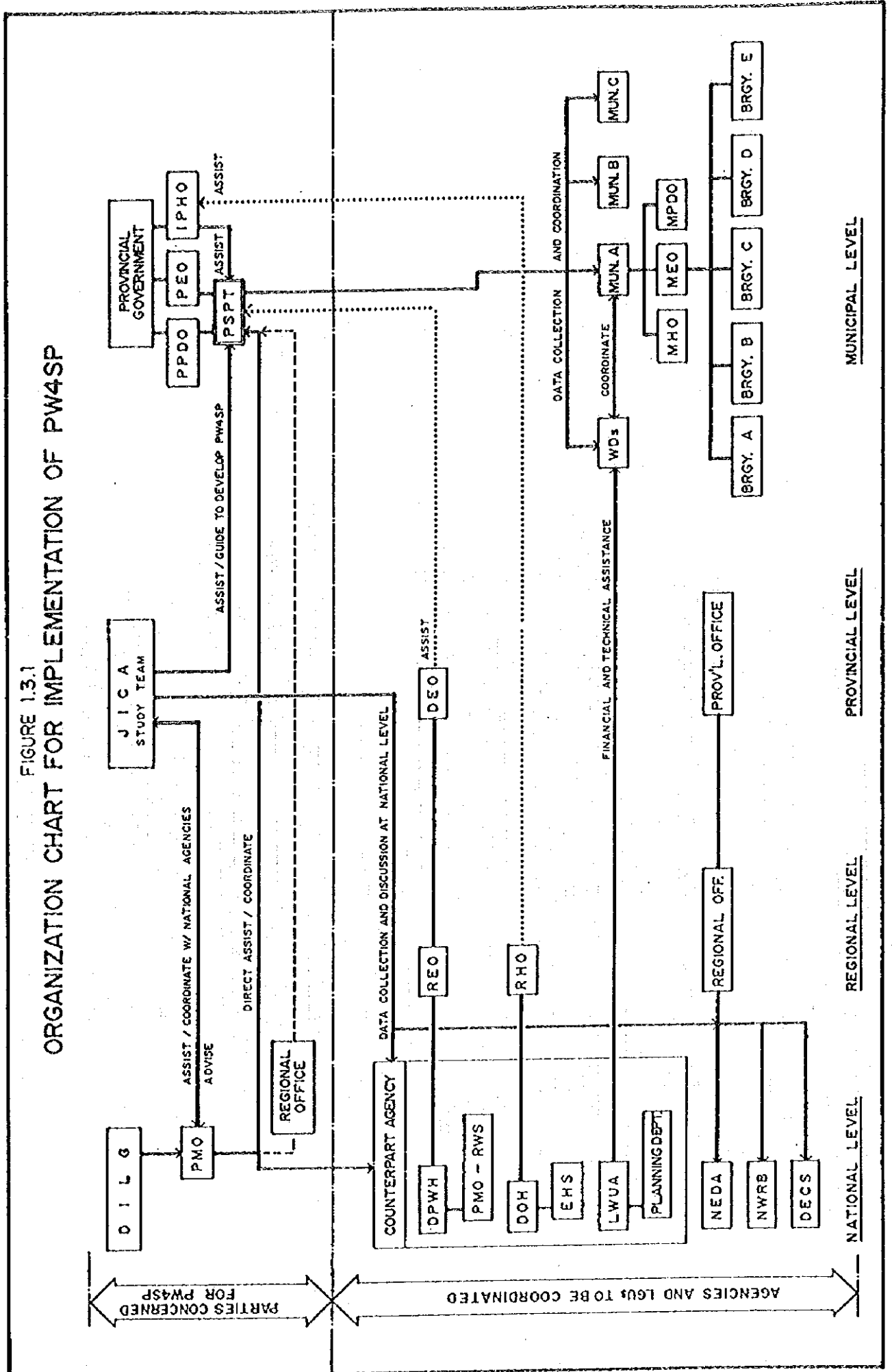
- (1) DILG will follow-up Batch No. 2 provinces for implementation of the PW4SPs, ascertaining the peace and order situation in the provinces.
- (2) The starting date of the third field work by JICA Study Team for Batch No. 2 will be informed to DILG through JICA Philippine Office.

Appendix A

LIST OF ATTENDEES

<u>Attendees</u>	<u>Designation</u>
A. DILG	
1. MR. ORVILLE M. ROQUE	Project Manager, PMO
2. MS. ELLEN I. PASCUA	Assistant Project Manager, PMO
3. MR. ROGELIO B. OCAMPO	Chief, Planning Div., PMO
4. MS. FE CRISILLA M. BANLUTA	PW4SP Overall Coordinator, PMO
5. MS. JOSEPHINE RAMOS	DILG Coordinator, Oriental Mindoro
6. MS. LINA GRIEGO	DILG Coordinator, Occidental Mindoro
7. MS. MA. CONTESSA NAVARRO	DILG Coordinator, Rizal
8. MS. VIVIAN BIALA	DILG Coordinator, Zambales
B. OTHER AGENCIES	
1. MR. VIRGILIO GACUSANA	Chief, Planning Division, PMO, DPWH
C. JICA	
1. MR. EIJI IWASAKI	Asst. Resident Representative, Philippine Office
2. MR. NOBUAKI MIYATA	Second Development Study Div., Social Development Study Dept.
D. JICA Study Team	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engineer
3. MS. YOLANDA M. MINGOA	Sanitary Engineer
4. MR. WILFREDO C. BARREIRO	Institutional/CD/T Specialist
5. MR. MANABU FUJIKAWA	Financial Specialist
6. MR. ALLEN LOWE	System Engineer


FIGURE 1.3.1
ORGANIZATION CHART FOR IMPLEMENTATION OF PW4SP

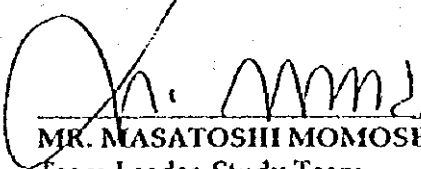


MINUTES OF DISCUSSIONS
ON
THE DRAFT FINAL REPORT
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, DECEMBER 7, 1995


HON. YOLANDA MA. L. DE LEON
Assistant Secretary
Dept. of the Interior and Local Government


MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l. Cooperation Agency

The Stage III field work for Batch II for "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") started on May 22, 1995 and will be completed on December 15, 1995.

Major conditions and assumptions for the development of Medium-Term and Long Term sector plans for the remaining five (5) provinces under Batch II were discussed and finalized between respective PSPTs and JICA Study Team through the conduct of Workshop No. 3.

The Draft Final Reports for the nine (9) provinces, which cover all outputs during the study period, were prepared for respective provinces. The contents of the report were basically agreed upon on December 7, 1995 between JICA Study Team and officials concerned in the Philippine side. The list of attendees to the meeting is presented in Appendix A. The following were confirmed and/or agreed upon by both parties.

1. Correction of typographical errors of the Draft Final Report will be undertaken by the Study Team prior to printing of the Final Report.
2. Adoption of the Plans (Batch II) by the Provincial Council (Sangguniang Panlalawigan) shall be facilitated by DILG in the same manner as Batch I.
3. Inclusion of the Message of the Governor in the Main Report of respective PW4SPs.

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LIST OF ATTENDEES

<u>Attendees</u>	<u>Designation</u>
A. DILG	
1. HON. YOLANDA MA. L. DE LEON	Assistant Secretary
2. MR. ORVILLE M. ROQUE	Program Manager, PMO
3. MS. ELLEN I. PASCUA	Asst. Program Manager, PMO
4. MR. ROGER OCAMPO	Chief, Planning Div., PMO
5. MR. MARIO VERGEL DE DIOS	Chief, Operations Div., PMO
6. MS. FE CRISILLA M. BANLUTA	PW4SP Overall & Ilocos Norte Coordinator
7. MS. JOSEPHINE RAMOS	DILG Coordinator, Abra & Or. Mindoro
8. MS. LINA GRIEGO	DILG Coordinator, Batanes & Occ. Mindoro
9. MS. MA. CONTESSA NAVARRO	DILG Coordinator, Nueva Vizcaya & Rizal
10. MS. VIVIAN BIALA	DILG Coordinator, Ilocos Sur & Zambales
B. OTHER AGENCIES	
1. MR. ROGELIO A. FLORES	Director, PMO-RWS, DPWH
2. MR. VIRGILIO GACUSANA	Chief, Planning Division, PMO, DPWH
3. MR. VICTOR SABANDEJA	Chief, Environmental Health Division, DOH
4. MR. ANIANO FORNELOS JR.	Sanitary Engineer II, DOH
5. MR. JOSE RENE RONCESVALLES	Program Manager, LWUA
C. JICA	
1. MR. SHIGEYUKI MATSUMOTO	2nd Development Study Div., Social Development Study Dept.
D. JICA Study Team	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engineer
3. MS. YOLANDA M. MINGOA	Sanitary Engineer
4. MR. WILFRIDO C. BARREIRO	Institutional/CD/T Specialist
5. MR. ALLEN LOWE	System Engineer

2. **PLANNING APPROACH FOR FUTURE SECTOR DEVELOPMENT**
2.6 **Planning Principles and Data Management**
2.6.2 **Data Management**

(1) Computer-based System

The data management system was established to support the Provincial Sector Planning Team (PSPT) in the preparation of the Provincial Water Supply, Sewerage and Sanitation Sector Plan (PW4SP). An essential task of data management is to organize various kind of data into an effective and efficient information base.

A computer-based system was applied as a viable solution to process large amount of data and to minimize the human-error in calculation. For this particular project, a dynamic system is designed to allow the planner to adjust planning factors and update the information when further data becomes available.

It is viable and economical to choose the microcomputer with software suitable for the average skills of the common user. In this connection, of the two types of software package available, *database* and *spreadsheet*, the latter method was selected. Among the available spreadsheet-type software, EXCEL was used. EXCEL supports file conversion (opening and saving), multiple file opening, graphic presentation of data, What-You-See-Is-What-You-Get (WYSIWYG) formatting, scaleable font and view, etc. The following are the advantages and disadvantages of the spreadsheet method with reference to database method.

<u>Advantage</u>	<u>Disadvantage</u>
1. Minimum programming skills	1. Repeated entry of same formula
2. Friendly environment to users	2. Sorting or indexing is done manually
3. Graphic presentation of data at user's option	3. All data are loaded in memory, which require huge amount of memory
4. Execution of data linkage at formula level entry	4. Limited to static data linkages
5. Guided formula creation using function wizard	

Data management task starts from the collection of data using the questionnaire forms. The existence and accuracy of data are major concern at this stage to prepare main information bases. Using the microcomputer provided with EXCEL spreadsheet, data in the questionnaire forms are transferred into the forms constructed in EXCEL. Applicable policy, criteria and assumptions are entered into key parameter tables. These data are then processed and finally consolidated into target forms. These final forms provide a map of provincial profile, service coverage, future requirements, cost estimates for future sector development, and funding requirements.

Table 2.6.1 Key Parameter

No.	Description of Key Parameter		Unit	Values			
1.	Service Level	Water Supply Number of household to be served by Level I Facility Water Consumption Rate for Level III System	HH/Facility Liter/capita/day				
		Sanitation Std. number of student to be served by a unit of sanitary toilet Standard number of toilets for a public utility	Student/Toilet Toilet/Public Facility				
2.	Provincial Sector Target	Medium Term Plan	Water Supply Urban Water Supply Rural Water Supply	% of Population % of Population			
			Sanitation Household Toilet <i>Urban Household Toilet</i> Flush Pour Flush VIP Latrine <i>Rural Household Toilet</i> Flush Pour Flush VIP Latrine School Toilet Public Toilet Solid Waste	% of Household % of Household % of Household % of Household % of Household % of Household % of Household % of Public Student % of Public Utility % of Population			
				Water Supply Urban Water Supply Rural Water Supply	% of Population % of Population		
				Sanitation Household Toilet <i>Urban Household Toilet</i> Flush Pour Flush VIP Latrine <i>Rural Household Toilet</i> Flush Pour Flush VIP Latrine School Toilet Public Toilet Urban Sewerage	% of Household % of Household % of Household % of Household % of Household % of Household % of Household % of Public Student % of Public Utility % of Urban Population		
		Long Term Plan			Water Supply Urban Water Supply Rural Water Supply	% of Population % of Population	
			Sanitation Household Toilet <i>Urban Household Toilet</i> Flush Pour Flush VIP Latrine <i>Rural Household Toilet</i> Flush Pour Flush VIP Latrine School Toilet Public Toilet		% of Household % of Household % of Household % of Household % of Household % of Household % of Household % of Public Student % of Public Utility		
					3. Percentage of Level I Wells for Rehabilitation		%
				4. Percentage of Sector Management Cost to Construction Cost Feasibility and Detail Design Construction Supervision		% of Construction Cost % of Construction Cost	
5. Contingencies Physical Contingency Price Contingency		% of Construction Cost Percent per annum					
6. Community Development and Training Cost Level III Level I and II		% of Construction Cost % of Construction Cost					
7.	Recurrent Cost	Level III System (Operating Cost)	Pesos/HH/year				
		Level III System (Spare Parts/Equipment)	% of Construction Cost				
		Level II System (Spare Parts/Equipment)	Pesos/HH/year				
		Level I System (Spare Parts/Equipment)	Pesos/HH/year				
		Public School Toilet Maintenance Cost Public Utility Toilet Maintenance Cost	Pesos/Toilet/year Pesos/Toilet/year				
8.	Allocation factors/Percentages of IRA From Provincial From Municipality and Brgy.		% %				
	9. Funding Levels/Percentages for Different Financing Scenarios 1st Scenario 2nd Scenario 3rd Scenario 4th Scenario 5th Scenario		% Funding Available % Funding Available % Funding Available % Funding Available % Funding Available				

Table 2.6.2 Composition of Well Sources and Specific Capacity

Municipality	Area	Source	Proportion (%)	Standard Specification		
				Depth (m)	SWI (m)	Specific Capacity (lit/sec/m)
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
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	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				

Table 2.6.5 Unit Construction Cost of Different Facilities

Description	Unit Construction Cost (Pesos)	Service Coverage		Unit Cost	
		Served Population	Served Household	Pesos/Person	Pesos/Household
Water Supply					
<i>Level III - New System</i>					
For 5000 Population					
For 10000 Population					
For 15000 Population					
<i>Level III - Expansion</i>					
For 5000 Population					
For 10000 Population					
For 15000 Population					
<i>Level II</i>					
<i>Level I</i>					
Deep Well - 30 meter depth					
Deep Well - 50 meter depth					
Deep Well - 70 meter depth					
Shallow Well					
Spring Development					
<i>Rehabilitation Cost for Level I Deep Well</i>					
<i>Disinfection of Level I Wells</i>					
Sanitation					
Flush					
Pour Flush					
VIP Latrine					
School Toilet					
Public Toilet					
Urban Sewerage					

Table 2.6.6 Scoring Factor for Municipal Investment Ranking for Urban Water Supply

Unit: Percent

Score	Underserved and Unserved Population in Base Year	Underserved and Unserved Population in Phase I	Population Unserved by Level III Systems in Base Year
1.0	< %	< %	< %
0.8	< %	< %	< %
0.6	< %	< %	< %
0.4	< %	< %	< %
0.2	%	%	%
Weight Allocation Score			

Table 2.6.7 Scoring Factor for Municipal Comprehensive Investment Ranking

Unit: Percent

Score	Urban Water Supply	Rural Water Supply	Urban Sanitation	Rural Sanitation
1.0	N.A.	< %	< %	< %
0.8	N.A.	< %	< %	< %
0.6	N.A.	< %	< %	< %
0.4	N.A.	< %	< %	< %
0.2	N.A.	%	%	%
Weight Allocation Score				

3. PROVINCIAL PROFILE

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Table 3.3.1 Distribution of Household by Income Class

Income Class	Ilocos Norte				Region I	
	Total Families ¹		Annual Income		Total Number of Families	Annual Income Average (Pesos)
	Number	Share	Total (P 1,000)	Average (Pesos)		
Under 15,000	7,356	7.78	84,891	11,541	39,905	11,560
15,000 - 19,999	8,351	8.83	149,242	17,870	44,018	17,628
20,000 - 29,999	21,484	22.73	533,768	24,845	134,728	25,132
30,000 - 39,999	12,339	13.05	426,598	34,572	114,843	34,502
40,000 - 59,999	18,116	19.17	931,397	51,414	143,584	48,926
60,000 - 99,999	15,135	16.01	1,211,587	80,051	122,295	76,111
100,000 - 249,999	9,949	10.53	1,550,077	155,802	62,116	142,519
250,000 and over	1,794	1.90	626,017	348,892	10,038	427,302
Total/Average	94,524	100.00	5,513,577	58,330	671,527	56,678
Median				36,683		40,253

Source: 1991 Family Income and Expenditures Survey, NSO

Note:

- (1) Based on NEDA and other agencies, poverty threshold in Region I in 1991 was estimated at P 48,700. Proportion of families below poverty level was 62% in the same year.
- (2) For purposes of the survey, a family is defined as a group of persons usually living together and composed of the head and other persons related to the head by blood, marriage or adoption. A single person living alone is considered as a separate family.

Table 3.3.2 Gainful Workers by Occupation Group and Major Industry Group

Major Occupation Group	Gainful Workers 15 Years Old and Over	MAJOR INDUSTRY GROUP				
		Agriculture, Fishery and Forestry	Mining and Quarrying	Manu- facturing	Electricity, Gas and Water	Construction
Total	155,661	78,320	333	6,169	637	5,784
Official of Govt. & Special Interest Org., Corp. Executives, Managers, Managing Prod. & Supervisors	5,304	50	21	226	59	265
Professional	6,135	-	-	72	43	95
Technicians and Associated Professional	2,148	39	-	90	21	22
Clerks	3,743	10	-	116	176	21
Service & Shop Market Sales Workers	5,910	17	-	210	-	-
Farmers, Forestry Workers & Fishermen	73,571	73,122	-	10	-	-
Craft and Related Workers	10,567	-	171	3,694	198	4,762
Plant & Machine Operators and Assemblers	9,161	49	115	695	73	130
Elementary Occupations	20,385	4,412	-	201	20	72
Other Occupations	11,109	621	26	815	47	417
Occupation Not Stated	7,628	-	-	-	-	-

Major Occupation Group	MAJOR INDUSTRY GROUP					
	Wholesale and Retail Trade	Transportation and Communication	Financing, Insurance, Real Estate and Business Services	Community, Social and Personal Services	Activities Not Adequately Defined	Not Stated
Total	10,380	8,746	1,403	26,737	15,056	2,096
Official of Govt. & Special Interest Org., Corp. Executives, Managers, Managing Prod. & Supervisors	2,478	223	127	1,540	275	-
Professional	42	77	131	3,851	1,824	-
Technicians and Associated Professional	265	96	293	1,099	223	-
Clerks	507	196	297	1,778	642	-
Service & Shop Market Sales Workers	2,225	349	364	2,450	295	-
Farmers, Forestry Workers & Fishermen	29	-	-	92	318	-
Craft and Related Workers	57	153	-	1,196	336	-
Plant & Machine Operators and Assemblers	53	7,143	20	621	262	-
Elementary Occupations	4,318	269	41	10,389	663	-
Other Occupations	406	240	130	3,701	4,706	-
Occupation Not Stated	-	-	-	20	-5,512	2,096

Source: NSO Census 1990

3.3.3 Education

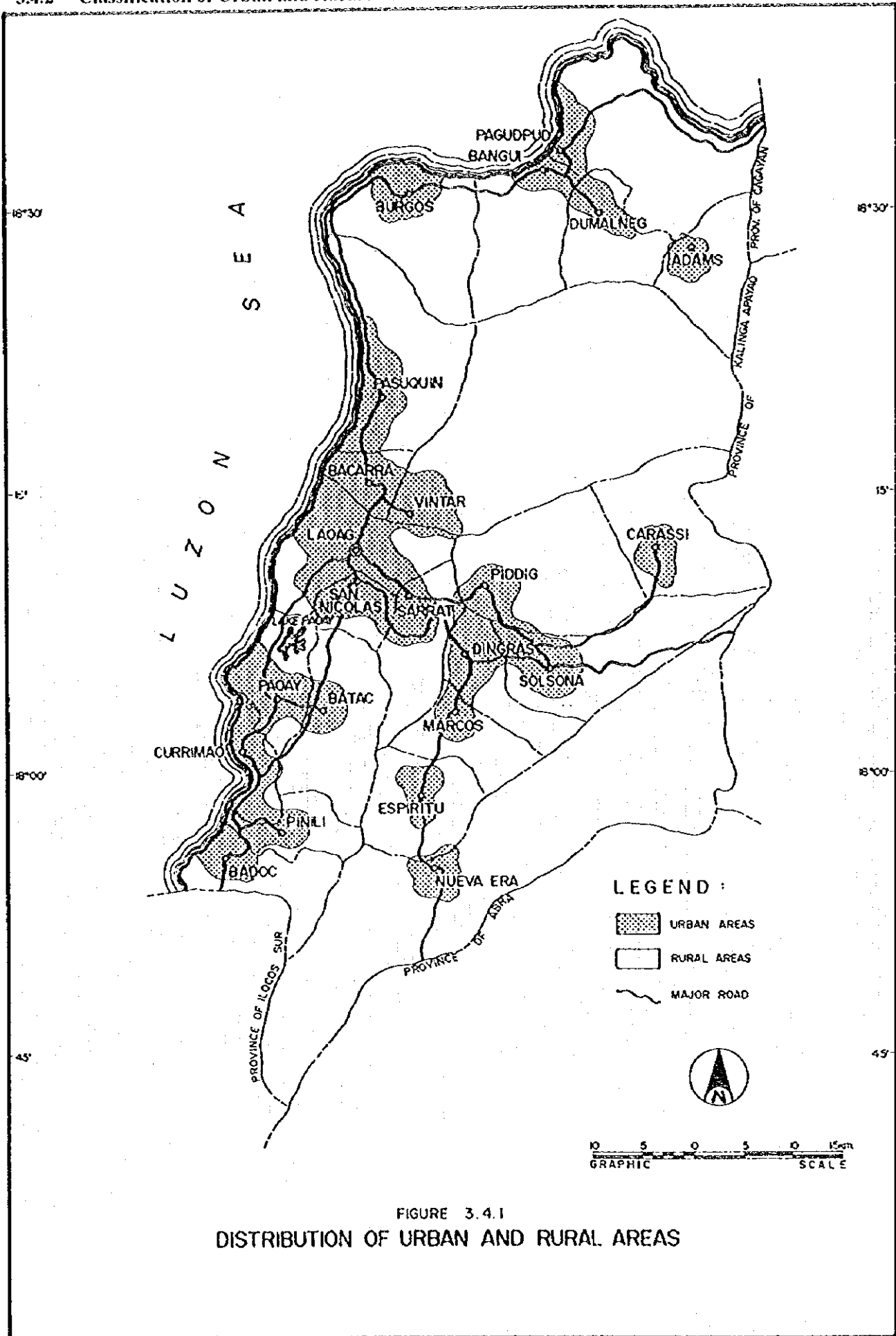
Table 3.3.3 Household Population by Highest Educational Attainment

Highest Educational Attainment	Household Population 7 Years Old and Over	Age Group						
		Below 20	20-24	25-29	30-34	35-39	40-44	45 & Over
Total	385,702	133,358	41,958	36,326	30,781	26,345	22,317	94,617
No Grade	20,733	4,037	377	385	399	422	523	14,590
Pre-School	3,058	2,758	12	11	8	12	16	241
Elementary	191,578	7,858	9,261	9,869	10,906	12,111	12,752	58,663
1st - 4th Grade	88,584	78,016	1,769	1,676	2,070	2,669	3,059	28,510
5th - 7th Grade	102,994	48,831	7,492	8,193	8,836	9,442	9,693	30,153
High School	100,951	29,185	16,558	12,281	9,574	7,025	4,389	11,504
Undergraduate	46,636	39,358	4,810	3,476	2,793	2,194	1,533	4,472
Graduate	54,315	12,262	11,748	8,805	6,781	4,831	2,856	7,032
Post Secondary	9,175	830	2,604	2,142	1,395	768	408	1,029
Undergraduate	1,663	259	468	325	216	154	90	151
Graduate	7,513	571	2,136	1,817	1,179	614	318	878
College Undergraduate	30,203	788	7,872	4,880	3,393	22,267	1,414	2,689
Academic Degree Holder	29,186	143	5,147	6,665	5,034	3,689	2,775	5,733
Not Stated	817	266	127	93	72	51	40	168

Source: NSO Census 1990

3.4 Population

3.4.2 Classification of Urban and Rural Areas



3.5 Health Status

3.5.3 Health Facilities and Practitioners

Table 3.5.1 Number and Ratio to Population of Health Facilities and/or Medical Practitioners

Health Facilities	Ilocos Norte		Philippines	
	Number	Ratio	Number	Ratio
Hospitals	15	1:33,501	1,733	1:35,017
RHUs	27	1:18,612	2,295	1:26,442
BHSs	123	1:4,086	10,151	1:5,978
Practitioners				
Doctors	166	1:3,027	7,431	1:8,166
Nurses	430	1:1,169	10,270	1:5,909
Midwives	312	1:1,611	11,604	1:5,230
Dentists	68	1:7,390	1,550	1:39,152

3.6 Environmental Conditions

3.6.2 Water Pollution

Table 3.6.1 DENR Water Quality Criteria/Water Usage and Classification for Fresh Water

PARAMETER	UNIT	CLASS AA	CLASS A	CLASS B	CLASS C	CLASS D
Color	PCU	15	50	(C)	(C)	(C)
Temperature ^(D) (max. rise in deg. Celsius)	°C rise	--	3	3	3	3
pH (range)		6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.0-9.0
Dissolved Oxygen ^(B) (Minimum)	% satn	70	70	70	60	40
	mg/L	5.0	5.0	5.0	5.0	3.0
5-Day 20°C BOD	mg/L	1	5	5	7(10)	10(15)
Total Suspended Solids	mg/L	25	50			
Total Dissolved Solids	mg/L	500	1,000	--	--	1,000
Surfactants (MBAS)	mg/L	nil	0.2(0.5)	0.3(0.5)	0.5	--
Oil/Grease (Petroleum Ether Extract)	mg/L	nil	1	1	2	5
Nitrate as Nitrogen	mg/L	1	10	NR	10	--
Phosphate as Phosphorous	mg/L	nil	0.1	0.2	0.4	--
Phenolic Substances as Phenols	mg/L	nil	0.002	0.005	0.02	--
Total Coliforms	MPN/100mL	50	1,000	1,000	5,000	--
or Fecal Coliforms	MPN/100mL	20	100	200	--	--
Chloride as Cl	mg/l	250	250	--	350	--
Copper	mg/L	1	1	--	0.05	--

Notes:

Class AA - Public Water Supply Class I. Intended for waters having watersheds which are uninhabited and otherwise protected and which require only approved disinfection in order to meet the national standards for drinking water.

Class A - Public Water Supply Class II. Sources of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet drinking water standards.

Class B - Recreational Water Class I. For primary contact recreation such as bathing, swimming, skin diving, etc. (particularly for tourism purposes).

Class C - Fishery Water for the propagation and growth of fish and other aquatic resources; recreational (for boating, etc.); industrial water supply class I for manufacturing processes after treatment.

Class D - For agriculture, irrigation, livestock watering, etc.; for industrial water supply class II (cooling, etc.); other inland waters by their quality, belong to this specification.

4. EXISTING FACILITIES AND SERVICE COVERAGE

4.1 Water Supply

4.1.3 Level III Systems

Table 4.1.1 Details on Existing Level III Systems

Sheet 1

NEDA Geo- graphic Code	Municipality	Name of Sytem (Operating Body)	Level III Services								
			Number of Barangays Served			Number of Households Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
012801	Adams	Save the Children Inc.		1	1		117	117		644	644
012802	Bacarra	INWAD	18	10	28	1,357	915	2,272	5,970	4,667	10,637
012804	Bangui	Malasin WS		1	1		120	120		600	600
		San Lorenzo W.S	1		1	305		305	1,525		1,525
Municipal Total			1	1	2	305	120	425	1,525	600	2,125
012805	Batac	Batac Water District	16		16	844		844	4,389		4,389
012806	Burgos	Nagpartian W.S	1		1	99		99	505		505
		Ablan W.S		1	1		53	53		276	276
		Agaga W.S		1	1		57	57		296	296
		Tanap W.S		1	1		70	70		364	364
Municipal Total			1	3	4	99	180	279	505	936	1,441
012808	Curriniao	Curriniao W.S	1	1	2	189	195	384	926	996	1,922
012809	Dingras	Dingras W. D.	6	2	8	601	41	645	5,805	1,408	7,213
012810	Dumalneg	Dumalneg WS		1	1		156	156		828	828
012811	Espiritu	Espiritu WS	4		4	607		607	3,035		3,035
012812	Lacag City (Capital)	INWAD	39		39	4,247		4,247	21,235		21,235
		Dibwa North W.S		1	1		133	133		665	665
		Dibwa South W.S		1	1		147	147		735	735
		Bacsil North W.S		1	1		167	167		835	835
		Bacsil South W.S		1	1		226	226		1,130	1,130
		La Paz Proper W.S		1	1		119	119		595	595
Municipal Total			39	5	44	4,247	792	5,039	21,235	3,960	25,195
012815	Pagudpod	Municipal Gov't	2	3	5	678	439	1,117	3,390	2,195	5,585
012816	Paoay	INWAD	15	4	19	242	87	329	1,210	461	1,671
		Callaguip W.S		1	1		120	120		636	636
		Nagbacalan W.S		1	1		30	30		159	159
Municipal Total			15	6	21	242	237	479	1,210	1,256	2,466
012817	Pasquin	INWAD	10		10	1,035		1,035	5,175		5,175
012819	Pinili	Pinili WS	2		2	126		126	2,010		2,010
012820	San Nicolas	San Nicolas W.D.	15		15	4,897		4,897	17,356		17,356
012821	Sarrat	Sarrat Water District	6		6	463		463	5,385		5,385
012823	Vintar	INWAD	5	1	6	462	15	477	2,310	75	2,385
Provincial Total			141	34	175	16,155	3,207	19,362	80,226	17,565	97,791

Table 4.1.1 Details on Existing Level III Systems

Sheet 2

NEDA Geo- graphic Code	Municipality	Name of Sytem (Operating Body)	Level II Services								
			Number of Public Faucets			Number of Households Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
012801	Adams	Save the Children Inc.			0			0			0
012802	Bacarra	INWAD			0			0			0
012804	Banguit	Malasin WS			0			0			0
		San Lorenzo W.S			0			0			0
Municipal Total			0	0	0	0	0	0	0	0	0
012805	Batac	Batac Water District			0			0			0
012806	Burgos	Nagpartian W.S			0			0			0
		Ablan W.S			0			0			0
		Agaga W.S			0			0			0
		Tanap W.S			0			0			0
Municipal Total			0	0	0	0	0	0	0	0	0
012808	Currimao	Currimao W.S			0			0			0
012809	Dingras	Dingras Water District			0			0			0
012810	Dumalneg	Dumalneg WS			0			0			0
012811	Espiritu	Espiritu WS			0			0			0
012812	Laoag City (Capital)	INWAD			0			0			0
		Dibwa North W.S			0			0			0
		Dibwa South W.S			0			0			0
		Bacsil North W.S			0			0			0
		Bacsil South W.S			0			0			0
		La Paz Proper W.S			0			0			0
Municipal Total			0	0	0	0	0	0	0	0	0
012815	Pagudpud	Municipal Gov't			0			0			0
012816	Paoyay	INWAD			0			0			0
		Callaguip W.S			0			0			0
		Nagbacalan W.S			0			0			0
Municipal Total			0	0	0	0	0	0	0	0	0
012817	Pasquin	INWAD			0			0			0
012819	Pinili	Pinili WS			0			0			0
012820	San Nicolas	San Nicolas W.D.			0	360		360	558		558
012821	Sarrat	Sarrat Water District			0	15		15	150		150
012823	Vintar	INWAD			0			0			0
Provincial Total			0	0	0	375	0	375	708	0	708

Table 4.1.1 Details on Existing Level III Systems

Sheet 3

NEDA Geo- graphic Code	Municipality	Name of Sytem (Operating Body)	Water Sources			Consumption			
			Type ¹	Number	Production (cu. m/day)	Domestic	Institutional	Commercial	Industrial
						(cu. m/day)			
012801	Adanis	Save the Children Inc.	SP	1		0	0	0	0
012802	Bacarra	INWAD	DW			0	0	0	0
012804	Bangui	Malasin W.S	SP	1		0	0	0	0
		San Lorenzo W.S	SP	2		0	0	0	0
Municipal Total				3	0	0	0	0	0
012805	Batac	Batac Water District	DW	11	528	19.5	5.2	0	28
012806	Burgos	Nagpartian W.S	SP	1		0	0	0	0
		Ablan W.S	SP	1		0	0	0	0
		Agaga W.S	SP	1		0	0	0	0
		Tanap W.S	SP	1		0	0	0	0
Municipal Total				4	0	0	0	0	0
012808	Currimao	Currimao W.S	DW	1		0	0	0	0
012809	Dingras	Dingras W. D.	DW	3	632	378.8	17.7	0	0
012810	Dumalneg	Dumalneg WS	SP	2	576	0	0	0	0
012811	Espiritu	Espiritu WS	SP	1	751	487.2	0	0	0
012812	Laoag City (Capital)	Bacsil North W.S	SP	1		0	0	0	0
		Bacsil South W.S	SP	1		0	0	0	0
		Dibwa North W.S	SP	1		0	0	0	0
		Dibwa South W.S	SP	1		0	0	0	0
		INWAD (Laoag)	DW	10	9,052	866.0	18	0	4
		La Paz Proper W.S	DW	1		0	0	0	0
Municipal Total				15	9,052	866	18	0	4
012815	Paguadpud	Municipal Gov't	SP	1		0	0	0	0
012816	Paoyay	INWAD	DW			0	0	0	0
		Callaguip W.S	DW	1		0	0	0	0
		Nagbacalan W.S	DW	1		0	0	0	0
Municipal Total				2	0	0	0	0	0
012817	Pasquin	INWAD	DW			0	0	0	0
012819	Pindi	Pirili WS	DW	2		0	0	0	0
012820	San Nicolas	San Nicolas W.D.	DW	3	1,592	746	3.6	0	528
012821	Sarrat	Sarrat Water District	1 Dug Well & 2 Spring	3	432	0	0	0	0
012823	Vintar	INWAD	DW			241	0	0	0
Provincial Total				52	13,563	2,738.5	44.5	0	564

Note: 1. Type of Water Source: DW - Deep Well, Surf. - Surface Water (River), DgW - Dug Well, SP - Spring, IG - Infiltration Gallery.

Table 4.1.1 Details on Existing Level III Systems

Sheet 4

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Consumers																			
			Domestic House Connections				Domestic Public Faucets				Institutional				Commercial				Industrial			
			Connection Metered	Connection Unmetered	Consumption (cu.m/day)	Consumption (cu.m/day)	Connection Metered	Connection Unmetered	Consumption (cu.m/day)	Consumption (cu.m/day)	Connection Metered	Connection Unmetered	Consumption (cu.m/day)	Consumption (cu.m/day)	Connection Metered	Connection Unmetered	Consumption (cu.m/day)	Consumption (cu.m/day)				
012801	Adams	Save the Children Inc.			117																	
012802	Bacarra	INWAD	1,741																			
012804	Bangui	Malasin WS			120																	
		San Lorenzo W.S.			305																	
		Municipal Total	0	0	425	0	0	0	0	0	0	0	0	0	0	0	0					
012805	Batac	Batac Water District	844		19.50												28.27					
012806	Burgos	Nagpartian W.S.			99																	
		Ablan W.S.			53																	
		Agga W.S.			57																	
		Tanap W.S.			70																	
		Municipal Total	0	0	279	0	0	0	0	0	0	0	0	0	0	0	0					
012808	Curimaog	Curimaog W.S.																				
012809	Dingras	Dingras Water District	605		378.80												4.00					
012810	Dumaligez	Dumaligez WS			156																	
012811	Espiritu	Espiritu WS	174		487.20																	
012812	Laoag City (Capital Baesil North W.S.				167																	
		Baesil South W.S.			226																	
		Dibwa North W.S.			133																	
		Dibwa South W.S.			147																	
		INWAD (Laoag)	4,247																			
		La Paz Proper W.S.			119																	
		Municipal Total	4,247	0	792	0	0	0	0	0	0	0	0	0	0	0	0					
012815	Pagsanjan	Municipal Govt			1,117																	
012816	Phoay	INWAD			242																	
		Calaguap W.S.			120																	
		Nagbacalan W.S.			30																	
		Municipal Total	0	0	392	0	0	0	0	0	0	0	0	0	0	0	0					
012817	Pasugum	INWAD			1,035																	
012819	Pruli	Pruli WS	126																			
012820	San Nicolas	San Nicolas W.D.	1,910		746												528.00					
012821	Sarrat	Sarrat Water District	463		102																	
012823	Vintar	INWAD	477		241																	
		Provincial Total	10,587	5,020	1,872.50	0	0	0	0	0	0	0	0	0	0	0	0					

4.1.4 Level II Systems

Table 4.1.2 Existing Level II Systems

Sheet 1

NEDA Geographic Code	Municipality	Name of System (Operating System)	Water Source		Existing Facilities				
			Type ¹	Number	Length of Transmission Line (meter)	Reservoir		Length of Distribution Line (meter)	Number of Public Faucets
						Number	Q (cu.m)		
012802	Bocarra	Femin Afoga WS	DW	1		1			20
		Parinaon WS	SP	2	200	2		1,000	49
		Municipal Total		3	200	3	0	1,000	39
012803	Badoc	Camanga WS	SP	1	500	1		1,000	8
		Madupayas WS	SP	1	500	1			10
		Municipal Total		2	1,000	2	0	1,000	18
012804	Bangui	Abacca W.S	SP	1		1			37
		Barayan W.S	SP	1		1			39
		Lanso W.S	SP	2		1			43
		Manayon W.S	SP	1		1			26
		Nagbalagan W.S	SP	1		1			14
		San Isidro W.S	SP	1		1			17
		Municipal Total		7	0	6	0	0	176
012807	Carassi	Angset WS	SP	1	1,000	1	6.45	700	8
		Barbequeso WS	SP	1	1,200	1	6.45		10
		Virbira WS	SP	1	1,500	1	6.45		7
		Municipal Total		3	3,700	3	19	700	25
012809	Dingras	Capasan WS	SP	1	2,000	1	32.0	1,200	15
		San Marcelino WS	SP	2	1,500	1	27.0	2,000	36
		Municipal Total		3	3,500	2	59	3,200	51
012813	Marcos	Marcos WS	DW	1	1,300		75.8	3,500	15
012814	Nueva era	Nueva Era WS	SP	1		9	50		101
012815	Paguipud	Capurispisan WS	SP	1	5	1	60		40
		Dampig	SP	1		1			6
		Panslan	SP	1		1			47
		Pasateng WS	SP	1		1			45
		Subec WS	SP	1		1			30
		Tarrag WS	SP	1		1			4
		Municipal Total		6	5	6	60	0	181
012817	Pasquin	Municipal WS	SP	7					86
012818	Piddig	San Antonio-Tangaon	SP	1		1			30
012821	Sarrat	San Andres W.S	SP	1					19
012822	Solsona	LGUS	SP	1		1	8		199
012823	Vintar	Abu	SP	1		1			31
		Alsen	SP	1		1			16
		Bago	SP	1		1			7
		Barenganobong	SP	1		1			7
		Bongbangog	SP	1		1			7
		Buibelala	SP	1		1			41
		Cabangaran	SP	1		1			13
		Colombia	SP	1		1			18
		Dagupan	SP	1		1			10
		Diateo	SP	1		1			13

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 1

NEDA Geographic Code	Municipality	Name of System (Operating System)	Water Source		Existing Facilities				
			Type ¹	Number	Length of Transmission Line (meter)	Reservoir		Length of Distribution Line (meter)	Number of Public Faucets
						Number	Q (cu.m)		
012823	Vintar	Ester	SP	1		1			57
		Isic-Isic	SP	1		1			15
		Lubnae	SP	1		1			97
		Mabonbonag	SP	1		1			9
		Malampa	SP	1		1			7
		Manarang	SP	1		1			24
		Maypangal	SP	1		1			9
		Padayan	SP	1		1			2
		Porporoc	SP	1		1			3
		Salsalamog	SP	1		1			19
		SitioBalbalay(Brgy. Cabayo)	SP	1		1			4
		SitioBato(Brgy. Isic-Isic)	SP	1		1			5
		SitioBaybaya(Brgy. Diaton)	SP	1		1			8
		SitioBoac(Brgy. Dipilat)	SP	1		1			5
		SitioCaocacuyan(Brgy. Cabayo)	SP	1		1			5
		SitioDagagan(Brgy. Dagupan)	SP	1		1			6
		SitioDasar(Brgy. Isic-Isic)	SP	1		1			15
		SitioDicawa(Brgy. Diaton)	SP	1		1			19
		SitioDimamaga(Brgy. Tandagan)	SP	1		1			13
		SitioDitulang(Brgy. Alsem)	SP	1		1			2
		SitioGubang(Brgy. Canaan)	SP	1		1			4
		SitioLepanto(Brgy. Isic-Isic)	SP	1		1			4
		SitioLipay(Brgy. San Jose)	SP	1		1			16
		SitioMagabobo(Brgy. Salsalamog)	SP	1		1			23
		SitioMangmonoga(Brgy. Cabayo)	SP	1		1			10
		SitioMangrapon(Brgy. Canaan)	SP	1		1			4
		SitioMarabanos(Brgy. Malampa)	SP	1		1			9
		SitioNagkamotigan(Brgy. Tandagan)	SP	1		1			2
		SitioNagalangan(Brgy. Tandagan)	SP	1		1			3
		SitioNasbatan(Brgy. Isic-Isic)	SP	1		1			5
		SitioPadayan(Brgy. Tandagan)	SP	1		1			2
		SitioPalisian(Brgy. Dagupan)	SP	1		1			2
		SitioPaninoan(Brgy. Malampa)	SP	1		1			9
		SitioPaparangit(Brgy. Cabayo)	SP	1		1			6
		SitioSagpat(Brgy. Dipilat)	SP	1		1			10
		SitioSaricao(Brgy. San Jose)	SP	1		1			21
		SitioSinagban(Brgy. Cabangaran)	SP	2		1			5
		SitioTungel(Brgy. Isic-Isic)	SP	1		1			12
		SitioVira-Medes(Brgy. Bago)	SP	1		1			5
		Tandagan	SP	1		1			20
Tomogan	SP	1		1			20		
Visaya	SP	1		1			38		
Municipal Total				53	0	52	0	0	723
Provincial Total				89	9,705	85	272	9,400	1,663

Note. 1. Type of Water Source: DW - Deep Well, Surf. - Surface Water (River), SP - Spring, IG - Infiltration Gallery.

Table 4.1.2 Existing Level II Systems

Sheet 2

NEDA Geo- graphic Code	Municipality	Name of System (Operating Body)	Number of Barangays Served			Number of Households Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
012802	Bacarra	Femin Afaga WS		1	1		112	112		560	560
		Parinaan WS		1	1		104	104		520	520
		Municipal Total	0	2	2	0	216	216	0	1,080	1,080
012803	Badoc	Camanga WS		1	1		156	156		952	952
		Madupayas WS		1	1		200	200		1,000	1,000
		Municipal Total	0	2	2	0	356	356	0	1,952	1,952
012804	Bangui	Abocca W.S		1	1		189	189		926	926
		Baruyen W.S		1	1		198	198		970	970
		Lanao W.S		1	1		215	215		1,054	1,054
		Manayon W.S		1	1		130	130		637	637
		Nagbolagan W.S		1	1		72	72		353	353
		San Isidro W.S		1	1		89	89		436	436
		Municipal Total	0	6	6	0	893	893	0	4,376	4,376
012807	Carassi	Angset WS		1	1		19	19		122	122
		Barbequeso WS		1	1		66	66		330	330
		Virbira WS		1	1		29	29		150	150
		Municipal Total	0	3	3	0	114	114	0	602	602
012809	Dingras	Capasan WS		1	1		79	79		301	301
		San Marcelino WS		1	1		184	184		938	938
		Municipal Total	0	2	2	0	263	263	0	1,239	1,239
012813	Marcos	Marcos WS	1		1	90		90		540	540
012814	Nueva era	Nueva Era WS	1	5	6	174	334	508	870	1,670	2,540
012815	Pagudpud	Caparispisan WS		3	3		200	200		1,225	1,225
		Dampig		1	1		134	134		773	773
		Pansian		1	1		244	244		1,444	1,444
		Pasateng WS		1	1		226	226		1,269	1,269
		Subec WS		1	1		196	196		1,142	1,142
		Tarrag WS		1	1		136	136		774	774
		Municipal Total	0	8	8	0	1,136	1,136	0	6,627	6,627
012817	Pasguin	Municipal WS		12	12		430	430		2,150	2,150
012818	Piddig	San Antonio-Tangaan		2	2		150	150		650	650
012821	Sarrat	San Andres W.S		1	1		97	97		475	475
012822	Selisona	LGUS		6	6		1,007	1,007		4,422	4,422
012823	Vintar	Abu		1	1		135	135		815	815
		Alsem		1	1		16	16		55	55
		Bago		1	1		221	221		1,146	1,146
		Barenganobong		1	1		47	47		179	179
		Bengbangcoog		1	1		285	285		1,357	1,357
		Bulbolala		1	1		115	115		516	516
		Cabangaran		1	1		69	69		315	315
		Colombia		1	1		42	42		171	171
		Dagupan		1	1		171	171		815	815
		Dinton		1	1		47	47		218	218
		Ester		1	1		123	123		620	620
		Isic-Isic		1	1		35	35		176	176
		Lubnac		1	1		22	22		117	117
		Mabonbonag		1	1		23	23		123	123

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 2

NEDA Geo- graphic Code	Municipality	Name of System (Operating Body)	Number of Barangays Served			Number of Households Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
012823	Vintar	Malampa		1	1		102	102		540	540
		Manarang		1	1		69	69		374	374
		Maypangal		1	1		50	50		264	264
		Padayan		1	1		9	9		60	60
		Porporotoc		1	1		37	37		171	171
		Salsalamague		1	1		37	37		172	172
		SitioBaltalay(Brgy. Cabayo)		1	1		105	105		496	496
		SitioBato(Brgy. Isic-Isic)		1	1		51	51		245	245
		SitioBaybayawa(Brgy. Diaton)		1	1		38	38		200	200
		SitioBeao(Brgy. Dipilat)		1	1		61	61		206	206
		SitioCaocaoayan(Brgy. Cabayo)		1	1		54	54		258	258
		SitioDangagan(Brgy. Dagupan)		1	1		93	93		459	459
		SitioDasar(Brgy. Isic-Isic)		1	1		25	25		116	116
		SitioDicawa(Brgy. Diaton)		1	1		46	46		240	240
		SitioDimamaga(Brgy. Tamdagan)		1	1		33	33		187	187
		SitioDitulang(Brgy. Alsem)		1	1		192	192		941	941
		SitioGubang(Brgy. Canaan)		1	1		28	28		129	129
		SitioLepantot(Brgy. Isic-Isic)		1	1		83	83		479	479
		SitioLipay(Brgy. San Jose)		1	1		25	25		88	88
		SitioMagabobo(Brgy. Salsalamague)		1	1		27	27		120	120
		SitioMangmanoga(Brgy. Cabayo)		1	1		21	21		94	94
		SitioMangrapon(Brgy. Canaan)		1	1		78	78		352	352
		SitioMarabanes(Brgy. Malampa)		1	1		15	15		105	105
		SitioNagkamotigan(Brgy. Tamdagan)		1	1		12	12		66	66
		SitioNangalangan(Brgy. Tamdagan)		1	1		69	69		568	568
		SitioNasbatan(Brgy. Isic-Isic)		1	1		25	25		135	135
		SitioPadayan(Brgy. Tamdagan)		1	1		27	27		358	358
		SitioPalision(Brgy. Dagupan)		1	1		47	47		219	219
		SitioPaninoan(Brgy. Malampa)		1	1		46	46		240	240
		SitioParparingit(Brgy. Cabayo)		1	1		33	33		153	153
		SitioSagpat(Brgy. Dipilat)		1	1		25	25		87	87
		SitioSaricao(Brgy. San Jose)		1	1		21	21		67	67
		SitioSinagban(Brgy. Cabangaran)		1	1		98	98		440	440
SitioTungel(Brgy. Isic-Isic)		1	1		36	36		187	187		
SitioVira-Medesit(Brgy. Bago)		1	1		99	99		410	410		
Tamdagan		1	1		51	51		276	276		
Tomogan		1	1		82	82		413	413		
Visaya		1	1		79	79		352	352		
Municipal Total			0	52	52	0	3,380	3,380	0	16,890	16,890
Provincial Total			2	101	103	264	8,376	8,640	870	42,673	43,543

Table 4.1.2 Existing Level II Systems

Sheet 3

NEDA Geo- graphic Code	Municipality	Name of System (Operating Body)	Supply (Hrs/day)	Dirty Water ¹	Taste or Smell ²	Service Conditions During Dry Season					Supply Water Pressure (% of Total)	
						Supply Interruption (number/month)			Pipe Burst	Others	Adequate	Inadequate
						Power Failure	Pump Breakdown	0				
012802	Bacarra	Femin Afaga WS		O	G	4	2					100%
		Parinaan WS	24	O	G							
		Municipal Total	24			4	2	0	0			
012803	Badoc	Camanga WS		O	G							
		Madupayas WS		O	G							
		Municipal Total				0	0	0	0			
012804	Bangui	Abacca W.S										
		Banuyen W.S										
		Lanao W.S										
		Manayon W.S										
		Nagbalagan W.S										
		San Isidro W.S										
Municipal Total					0	0	0	0				
012807	Carassi	Angset WS										
		Barbequeso WS		O	G							
		Virbira WS		O	G							
		Municipal Total				0	0	0	0			
012809	Dingras	Capasan WS	24		G						1	
		San Marcelino WS	24		G							
		Municipal Total	24			0	0	0	0			1
012813	Marcos											
012814	Nueva era		12								0.6	
012815	Pagudpud		24	O	G						4	0.5
		Caparispisan WS										

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 3

NEDA Geo- graphic Code	Municipality	Name of System (Operating Body)	Supply (Hrs/day)	Dirty Water ¹	Taste or Smell ²	Service Conditions During Dry Season					Supply Water Pressure (% of Total)		
						Supply Interruption (number/month)			Pipe Burst	Others	Adequate	Inadequate	
						Power Failure	Pump Breakdown	0					
012815	Pagudpud	Dampig			G								
		Pansian			G								
		Pasateng WS	24		G								
		Subec WS											
		Tarrag WS			G								
		Municipal Total	24			0	0	0	0	4			
012817	Pasquin	Municipal WS											
012818	Piddig	San Antonio-Tangaosan											
012821	Sarrat	San Andres W.S											
012822	Solsona	LGU'S											
012823	Vintar	Abu											
		Alsem											
		Bago											
		Barenganobong											
		Bengbangcog											
		Bulbulala											
		Cabangaran											
		Colombia											
		Dakupan											
		Diaton											
		Ester											
		Isic-Isic											
		Lubnac											
Mabonbonag													

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 3

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Service Conditions During Dry Season							Supply Water Pressure (% of Total)		
			Supply (Hrs/day)	Dirty Water ¹	Taste or Smell ²	Power Failure	Pump Breakdown	Pipe Burst	Others	Adequate	Inadequate	
012823	Vintar	Malampa										
		Manarang										
		Maypangal										
		Pedayan										
		Porpororoc										
		Salsalagaue										
		Sitio Balbalay (Brgy. Cabayo)										
		Sitio Bato (Brgy. Isic-Isic)										
		Sitio Baybayawa (Brgy. Diaton)										
		Sitio Boao (Brgy. Diplat)										
		Sitio Cacaouayan (Brgy. Cabayo)										
		Sitio Dangagan (Brgy. Dagupan)										
		Sitio Dasar (Brgy. Isic-Isic)										
		Sitio Dicawa (Brgy. Diaton)										
		Sitio Dimamaga (Brgy. Tamdagan)										
		Sitio Diulang (Brgy. Alsem)										
		Sitio Gubang (Brgy. Canaan)										
		Sitio Lepanto (Brgy. Isic-Isic)										
		Sitio Lipay (Brgy. San Jose)										
		Sitio Magabobo (Brgy. Salsalagaue)										
		Sitio Mangmanoga (Brgy. Cabayo)										
		Sitio Mangrapon (Brgy. Canaan)										
		Sitio Marabanos (Brgy. Malampa)										
		Sitio Nagkamotigan (Brgy. Tamdagan)										

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 3

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Service Conditions During Dry Season											
			Supply (Hrs/Day)	Dirty Water ¹	Taste or Smell ²	Supply Interruption (number/month)				Supply Water Pressure (% of Total)				
						Power Failure	Pump Breakdown	Pipe Burst	Others	Adequate	Inadequate			
		Sitio Nangalangan (Brgy. Tamdagan)												
		Sitio Nasbatan (Brgy. Isic-Isic)												
		Sitio Padayan (Brgy. Tamdagan)												
		Sitio Palisian (Brgy. Dagupan)												
		Sitio Paninoan (Brgy. Malampa)												
		Sitio Parparingit (Brgy. Cabayo)												
		Sitio Sagpat (Brgy. Dpihat)												
		Sitio Sancaao (Brgy. San Jose)												
		Sitio Sinagban (Brgy. Cabangaran)												
		Sitio Tungal (Brgy. Isic-Isic)												
		Sitio Vira-Medesi (Brgy. Bago)												
		Tamdagan												
		Tomogan												
		Visaya												
		Municipal Total				0	0	0	0	0	0	0	0	5
		Provincial Total				4	2	0	0	0	0	0	0	5

Note: 1. Dirty Water: E - Everyday, OW - Once a week, OM - Once a month, O - Occasional.
 2. Taste/Smell: G - Good taste, S - Salty, W - Wood taste, M - Metallic taste, O - Others.

Table 4.1.2 Existing Level II Systems

Sheet 4

NEDA Geo- graphic Code	Municipality	Name of System (Operating Body)	Number of Staff						
			Technical Professional	Adminis- trative Staff	Collector	Total Number of Staff	Repair Work		
							Local Tradesman	MEO/ CEO	DEO
012802	Bacarra	Femin Afaga WS	1	1	1	3	Y		
		Parinaan WS			6	1	7	Y	
		Municipal Total	1	7	2	10			
012804	Bangui	Abacca W.S							
		Banuyon W.S							
		Lanao W.S							
		Manayon W.S							
		Nagbalagan W.S							
		San Isidro W.S							
		Municipal Total	0	0	0	0			
012803	Badoc	Camanga WS		8		8	Y	Y	
		Madupayas WS	2	4		6	Y	Y	
		Municipal Total	2	12	0	14			
012807	Carassi	Angset WS					Y		
		Barbequeso WS					Y		
		Virbira WS					Y		
		Municipal Total							
012809	Dingras	Capasan WS	*	*				Y	Y
		San Marcelino WS	*	*			Y	Y	
		Municipal Total							
012813	Marcos	Marcos WS	1		1	2			
012814	Nueva era	Nueva Era WS	*	*				Y	
012815	Pagudpod	Caparispisan WS	*	*					Y
		Dampig							
		Pansian	*	*					Y
		Pasateng WS	*	*					Y
		Subec WS	*	*					Y
		Tarrag WS	*	*					Y
		Municipal Total							
012817	Pasquin	Municipal WS							
012818	Piddig	Saa Antonio-Tangacan							
012821	Sarrat	San Andres W.S							
012822	Solsona	LGUS							
012823	Vintar	Abu							
		Alsem							
		Bago							
		Baranganobong							
		Bengbangcog							
		Bulbulala							
		Cabangaran							
		Colombia							
		Dagupan							
		Diaton							
		Ester							
		Isic-Isic							
		Lubnac							
		Mabonbonag							

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 4

NFDA Geo- graphic Code	Municipality	Name of System (Operating Body)	Number of Staff						
			Technical Professional	Adminis- trative Staff	Collector	Total Number of Staff	Repair Work		
							Local Tradesman	MEO/ CEO	DEO
012823	Vintar	Malampo							
		Manarang							
		Maypangal							
		Padayan							
		Perpororoc							
		Salsalamague							
		SitioBalbalay(Brgy. Cabayo)							
		SitioBato(Brgy. Isic-Isic)							
		SitioBaybayawat(Brgy. Diaton)							
		SitioBooc(Brgy. Dipilat)							
		SitioCaocaouayan(Brgy. Cabayo)							
		SitioDangagan(Brgy. Dagupan)							
		SitioDasar(Brgy. Isic-Isic)							
		SitioDicawa(Brgy. Diaton)							
		SitioDimamaga(Brgy. Tamdagan)							
		SitioDitulang(Brgy. Alsem)							
		SitioGubang(Brgy. Canaan)							
		SitioLepanto(Brgy. Isic-Isic)							
		SitioLipay(Brgy. San Jose)							
		SitioMagabobo(Brgy. Salsalamague)							
		SitioMangmanoga(Brgy. Cabayo)							
		SitioMangapont(Brgy. Canaan)							
		SitioMarabano(Brgy. Malampa)							
		SitioNagkamotigan(Brgy. Tamdagan)							
		SitioNangalangan(Brgy. Tamdagan)							
		SitioNasbatan(Brgy. Isic-Isic)							
		SitioPadayan(Brgy. Tamdagan)							
		SitioPalistian(Brgy. Dagupan)							
		SitioPaninoan(Brgy. Malampa)							
		SitioParparingit(Brgy. Cabayo)							
		SitioSagpat(Brgy. Dipilat)							
		SitioSaricao(Brgy. San Jose)							
		SitioSinagban(Brgy. Cabangaran)							
SitioTungel(Brgy. Isic-Isic)									
SitioVira-Modesi(Brgy. Bago)									
Tamdagan									
Tomogan									
Visaya									
		Municipal Total							

Note : Barangay Council/IGUs

Table 4.1.2 Existing Level II Systems

Sheet 5

NEDA Geo-graphic Code	Municipality	Name of System (Operating Body)	Expenditures (Thousand of Pesos/year)				Tariff (Pesos)				Average Collection Efficiency (%)					
			Annual Wages	Fuel, Chem. Mat'l.	Transport	Repairs	Loan Repayment	Other	Consumer Payment (Year)	Cost per Pail		Cost per Cubic Meter	Cost Per Household	Other		
012802	Bacara	Fermin Aligsa WS						120								
		Pannanan WS						120								
012804	Bangui	Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Abaeca W.S														
		Lanao W.S														
		Banuyan W.S														
		Manayon W.S														
		Nagbalagan W.S														
012803	Badoc	San Isidro W.S	0	0	0	0	0	0	0	0	0	0	0.00	0.00		
		Municipal Total														
		Madunayas WS														
		Camanga WS														
012807	Carassi	Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0.00		
		Virbun WS														
		Barbequeso WS														
		Amocet WS														
012809	Dungas	Municipal Total	0	0	0	0	0	0	0	0	0	0	0.00	0.00		
		San Marcelino WS														
		Carasan WS														
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0.00		
012813	Marcos Nueva era Pagadpud	Marcos WS	2,000	12,000		44,000		36,000						4,313.00		
		Nueva Era WS									60					
		Capangpisan WS														
		Subec WS														
		Tarrag WS														
		Pasatag WS														
		Pansian														
		Dampag														
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Municipal WS														
		San Antonio-Jangaoan														
		012821	Solsona	San Andres W.S												
LGU'S																
Abu																
Alem																
SinoDuciang(Brgy. Alem)																
012823	Vinar	Bago														
		Barenganobong														
		Bengbangco														
		SinoVina-Medes(Brgy. Baco)														
		Bulbulala														
SinoSinagban(Brgy. Cabangan)																
Colombia																

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 5

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Expenditures (Thousand of Pesos/year)					Tariff (Pesos)				Average Collection Efficiency (%)			
			Annual Wages	Fuel, Chem. Mat'l.	Transport	Repairs	Loan Repayment	Other	Consumer Payment (Year)	Cost per Pail	Cost per Cubic Meter		Cost Per Household	Other	
012823	Virar	Dagupan													
		SinoDangsan(Brgy. Dagupan)													
		SinoPalisitan(Brgy. Dagupan)													
		Diaton													
		SinoBavayawa(Brgy. Diaton)													
		SinoDicawa(Brgy. Diaton)													
		Esler													
		Isc-Isc													
		SinoBaco(Brgy. Isc-Isc)													
		SinoDasar(Brgy. Isc-Isc)													
		SinoLpanto(Brgy. Isc-Isc)													
		SinoNashan(Brgy. Isc-Isc)													
		SinoTungel(Brgy. Isc-Isc)													
		Lubnac													
		Mabonbonag													
		Malampa													
		SinoMarabanos(Brgy. Malampa)													
		SinoPainman(Brgy. Malampa)													
		Padayan													
		Manarang													
		Maypangal													
		Poporoc													
		Salsamague													
		SinoMagabob(Brgy. Salsamague)													
		Tandagan													
		SinoDramaga(Brgy. Tandagan)													
		SinoNaskamonan(Brgy. Tandagan)													
		SinoNangalangun(Brgy. Tandagan)													
		SinoPadayan(Brgy. Tandagan)													
		Tomoran													
		SinoBabalay(Brgy. Cabayo)													
		SinoCacoauvan(Brgy. Cabayo)													
		SinoMangmanozal(Brgy. Cabayo)													
		SinoPamanang(Brgy. Cabayo)													
		SinoGurang(Brgy. Camaan)													
		SinoMangapont(Brgy. Camaan)													
		SinoKoa(Brgy. Duplat)													
		SinoLupay(Brgy. San Jose)													
		SinoSanca(Brgy. San Jose)													
		Virava													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	0%

Table 4.1.2 Existing Level II Systems

Sheet 6

NEDA Geo-graphic Code	Municipality	Name of System (Operating Body)	Billings					Revenues							
			Annual Billing (Number)	Public Faucet Consumers	House Connection Consumers	Expected Subsidies	Others	Annual Income	Payment by Public Faucet Consumers	Payment by House Connection Consumer	Subsidies	Others			
012802	Bacarra	Femin Afaga WS													
		Panmaan WS													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	0
012804	Bangui	Alabaca W.S													
		Baruyen W.S													
		Lanao W.S													
		Mauyon W.S													
		Nagbalagan W.S													
		San Isidro W.S													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	
012803	Badoc	Camanga WS													
		Macapavas WS													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	
012807	Carassi	Augset WS													
		Barbequeso WS													
		Virbira WS													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	
012809	Diugras	Capasan WS													
		San Marcelino WS													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	
012813	Marcos	Marcos WS													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	
012814	Nueva era	Nueva Era WS													
012815	Pagudpud	Capansipisan WS													
		Dampig													
		Pansian													
		Paxateng WS													
		Subec WS													
		Tarrag WS													
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 6

NEDA Geo-graphic Code	Municipality	Name of System (Operating Body)	Billings				Revenues					
			Annual Billing (Number)	Public Faucet Consumers	House Connection Consumers	Expected Subsidies	Others	Annual Income (Thousand of Pesos/year)	Payment by Public Faucet Consumers	Payment by House Connection Consumer	Subsidies	Others
012817	Pasquin	Municipal WS										
012818	Piddig	San Antonio-Tangroon										
012821	Sarrat	San Andres W.S										
012822	Solsora	LGUS										
012823	Vintar	Abu										
		Aisem										
		Bago										
		Barenganobong										
		Bembangcog										
		Bubulala										
		Cabangaran										
		Colombia										
		Dagupan										
		Diaton										
		Ester										
		Isic-Isic										
		Lubnac										
		Mabonbonog										
		Malampa										
		Manarang										
		Maypangal										
		Padivan										
		Porpororoc										
		Salsalagaue										
		SitioBubalay(Brgy. Cabayo)										
		SitioBate(Brgy. Isic-Isic)										
		SitioBayayawan(Brgy. Diaton)										
		SitioBoat(Brgy. Duplat)										
		SitioCaococuyam(Brgy. Cabayo)										
		SitioDangagan(Brgy. Dagupan)										

Table 4.1.2 Existing Level II Systems (Cont'd.)

Sheet 6

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Billings				Revenues									
			Annual Billing (Number)	Public Faucet Consumers	House Connection Consumers	Expected Subsidies	Others	Annual Income (Thousand of Pesos/year)	Payment by Public Faucet Consumers	Payment by House Connection Consumer	Subsidies	Others				
012823	Vintar	SitioDasari(Brgy. Isic-Isic)														
		SitioDicawa(Brgy. Diaton)														
		SitioDimamaga(Brgy. Tamdagan)														
		SitioDitulang(Brgy. Albem)														
		SitioGubang(Brgy. Canaan)														
		SitioLepanto(Brgy. Isic-Isic)														
		SitioLipay(Brgy. San Jose)														
		SitioMagaboh(Brgy. Salsalague)														
		SitioMangmanoga(Brgy. Cabayo)														
		SitioMangrapont(Brgy. Canaan)														
		SitioMarabatos(Brgy. Malampa)														
		SitioNagkamougan(Brgy. Tamdagan)														
		SitioNangalangan(Brgy. Tamdagan)														
		SitioNasutan(Brgy. Isic-Isic)														
		SitioPadayan(Brgy. Tamdagan)														
		SitioPalusian(Brgy. Dagupan)														
		SitioPaninonan(Brgy. Malampa)														
		SitioParparangit(Brgy. Cabayo)														
		SitioSagpat(Brgy. Dipilat)														
		SitioSancatol(Brgy. San Jose)														
SitioSinagan(Brgy. Cabangaran)																
SitioTunseit(Brgy. Isic-Isic)																
SitioVira-Medes(Brgy. Bago)																
Tamdagan																
Tomogan																
Visaya																
		Municipal Total	0	0	0	0	0	0	0	0	0	0	0	0	0	

4.1.5 Level I Facilities

Safe and Unsafe Classification of Level I Facilities

The PHO has been conducting water quality analysis of samples collected from public and private Level I wells and classified into safe and unsafe sources/facilities.

The results of water quality analysis indicate that about 46% of existing shallow wells as a provincial average are classified unsafe sources as shown in Table 4.1.3.

Table 4.1.3 Percentage of Unsafe Water Sources by PHO

No. of Existing Level I Shallow Wells Sampled	No. of Unsafe Results	Percentage of Unsafe Sources
482	221	45.8

Behind the high percentage of unsafe results, there are following background conditions:

- Water sampling by RHU is usually conducted at the request of local residents where problems on water quality and/or incidence of water related diseases are experienced.
- There may be the cases that same Level I sources/facilities become unsafe results repeatedly.
- There are about 7,900 open dug wells (75% of which in rural area) out of the total 30,681 Level I sources/facilities in the province and these sources being defined as unsafe by DOH may have been included in the above sampling.

Considering the above background, application of unsafe percentage given by PHO analysis results for classification of Level I shallow wells may lead to overestimate the number of unsafe sources. Experiences in neighboring provinces on PW4SP show more or less approximately 30% of unsafe results. In this regard, 30% is adopted in this planning as a reference unsafe percentage to the whole province in classification of shallow wells. While, those sources other than shallow wells are processed as classified in the questionnaire. Table 4.1.4 presents number of Level I facilities by safe and unsafe classification.

Table 4.1.4 Number of Level I Facilities by Safe and Unsafe Classification (Cont'd.)

NEDA Geographic Code	Municipality	Type	Safe Sources										Unsafe Sources							Grand Total	
			Public					Private					Total	Public			Private				
			Deep Well	Shallow Well	Covered/Improved Dug Well	Developed Spring	Sub-total	Deep Well	Shallow Well	Covered/Improved Dug Well	Sub-total	Shallow Well		Open Dug Well	Undeveloped Spring	Sub-total	Shallow Well	Open Dug Well	Rain Water Collector		Sub-total
012814	Nueva Era	Urban	5	0	0	2	7	0	0	4	11	0	0	0	0	0	49	0	49	60	
Rural		5	8	0	7	20	0	13	23	36	56	3	0	0	3	6	199	0	205	264	
Total		10	8	0	9	27	0	13	27	40	67	3	0	0	3	6	248	0	254	324	
012815	Paguepud	Urban	3	61	0	1	65	0	22	0	22	42	0	0	0	4	10	58	0	68	72
Rural		5	8	0	7	20	0	22	0	44	129	30	0	0	30	19	103	0	122	152	
Total		8	69	0	8	85	0	44	0	22	173	62	0	0	64	38	261	0	269	304	
012816	Paoyay	Urban	10	23	0	0	35	0	924	0	924	939	10	0	0	10	396	426	0	822	832
Rural		24	22	0	1	47	0	1,896	0	2,820	1,943	9	0	0	9	813	526	0	1,339	1,348	
Total		34	47	0	1	82	0	2,820	0	2,820	2,902	19	0	0	19	1,209	952	0	2,161	2,180	
012817	Pausiquan	Urban	3	12	0	0	15	0	88	0	88	103	5	0	0	5	38	12	0	50	55
Rural		9	36	0	2	47	0	1,147	0	1,147	1,194	16	0	0	16	491	288	0	779	795	
Total		12	48	0	2	62	0	1,235	0	1,235	1,297	21	0	0	21	529	300	0	829	850	
012818	Piddig	Urban	2	1	0	0	3	0	12	0	12	15	0	0	0	0	5	0	0	5	5
Rural		11	40	0	6	57	0	307	0	307	364	17	0	0	17	131	0	0	131	148	
Total		13	41	0	6	60	0	319	0	319	379	17	0	0	17	136	0	0	136	153	
012819	Pinala	Urban	3	55	0	0	58	0	83	5	88	146	23	0	0	23	36	28	0	64	87
Rural		0	46	0	0	46	0	561	89	650	696	19	0	0	19	241	529	0	770	789	
Total		3	101	0	0	104	0	644	94	738	842	42	0	0	42	277	557	0	834	876	
012820	San Nicolas	Urban	4	11	0	0	15	0	8	77	85	100	4	0	0	4	4	20	0	24	28
Rural		10	20	0	6	36	3	34	289	326	362	8	0	0	8	14	275	0	289	297	
Total		14	31	0	6	51	3	42	366	411	462	12	0	0	12	18	294	0	313	325	
012821	Sarrat	Urban	5	8	0	0	13	0	583	0	583	596	4	0	0	4	250	0	0	250	254
Rural		18	32	0	0	50	0	1,297	0	1,297	1,347	13	0	0	13	556	0	0	556	569	
Total		23	40	0	0	63	0	1,880	0	1,880	1,943	17	0	0	17	806	0	0	806	823	
012822	Solsona	Urban	3	5	0	0	8	0	8	534	542	550	2	0	0	2	4	41	0	45	47
Rural		2	0	0	8	10	0	193	40	233	243	0	0	0	0	82	226	0	308	308	
Total		5	5	0	8	18	0	201	574	775	793	2	0	0	2	86	267	0	353	355	
012823	Vintar	Urban	4	0	0	0	4	0	92	161	253	257	0	0	0	39	100	0	139	139	
Rural		21	39	0	0	60	0	64	0	64	178	17	0	0	17	28	261	0	289	306	
Total		25	39	0	0	64	0	64	0	64	214	17	0	0	17	67	361	0	428	445	
Provincial Total	Urban	83	321	0	5	409	9	2,515	1,785	4,309	4,718	134	0	0	134	1,077	1,983	0	3,062	3,198	
	Rural	291	1,045	0	88	1,424	91	8,147	3,238	11,476	12,900	449	0	0	449	3,492	5,926	0	9,418	9,867	
	Total	374	1,366	0	93	1,833	100	10,662	5,023	15,785	17,618	583	0	0	583	4,569	7,911	0	12,480	13,063	

4.1.6 Water Supply Service Coverage

Estimation of Service Coverage in Terms of Safe, Unsafe and Unserved Classification

Through the quick review of the number of water supply systems/facilities and the number of households derived from questionnaire, it was found that a great number of unserved population would be figured out as a balance between the total population and population with any levels of services (including unsafe facilities) in application of the service level standard for Level I and II. To come up with more realistic service coverage, the unserved population in 1995 was prefixed referring to the profile in 1990 population census data, "Households by Main Source of Drinking Water and City/Municipality." Of the rest of the population those who are not served by Level III and/or II systems were considered to be covered by shared or own use of Level I facilities. The calculation procedure is as follows:

- Service percentage/population of Level III and Level II systems was estimated based on the questionnaire survey results.
- Percentage of unserved population (using undeveloped spring, lake, river, peddler, etc.) reported in the 1990 population census was assumed to have unchanged up to present.
- Population covered by Level I facilities were calculated as a balance figure between the total population, and the population served by Level III & II systems and the unserved population.
- Level I population coverage was estimated in assumption that 50% of the private facilities were shared by neighbors.

Unserved population and the population covered by Level I facilities are presented in Table 4.1.5. Table 4.1.6 presents overall population covered by Level I facilities and number of households.

Number of households per shared public/private facility ranges from 1 to 10 households, which are considered within the reasonable level, as more or less equivalent to the service level standard of Level I public facility (15 households/facility) and Level II system (5 household/public faucet).

Table 4.1.5 Estimation of Unserved Population by Municipality

NEDA Geo-graphic Code	Municipality	Type	Population and Households		Served Population			Unserved Population			Population Covered by Level I Facilities		
			Number	RHs Size	Level III	Level II	Total	Total No. of HHs	Unserved Percentage (1990)	Number of Unserved HHs		%	Unserved Population (1995)
012801	Adams	Urban	0	0.0	0	0	0	0	0	0.0	0	0	
		Rural	1,165	5.5	644	0	644	213	8	3.8	44	477	
		Total	1,165	5.5	644	0	644	213	8	3.8	44	477	
012802	Bacarra	Urban	8,649	4.8	5,970	0	5,970	1,798	2	0.1	10	2,669	
		Rural	20,318	4.9	4,667	1,080	5,747	4,149	9	0.2	44	14,527	
		Total	28,967	4.9	10,637	1,080	11,717	5,947	11	0.2	54	17,196	
012803	Badoc	Urban	1,744	4.9	0	0	0	358	17	4.7	83	1,661	
		Rural	25,793	5.1	0	1,952	1,952	5,098	99	1.9	501	23,340	
		Total	27,537	5.0	0	1,952	1,952	5,456	116	2.1	584	25,001	
012804	Bangui	Urban	3,964	5.0	1,525	0	1,525	794	24	3.0	120	2,319	
		Rural	9,973	4.9	600	4,376	4,976	2,049	139	6.8	677	4,320	
		Total	13,937	4.9	2,125	4,376	6,501	2,843	163	5.7	797	6,639	
012805	Batac	Urban	13,989	5.2	4,389	0	4,389	2,700	13	0.5	67	9,533	
		Rural	32,163	5.1	0	0	0	6,351	73	1.1	370	31,793	
		Total	46,152	5.1	4,389	0	4,389	9,051	86	1.0	437	41,326	
012806	Burgos	Urban	1,459	5.1	505	0	505	285	11	3.9	56	898	
		Rural	7,265	5.2	936	0	936	1,390	62	4.5	324	6,005	
		Total	8,724	5.2	1,441	0	1,441	1,675	73	4.4	380	6,903	
012807	Carassi	Urban	0	0.0	0	0	0	0	0	0.0	0	0	
		Rural	774	4.9	0	602	602	159	5	3.1	24	148	
		Total	774	4.9	0	602	602	159	5	3.1	24	148	
012808	Currimaao	Urban	1,068	4.9	926	0	926	219	0	0.0	0	142	
		Rural	9,367	5.1	996	0	996	1,844	0	0.0	0	8,371	
		Total	10,435	5.1	1,922	0	1,922	2,063	0	0.0	0	8,513	
012809	Dingras	Urban	6,003	5.1	5,805	0	5,805	1,179	15	1.3	76	122	
		Rural	26,758	5.1	1,408	1,239	2,647	5,199	84	1.6	432	23,679	
		Total	32,761	5.1	7,213	1,239	8,452	6,378	99	1.6	508	23,801	

Table 4.1.5 Estimation of Unserved Population by Municipality (Cont'd.)

NEDA Geo- graphic Code	Municipality	Type	Population and Households		Served Population			Unserved Population			Population Covered by Level I Facilities	
			Number	HHs Size	Level III	Level II	Total	Total No. of HHs	Number of Unserved HHs	Unserved Percentage (1990) %		Unserved Population (1995)
012810	Dumaineq	Urban	0	0.0	0	0	0	0	0	0	0	0
		Rural	971	5.3	828	0	828	183	2	1.1	11	132
		Total	971	5.3	828	0	828	183	2	1.1	11	132
012811	Espiritu	Urban	3,253	5.0	3,035	0	3,035	649	12	1.8	60	158
		Rural	13,489	5.3	0	0	0	2,566	69	2.7	363	13,126
		Total	16,742	5.2	3,035	0	3,035	3,215	81	2.5	423	13,284
012812	Laong City (Capital)	Urban	42,262	4.9	21,235	0	21,235	8,540	36	0.4	178	20,849
		Rural	49,595	5.0	3,960	0	3,960	9,956	207	2.1	1,031	44,604
		Total	91,857	5.0	25,195	0	25,195	18,496	243	1.3	1,209	65,453
012813	Marcon	Urban	1,497	5.1	0	0	0	291	12	4.1	62	1,435
		Rural	13,087	5.1	0	540	540	2,552	71	2.8	364	12,183
		Total	14,584	5.1	0	540	540	2,843	83	2.9	426	13,618
012814	Nueva Era	Urban	1,416	5.3	0	870	870	266	11	4.1	59	487
		Rural	4,644	5.0	0	1,670	1,670	934	61	6.5	303	2,671
		Total	6,060	5.1	0	2,540	2,540	1,200	72	6.0	362	3,158
012815	Pagudpud	Urban	4,158	5.2	3,390	0	3,390	806	46	5.7	237	531
		Rural	14,065	5.5	2,195	6,627	8,822	2,575	265	10.3	1,447	3,796
		Total	18,223	5.4	5,585	6,627	12,212	3,381	311	9.2	1,684	4,327
012816	Paosay	Urban	7,230	5.1	1,210	0	1,210	1,419	7	0.5	36	5,984
		Rural	15,578	5.3	1,256	0	1,256	2,933	40	1.4	212	14,110
		Total	22,808	5.2	2,466	0	2,466	4,352	47	1.1	248	20,094
012817	Pasuquin	Urban	5,663	4.8	5,175	0	5,175	1,184	7	0.6	33	455
		Rural	17,828	5.0	0	2,150	2,150	3,556	41	1.2	206	15,472
		Total	23,491	5.0	5,175	2,150	7,325	4,740	48	1.0	239	15,927
012818	Piddig	Urban	3,238	5.0	0	0	0	646	18	2.8	90	3,148
		Rural	15,125	4.9	0	650	650	3,081	105	3.4	515	13,960
		Total	18,363	4.9	0	650	650	3,727	123	3.3	605	17,108

Table 4.1.5 Estimation of Unserved Population by Municipality (Cont'd.)

NEDA Geo- graphic Code	Municipality	Type	Population and Households		Served Population			Unserved Population			Population Covered by Level I Facilities	
			Number	HRs Size	Level III	Level II	Total	Total No. of HRs	Unserved Percentage (1990)	Number of Unserved HRs		Unserved Population (1995)
012819		Urban	2,032	5.3	2,010	0	2,010	387	13	3.4	22	0
		Rural	13,697	5.2	0	0	0	2,626	76	2.9	396	13,301
		Total	15,729	5.2	2,010	0	2,010	3,013	89	3.0	418	13,301
012820	San Nicolas	Urban	20,168	4.9	17,356	558	17,914	4,089	1	0.0	0	2,254
		Rural	9,884	5.2	0	0	0	1,915	9	0.5	46	9,838
		Total	30,052	5.0	17,356	558	17,914	6,004	10	0.2	46	12,092
012821	Sarrat	Urban	7,400	5.0	5,385	150	5,535	1,487	121	8.1	602	1,263
		Rural	15,229	4.8	0	475	475	3,160	700	22.2	3,374	11,380
		Total	22,629	4.9	5,385	625	6,010	4,647	821	17.7	3,976	12,643
012822	Solsona	Urban	3,361	5.0	0	0	0	673	36	5.3	180	3,181
		Rural	18,019	5.1	0	4,422	4,422	3,539	211	6.0	1,074	12,523
		Total	21,380	5.1	0	4,422	4,422	4,212	247	5.9	1,254	15,704
012823	Vintar	Urban	4,662	4.8	2,310	0	2,310	968	63	6.5	303	2,049
		Rural	24,518	5.0	75	16,890	16,965	4,929	382	7.8	1,900	5,653
		Total	29,180	4.9	2,385	16,890	19,275	5,897	445	7.5	2,203	7,702
Provincial Total		Urban	143,216	5.0	80,226	1,578	81,804	28,738	465	1.6	2,274	59,138
		Rural	359,305	5.1	17,565	42,673	60,238	70,957	2,718	3.8	13,658	285,499
		Total	502,521	5.0	97,791	44,251	142,042	99,695	3,183	3.2	15,932	344,547

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality

Sheet 1

NEDA Geo- graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Number of Facilities						Coverage of Own Use						
				Public Facilities			Private Facilities			Number of Private Facilities			(1) Population Covered			
				Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total	
				0	0	0	0	0	0	0	0	0	0	0	0	
012801	Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
012802	Bacarra	Urban	7	1	8	96	151	247	48	76	124	230	362	592		
		Rural	27	2	29	413	850	1,263	207	425	632	1,012	2,083	3,095		
		Total	34	3	37	509	1,001	1,510	255	501	756	1,242	2,445	3,687		
012803	Badoc	Urban	8	0	8	113	223	336	57	112	169	277	546	823		
		Rural	117	23	140	555	1,224	1,779	278	612	890	1,415	3,121	4,536		
		Total	125	23	148	668	1,447	2,115	335	724	1,059	1,692	3,667	5,359		
012804	Bangui	Urban	14	3	17	81	42	123	41	21	62	203	105	308		
		Rural	53	13	66	113	110	223	57	55	112	277	270	547		
		Total	67	16	83	194	152	346	98	76	174	480	375	855		
012805	Batac	Urban	14	4	18	234	63	297	117	32	149	608	164	772		
		Rural	265	106	371	713	217	930	357	109	466	1,818	553	2,371		
		Total	279	110	389	947	280	1,227	474	141	615	2,426	717	3,143		
012806	Burgos	Urban	6	0	6	61	29	90	31	15	46	156	74	230		
		Rural	21	3	24	134	154	288	67	77	144	348	400	748		
		Total	27	3	30	195	183	378	98	92	190	504	474	978		
012807	Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	8	5	13	15	3	18	8	2	10	37	7	44		
		Total	8	5	13	15	3	18	8	2	10	37	7	44		
012808	Currimaio	Urban	142	16	158	157	120	277	79	60	139	81	61	142		
		Rural	56	25	81	362	497	859	181	249	430	923	1,267	2,190		
		Total	198	41	239	519	617	1,136	260	309	569	1,004	1,328	2,332		
012809	Dingras	Urban	122	1	123	612	256	878	306	133	439	85	37	122		
		Rural	19	5	24	1,627	685	2,312	814	343	1,157	4,149	1,747	5,896		
		Total	23,801	20	23,821	2,239	951	3,190	1,120	476	1,596	4,234	1,784	6,018		

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 1

NEDA Geo-graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Number of Facilities			Coverage of Own Use								
				Public Facilities			Private Facilities			Number of Private Facilities			(1) Population Covered		
				Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total
012810	Dumalneg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	132	0	0	0	0	0	0	0	0	0	0	0	0
		Total	132	0	0	0	0	0	0	0	0	0	0	0	0
012811	Espiritu	Urban	158	19	24	21	5	26	11	3	14	53	13	66	
		Rural	13,126	35	43	87	24	111	44	12	56	231	64	295	
		Total	13,284	54	67	108	29	137	55	15	70	284	77	361	
012812	Laog City (Capital)	Urban	20,849	271	54	325	358	624	982	179	312	491	877	1,529	2,406
		Rural	44,604	442	66	508	1,281	863	2,144	641	432	1,073	3,203	2,158	5,361
		Total	65,453	713	120	833	1,639	1,487	3,126	820	744	1,564	4,080	3,687	7,767
012813	Marcos	Urban	1,435	74	31	105	67	37	104	34	19	53	171	94	265
		Rural	12,183	105	45	150	157	57	214	79	29	108	400	145	545
		Total	13,618	179	76	255	224	94	318	113	48	161	571	239	810
012814	Nueva Era	Urban	487	7	0	4	49	53	2	25	27	11	130	141	
		Rural	2,671	20	4	24	36	205	241	18	103	121	90	513	603
		Total	3,158	27	4	31	40	254	294	20	128	148	101	643	744
012815	Pagudpud	Urban	531	65	26	91	22	54	76	11	27	38	57	140	197
		Rural	3,796	20	4	24	22	68	90	11	34	45	61	187	248
		Total	4,327	85	30	115	44	122	166	22	61	83	118	327	445
012816	Paoy	Urban	5,984	35	10	45	924	822	1,746	462	411	873	2,356	2,096	4,452
		Rural	14,110	47	9	56	1,896	1,339	3,235	948	670	1,618	5,024	3,548	8,572
		Total	20,094	82	19	101	2,820	2,161	4,981	1,410	1,081	2,491	7,380	5,644	13,024
012817	Pasauquin	Urban	455	15	5	20	88	50	138	44	25	69	211	120	331
		Rural	15,472	47	17	64	1,147	779	1,926	574	390	964	2,868	1,948	4,816
		Total	15,927	62	22	84	1,235	829	2,064	618	415	1,033	3,079	2,068	5,147
012818	Piddig	Urban	3,148	3	0	3	12	5	17	6	3	9	30	13	43
		Rural	13,960	57	17	74	307	131	438	154	66	220	752	321	1,073
		Total	17,108	60	17	77	319	136	455	160	69	229	782	334	1,116

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 1

NEDA Geographic Code	Municipality	Type	Pop. Covered by Level I Facilities	Number of Facilities						Coverage of Own Use					
				Public Facilities			Private Facilities			Number of Private Facilities			(1) Population Covered		
				Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total
012819	Pitili	Urban	0	58	23	81	83	64	152	44	32	76	0	0	0
		Rural	13,301	46	19	65	650	770	1,420	325	385	710	1,690	2,002	3,692
		Total	13,301	104	42	146	738	834	1,572	369	417	786	1,690	2,002	3,692
012820	San Nicolas	Urban	2,254	15	4	19	85	24	109	43	12	55	208	59	267
		Rural	9,838	36	8	44	326	289	615	163	145	308	848	751	1,599
		Total	12,092	51	12	63	411	313	724	206	157	363	1,056	810	1,866
012821	Sarrat	Urban	1,263	13	4	17	583	250	833	292	125	417	884	379	1,263
		Rural	11,380	50	14	64	1,297	556	1,853	649	278	927	3,113	1,334	4,447
		Total	12,643	63	18	81	1,880	806	2,686	941	403	1,344	3,997	1,713	5,710
012822	Soisona	Urban	3,181	8	2	10	542	45	587	271	23	294	1,355	113	1,468
		Rural	12,523	10	0	10	233	308	541	117	154	271	594	785	1,379
		Total	15,704	18	2	20	775	553	1,128	388	177	565	1,949	898	2,847
012823	Vintar	Urban	2,049	4	0	4	253	139	392	127	70	197	607	334	941
		Rural	5,653	60	17	77	158	289	447	79	145	224	395	723	1,118
		Total	7,702	64	17	81	411	428	839	206	215	421	1,002	1,057	2,059
Provincial Total	Urban	59,138	653	177	830	4,401	3,062	7,463	2,205	1,536	3,741	8,460	6,369	14,829	
	Rural	285,409	1,541	410	1,951	11,529	9,418	20,947	5,771	4,715	10,486	29,248	23,927	53,175	
	Total	344,547	2,194	587	2,781	15,930	12,480	28,410	7,976	6,251	14,227	37,708	30,296	68,004	

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality

Sheet 2

NEDA Geographic Code	Municipality	Type	Pop. Covered by Level I Facilities	Coverage of Shared Use						Level I Coverage (1) + (2)								
				(2) Population Covered by Public and Private			No. of HKs per Shared Facility			Safe			Unsafe			Total		
				Safe	Unsafe	Total	Safe	Unsafe	Total	Facility	Pop.	%	Pop.	%	Pop.	%	Pop.	%
012801	Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	477	0	477	0	87	87	0	0	0	477	41	477	41			
		Total	477	0	477	0	87	87	0	0	0	477	41	477	41			
012802	Bacarra	Urban	2,669	869	1,208	2,077	181	252	433	3	1,099	13	1,570	18	2,669	31		
		Rural	14,527	4,041	7,391	11,432	825	1,508	2,333	4	5,053	25	9,474	47	14,527	71		
		Total	17,196	4,910	8,599	13,509	1,006	1,760	2,766	3	6,152	21	11,044	38	17,196	59		
012803	Badoc	Urban	1,661	307	531	838	63	108	171	1	584	33	1,077	62	1,661	95		
		Rural	23,340	7,256	11,598	18,804	1,413	2,274	3,687	4	8,621	33	14,719	57	23,340	90		
		Total	25,001	7,513	12,129	19,642	1,476	2,382	3,858	3	9,205	33	15,796	57	25,001	91		
012804	Bangui	Urban	2,319	1,396	615	2,011	279	123	402	5	1,599	40	720	18	2,319	59		
		Rural	4,320	2,328	1,445	3,773	475	295	770	4	2,605	26	1,715	17	4,320	43		
		Total	6,639	3,724	2,060	5,784	754	418	1,172	5	4,204	30	2,435	17	6,639	48		
012805	Batec	Urban	9,533	6,893	1,868	8,761	1,326	359	1,685	10	7,501	54	2,032	15	9,533	68		
		Rural	31,793	21,873	7,549	29,422	4,289	1,480	5,769	7	23,691	74	8,102	25	31,793	99		
		Total	41,326	28,766	9,417	38,183	5,615	1,839	7,454	7	31,192	68	10,134	22	41,326	90		
012806	Burgos	Urban	398	478	190	668	94	37	131	3	634	43	264	18	398	62		
		Rural	6,005	2,754	2,503	5,257	530	481	1,011	6	3,102	43	2,903	40	6,005	83		
		Total	6,903	3,232	2,693	5,925	624	518	1,142	5	3,736	43	3,167	36	6,903	79		
012807	Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	148	73	31	104	15	6	21	1	110	14	38	5	148	19		
		Total	148	73	31	104	15	6	21	1	110	14	38	5	148	19		
012808	Currimaos	Urban	142	0	0	0	0	0	0	0	81	8	61	6	142	13		
		Rural	8,371	2,870	3,311	6,181	563	649	1,212	2	3,793	40	4,578	49	8,371	89		
		Total	8,513	2,870	3,311	6,181	563	649	1,212	2	3,874	37	4,639	44	8,513	82		
012809	Dingras	Urban	122	0	0	0	0	0	0	0	85	1	37	1	122	2		
		Rural	23,679	12,546	5,237	17,783	2,460	1,027	3,487	3	16,695	62	6,984	26	23,679	88		
		Total	23,801	12,546	5,237	17,783	2,460	1,027	3,487	2	16,780	51	7,021	21	23,801	73		

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 2

NEDA Geographic Code	Municipality	Type	Pop. Covered by Level I Facilities	Coverage of Shared Use						Level I Coverage (1) + (2)						
				(2) Population Covered by Public and Private			No. of FHs per Shared Facility			Safe			Unsafe			
				Safe	Unsafe	Total	Safe	Unsafe	Total	Facility	Pop.	%	Pop.	%	Pop.	%
012810	Dumalneg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	132	132	132	0	25	25	0	132	14	132	14			
		Total	132	132	132	0	25	25	0	132	14	132	14			
012811	Espiritu	Urban	158	19	92	15	4	19	1	126	4	32	1	158	5	
		Rural	13,126	10,226	12,831	1,929	492	2,421	25	10,457	78	2,669	20	13,126	97	
		Total	13,284	10,299	12,923	1,944	496	2,440	18	10,583	63	2,701	16	13,284	79	
012812	Laang City (Capital)	Urban	20,849	10,171	8,272	2,076	1,688	3,764	5	11,048	26	9,801	23	20,849	49	
		Rural	44,604	26,886	12,357	5,377	2,471	7,848	5	30,089	61	14,515	29	44,604	90	
		Total	65,453	37,057	20,629	7,453	4,159	11,612	5	41,137	45	24,316	26	65,453	71	
012813	Marcos	Urban	1,435	801	369	1,170	157	72	229	1	972	65	463	31	1,435	96
		Rural	12,183	8,310	3,328	11,638	1,629	653	2,282	9	8,710	67	3,473	27	12,183	93
		Total	13,618	9,111	3,697	12,808	1,786	725	2,511	6	9,682	66	3,936	27	13,618	93
012814	Nueva Era	Urban	487	93	253	346	18	48	66	2	104	7	383	27	487	34
		Rural	2,671	544	1,524	2,068	109	305	414	3	634	14	2,037	44	2,671	58
		Total	3,158	637	1,777	2,414	127	353	480	3	738	12	2,420	40	3,158	52
012815	Pagudpud	Urban	531	197	137	334	38	26	64	0	254	6	277	7	531	13
		Rural	3,796	1,594	1,954	3,548	290	355	645	9	1,655	12	2,141	15	3,796	27
		Total	4,327	1,791	2,091	3,882	328	381	709	4	1,909	10	2,418	13	4,327	24
012816	Paoy	Urban	5,984	829	703	1,532	163	138	301	0	3,185	44	2,799	39	5,984	83
		Rural	14,110	3,293	2,245	5,338	621	424	1,045	1	8,317	53	5,793	37	14,110	91
		Total	20,094	4,122	2,948	7,070	784	562	1,346	1	11,502	50	8,592	38	20,094	88
012817	Pasauquin	Urban	455	82	42	124	17	9	26	0	293	5	162	3	455	8
		Rural	15,472	6,438	4,218	10,656	1,288	844	2,132	2	9,306	52	6,166	35	15,472	87
		Total	15,927	6,520	4,260	10,780	1,305	853	2,158	2	9,599	41	6,328	27	15,927	68
012818	Pidlig	Urban	3,148	2,430	675	3,105	486	135	621	54	2,460	76	688	21	3,148	97
		Rural	13,960	9,258	3,629	12,887	1,889	741	2,630	9	10,010	66	3,950	26	13,960	92
		Total	17,108	11,688	4,304	15,992	2,375	876	3,251	11	12,470	68	4,638	25	17,108	93

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 2

NEDA Geographic Code	Municipality	Type	Pop. Covered by Level I Facilities	Coverage of Shared Use						Level I Coverage (1) + (2)								
				(2) Population Covered by Public and Private			No. of HHS per Shared Facility			Safe			Unsafe			Total		
				Safe	Unsafe	Total	Safe	Unsafe	Total	Facility	Pop.	%	Pop.	%	Pop.	%	Pop.	%
012819	Pinit	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	4,600	5,009	9,609	885	963	1,848	2	6,290	46	7,011	51	13,301	97			
		Total	4,600	5,009	9,609	885	963	1,848	2	6,290	40	7,011	45	13,301	85			
012820	San Nicolas	Urban	1,554	433	1,987	317	88	405	6	1,762	9	492	2	2,254	11			
		Rural	4,664	3,575	8,239	897	688	1,585	5	5,512	56	4,326	44	9,838	100			
		Total	6,218	4,008	10,226	1,214	776	1,990	5	7,274	24	4,818	16	12,092	40			
012821	Sarrat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0			
		Rural	4,889	2,044	6,933	1,019	426	1,445	1	8,002	53	3,378	22	11,380	75			
		Total	4,889	2,044	6,933	1,019	426	1,445	1	8,886	39	3,757	17	12,643	56			
012822	Solsona	Urban	1,575	138	1,713	315	28	343	1	2,930	87	251	7	3,181	95			
		Rural	5,026	6,118	11,144	985	1,200	2,185	8	5,620	31	6,903	38	12,523	69			
		Total	6,601	6,256	12,857	1,300	1,228	2,528	4	8,550	40	7,154	33	15,704	73			
012823	Vintar	Urban	723	385	1,108	151	80	231	1	1,330	29	719	15	2,049	44			
		Rural	2,098	2,437	4,535	420	487	907	3	2,493	10	3,160	13	5,653	23			
		Total	2,821	2,822	5,643	571	567	1,138	2	3,823	13	3,879	13	7,702	26			
Provincial Total		Urban	28,471	15,838	44,309	5,696	3,195	8,891	2	36,931	26	22,207	16	59,138	41			
		Rural	141,517	90,717	232,234	27,908	17,881	45,789	4	170,765	48	114,644	32	285,409	79			
		Total	169,988	106,555	276,543	33,604	21,076	54,680	3	207,696	41	136,851	27	344,547	69			

4.2 Sanitation and Sewerage

4.2.2 Types of Facilities and Definition of Service Level Standard

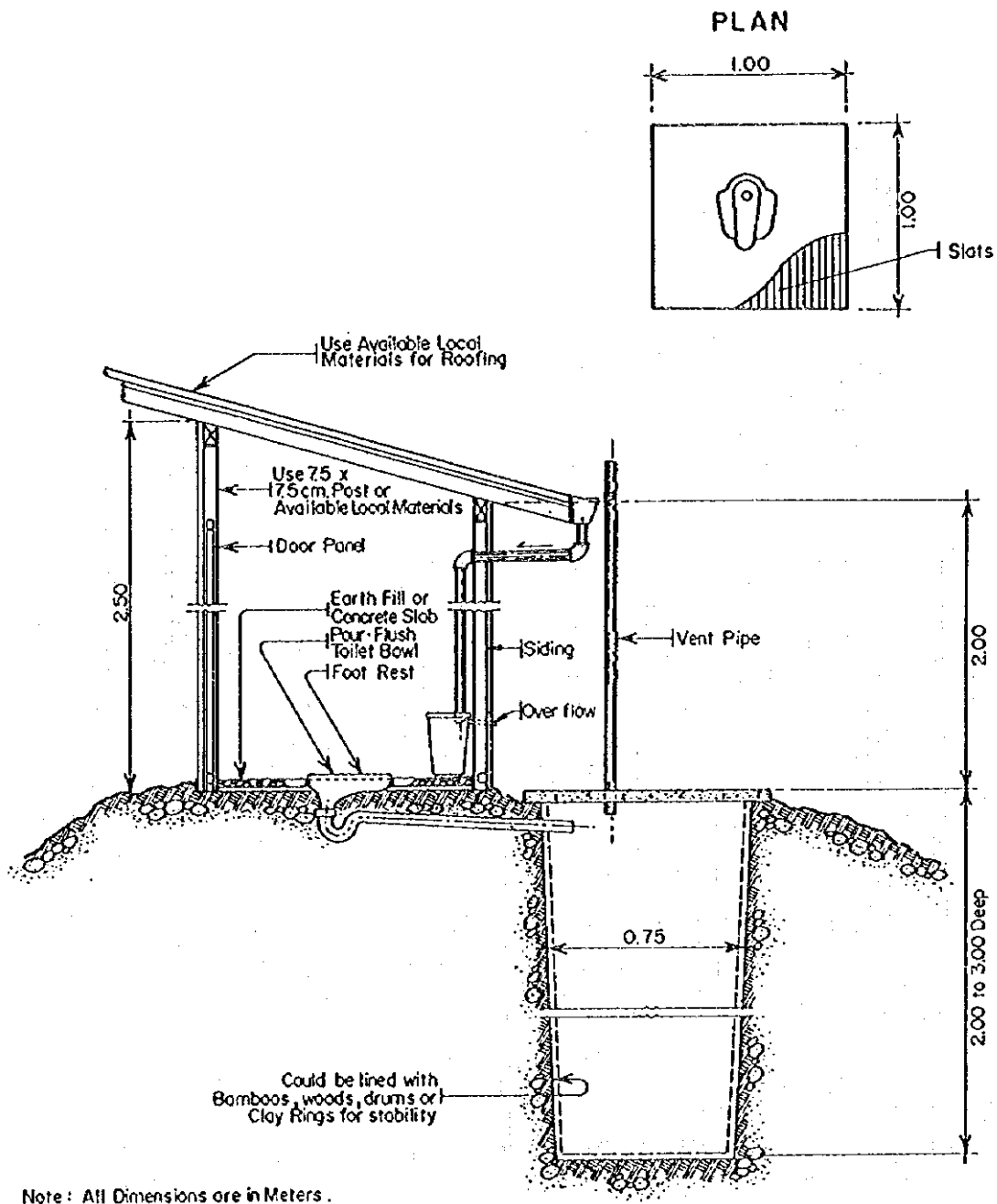
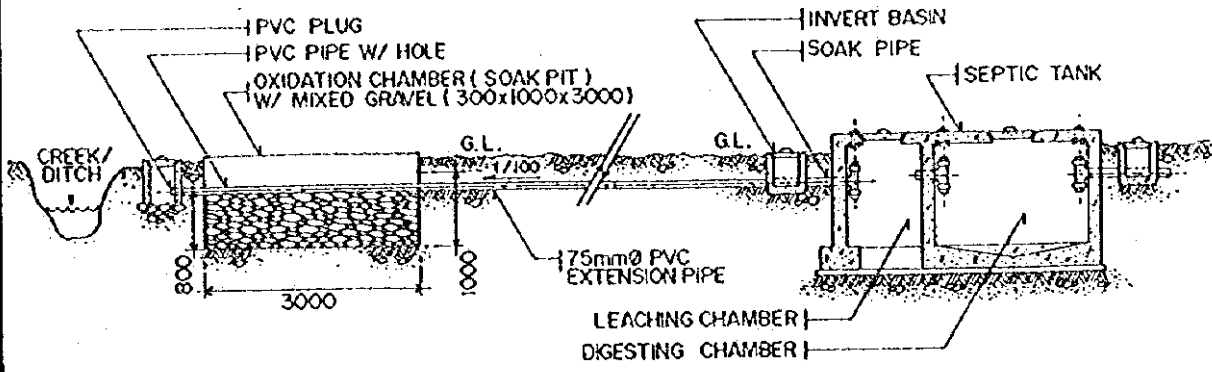


FIGURE 4.2.1
STANDARD STRUCTURE OF PRIVATE TOILET FACILITY



LAYOUT PLAN OF HIGH GROUND WATER SITE

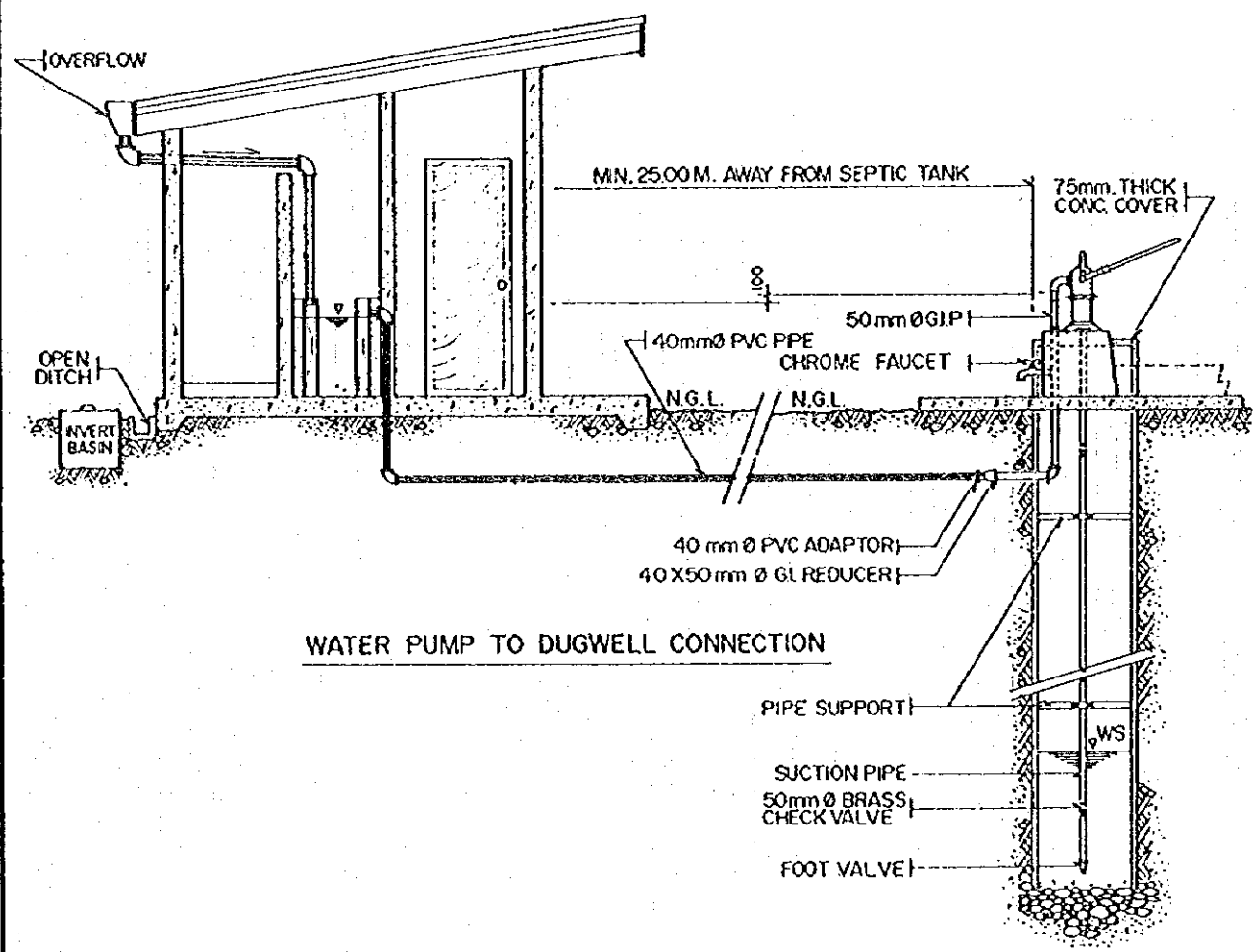


FIGURE 4.2.2
STANDARD STRUCTURE OF SCHOOL TOILET FACILITY

4.2.3 Sanitation Facilities and Service Coverage

Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets by Type, by Municipality, Urban and Rural, 1995

Municipality	Type	HHs No. 1995	Households Served by Sanitary Toilets								Underserved/Unservd HHs			
			Flush		Pour Flush		VIP		Total		Unsanitary		No Facility	
			Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	213	0	0	174	82	0	0	174	82	39	18	0	0
	Total	213	0	0	174	82	0	0	174	82	39	18	0	0
Bacarra	Urban	1,798	482	27	1,274	71	42	2	1,701	94	35	2	62	3
	Rural	4,149	252	6	3,265	79	83	2	3,790	91	107	3	252	6
	Total	5,947	734	12	4,539	76	125	2	5,491	92	142	2	314	5
Badoc	Urban	358	50	14	283	79	0	0	333	93	10	3	15	4
	Rural	5,098	120	2	4,729	93	0	0	4,849	95	120	2	129	3
	Total	5,456	170	3	5,012	92	0	0	5,182	95	130	2	144	3
Bangui	Urban	794	80	10	692	87	0	0	772	97	7	1	15	2
	Rural	2,049	130	6	1,661	81	0	0	1,791	87	143	7	115	6
	Total	2,843	210	7	2,353	83	0	0	2,563	90	150	5	130	5
Batac	Urban	2,700	280	10	2,315	86	0	0	2,595	96	91	3	14	1
	Rural	6,351	437	7	5,279	83	0	0	5,244	83	758	12	349	5
	Total	9,051	717	8	7,594	84	0	0	7,839	87	849	9	363	4
Burgos	Urban	285	15	5	235	82	0	0	250	87	31	11	4	1
	Rural	1,390	27	2	1,133	82	0	0	970	70	365	26	55	4
	Total	1,675	42	3	1,368	82	0	0	1,220	73	396	24	59	4
Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	159	0	0	40	25	44	28	84	53	52	33	23	14
	Total	159	0	0	40	25	44	28	84	53	52	33	23	14
Currimaó	Urban	219	61	28	63	29	0	0	124	57	13	6	82	37
	Rural	1,844	59	3	1,366	74	0	0	1,425	77	56	3	363	20
	Total	2,063	120	6	1,429	69	0	0	1,549	75	69	3	445	22
Dingras	Urban	1,179	114	10	1,046	89	0	0	1,160	99	0	0	19	2
	Rural	5,199	81	2	5,068	97	0	0	5,149	99	17	0	33	1
	Total	6,378	195	3	6,114	96	0	0	6,309	99	17	0	52	1
Dumalneg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	183	0	0	183	100	0	0	183	100	0	0	0	0
	Total	183	0	0	183	100	0	0	183	100	0	0	0	0
Espíritu	Urban	649	161	25	241	37	149	23	649	100	0	0	0	0
	Rural	2,566	305	12	1,630	64	598	23	2,533	99	33	1	0	0
	Total	3,215	466	14	1,871	58	747	23	3,182	98	33	1	0	0
Laog City (Capital)	Urban	8,540	2,100	25	6,302	74	0	0	8,402	99	45	1	93	1
	Rural	9,956	663	7	8,330	84	0	0	8,993	91	239	2	724	7
	Total	18,496	2,763	15	14,632	79	0	0	17,395	94	284	2	817	4

Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets by Type, by Municipality, Urban and Rural, 1995 (Cont'd.)

Municipality	Type	HHs No. 1995	Households Served by Sanitary Toilets								Underserved/Unserved HHs			
			Flush		Pour Flush		VIP		Total		Unsanitary		No Facility	
			Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Marcos	Urban	291	9	3	282	97	0	0	291	100	0	0	0	0
	Rural	2,552	0	0	2,306	90	0	0	2,345	92	21	1	186	7
	Total	2,843	9	0	2,588	91	0	0	2,636	92	21	1	186	7
Nueva Era	Urban	266	4	2	182	68	0	0	188	71	31	12	47	18
	Rural	934	0	0	593	63	0	0	593	63	140	15	201	22
	Total	1,200	4	0	775	65	0	0	781	65	171	14	248	21
Paguipud	Urban	806	27	3	496	62	0	0	729	90	18	2	59	7
	Rural	2,575	9	0	1,302	51	0	0	2,322	90	174	7	79	3
	Total	3,381	36	1	1,798	53	0	0	3,051	90	192	6	138	4
Paoay	Urban	1,419	356	25	1,043	74	15	1	1,419	100	0	0	0	0
	Rural	2,933	224	8	2,240	76	395	13	2,859	97	0	0	74	3
	Total	4,352	580	13	3,283	76	410	9	4,278	98	0	0	74	2
Pasuquin	Urban	1,184	270	23	724	61	0	0	994	84	104	9	86	7
	Rural	3,556	56	2	2,336	66	0	0	2,392	68	562	16	602	17
	Total	4,740	326	7	3,060	65	0	0	3,386	72	666	14	688	15
Piddig	Urban	646	30	5	613	95	0	0	643	100	0	0	3	0
	Rural	3,081	0	0	2,983	97	23	1	3,006	98	0	0	75	2
	Total	3,727	30	1	3,596	96	23	1	3,649	98	0	0	78	2
Pinit	Urban	387	14	4	371	96	0	0	385	100	0	0	2	1
	Rural	2,626	24	1	2,370	90	0	0	2,394	91	33	1	199	8
	Total	3,013	38	1	2,741	91	0	0	2,779	92	33	1	201	7
San Nicolas	Urban	4,089	583	14	3,500	86	0	0	4,083	100	0	0	6	0
	Rural	1,915	154	8	1,662	87	0	0	1,816	95	0	0	99	5
	Total	6,004	737	12	5,162	86	0	0	5,899	98	0	0	105	2
Sarrat	Urban	1,487	251	17	1,236	83	0	0	1,487	100	0	0	0	0
	Rural	3,160	0	0	3,116	99	0	0	3,116	99	0	0	44	1
	Total	4,647	251	5	4,352	94	0	0	4,603	99	0	0	44	1
Solsona	Urban	673	135	20	510	76	0	0	645	96	10	1	18	3
	Rural	3,539	160	5	3,206	91	0	0	3,366	96	79	2	94	3
	Total	4,212	295	7	3,716	88	0	0	4,011	95	89	2	112	3
Vintar	Urban	968	160	17	729	75	0	0	717	75	6	1	245	25
	Rural	4,929	85	2	3,275	66	0	0	3,360	68	553	11	1,016	21
	Total	5,897	245	4	4,004	68	0	0	4,077	69	559	9	1,261	21
Provincial Total	Urban	28,738	5,182	18	21,142	77	206	1	27,567	96	401	1	770	3
	Rural	70,957	2,786	4	58,247	82	1,143	2	62,754	88	3,491	5	4,712	7
	Total	99,695	7,968	8	80,389	81	1,349	1	90,321	91	3,892	4	5,482	6

5. EXISTING SECTOR ARRANGEMENTS AND INSTITUTIONAL CAPACITY
 5.5 Sector Agencies at the Local Level

FIGURE 5.5.1
 ORGANIZATIONAL CHART
 PROVINCIAL PLANNING & DEVELOPMENT OFFICE
 PROVINCE OF ILOCOS NORTE

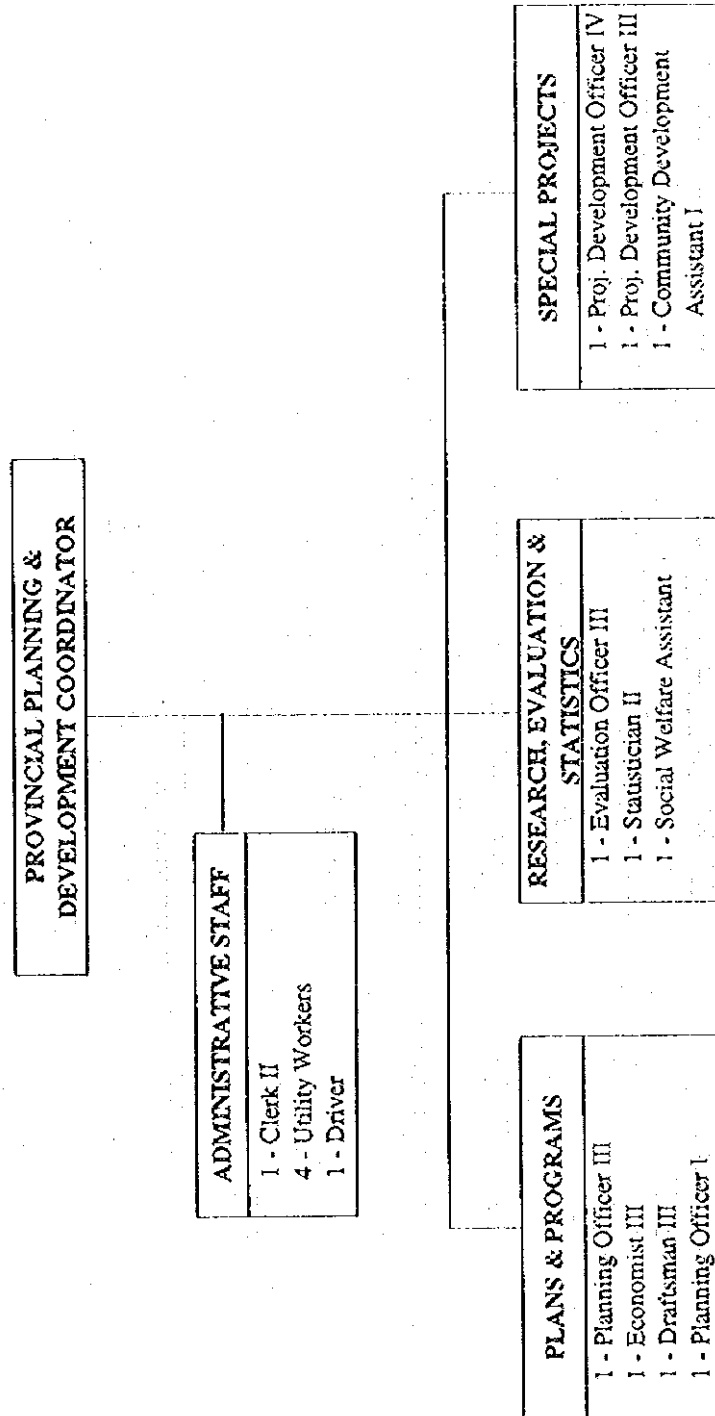


FIGURE S.5.2
 ORGANIZATIONAL CHART
 PROVINCIAL ENGINEER'S OFFICE
 PROVINCE OF ILOCOS NORTE

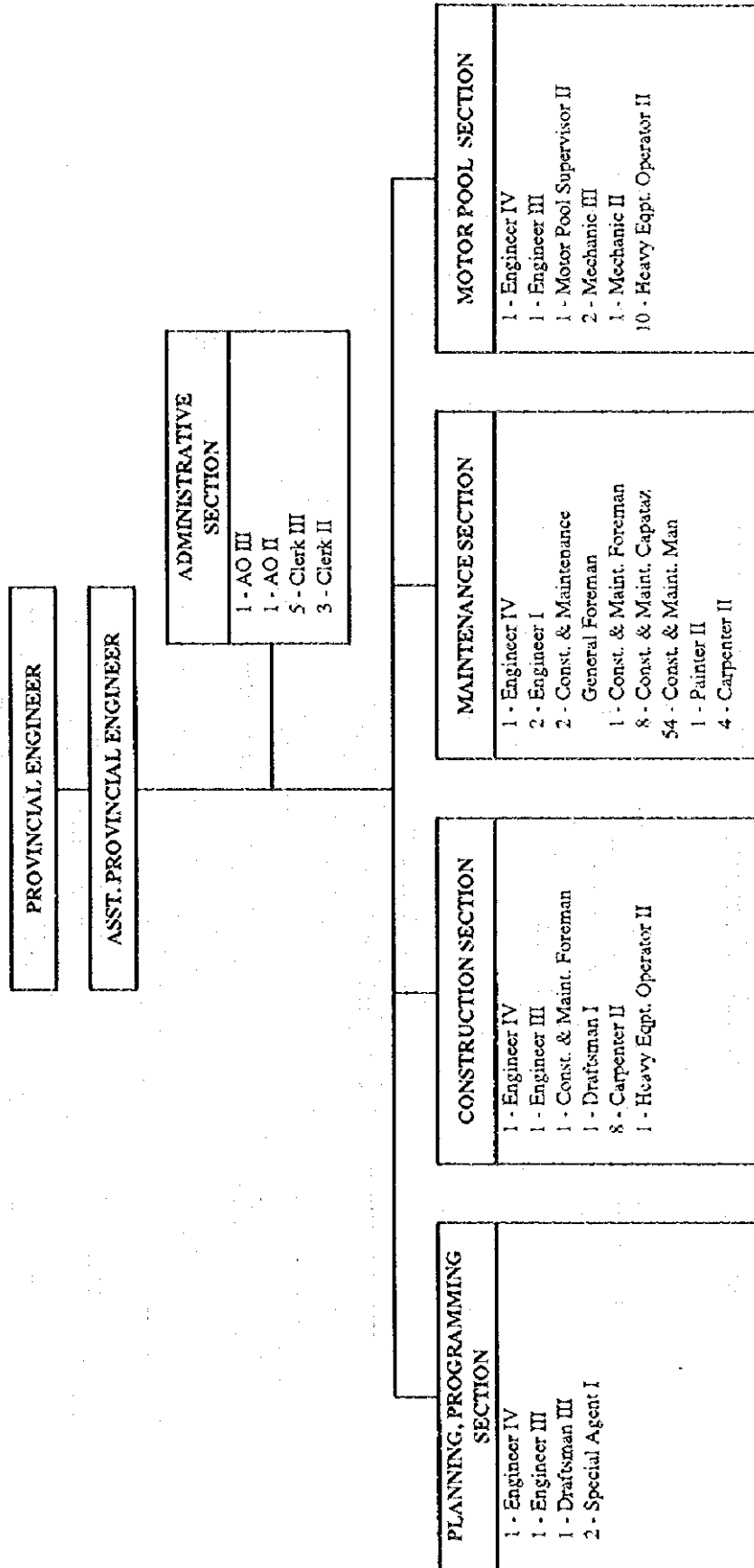
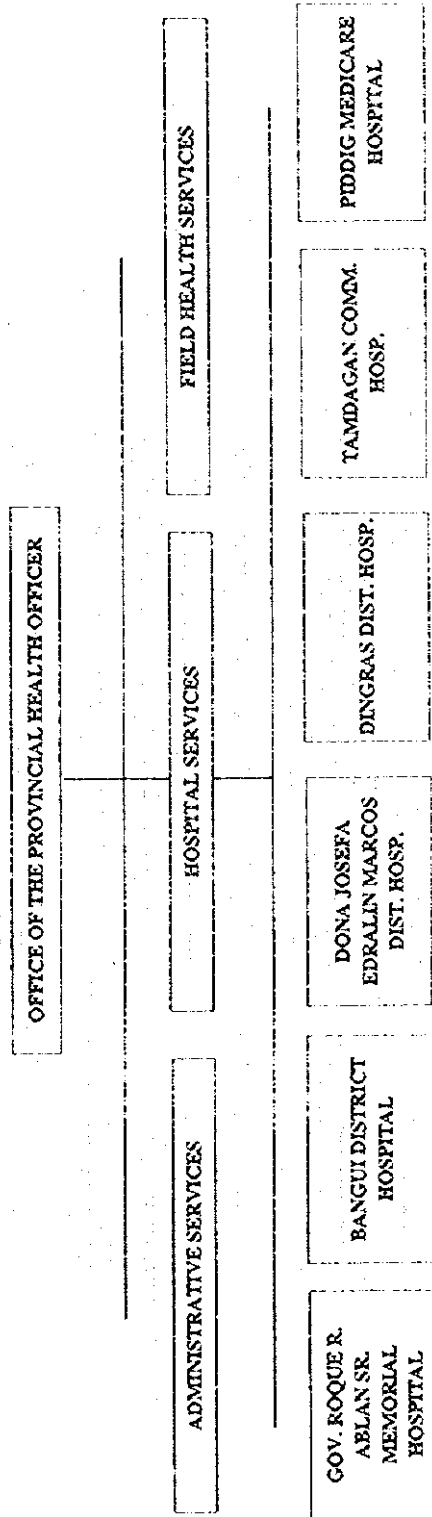


FIGURE 5.5.3
 ORGANIZATIONAL CHART
 PROVINCIAL HEALTH OFFICE
 PROVINCE OF ILOCOS NORTE



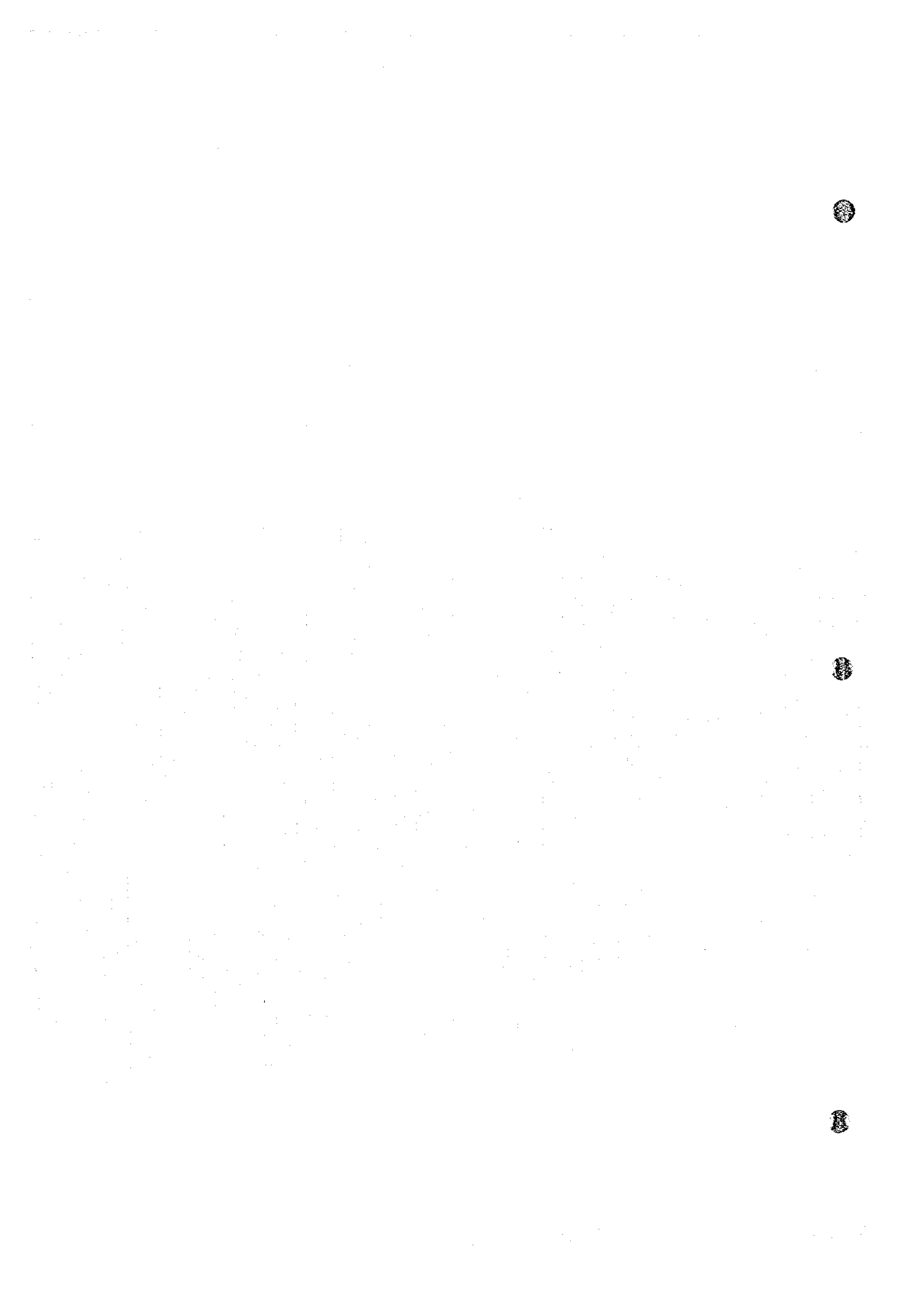


6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION
6.2 Past Public Investment

Table 6.2.1 Past Internal Revenue Allotment to Municipalities in Ilocos Norte Province in 1990-94

	Unit: Pesos				
	1990	1991	1992	1993	1994
I. IRA to All Municipalities (National Total)	3,054,601,475	4,046,837,742	7,127,522,550	12,484,800,000	16,325,288,074
II. IRA to Municipalities					
<i>Total</i>	29,550,239	37,853,246	76,486,120	130,327,634	174,312,561
1. Adams	525,594	673,829	2,114,261	3,463,631	4,968,331
2. Bacara	1,623,301	2,026,783	3,596,668	6,120,756	8,450,371
3. Badoc	1,605,422	1,998,164	3,597,130	6,114,325	8,148,105
4. Bangui	1,062,573	1,350,787	2,920,966	4,876,526	6,554,597
5. Batac	2,645,468	3,288,919	5,343,829	9,344,353	12,525,188
6. Burgos	939,280	1,268,128	3,110,566	5,240,148	5,857,299
7. Carasi	489,421	652,027	2,117,881	3,451,718	4,842,850
8. Curimaao	689,233	892,658	2,176,147	3,493,149	5,024,995
9. Dingras	1,914,949	2,390,517	4,150,612	7,125,541	9,526,851
10. Dumalneg	368,689	490,466	1,753,866	2,804,408	4,004,335
11. Espiritu (Banna)	1,092,730	1,400,381	2,899,133	4,854,824	6,792,828
12. Marcos	943,290	1,254,777	2,764,152	6,222,680	7,957,262
13. Nueva Era	1,805,374	2,414,705	5,546,621	8,200,756	12,023,022
14. Pagudpud	1,424,784	1,859,911	3,811,666	6,553,052	8,207,737
15. Paoy	1,304,770	1,691,856	3,250,519	5,478,729	7,614,014
16. Pasuquin	1,532,512	1,981,767	3,805,270	6,505,447	9,150,563
17. Piddig	1,419,531	1,804,925	3,605,945	6,242,728	7,422,198
18. Pili	1,192,078	1,451,203	2,902,786	4,820,046	6,215,821
19. San Nicolas	1,543,084	1,981,199	3,629,590	6,185,987	8,104,733
20. Sarra	1,428,829	1,772,395	3,361,229	5,699,663	7,394,852
21. Solsona	1,376,137	1,845,866	3,690,897	6,300,340	7,951,812
22. Vintar	2,623,190	3,361,983	6,335,786	11,228,832	15,574,797
III. Shares (%) in national total					
<i>Total</i>	0.967	0.935	1.073	1.044	1.068
1. Adams	0.017	0.017	0.030	0.028	0.030
2. Bacara	0.053	0.050	0.050	0.049	0.052
3. Badoc	0.053	0.049	0.050	0.049	0.050
4. Bangui	0.035	0.033	0.041	0.039	0.040
5. Batac	0.087	0.081	0.075	0.075	0.077
6. Burgos	0.031	0.031	0.044	0.042	0.036
7. Carasi	0.016	0.016	0.030	0.028	0.030
8. Curimaao	0.023	0.022	0.031	0.028	0.031
9. Dingras	0.063	0.059	0.058	0.057	0.058
10. Dumalneg	0.012	0.012	0.025	0.022	0.025
11. Espiritu (Banna)	0.036	0.035	0.041	0.039	0.042
12. Marcos	0.031	0.031	0.039	0.050	0.049
13. Nueva Era	0.059	0.060	0.078	0.066	0.074
14. Pagudpud	0.047	0.046	0.053	0.052	0.050
15. Paoy	0.043	0.042	0.046	0.044	0.047
16. Pasuquin	0.050	0.049	0.053	0.052	0.050
17. Piddig	0.046	0.045	0.051	0.050	0.045
18. Pili	0.039	0.036	0.041	0.039	0.038
19. San Nicolas	0.051	0.049	0.051	0.050	0.050
20. Sarra	0.047	0.044	0.047	0.046	0.045
21. Solsona	0.045	0.045	0.052	0.050	0.049
22. Vintar	0.086	0.083	0.089	0.090	0.095

Sources: (1) Department of Budget and Management and (2) Bureau of Local Government Finance (DOF)



7. WATER SOURCE DEVELOPMENT

7.3 Groundwater Sources

7.3.2 Groundwater Availability in the Province

(1) Major Information and References

The Groundwater Availability Map was prepared using the following information and references (detailed list of references is presented in Table 7.3.1, Data Report):

- Administrative and Topographical Maps of the Province published by NAMRIA with scale of 1:150,000 and 1:50,000, respectively.
- Geological Map of the Philippines published by then BMGS with a scale of 1:1,000,000.
- Water Resource Investigation conducted by NWRB, 1986.
- Well Inventory Database prepared by NWRB, LWUA, DPWH.
- Well Inventory Database in the province.

(2) Approach and Methodology

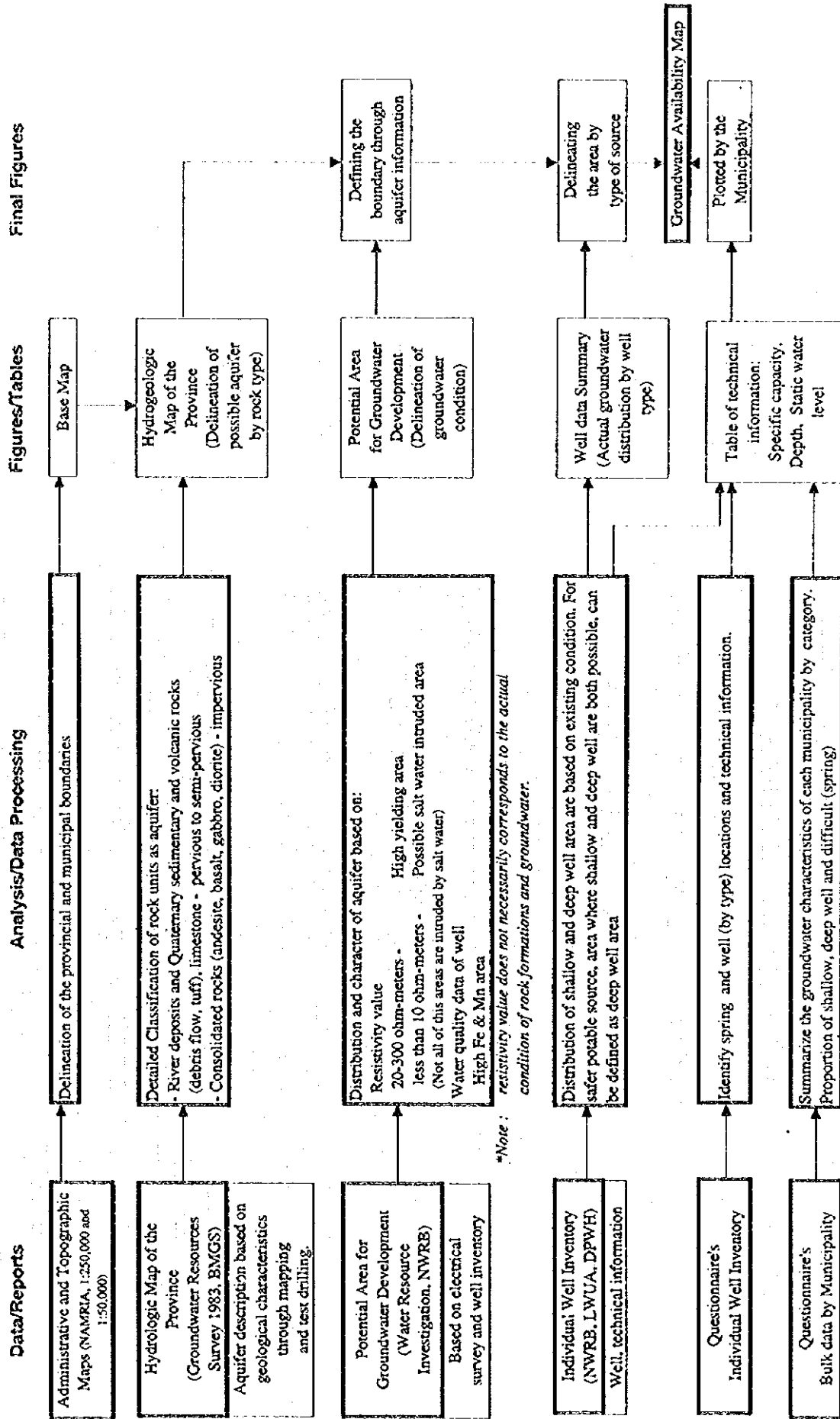
The procedure in preparing the Groundwater Availability Map is explained below with work flow depicted in Figure 7.3.1.

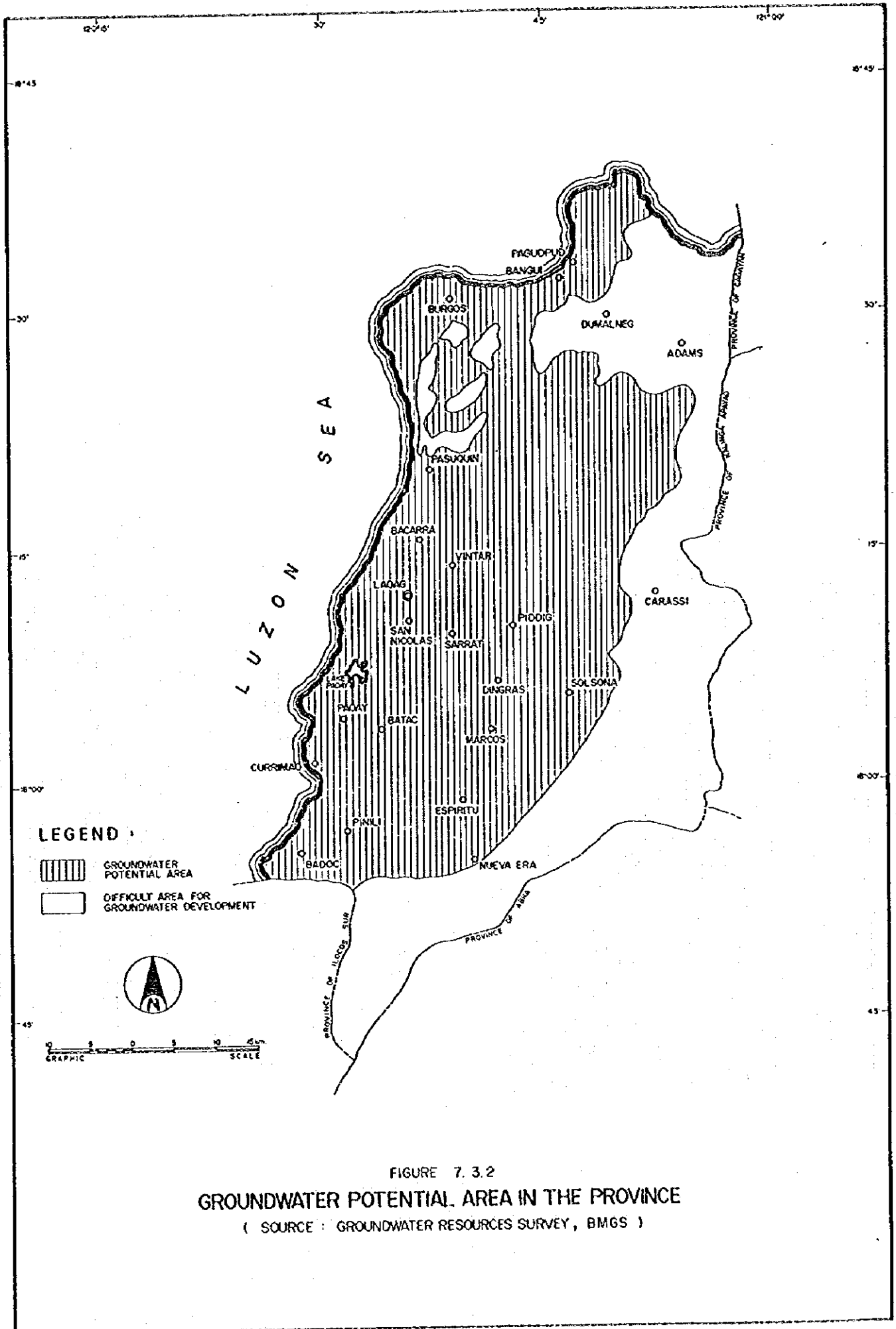
- 1) Prepare a base map with a scale of 1:400,000. The Administrative Map of NAMRIA (1:150,000) is used as reference map and details are verified from the Topographical Map (1:50,000). Basic information including rivers and provincial and municipal boundaries are indicated in the prepared base map.
- 2) The groundwater potential areas, based on the geology of the province, are delineated on the base map. The Recent alluvial and/or beach deposits, Pliocene-Pleistocene rocks (sandstone, conglomerate and volcanic pyroclastics) and Miocene sediments are regarded as possible aquifers considering their high porosity and permeability relative to older formations.

Aside from the defined boundaries of the areas underlain by pervious or groundwater bearing formations, difficult areas for the groundwater development are also delineated as presented in Figure 7.3.2.

- 3) Areas with potential high yielding aquifer and/or with saline water problem, as established in the Water Resources Investigation of NWRB, is reflected in the defined groundwater potential areas.

Figure 7.3.1 WORK FLOW OF GROUNDWATER AVAILABILITY MAP

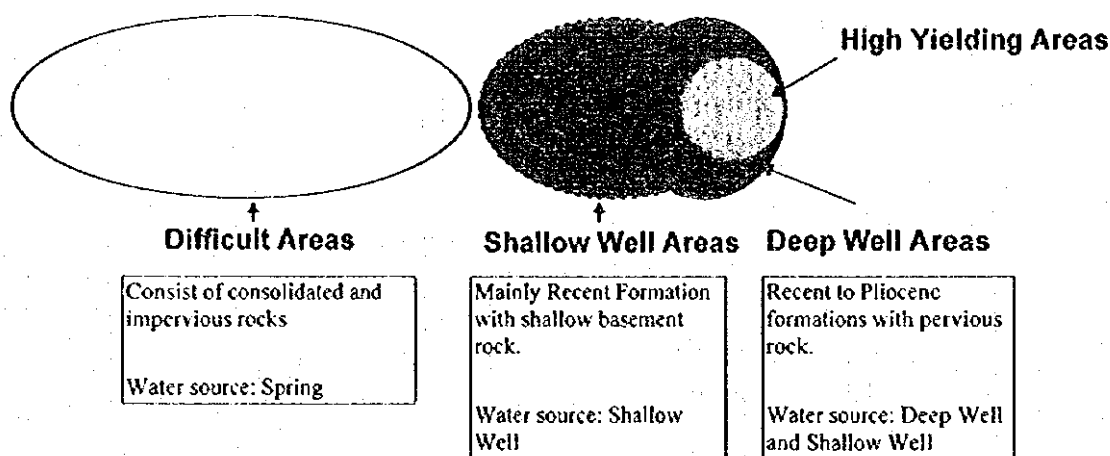




Based on the results of geo-electrical survey of the above investigation, resistivity values of 50 to 300 ohm-meter indicate potential high yielding formation. Values less than 10 ohm-meters suggest clayey layer or saturated formation with high salinity. Figure 7.3.3 shows the boundaries of areas with high and low yielding aquifers, and high chloride concentration. In addition, considering the results of water quality examination of wells, areas with high iron and manganese contents are indicated on the map.

- 4) Delineate shallow and deep well areas based on the well inventory in each municipality (refer to Table 7.3.1, Data Report) and rock distribution. Figure 7.3.4 presents the categorization in terms of groundwater utilization.

Figure 7.3.4 Area Category by Groundwater Utilization



Shallow well areas are defined on the following basis:

- (a) Predominance of serviceable shallow wells and presence of deep wells with water quality problem and/or low yielding aquifers.
 - (b) Occurrence of impervious rocks beneath the Recent formation at shallow depth.
- 5) Based on the information provided by NWRBs well inventory and the data obtained through the questionnaires, well specifications for each municipality are established as shown in the map. These specifications are used as references in evaluating the groundwater availability in each locality. Individual well locations with technical information are presented in Figure 7.6.1, Data Report.

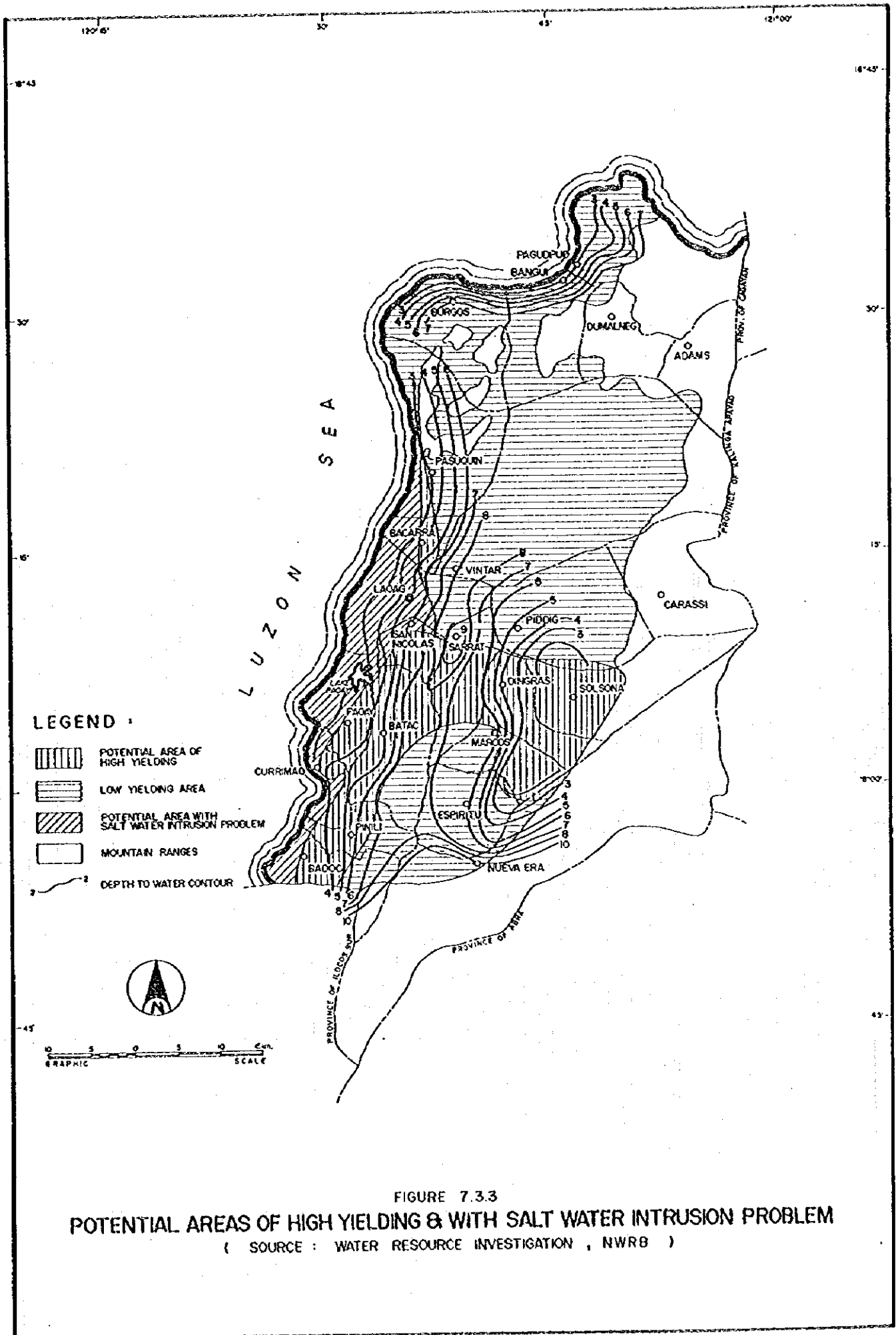


FIGURE 7.3.3
POTENTIAL AREAS OF HIGH YIELDING & WITH SALT WATER INTRUSION PROBLEM
 (SOURCE : WATER RESOURCE INVESTIGATION , NWRB)

(3) Future updating and utilization of the map

For future updating of the map, the following procedure shall be employed:

- 1) Referring to the results of any supplementary water sources investigation by various agencies, redefine the potential area for groundwater development by applying the aforementioned procedures.
- 2) Update the provincial database using the questionnaires made for the study to make necessary revision of the delineated boundaries of groundwater categories.

7.4 Spring Sources

Table 7.4.1 Existing Spring Sources

Municipality	Developed Spring			Undeveloped Spring			Untapped Spring		
	Number	Discharge (l/sec)		Number	Discharge (l/sec)		Number	Discharge (l/sec)	
		Ave.	Range		Ave.	Range		Ave.	Range
Adams	1								
Bacarra	3								
Badoc	10			2					
Bangui	16								
Batac	9			1					
Burgos	7			2	3.34	0.50 - 10.00			
Carassi	6								
Currimao				3					
Dingras	7						1	1.25	
Dumalneg	2	3.33	3.19 - 3.47						
Espiritu	2								
Laoag City	6			2					
Marcos	5			3					
Nueva Era	10			1					
Pagudpud	15	1.01	1.00 - 1.02				1	1.28	
Paoay	1								
Pasquin	9	1.00	1.00 - 1.00	1					
Piddig	7	0.45	0.15 - 1.00				1	1.90	
Pinili									
San Nicolas	6								
Sarrat	4			1					
Solsona	9								
Vintar	54								
TOTAL	189			16			3		

Source: PPDO/PSPT

7.5 Surface Water Sources

(1) Study Rivers

Laoag, Vintar, Bolo, Quiaoit, Badoc, Baruyen, Pasuquin and Pagudpud rivers form the major drainage systems in the province. These rivers may be categorized into two types based on drainage area and flow rate. The first type has narrow and relatively small drainage area (25-250km²) with lower flow rate (less than 10 cum./sec in average). The second type has more than 750 km² catchment area with relatively higher flow rate (more

than 50 cum./sec in average). This type of rivers is generally characterized by long winding stream with numerous tributaries. The Bolo, Quiaoit, Badoc, Baruyen, Pasuquin and Pagudpud rivers fall under the first type, while the Laoag (Padsan) and Vintar (Bislak) rivers represent the second type. Laoag and Vintar are potential sources of water supply considering their perennial flow, relatively large catchment area and proximity to densely populated municipalities/city of the province. These rivers were selected for further study. Fig. 7.5.1 shows the river basins in the province and Table 7.5.1 presents basic information on the selected rivers.

Table 7.5.1 River Information and Related Data

River	Drainage Area (km ²)	Flow Rate (cu. m/sec)			Relevant Information in the Basin	
		Minimum	Average	Maximum	Major Mun. & Population I/	Water District
Laoag	1,355	5.85	104.86	4,271.71	Laoag 83,756	Ilocos Norte WD
Vintar	646	-	-	-	Vintar 27,084	Ilocos Norte WD

I/ 1990 Population, NSO

Note : - No data available

(2) Sampling Points and Examination procedures

Water quality analysis of the two selected rivers was undertaken to determine the general characteristics of surface water in the province. Locations of sampling points were set at a minimum of 5 kilometers from the river mouth to avoid tidal effect (refer to Figure 7.5.1).

Water sampling was conducted on June 29, 1995 at different points across the courses of selected rivers. The samples were sent to MWSS laboratory within 24 hours after they were taken. Flow rates were also measured at the sampling points. A composite sample for each rivers was prepared in proportion to the flow rates of the rivers.

The water quality analysis considered twelve (12) parameters and was performed in accordance to the Philippine Standard Method for Analysis of Air and Water.

(3) Results of Water Quality Analysis

Table 7.5.2 summarizes the results of analysis (refer to MWSS Central Laboratory Examination Results, 7.5 Data Report). Flow rates of Laoag and Vintar rivers at the time of sampling were 75 and 119 m³/sec, respectively. The discharge of Laoag river was close to its recorded average flow rate.

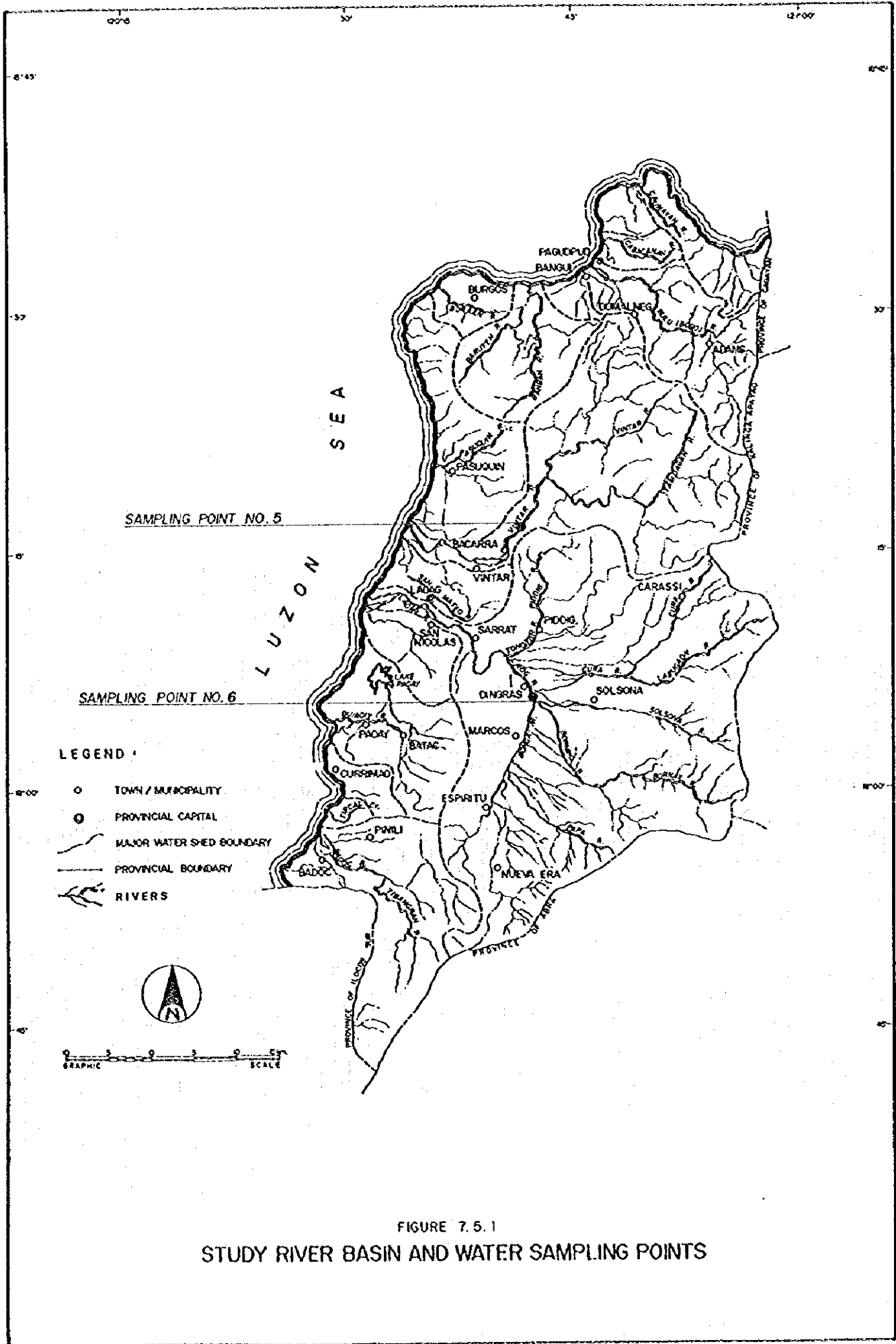


FIGURE 7.5.1
STUDY RIVER BASIN AND WATER SAMPLING POINTS