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 - 8

SUPPORTING AND DATA REPORT

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

BATANES

FEBRUARY 1996

NIPPON JOGESUIDO SEKKEI CO., LTD.

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VOLUME III - 8 SUPPORTING AND DATA REPORT

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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
Assistant Secretary
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	BATCH No. 2
(1) Zambales	(1) Abra
(2) Rizal	(2) Ilocos Norte
(3) Mindoro Oriental	(3) Ilocos Sur
(4) Mindoro Occidental	(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.

Appendix A

LIST OF ATTENDANTS IN THE SERIES OF DISCUSSIONS

ATTENDANTS	DESIGNATION
A. DILG	
1. HON. YOLANDA MA. L. DE LEON	Assistant Secretary, Plans and Programs
2. MR. ORVILLE M. ROQUE	Project Manager I, PMO
3. MR. ROGELIO B. OCAMPO	Chief, Planning Div., PMO
4. MS. ELLEN I. PASCUA	Chief, Admin. Div., PMO
5. MS. FE CRISILLA M. BANLUTA	PW4SP Overall Coordinator, PMO
B. OTHER AGENCIES	
1. MR. ANTONIO DE VERA	Administrator, LWUA
2. MR. ROGELIO A. FLORES	Director, PMO-RWS, DPWH
3. DR. MARIO VILLAVERDE	Director, EHS, DOH
C. JICA	
1. MR. MASAO TATEBA	Supervisor, Second Dev't. Study Div., Social Dev't. Study Dept.
2. MR. EIJI IWASAKI	Asst. Resident Representative, Phil. Office
D. JICA STUDY TEAM	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engr.
3. MR. KENSUKE ICHIKAWA	Hydrogeologist
4. MS. YOLANDA M. MINGOA	Sanitary Engr.
5. MR. WILFRIDO C. BARREIRO	Institutional/CD/T Specialist
6. MR. ALLEN M. LOWE	System Engr.
7. KENJI KASAMATU	Coordinator

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
Assistant Secretary
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.

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.

Appendix A

LIST OF ATTENDANTS

Attendants	Designation
A. DILG	
1. MR. ORVILLE M. ROQUE	Project Manager, PMO
2. MR ROGELIO B. OCAMPO	Chief, Planning Div., PMO
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 CACUSANA	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

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 Worksbop 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.

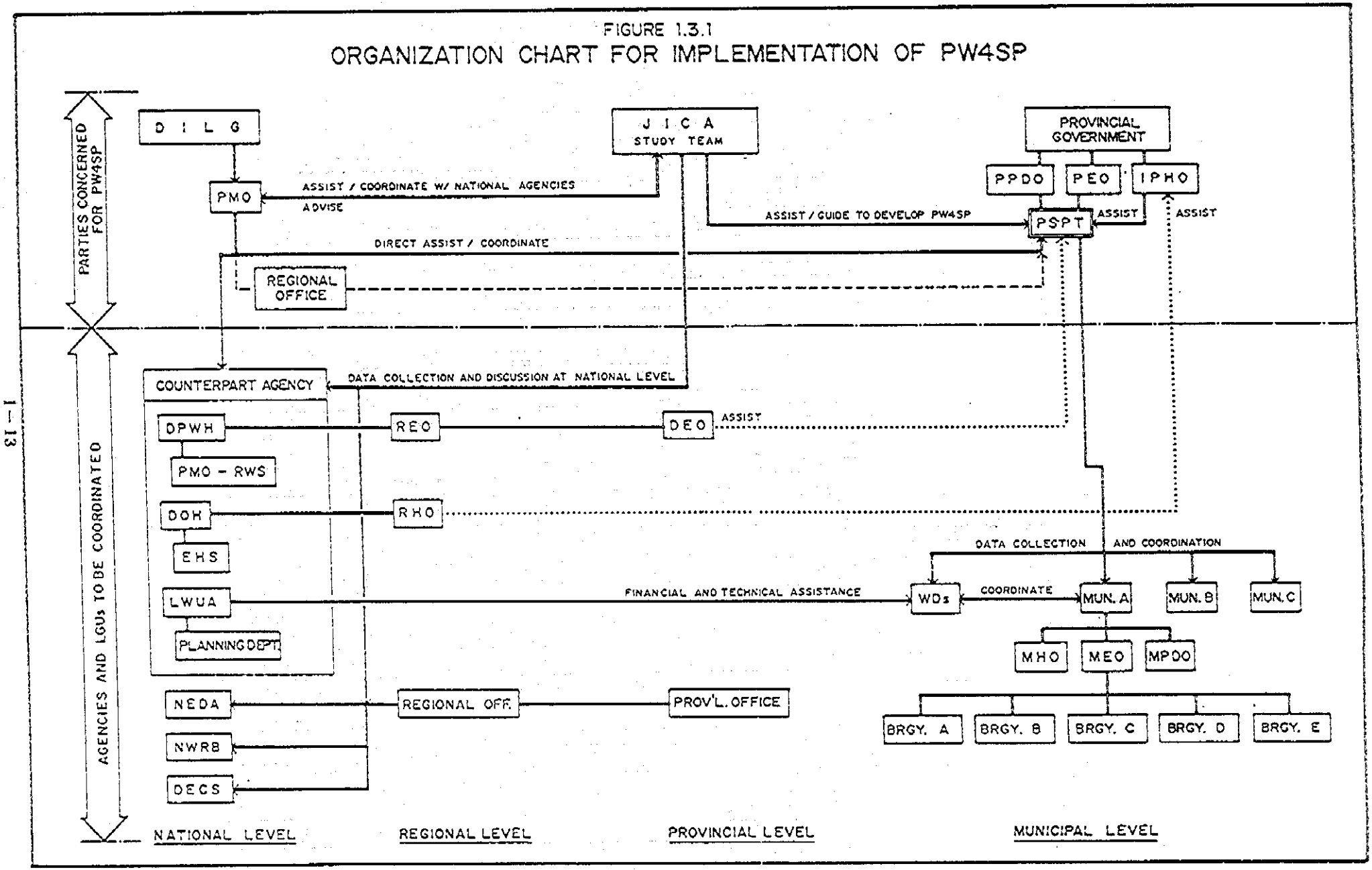
Appendix A

LIST OF ATTENDEES

Attendees	Designation
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.

Appendix A

LIST OF ATTENDEES

Attendees	Designation
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.

Advantage	Disadvantage
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		HH/Facility	
		Water Consumption Rate for Level III System		Liter/capita/day	
		Sanitation			
		Std. number of student to be served by a unit of sanitary toilet		Student/Toilet	
		Standard number of toilets for a public utility		Toilet/Public Facility	
2.	Provincial Sector Target	Medium Term Plan	*Water Supply*		
			UrbanWater Supply	% of Population	
			Rural Water Supply	% of Population	
			Sanitation		
			Household Toilet	% of Household	
			Urban Household Toilet		
			Flush	% of Household	
			Pour Flush	% of Household	
			VIP Latrine	% of Household	
			Rural Household Toilet		
			Flush	% of Household	
			Pour Flush	% of Household	
			VIP Latrine	% of Household	
			School Toilet	% of Public Student	
			Public Toilet	% of Public Utility	
			Solid Waste	% of Population	
		Long Term Plan	*Water Supply*		
			UrbanWater Supply	% of Population	
			Rural Water Supply	% of Population	
			Sanitation		
			Household Toilet	% of Household	
			Urban Household Toilet		
			Flush	% of Household	
			Pour Flush	% of Household	
			VIP Latrine	% of Household	
			Rural Household Toilet		
			Flush	% of Household	
			Pour Flush	% of Household	
			VIP Latrine	% of Household	
			School Toilet	% of Public Student	
			Public Toilet	% of Public Utility	
			Urban Sewerage	% of Urban Population	
3.	**Percentage of Level I Wells for Rehabilitation**			%	
4.	**Percentage of Sector Management Cost to Construction Cost**				
	Feasibility and Detail Design			% of Construction Cost	
	Construction Supervision			% of Construction Cost	
5.	**Contingencies**				
	Physical Contingency			% of Construction Cost	
	Price Contingency			Percent per annum	
6.	**Community Development and Training Cost**				
	Level III			% of Construction Cost	
	Level I and II			% 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		Pesos/Toilet/year	
		Public Utility Toilet Maintenance Cost		Pesos/Toilet/year	
8.	**Allocation factors/Percentages of IRA**				
	From Provincial			%	
	From Municipality and Brgy.			%	
9.	**Funding Levels/Percenatges for Different Financing Scenarios**				
	1st Scenario			% Funding Available	
	2nd Scenario			% Funding Available	
	3rd Scenario			% Funding Available	
	4th Scenario			% Funding Available	
	5th Scenario			% Funding Available	

Table 2.6.2 Composition of Well Sources and Specific Capacity

Municipality	Area	Source	Proportion (%)	Standard Specification Depth (m)	SWL (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				
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	Urban	Shallow Well				
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		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 2.6.3 Annual Distribution of Investment Cost Required by Sub-sector for Medium-Term Development Plan

Unit: Percent

Sub-Sector	Component	1996	1997	1998	1999	2000	Total
Urban Water Supply	**Level III System**						
	Feasibility Study and Detail Design						
	Construction & Supervision						
	Community Development & Training						
Rural Water Supply	**Level I Facility**						
	Detail Design						
	Construction & Supervision						
	Community Development & Training						
	Level II System						
	Detail Design						
	Construction & Supervision						
	Community Development & Training						
Sanitation	Urban Household Toilet						
	Rural Household Toilet						
	Public School Toilet						
	Public Toilet						
	Disinfection of Level I Wells						
	Detail Design						
	Construction & Supervision						
	Community Development & Training						

Table 2.6.4 Level I Safe and Unsafe Percentage

Municipality	Safe Source (%)	Unsafe Source (%)
Provincial Average		

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					
Level III - New System					
For 5000 Population					
For 10000 Population					
For 15000 Population					
Level III - Expansion					
For 5000 Population					
For 10000 Population					
For 15000 Population					
Level II					
Level I					
Deep Well - 30 meter depth					
Deep Well - 50 meter depth					
Deep Well - 70 meter depth					
Shallow Well					
Spring Development					
Rehabilitation Cost for Level I Deep Well					
Disinfection of Level I Wells					
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	Batanes				Region II	
	Total Families[2]		Annual Income		Total Number of Families	Annual Income Average (Pesos)
	Number	Share	Total (P 1,000)	Average (Pesos)		
Under 15,000	245	8.82	2,047	8,357	103,500	13,259
15,000 - 19,999	549	19.77	9,727	17,718	72,752	17,474
20,000 - 29,999	732	26.36	18,656	25,486	106,259	24,570
30,000 - 39,999	580	20.88	19,824	34,179	51,903	35,166
40,000 - 59,999	427	15.38	20,799	48,710	52,341	49,153
60,000 and over	244	8.79	16,959	69,506	51,245	149,999
Total/Average	2,777	100.00	88,012	31,701	438,000	39,183

Source: 1988 Family Income and Expenditures Survey, NSO

Note:

(1) Based on NEDA and other agencies, poverty threshold in Region II in 1988 was estimated at P 30,912. Proportion of families below poverty level was 48.9% in the same year.

(2) For purposes of the survey, a family is defined as a group of person 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	6,091	3,092	1	116	15	168
Official of Gov't. & Special Interest Org., Corp. Executives, Managers, Managing Prod. & Supervisors	241		-	1		5
Professional	479	1	-	15	-	12
Technicians and Associated Professional	157		-	6	-	4
Clerks	358		-	12		-
Service & Shop Market Sales Workers	316		1	5	1	2
Farmers, Forestry Workers & Fishermen	3,002	2,973	-		-	-
Craft and Related Workers	276	-		61	7	110
Plant & Machine Operators and Assemblers	120	1	-	5	-	11
Elementary Occupations	789	103		8	1	18
Other Occupations	229	14	-	3	6	6
Occupation Not Stated	124	-	-	-	-	-

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	195	106	55	2,095	124	124
Official of Gov't. & Special Interest Org., Corp. Executives, Managers, Managing Prod. & Supervisors	29	8	2	194	2	-
Professional	-		8	442	1	-
Technicians and Associated Professional	3	7	8	129		-
Clerks	35	19	20	263	9	-
Service & Shop Market Sales Workers	94	7	9	175	222	-
Farmers, Forestry Workers & Fishermen	6	-	-	15	8	-
Craft and Related Workers	11	4		75	8	-
Plant & Machine Operators and Assemblers	5	45	-	52	1	-
Elementary Occupations	10	9	6	587	47	-
Other Occupations	2	7	2	163	26	-
Occupation Not Stated	-	-	-	-	-	124

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	12,484	4,678	1,394	1,140	835	697	606	3,134
No Grade	327	71	3	5	6	3	1	238
Pre-School	74	70	-	-	1	-	-	3
Elementary	4,877	2,384	71	82	95	168	213	1,864
1st - 4th Grade	2,466	1,544	24	21	18	21	36	802
5th - 7th Grade	2,411	840	47	61	77	147	177	1,062
High School	3,818	1,665	499	397	320	223	195	519
Undergraduate	1,788	1,156	141	89	94	70	55	183
Graduate	2,030	509	358	308	226	153	140	336
Post Secondary	596	72	170	136	61	51	26	80
Undergraduate	142	28	42	28	15	12	9	8
Graduate	454	44	128	108	46	39	17	72
College Undergraduate	1,546	387	413	246	141	117	72	170
Academic Degree Holder	1,172	9	223	264	207	130	96	243
Not Stated	74	20	15	10	4	5	3	17

Source: NSO Census 1990

3.4 Population

3.4.2 Classification of Urban and Rural Areas

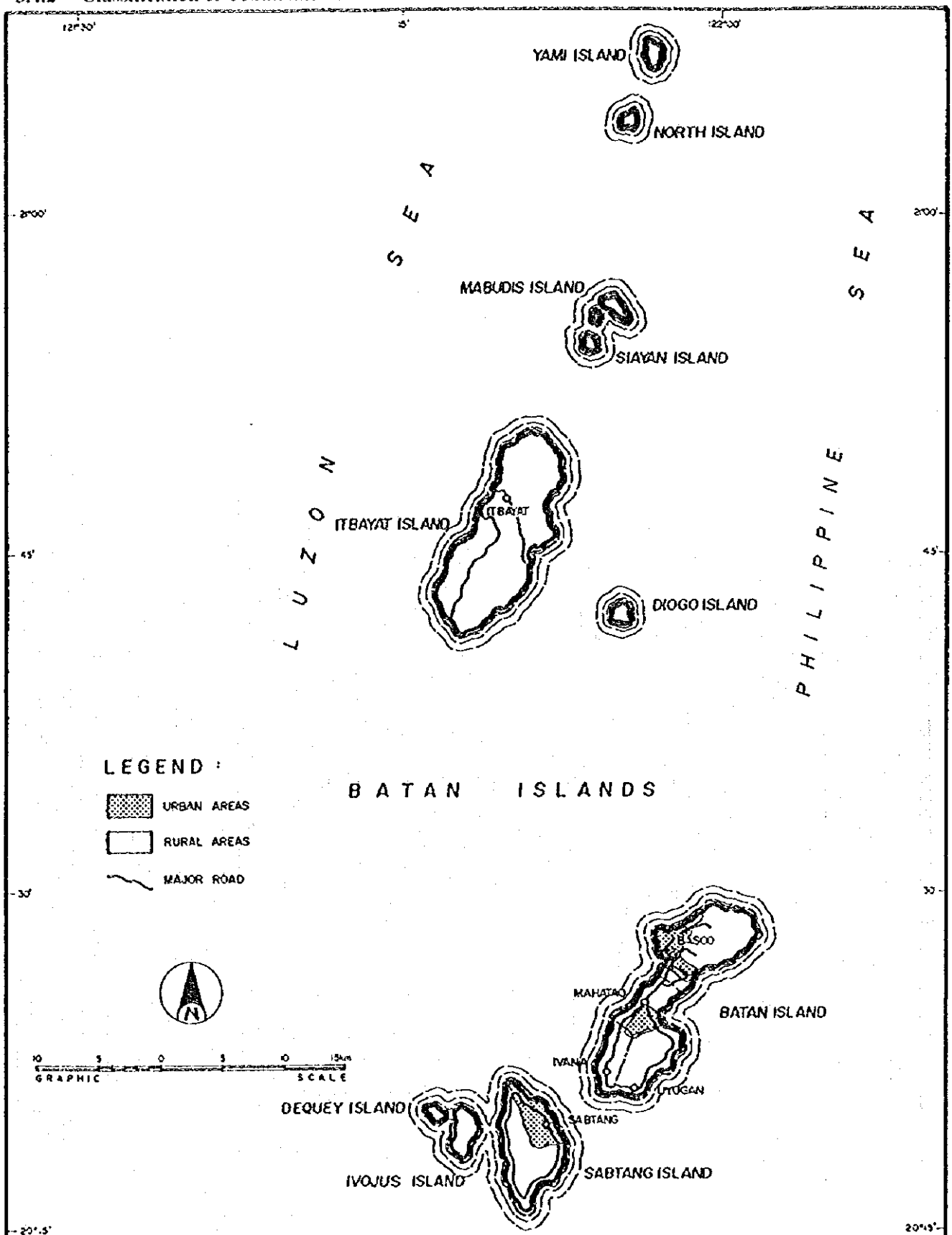


FIGURE 3.4.1
DISTRIBUTION OF URBAN AND RURAL AREAS

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	Batanes		Philippines	
	Number	Ratio	Number	Ratio
Hospitals	2	1:8,414	1,733	1:35,017
RHUs	6	1:2,805	2,295	1:26,442
BHSs	6	1:2,805	10,151	1:5,978
Practitioners				
Doctors	8	1:2,104	7,431	1:8,166
Nurses	28	1:601	10,270	1:5,909
Midwives	12	1:1,402	11,604	1:5,230
Dentists	3	1:5,609	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 Phosporous	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 contect 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 agnatic 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

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Level III Services								
			Number of Barangays Served			Number of Household Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
020901	Basco (Capital)	Basco M.W.	2	3	5	830	285	1,115	4,316	1,482	5,798
		Chanarian RWSA		1	1		35	35		182	182
	Municipal Total		2	4	6	830	320	1,150	4,316	1,664	5,980
020903	Ivana	Ivana M.W.		4	4		249	249		1,215	1,215
020904	Mahatao	Mahatao M.W.	1	3	4	84	265	349	353	1,299	1,652
020905	Sabtang	Sabtang M.W.	2		2	119		119	595		595
020906	Uyugan	Uyugan M.W.		4	4		246	246		1,205	1,205
Provincial Total			5	15	20	1,033	1,080	2,113	5,264	5,383	10,647

NEDA Geographic Code	Municipality	Name of System (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
020901	Basco (Capital)	Basco M.W.		2	2		12	12		62	62
		Chanarian RWSA		4	4		24	24		125	125
	Municipal Total		0	6	6	0	36	36	0	187	0
020903	Ivana	Ivana M.W.		1	1		5	5		25	25
020904	Mahatao	Mahatao M.W.		2	2		10	10		50	50
020905	Sabtang	Sabtang M.W.			0			0			0
020906	Uyugan	Uyugan M.W.		1	1		5	5		25	25
Provincial Total			0	10	10	0	56	56	0	287	287

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Water Sources			Consumption			
			Type[1]	Number	Production (cu.m/day)	Domestic	Institutional	Commercial	Industrial
						(cu. m/day)			
020901	Basco (Capital)	Basco M.W.	SP	2	1,064	819	80	0	0
		Chanarian RWSA	SP	1	86	21	0	0	0
	Municipal Total			3	1,150	840	80	0	0
020903	Ivana	Ivana M.W.	SP	2	302	126	2	0	0
020904	Mahatao	Mahatao M.W.	SP	1	532	281	3	0	0
020905	Sabtang	Sabtang M.W.	SP	1	3	28	0	0	0
			DgW	2	31				
	Municipal Total			3	34	28	0	0	0
020906	Uyugan	Uyugan M.W.	SP	5	617	132	0.5	0	0
Provincial Total				14	2,635	1,407	85.5	0	0

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

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Consumers													
			Domestic House Connections			Domestic Public Faucets			Institutional			Commercial			Industrial		
			Connection		Consumption (cu.m/day)	Connection		Consumption (cu.m/day)	Connection		Consumption (cu.m/day)	Connection		Consumption (cu.m/day)	Connection		Consumption (cu.m/day)
			Metered	Unmetered		Metered	Unmetered		Metered	Unmetered		Metered	Unmetered		Metered	Unmetered	
020901	Basco (Capital)	Basco M.W.	1,065	50	818		2	1	4		80						
		Chanarian RWSA		35	17.50		4	3									
	Municipal Total		1,065	85	836	0	6	4	4	0	80	0	0	0	0	0	0
020903	Ivana	Ivana M.W.	249		124.5		1	1	3	2	1.5						
020904	Mahatao	Mahatao M.W.	247	102	279.2		2	1.33		4	2.67						
020905	Sabtang	Sabtang M.W.	119		28												
020906	Uyugan	Uyugan M.W.	246		123		1	0.67		1	0.50						
Provincial Total			1,926	187	1,391	0	10	7	5	7	84.7	0	0	0	0	0	0

4.1.4 Level II Systems

Table 4.1.2 Existing Level II Systems

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Water Source		Existing Facilities: Length of Transmission Line	Reservoir		Length of Distribution Line	Number of Public Faucets
			Type[1]	Number	(meter)	Number	Q (cu.m)	(meter)	
020902	Ibayat	Ibayat M.W.	SP	1	3,230	2	91	N.A.	80
020905	Sabtang	Sabtang M.W.	SP	1	4,900	4	108	3,131	15
Provincial Total				2	8,130	6	199	N.A.	95

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

NEDA Geographic 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
020902	Ibayat	Ibayat M.W.		4	4		650	650		3,315	3,315
020905	Sabtang	Sabtang M.W.		4	4		75	75		375	375
Provincial Total			0	8	8	0	725	725	0	3,690	3,690

NEDA Geo-graphic Code	Municipality	Name of System (Operating Body)	Service Conditions During Dry Season: Supply (Hrs/day)	Dirty Water[1]	Taste/ Smell[2]	Supply Interruption (number/month): Power Failure	Pump Breakdown	Pipe Burst	Others	Supply Water Pressure (% of Total): Adequate	Inadequate
020902	Ibayat	Ibayat M.W.	24		G					65%	35%
020905	Sabtang	Sabtang M.W.	18		G					70%	30%
Provincial Total			42	0		0	0	0	0	68%	33%

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

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Number of Staff: Technical Professional	Administrative Staff	Collector	Total Number of Staff	Repair Work: Local Trademan	MEO/ CEO	DEO
020902	Ibayat	Ibayat M.W.		1	1	2			
020905	Sabtang	Sabtang M.W.	1	2	1	4			
Provincial Total			1	3	2	6	0	0	0

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Expenditures (Thousand of Pesos/year): Annual	Wages	Fuel, Chem, Mat'l.	Transport	Repairs	Loan Repayment	Other	Tariff: Consumer Payment (Year)	Cost per Pail (Pesos)	Cost per Cubic Meter	Cost Per Household	Other	Average Collection Efficiency (%)
020902	Ibayat	Ibayat M.W.											10.00		100%
020905	Sabtang	Sabtang M.W.											10.00		90%
Provincial Total			0	0	0	0	0	0	0	0	0	0	20.00	0	

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Billings: Annual Billing (Number)	Public Faucet Consumers (Thousand of Pesos/year)	House Connection Consumers	Expected Subsidies	Others	Revenues: Annual Income	Payment by Public Faucet Consumers	Payment by House Connection Consumer	Subsidies	Others
020902	Ibayat	Ibayat M.W.										
020905	Sabtang	Sabtang M.W.										
Provincial Total			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 conducted 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 70% of existing wells in a provincial average are classified unsafe sources. Since the total number of shallow wells (21) occupies 64% of the total number of Level I wells (33) and the deep well is rarely exposed to contamination by seepage of wastewater, PHO analysis results (unsafe percentages) were applied to classify all shallow wells (drilled and driven) into safe and unsafe sources.

The unsafe percentage of provincial average is applied common to urban and rural areas both for public and private shallow wells considering limited number of water samples. While, those sources other than shallow wells are processed as classified in the questionnaire. Table 4.1.3 presents number of Level I facilities by safe and unsafe classification.

4.1.6 Water Supply Service Coverage

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

Although majority of population both in urban and rural areas have access to Level III or II services (85% in urban area and 73% in rural areas), there are still considerable number of population depending on Level I sources/facilities or without access to water supply facilities.

In estimation of service coverage, the unserved population 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, because it is common practice to share private wells with neighbors where public water sources are insufficient. 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.

Table 4.1.3 Number of Level I Facilities by Safe and Unsafe Classification

NEDA Geo-graphic Code	Municipality	Type	Safe Sources										Unsafe Sources									Grand Total
			Public					Private				Total	Public				Private				Total	
			Deep Well	Shallow Well	Covered/ Improved Dug Well	Developed Sping	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		
045201	Basco (Capital)	Urban	0	1	0	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	1	2
		Rural	4	0	0	1	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
		Total	4	1	0	1	6	0	0	0	0	6	1	0	0	1	0	0	0	0	1	7
045202	Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
		Total	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
045203	Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	2	2	0	0	4	0	1	0	1	5	3	0	0	3	1	0	0	1	4	9
		Total	2	2	0	0	4	0	1	0	1	5	3	0	0	3	1	0	0	1	4	9
045204	Mahatao	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	2	0	0	0	2	0	0	0	0	2	1	0	0	1	0	0	0	0	1	3
		Total	2	0	0	0	2	0	0	0	0	2	1	0	0	1	0	0	0	0	1	3
045205	Sabtang	Urban	0	1	0	0	1	0	1	0	1	2	1	0	0	1	2	0	0	2	3	5
		Rural	0	2	0	0	2	0	0	0	0	2	4	0	0	4	0	0	2	2	6	8
		Total	0	3	0	0	3	0	1	0	1	4	5	0	0	5	2	0	2	4	9	13
045206	Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	3	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
		Total	3	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
Provincial Total		Urban	0	2	0	0	2	0	1	0	1	3	2	0	0	2	2	0	0	2	4	7
		Rural	12	4	0	1	17	0	1	0	1	18	8	0	0	8	1	0	2	3	11	29
		Total	12	6	0	1	19	0	2	0	2	21	10	0	0	10	3	0	2	5	15	36

- 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 4.1.4. Table 4.1.5 presents overall population covered by Level I facilities and number of households.

Number of households per shared public/private facility ranges from 1 to 17 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). Some municipalities showing large number of households on this calculation is deemed to be caused by the presence of unreported private facilities.

Table 4.1.4 Estimation of Unserved Population by Municipality

NEDA Geographic Code	Municipality	Type	Population and Households		Served Population			Unserved Population				Population Covered by Level I Facilities
								Unserved Percentage (1990)			Unserved Population (1995)	
			Number	HHs Size	Level III	Level II	Total	Total No. of HHs	Number of Unserved HHs	%		
045201	Basco (Capital)	Urban	4,651	5.2	4,316	0	4,316	732	3	0.4	19	316
		Rural	1,985	5.1	1,664	187	1,851	376	5	1.3	26	108
		Total	6,636	5.2	5,980	187	6,167	1,108	8	1	45	424
045202	Itbayat	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	3,787	5.1	0	3,315	3,315	676	135	20.0	472	0
		Total	3,787	5.1	0	3,315	3,315	676	135	20.0	472	0
045203	Ivana	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	1,317	5.0	1,215	25	1,240	237	3	1.3	17	60
		Total	1,317	5.0	1,215	25	1,240	237	3	1.3	17	60
045204	Mahatao	Urban	424	5.2	353	0	353	72	0	0.0	0	71
		Rural	1,498	4.9	1,299	50	1,349	278	0	0.0	0	149
		Total	1,922	4.9	1,652	50	1,702	350	0	0.0	0	220
045205	Sabtang	Urban	953	5.1	595	0	595	170	16	9.4	90	268
		Rural	975	5.3	0	375	375	166	33	19.9	194	406
		Total	1,928	5.2	595	375	970	336	49	14.6	284	674
045206	Uyugan	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	1,238	4.9	1,205	25	1,230	244	0	0.0	0	8
		Total	1,238	4.9	1,205	25	1,230	244	0	0.0	0	8
Provincial Total		Urban	6,028	5.2	5,264	0	5,264	974	19	2.0	109	655
		Rural	10,800	5.0	5,383	3,977	9,360	1,977	176	8.9	709	731
		Total	16,828	5.1	10,647	3,977	14,624	2,951	195	6.6	818	1,386

Table 4.1.5 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
045201	Basco (Capital)	Urban	316	1	1	2	0	0	0	0	0	0	0	0	0
		Rural	108	5	0	5	0	0	0	0	0	0	0	0	0
		Total	424	6	1	7	0	0	0	0	0	0	0	0	0
045202	Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	0	1	0	1	0	0	0	0	0	0	0	0	0
		Total	0	1	0	1	0	0	0	0	0	0	0	0	0
045203	Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	60	4	3	7	1	1	2	1	1	1	3	3	6
		Total	60	4	3	7	1	1	2	1	1	1	3	3	6
045204	Mahatao	Urban	71	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	149	2	1	3	0	0	0	0	0	0	0	0	0
		Total	220	2	1	3	0	0	0	0	0	0	0	0	0
045205	Sabtang	Urban	268	1	1	2	1	2	3	1	1	2	3	5	8
		Rural	406	2	4	6	0	2	2	0	1	1	0	5	5
		Total	674	3	5	8	1	4	5	1	2	3	3	10	13
045206	Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	8	3	0	3	0	0	0	0	0	0	0	0	0
		Total	8	3	0	3	0	0	0	0	0	0	0	0	0
Provincial Total		Urban	655	2	2	4	1	2	3	1	1	2	3	5	8
		Rural	731	17	8	25	1	3	4	1	2	2	3	8	11
		Total	1,386	19	10	29	2	5	7	2	3	4	6	13	19

Table 4.1.5 Estimation of Population Covered by Safe and Unsafe Source by Municipality

Sheet 2

NEDA Geo-graphic 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			Number of Households			No. of HHs per Shared Facility	Safe		Unsafe		Total	
				Safe	Unsafe	Total	Safe	Unsafe	Total		Pop.	%	Pop.	%	Pop.	%
045201	Basco (Capital)	Urban	316	158	158	316	30	30	60	30	158	3	158	3	316	7
		Rural	108	108	0	108	21	0	21	4	108	5	0	0	108	5
		Total	424	266	158	424	51	30	81	12	266	4	158	2	424	6
045202	Itbayat	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
045203	Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	60	30	24	54	6	5	11	1	33	3	27	2	60	5
		Total	60	30	24	54	6	5	11	1	33	3	27	2	60	5
045204	Mahatao	Urban	71	0	71	71	0	14	14	0	0	0	71	17	71	17
		Rural	149	99	50	149	20	10	30	10	99	7	50	3	149	10
		Total	220	99	121	220	20	24	44	15	99	5	121	6	220	11
045205	Sabtang	Urban	268	111	149	260	22	29	51	15	114	12	154	16	268	28
		Rural	406	115	286	401	22	54	76	11	115	12	291	30	406	42
		Total	674	226	435	661	44	83	127	12	229	12	445	23	674	35
045206	Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	8	8	0	8	2	0	2	1	8	1	0	0	8	1
		Total	8	8	0	8	2	0	2	1	8	1	0	0	8	1
Provincial Total		Urban	655	269	378	647	52	73	125	23	272	5	383	6	655	11
		Rural	731	360	360	720	71	69	140	5	363	3	368	3	731	7
		Total	1,386	629	738	1,367	123	142	265	8	635	4	751	4	1,386	8

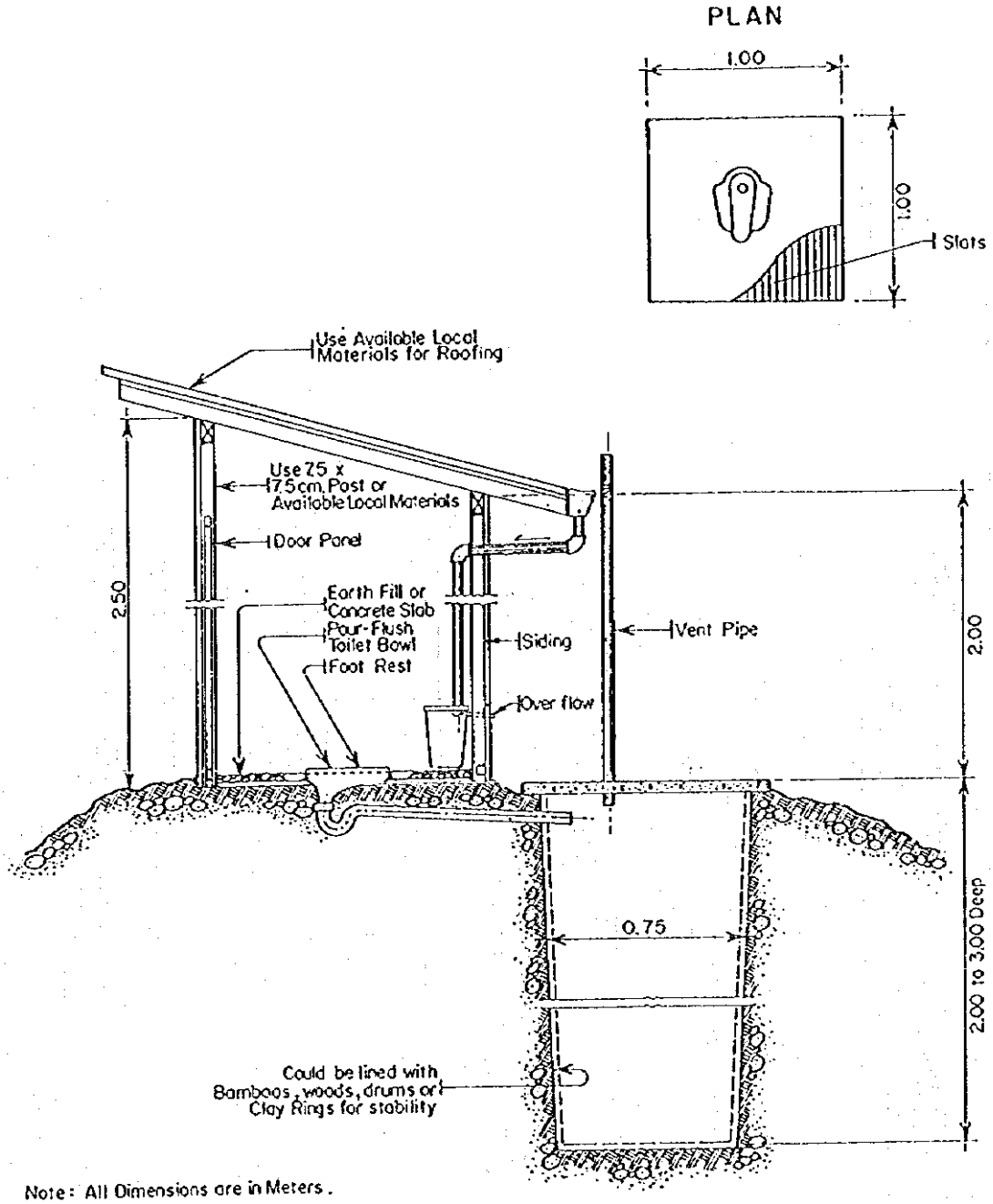
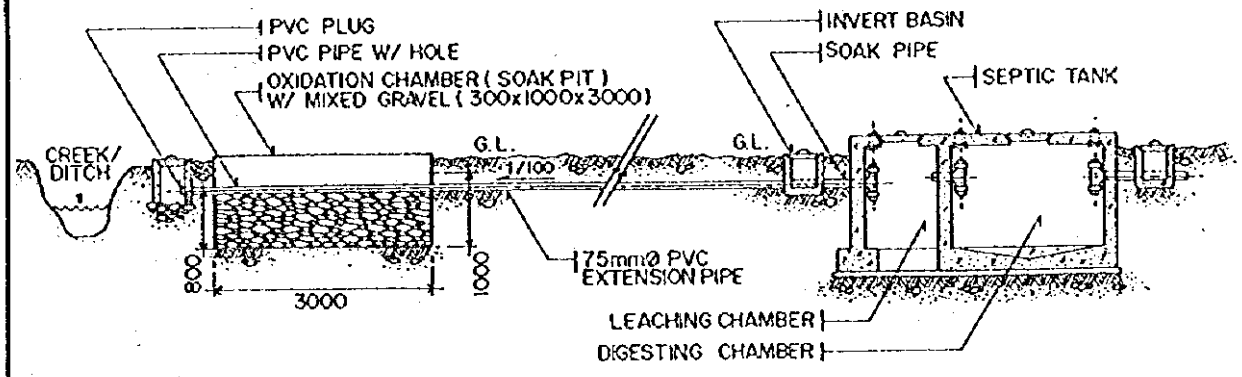


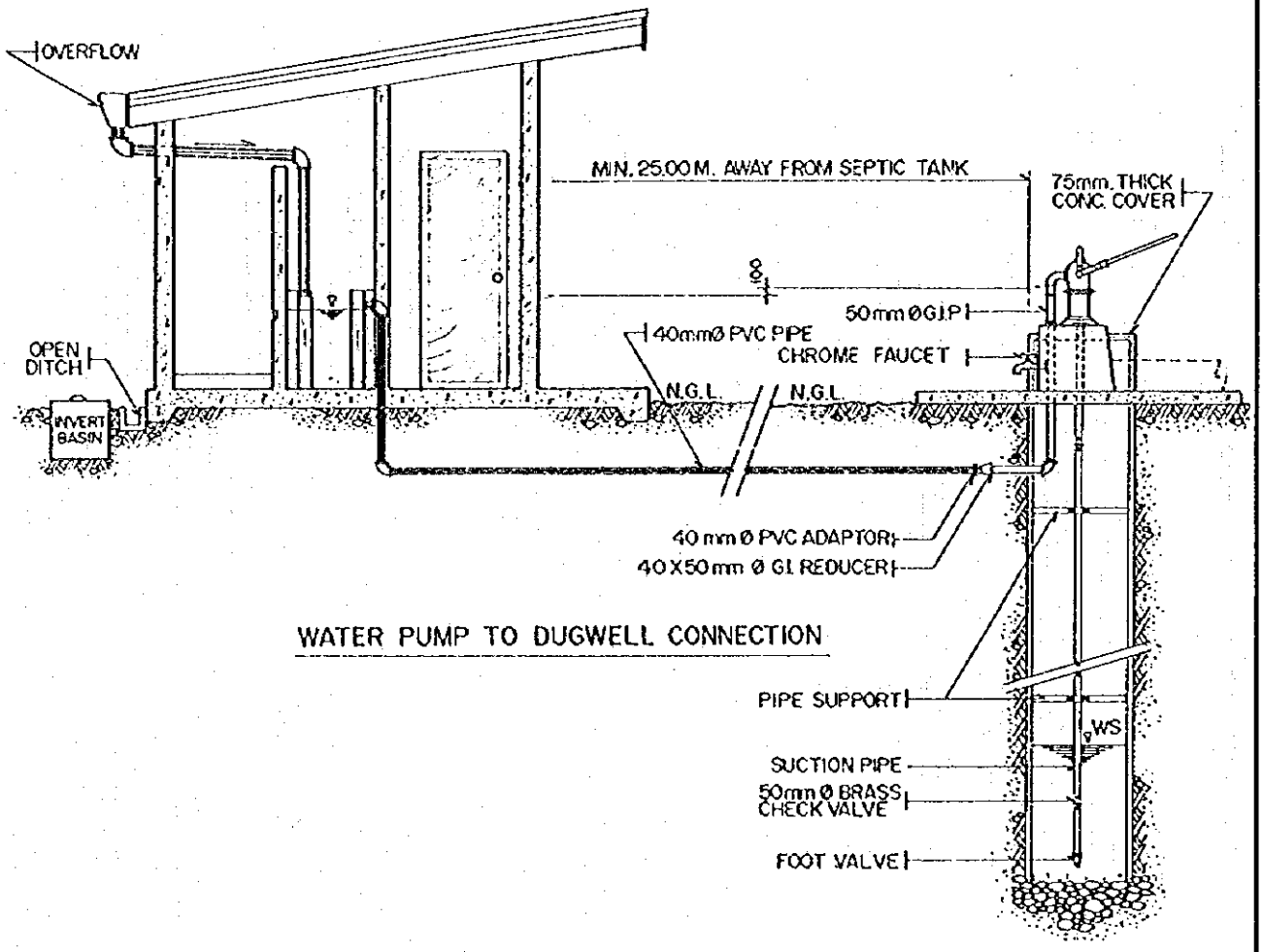
FIGURE 4.2.1

STANDARD STRUCTURE OF HOUSEHOLD TOILET FACILITY

SOURCE : DEPARTMENT OF HEALTH



LAYOUT PLAN OF HIGH GROUND WATER SITE



WATER PUMP TO DUGWELL CONNECTION

FIGURE 4.2.2

STANDARD STRUCTURE OF SCHOOL TOILET FACILITY

SOURCE : JICA - DPWH RURAL ENVIRONMENTAL SANITATION PROJECT

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/Unserved HHs			
			Flush		Pour Flush		VIP		Total		Unsanitary		No Facility	
			Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Basco (Capital)	Urban	891	14	2	847	95	13	1	874	98	11	1	6	1
	Rural	392	5	1	339	86	35	9	379	96	10	3	3	1
	Total	1,283	19	1	1,186	92	48	4	1,253	97	21	2	9	1
Ibayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	742	0	0	659	89	10	1	669	90	59	8	14	2
	Total	742	0	0	659	89	10	1	669	90	59	8	14	2
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	262	4	2	246	94	5	2	255	98	5	2	2	1
	Total	262	4	2	246	94	5	2	255	98	5	2	2	1
Mahatao	Urban	82	5	6	76	93	0	0	81	99	1	1	0	0
	Rural	308	0	0	294	95	0	0	294	95	3	1	11	4
	Total	390	5	1	370	95	0	0	375	96	4	1	11	3
Sabtang	Urban	188	0	0	131	70	31	16	162	86	18	10	8	4
	Rural	185	0	0	146	79	16	9	162	88	20	11	3	2
	Total	373	0	0	277	74	47	13	324	87	38	10	11	3
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	252	0	0	248	98	2	1	250	99	2	1	0	0
	Total	252	0	0	248	98	2	1	250	99	2	1	0	0
Provincial Total	Urban	1,161	19	2	1,054	91	44	4	1,117	96	30	3	14	1
	Rural	2,141	9	0	1,932	90	68	3	2,009	94	99	5	33	1
	Total	3,302	28	1	2,986	90	112	3	3,126	95	129	4	47	1

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 BATANES

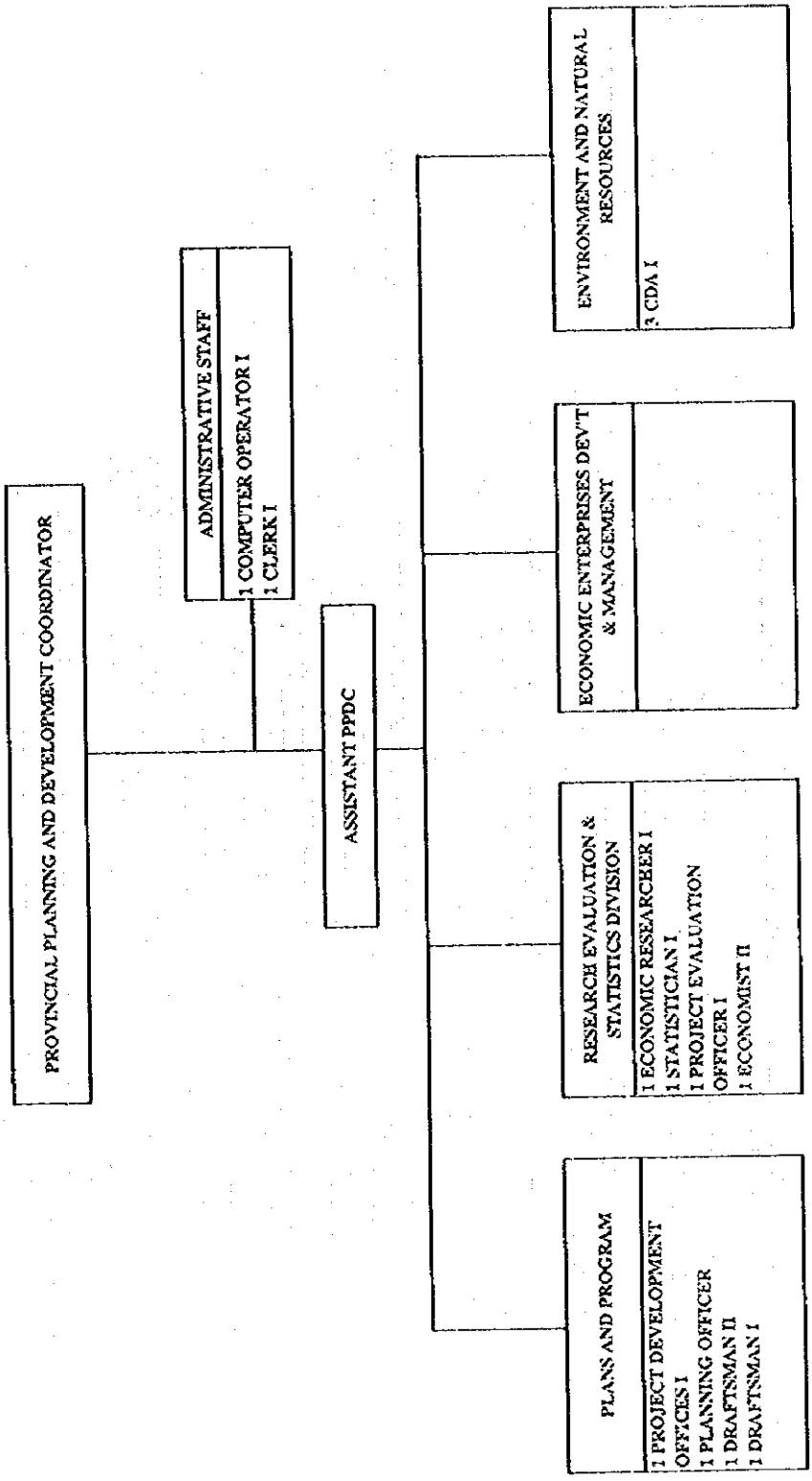


FIGURE 5.5.2
ORGANIZATIONAL CHART
PROVINCIAL ENGINEER'S OFFICE
PROVINCE OF BATANES

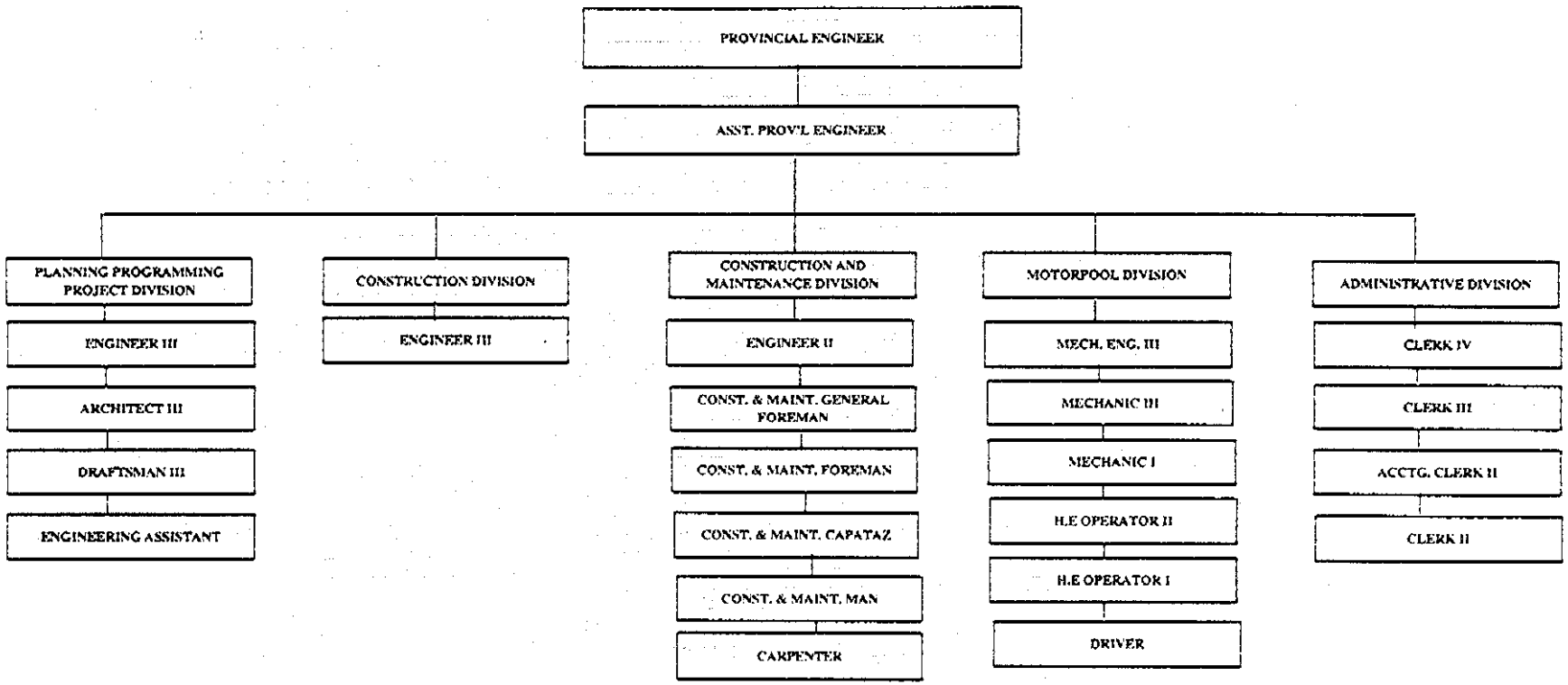
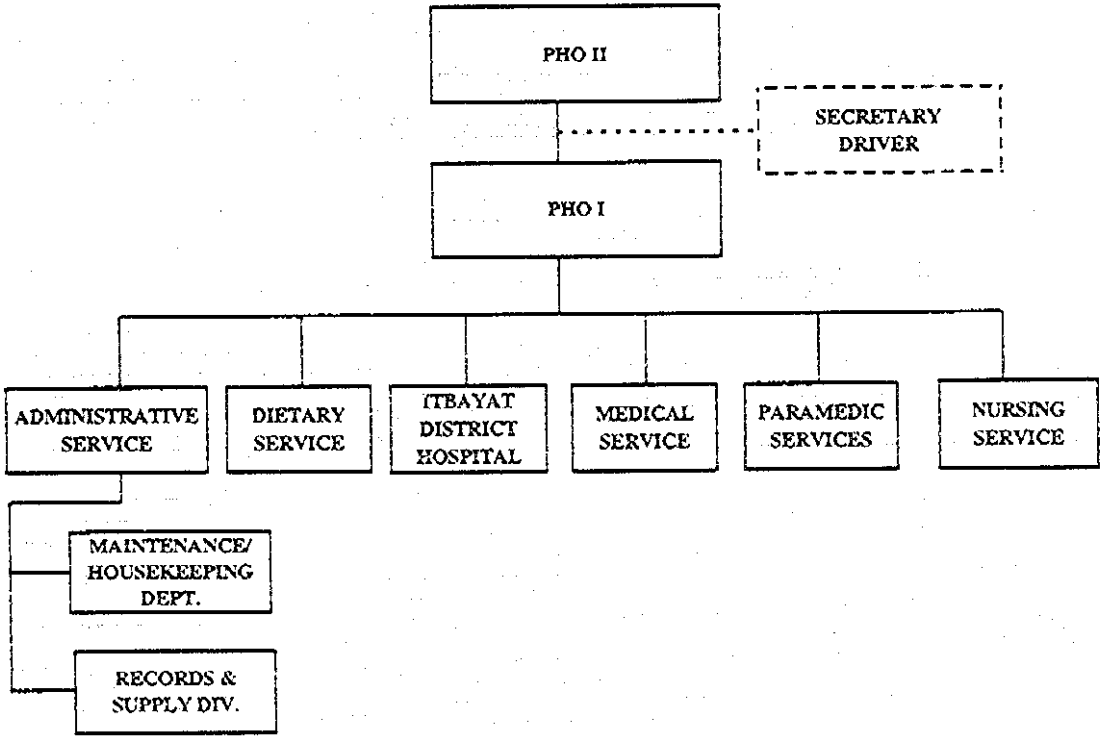


FIGURE 5.5.3
ORGANIZATIONAL CHART
PROVINCIAL HEALTH OFFICE
PROVINCE OF BATANES



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 Batanes 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					
Total	2,448,870	3,071,526	10,451,893	16,421,233	22,350,066
1. Basco	518,336	701,385	2,008,152	3,165,894	4,469,847
2. Ibayat	559,138	734,297	2,154,077	3,500,490	4,595,159
3. Ivana	324,660	368,602	1,496,060	2,310,118	3,155,161
4. Mahatao	347,795	403,695	1,535,753	2,392,172	3,270,040
5. Sabtang	367,780	483,941	1,718,827	2,700,574	3,625,438
6. Uyugan	331,161	379,606	1,539,024	2,351,985	3,234,421
III. Shares (%) in national total					
Total	0.080	0.076	0.147	0.132	0.137
1. Basco	0.017	0.017	0.028	0.025	0.027
2. Ibayat	0.018	0.018	0.030	0.028	0.028
3. Ivana	0.011	0.009	0.021	0.019	0.019
4. Mahatao	0.011	0.010	0.022	0.019	0.020
5. Sabtang	0.012	0.012	0.024	0.022	0.022
6. Uyugan	0.011	0.009	0.022	0.019	0.020

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

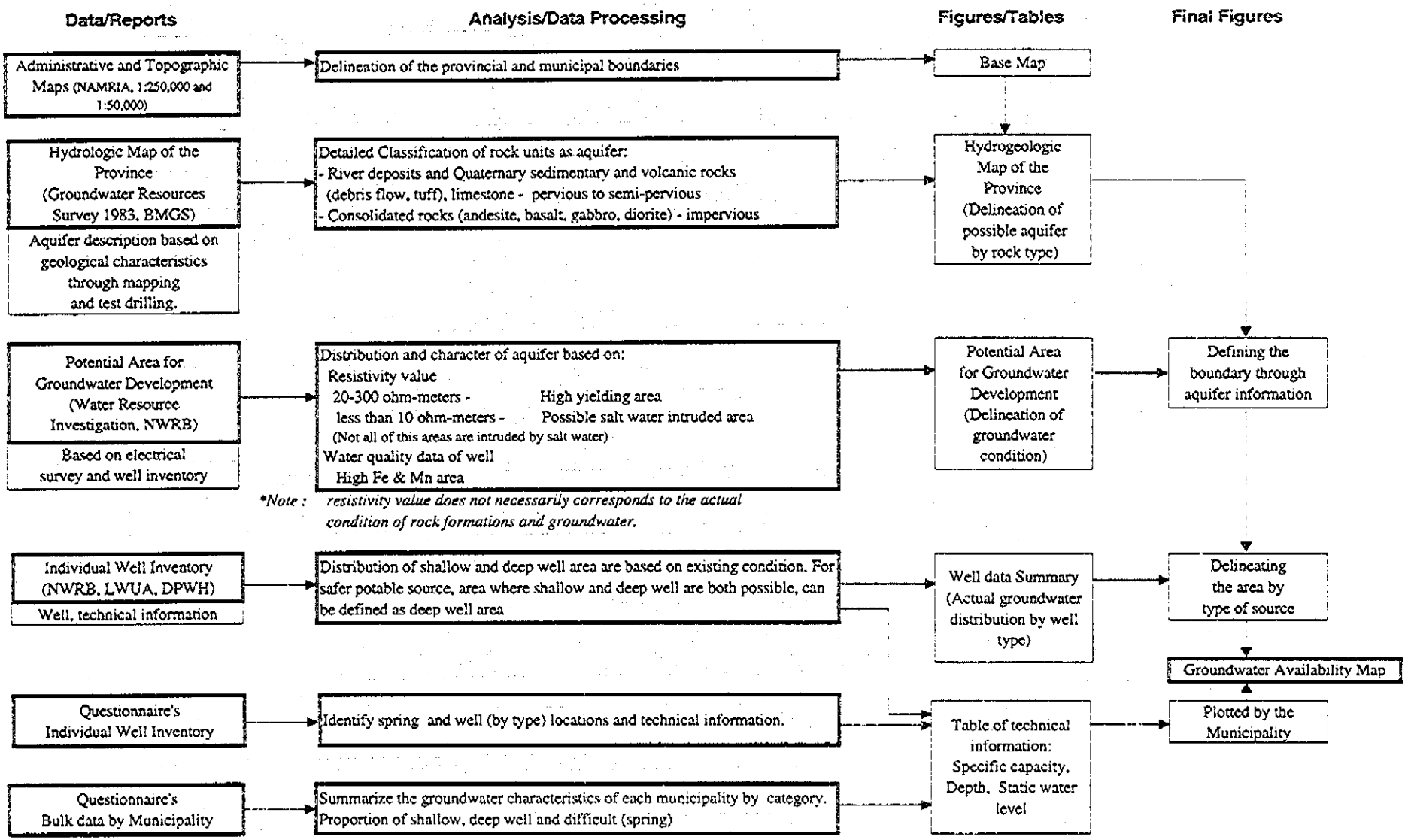
The procedure in preparing the Groundwater Availability Map is explained below with work flow depicted in Figure 7.3.1.

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 (1:50,0000). 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



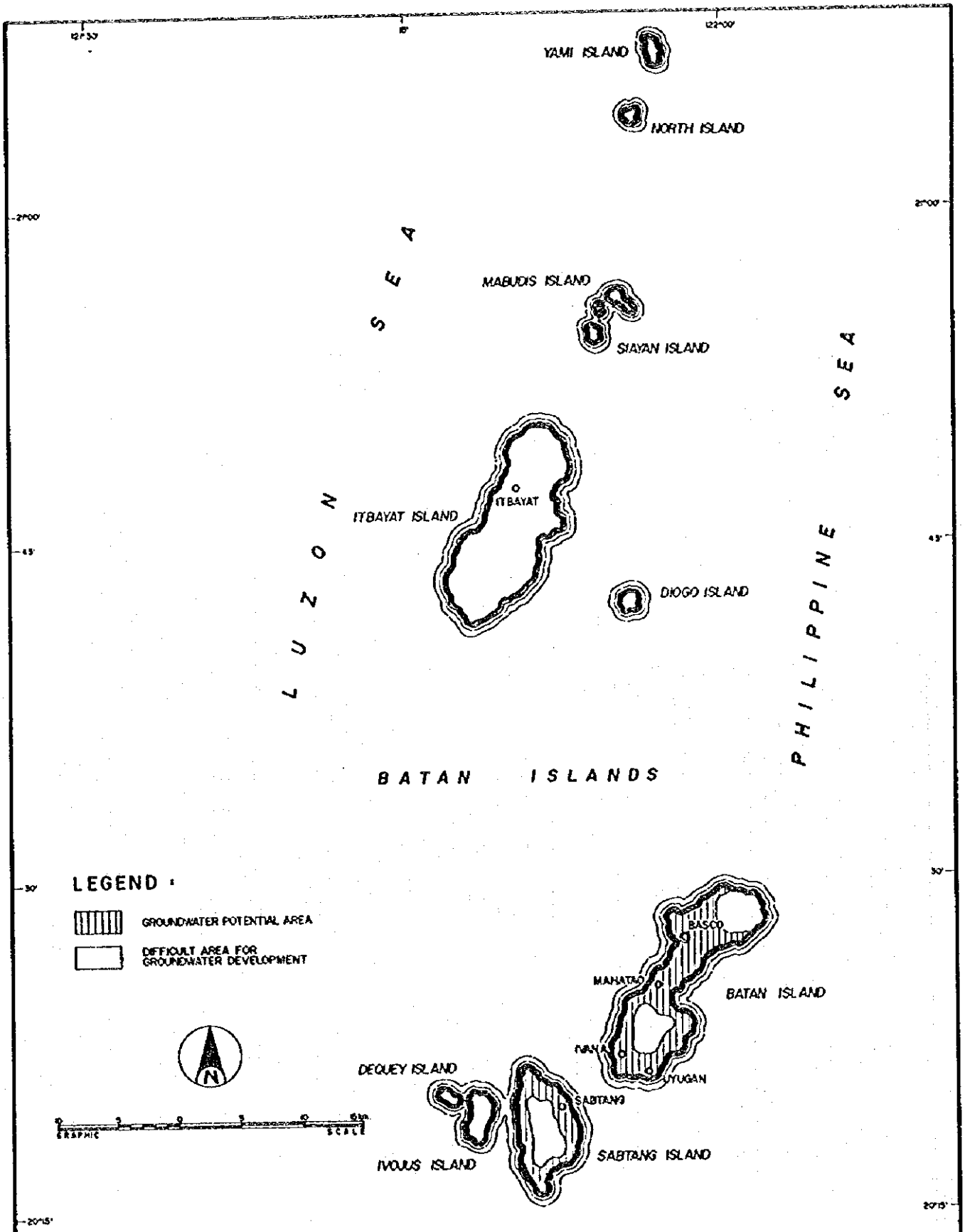


FIGURE 7.3.2

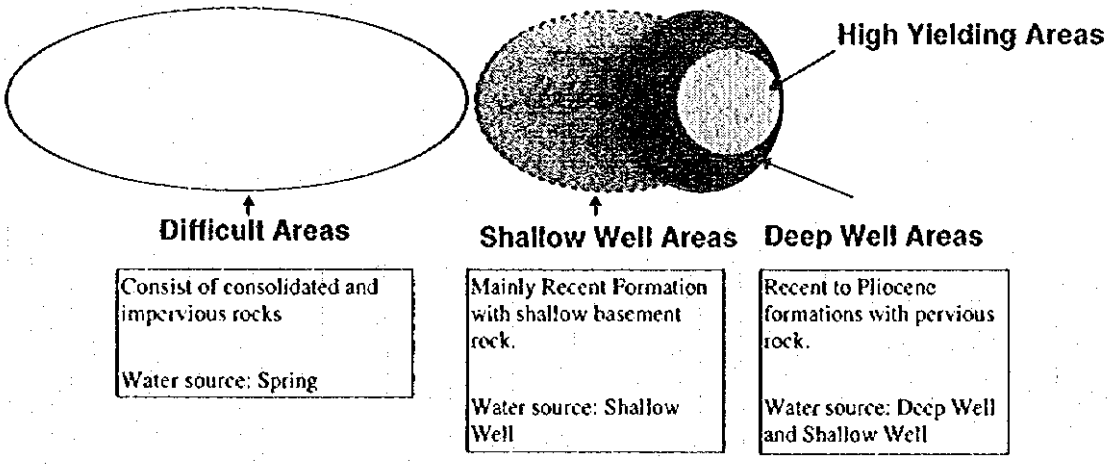
GROUNDWATER POTENTIAL AREA IN THE PROVINCE

(SOURCE : GROUNDWATER RESOURCES SURVEY, BMGS)

Based on the results of geo-electrical survey of the above investigation, resistivity values of 20 to 200 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 municipality. Individual well locations with technical information are presented in Figure 7.6.1, Data Report.

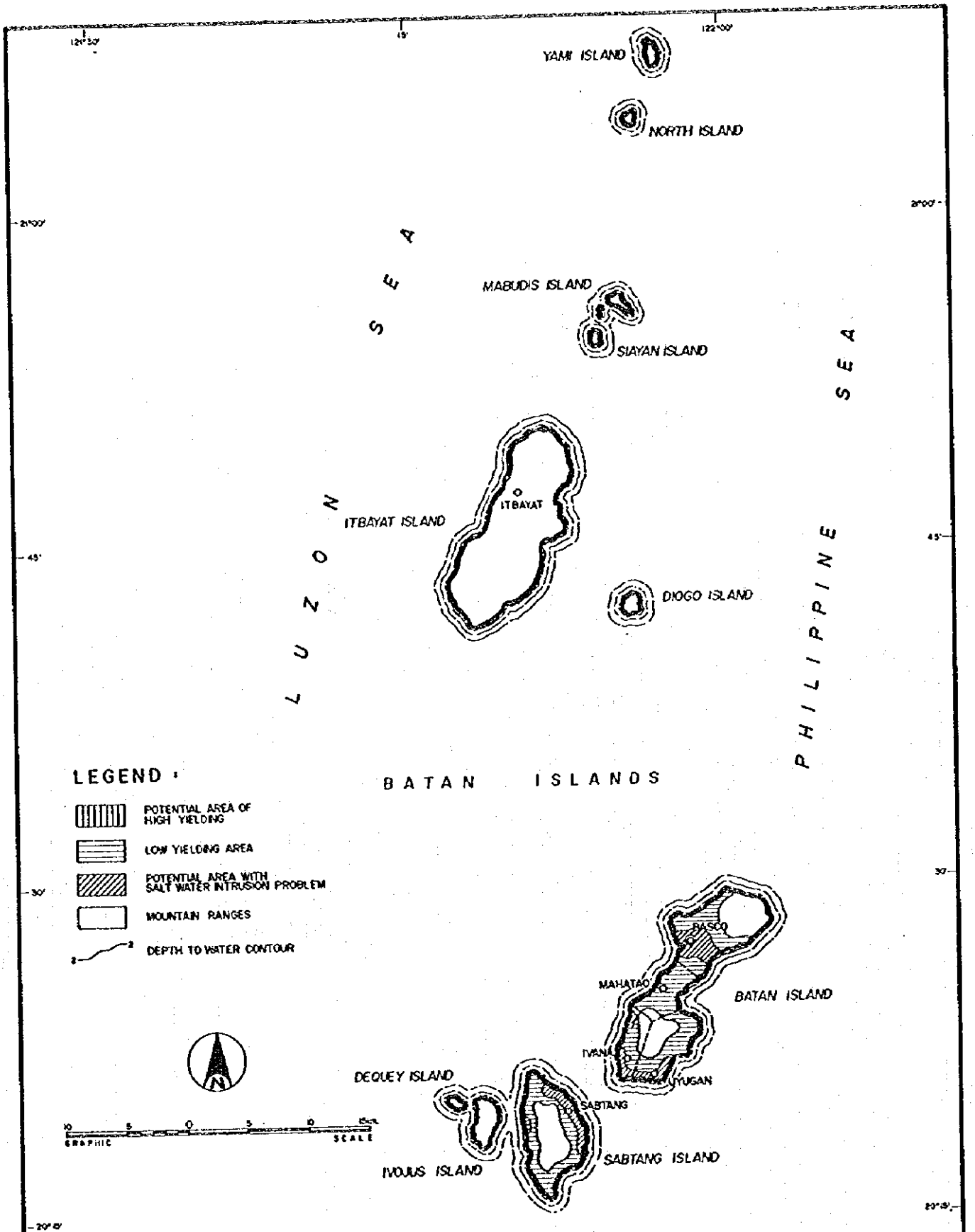


FIGURE 7.3.3

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		
		Discharge (l/sec)			Discharge (l/sec)			Discharge (l/sec)	
	Number	Ave.	Range	Number	Ave.	Range	Number	Ave.	Range
Basco	4	4.44	1.00 - 10.12	N.A			N.A		
Itbayat	1	2.50		N.A			N.A		
Ivana	2	1.75	1.50 - 2.00	N.A			N.A		
Mahatao	1	6.16		N.A			N.A		
Sabtang	2	1.45	0.90 - 1.99	N.A			N.A		
Uyugan	5	1.43	1.08 - 1.92	N.A			N.A		
TOTAL	15								

Source: PPDO/PSPT

7.5 Surface Water Sources

(1) Study Rivers

The rivers in the major islands of Batanes are short with few tributaries. These rivers have small drainage area with a maximum of about 4 km^2. In the islands of Batan and Sabtang, the rivers radiate from the volcanic cones and flow directly into the sea. In Itbayat, the rivers discharge into the sea or diverted into the sinkholes of limestone as direct recharge of groundwater. Considering the narrow catchment area, sustainable flows of the rivers are expected to be small. Most of the rivers' discharges are derived from surface runoffs. Thus, no river in the province that could be utilized as source of water supply.

Since there is no major river system in the province that could be utilized as source of water supply, small streams from spring sources were considered for water quality analysis. These springs support the baseflow of the river systems. Samples were taken from Miaga stream in Basco and Makalebkeb stream in Mahatao (refer to Figure 7.5.1).

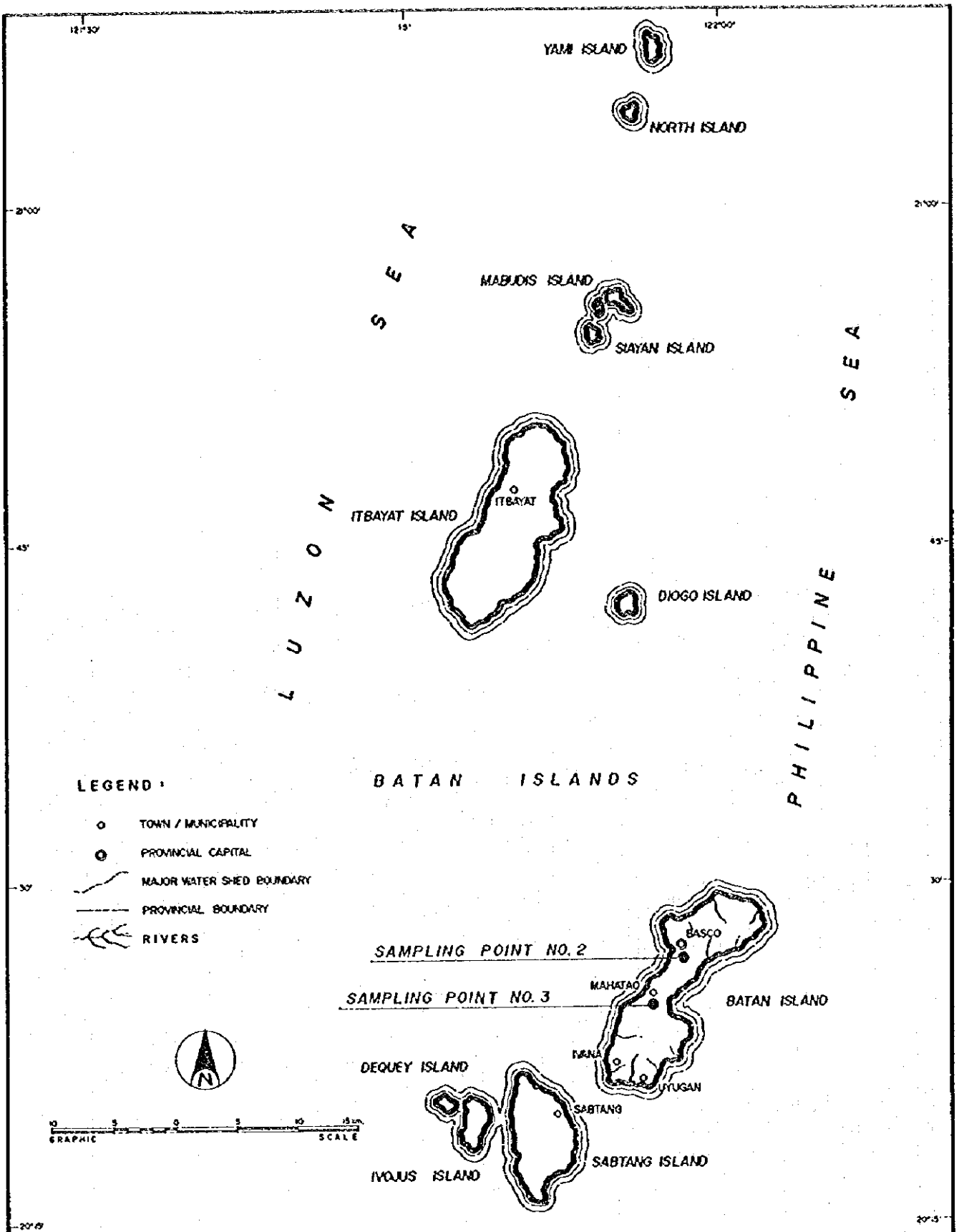


FIGURE 7.5.1

STUDY RIVER BASIN AND WATER SAMPLING POINTS

2) Sampling Points and Examination procedures

Water quality analysis of the two selected streams was undertaken to determine the general characteristics of spring water in the province. Locations of sampling points were set at the point of discharges.

Water sampling was conducted on June 29, 1995. The samples were sent to MWSS laboratory within 24 hours after they were taken. Flow rates were also measured at the same points where the samples were taken.

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 7.5.1 summarizes the results of analysis (refer to MWSS Central Laboratory Examination Results, 7.5 Data Report). The discharges of Miaga and Makalebkeb streams at the time of sampling were 2 and 6 l/sec, respectively.

Table 7.5.1 Water Quality Analysis Results

Indices	Unit	Criteria for for Drinking Water	Spring		Remarks
			Miaga	Makalebkeb	
Color	units	5	5.00	5.00	within limit
Turbidity	units	5	5.10	3.20	within limit
Conductivity	us/cm	-	490.00	400.00	
pH		6.5-8.5	7.30	7.20	within limit
Alkalinity	mg/L	-	127.00	116.00	
Total Hardness as $CaCO_3$	mg/L	400	125.00	108.00	within limit
Sulfate	mg/L	200	15.00	14.00	within limit
Chloride	mg/L	200	50.20	30.60	within limit
Iron	mg/L	0.3	0.03	0.05	within limit
Manganese	mg/L	0.5	0.06	0.40	within limit
Ammonia-Nitrogen	mg/L	-	0.10	0.10	
COD (by $K_2Cr_2O_7$)	mg/L	-	75.80	60.60	

The conductivity, alkalinity and hardness of the samples suggest that the spring water in Batan and probably in Sabtang contains high dissolved minerals. High COD of the samples is assumed to be caused by the presence of high unoxidized dissolved solids when discharged from springs, since no human activities exist in the vicinity.

7.6 Future Development Potential of Water Sources

The questionnaires collected from each municipality show that there are 98 wells existing in the province, while 25 wells are recorded in the inventory made by NWRB (See Tables 7.11 and 7.3.1, Data Report). Despite the smaller number of wells in NWRB data, they were used in the analysis since technical information are provided. Of the total 25 wells, 4 have complete information; depth, static water level and specific capacity; and are summarized in Table 7.6.1.

Table 7.6.1 Well Sources Information*

Municipality	Type	Number	Depth (m)		SWL (m)		Sp. Cap. (l/sec/m)	
			Ave.	Range	Ave.	Range	Ave.	Range
Basco	SW	***						
	DW	2	43.89	42.08 - 45.70	24.72	21.34 - 28.10	0.70	0.36 - 1.04
Itbayat	SW	***						
	DW	**	36.00	21.00 - 46.00	18.00	6.00 - 28.00	0.60	0.40 - 1.00
Ivana	SW	***						
	DW	**	36.00	21.00 - 46.00	18.00	6.00 - 28.00	0.60	0.40 - 1.00
Mahatao	SW	***						
	DW	**	36.00	21.00 - 46.00	18.00	6.00 - 28.00	0.60	0.40 - 1.00
Sabtang	SW	1	15.24	15.24 - 15.24	7.32	7.32 - 7.32	1.03	1.03 - 1.03
	DW	1	21.00	21.00 - 21.00	5.79	5.79 - 5.79	0.46	0.46 - 0.46
Uyugan	SW	***						
	DW	**	36.00	21.00 - 46.00	18.00	6.00 - 28.00	0.60	0.40 - 1.00
Provincial Total	SW	1	15.24	15.24 - 15.24	7.32	7.32 - 7.32	1.03	1.03 - 1.03
	DW	3	36.26	21.00 - 45.70	18.41	5.79 - 28.10	0.62	0.36 - 1.04

Source: NWRB Well Inventory Database.
Notes:
*Based on the data from Feasibility Study of WDs, LWUA and DPWH (Questionable data were disregarded).
**Estimated figures from the hydrogeological continuity of the aquifer.
***No related technical information available.
Legend: SWL=Static Water Level Sp. Cap.=Specific Capacity Ave.=Average
SW=Shallow Well DW=Deep Well

Considering the well information, the most productive wells are those with depth ranging from 16 and 45 m. These wells have static water levels that range from 8 to 22mbgl and specific capacity varying from 0.36 to 1.03 to l/sec/m of drawdown. All the wells considered have depth of more than 10 m.

Based on the distribution of wells in Batanes, good aquifers occur in the Plio-Pleistocene pyroclastic rocks lying around the volcanic cones. In Itbayat, groundwater mainly occurs in the limestone, however, the island is highly susceptible to sea water intrusion. The pyroclastics are considered the most potential sources of future water requirements in the province.

The fresh groundwater in the province is limited in amount. This is because of the relatively low recharge considering the small catchment area of the islands. The geo-resistivity survey of NWRB shows that sea water has been mapped in along the coast of Basco, Ivana, Uyugan and Sabtang. In Basco, saline water was detected in the town proper area. Considering the low recharge, the island of Itbayat has very limited fresh groundwater reserve. Under the aforesaid conditions, pumping water greater than the amount of infiltration will result tremendous lowering of the water table. Consequently, the quality of water in the wells will deteriorate as brackish water moves up. In this regard, the sustainable yield of groundwater must be fully investigated.

As an alternative to wells, the untapped spring identified can be developed. These are also the most reliable sources of water supply in the area considered as difficult for well development, particularly in the upland areas.

The detailed hydrogeological characteristics of each municipality are summarized in Table 7.6.2, while individual well locations with technical information are shown in Figure 7.6.1, Data Report. For water supply planning purposes, standard well specifications for each municipality are presented in Table 7.6.3. The specifications made in this study are intended for planning purposes. The design of wells for implementation will be based on the results of detailed investigations that must be made prior to construction.

The depth, static water level and specific capacity specified in Table 7.6.3 are established using the well information from NWRB, pertinent studies from other agencies and the hydrogeological assessment presented in Table7.6.2. The depth of wells in each municipality is estimated based on the inferred depth of potential aquifers approximated from the available data on existing wells. The static water level and specific capacity are the averages of existing wells employed in the analysis. For municipalities without any well data, the well parameters are made similar to adjoining towns, provided they have similar hydrogeologic features. It should be noted that for municipalities categorized as deep well areas, specifications for shallow wells are indicated since such type of well is still possible for the locality.

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY	EXISTING CONDITIONS																DATA INTERPRETATION					
	TOPOGRAPHY	GEOLOGIC UNITS (%)					WELL INFORMATIONS						SPRINGS				GROUND WATER AVAILABILITY (%)			AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (mbgl)	OTHERS
							DEPTH (m)		AVE. SWL (mbgl)		MAX./AVE. SP.CAP.(L/S/M)		TAPPED		UNTAPPED							
		R	N3	N2	N1	O	SW	DW	SW	DW	SW	DW	NO.	AVE.Q (l/s)	NO.	AVE.Q (l/s)	SW	DW	DF			
Basco	flat & hilly	0	100	0	0	0	-	42-46	-	24	-	0.36-1.04 (0.70)	4	4.44	0	0	0	60	40	Plio-Pleis-tocene pyro clastics	5-60	Potential aquifers occur in the volcanic plain in the vicinity of the Poblacion with Sp. Cap. of 1.5 l/s/m. Possible salt water intrusion occurs in the west coast and within the Poblacion. Major sources of water comes from springs.
Itbayat	flat & hilly	0	100	0	0	0	-	21-46	-	18	-	0.40-1.00 (0.60)	1	2.5	0	0	0	0	100			No aquifer information. Poten -tial aquifer occurs in the lime-stone plateau with Sp. Cap. of 1.5 l/s/m. Springs are the major sources of water supply.
Ivana	hilly	0	100	0	0	0	-	21-46	-	18	-	0.40-1.00 (0.60)	2	1.75	0	0	0	70	30	Plio-Pleis-tocene pyro clastics	<60	No aquifer information Potential aquifers are expected to have Sp. Cap. of 1.5 l/s/m. Possible salt water intrusion along the coast. Water supply is mainly derived from springs.
Mahatao	hilly	0	100	0	0	0	-	21-46	-	18	-	0.40-1.00 (0.60)	1	6.16	1	-	0	90	10	Plio-Pleis-tocene pyro clastics	<60	No aquifer information. Potential aquifers are expected to have Sp. Cap. of 1.5 l/s/m. Possible salt water intrusion along the coast. Water supply is mainly derived from springs.
Sabtang	hilly	0	100	0	0	0	15	21	7	6	1.03	0.46	2	1.45	0	0	0	45	55	Plio-Pleis-tocene pyro clastics	10-60	Possible aquifer occurs mainly in the volcanic plain. Potential aquifers are expected to have sp. Cap. of 1.5 l/s/m. Major sources of water supply is derived from springs.
Uyugan	hilly	0	100	0	0	0	-	21-46		18	-	0.40-1.00 (0.60)	5	1.43	0	0	0	60	40	Plio-Pleis-tocene pyro clastics	<60	No aquifer information. Potential aquifers to have Sp. Cap. of 1.5 l/s/m. Possible salt water intrusion along the coast. Water supply is mainly derived from springs.

Note :

R = Recent Deposits

N_3 = Plio-Pleistocene Rocks

N_2 = Late Miocene Rocks

N_1 = Early Miocene Rocks

O = Rocks Older than Miocene

SW = Shallow Well Area

DW = Deep Well

DF = Difficult Area

Q = Discharge/Flow Rate

mbgl = meter below ground level

l/s/m = liter/second/meter (draw-down)

Table 7.6.3 Standard Specification of Wells by Municipality

Municipality		Type	Proportion** (%)	Standard Specification			Remarks
				Depth Range (m)	SWL (m)	Specific Capacity (l/sec/m)	
Basco	Rural	SW	0	10< D <20	15	1.5	Possible salt water intrusion
		DW	40	20< D <60	20	1.5	
	Urban	SW	0	10< D <20	15	1.5	
		DW	50	20< D <60	20	1.5	
Itbayat	Rural	SW	0	-	-	-	Highly probable to seawater intrusion, considered difficult area
		DW	0	-	-	-	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Ivana	Rural	SW	0	10< D <20	15	1.5	Possible salt water intrusion
		DW	60	20< D <60	15	1.5	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Mahatao	Rural	SW	0	10< D <20	15	1.5	1 untapped spring Possible salt water intrusion
		DW	100	20< D <60	20	1.5	
	Urban	SW	0	10< D <20	15	1.5	
		DW	70	20< D <60	20	1.5	
Sabtang	Rural	SW	0	10< D <20	10	1.5	Possible salt water intrusion
		DW	50	20< D <60	10	1.5	
	Urban	SW	0	10< D <20	10	1.5	
		DW	35	20< D <60	10	1.5	
Uyugan	Rural	SW	0	10< D <20	15	1.5	Possible salt water intrusion
		DW	50	20< D <60	20	1.5	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	

B. FUTURE REQUIREMENTS AND DEVELOPMENT PLAN

Table 7.6.3 Standard Specification of Wells by Municipality

Municipality		Type	Proportion** (%)	Standard Specification			Remarks
				Depth Range (m)	SWL (m)	Specific Capacity (l/sec/m)	
Basco	Rural	SW	0	10< D <20	15	1.5	Possible salt water intrusion
		DW	40	20< D <60	20	1.5	
	Urban	SW	0	10< D <20	15	1.5	
		DW	50	20< D <60	20	1.5	
Itbayat	Rural	SW	0	-	-	-	Highly probable to seawater intrusion, considered difficult area
		DW	0	-	-	-	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Ivana	Rural	SW	0	10< D <20	15	1.5	Possible salt water intrusion
		DW	60	20< D <60	15	1.5	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Mahatao	Rural	SW	0	10< D <20	15	1.5	1 untapped spring Possible salt water intrusion
		DW	100	20< D <60	20	1.5	
	Urban	SW	0	10< D <20	15	1.5	
		DW	70	20< D <60	20	1.5	
Sabtang	Rural	SW	0	10< D <20	10	1.5	Possible salt water intrusion
		DW	50	20< D <60	10	1.5	
	Urban	SW	0	10< D <20	10	1.5	
		DW	35	20< D <60	10	1.5	
Uyugan	Rural	SW	0	10< D <20	15	1.5	Possible salt water intrusion
		DW	50	20< D <60	20	1.5	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	

B. FUTURE REQUIREMENTS AND DEVELOPMENT PLAN

8. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

8.2 Targets of Provincial Sector Plan

Table 8.2.1 Estimation of Base Year Service Coverage of Water Supply

Municipalities	Type	Population (1995)	Population Served by 1995 Facilities				Pop. Served by Planned/On-going Projects				Pop. Served in the Base Year (1995)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	% Coverage
Basco (Capital)	Urban	4,651	4,316	0	158	4,474	0	0	0	0	4,316	0	158	4,474	96
	Rural	1,985	1,664	187	108	1,959	0	0	0	0	1,664	187	108	1,959	99
	Total	6,636	5,980	187	266	6,433	0	0	0	0	5,980	187	266	6,433	97
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	3,787	0	3,315	0	3,315	0	0	0	0	0	3,315	0	3,315	88
	Total	3,787	0	3,315	0	3,315	0	0	0	0	0	3,315	0	3,315	88
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,317	1,215	25	33	1,273	0	0	0	0	1,215	25	33	1,273	97
	Total	1,317	1,215	25	33	1,273	0	0	0	0	1,215	25	33	1,273	97
Mahatao	Urban	424	353	0	0	353	0	0	0	0	353	0	0	353	83
	Rural	1,498	1,299	50	99	1,448	0	0	0	0	1,299	50	99	1,448	97
	Total	1,922	1,652	50	99	1,801	0	0	0	0	1,652	50	99	1,801	94
Sabtang	Urban	953	595	0	114	709	0	0	0	0	595	0	114	709	74
	Rural	975	0	375	115	490	0	0	0	0	0	375	115	490	50
	Total	1,928	595	375	229	1,199	0	0	0	0	595	375	229	1,199	62
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,238	1,205	25	8	1,238	0	0	0	0	1,205	25	8	1,238	100
	Total	1,238	1,205	25	8	1,238	0	0	0	0	1,205	25	8	1,238	100
Provincial Total	Urban	6,028	5,264	0	272	5,536	0	0	0	0	5,264	0	272	5,536	92
	Rural	10,800	5,383	3,977	363	9,723	0	0	0	0	5,383	3,977	363	9,723	90
	Total	16,828	10,647	3,977	635	15,259	0	0	0	0	10,647	3,977	635	15,259	91

Table 8.2.2 Population Coverage in Phase I Provided by Served Population in the Base Year (Water Supply)

Municipalities	Type	Population Served by Existing Facilities				1995		2000	
		Level III	Level II	Level I	Total	Total Population	% Coverage	Total Population	% Coverage
Basco (Capital)	Urban	4,316	0	0	4,316	4,651	93	5,090	85
	Rural	1,664	187	108	1,959	1,985	99	2,173	90
	Total	5,980	187	108	6,275	6,636	95	7,263	86
Itbayat	Urban	0	0	0	0	0	0	0	0
	Rural	0	3,315	0	3,315	3,787	88	4,144	80
	Total	0	3,315	0	3,315	3,787	88	4,144	80
Ivana	Urban	0	0	0	0	0	0	0	0
	Rural	1,215	25	33	1,273	1,317	97	1,441	88
	Total	1,215	25	33	1,273	1,317	97	1,441	88
Mahatao	Urban	353	0	0	353	424	83	464	76
	Rural	1,299	50	99	1,448	1,498	97	1,639	88
	Total	1,652	50	99	1,801	1,922	94	2,103	86
Sabtang	Urban	595	0	0	595	953	62	1,043	57
	Rural	0	375	115	490	975	50	1,067	46
	Total	595	375	115	1,085	1,928	56	2,110	51
Uyugan	Urban	0	0	0	0	0	0	0	0
	Rural	1,205	25	8	1,238	1,238	100	1,355	91
	Total	1,205	25	8	1,238	1,238	100	1,355	91
Provincial Total	Urban	5,264	0	272	5,536	6,028	92	6,597	84
	Rural	5,383	3,977	363	9,723	10,800	90	11,819	82
	Total	10,647	3,977	635	15,259	16,828	91	18,416	83

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1995)

Municipality	Area	1995		Households Using Sanitary Toilets in 1995				Recipient HHs of Planned/On-going Projects				Households Using Sanitary Toilets in Base Year (1995)							
												Number				Coverage (%)			
		Population	HHs	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total
Basco (Capital)	Urban	4,651	891	14	847	13	874	0	0	0	0	14	847	13	874	2	95	1	98
	Rural	1,985	392	5	339	35	379	0	0	0	0	5	339	35	379	1	86	9	97
	Total	6,636	1,283	19	1,186	48	1,253	0	0	0	0	19	1,186	48	1,253	1	92	4	98
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	3,787	742	0	659	10	669	0	0	0	0	0	659	10	669	0	89	1	90
	Total	3,787	742	0	659	10	669	0	0	0	0	0	659	10	669	0	89	1	90
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,317	262	4	246	5	255	0	0	0	0	4	246	5	255	2	94	2	97
	Total	1,317	262	4	246	5	255	0	0	0	0	4	246	5	255	2	94	2	97
Mahatao	Urban	424	82	5	76	0	81	0	0	0	0	5	76	0	81	6	93	0	99
	Rural	1,498	308	0	294	0	294	0	0	0	0	0	294	0	294	0	95	0	95
	Total	1,922	390	5	370	0	375	0	0	0	0	5	370	0	375	1	95	0	96
Sabtang	Urban	953	188	0	131	31	162	0	0	0	0	0	131	31	162	0	70	16	86
	Rural	975	185	0	146	16	162	0	0	0	0	0	146	16	162	0	79	9	88
	Total	1,928	373	0	277	47	324	0	0	0	0	0	277	47	324	0	74	13	87
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,238	252	0	248	2	250	0	0	0	0	0	248	2	250	0	98	1	99
	Total	1,238	252	0	248	2	250	0	0	0	0	0	248	2	250	0	98	1	99
Provincial Total	Urban	6,028	1,161	19	1,054	44	1,117	0	0	0	0	19	1,054	44	1,117	2	91	4	96
	Rural	10,800	2,141	9	1,932	68	2,009	0	0	0	0	9	1,932	68	2,009	0	90	3	94
	Total	16,828	3,302	28	2,986	112	3,126	0	0	0	0	28	2,986	112	3,126	1	90	3	95

Table 8.2.4 Number of Public School Students Served by School Toilets in Base Year (1995)

Municipality	1995 Total No. of Public School Students	Std. No. of Students that can be Served by 1995 Toilets	No. of Students to be Served by Planned/On-going Projects	Std. No. of Students that can be Served by Toilets in Base Year (1995)	Coverage (%)
Basco (Capital)	1,685	1,685	0	1,685	100
Itbayat	1,009	450	0	450	45
Ivana	302	302	0	302	100
Mahatao	405	405	0	405	100
Sabtang	349	349	0	349	100
Uyugan	295	295	0	295	100
Provincial Total	4,045	3,486	0	3,486	86

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1995)

Municipality	Type	No. of PU in 1995	No. of PU with Sanitary Toilets in 1995	No. of PU with Toilets in Planned/ On-going Project	No. of PU with Sanitary Toilets in Planned/ On-going Projects	No. of PU in Base Year 1995	No. of PU with Sanitary Toilets in Base year 1995	Coverage (%)
Basco (Capital)	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	1	1	0	0	1	1	100
	Total	2	2	0	0	2	2	100
Itbayat	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	1	1	0	0	1	1	100
	Total	1	1	0	0	1	1	100
Ivana	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	1	1	0	0	1	1	100
	Total	1	1	0	0	1	1	100
Mahatao	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
Sabtang	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
Uyugan	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
Provincial Total	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	3	3	0	0	3	3	100
	Total	4	4	0	0	4	4	100

Note: PU - Public Utilities

Table 8.2.6 Household Coverage in Phase I Provided by Existing Facilities in the Base Year (Household Toilets)

Municipality	Area	No. of Household Served by Existing Facilities				Coverage in 1995							Coverage in 2000				
							Served Households %				Served Population			Served Households %			
		Flush	Pour Flush	VIP Latrine	Total	No. of HHs	Flush	Pour Flush	VIP Latrine	Total	Number	%	No. of HHs	Flush	Pour Flush	VIP Latrine	Total
Basco (Capital)	Urban	14	847	13	874	891	2	95	1	98	4,558	98	979	1	87	1	89
	Rural	5	339	35	379	392	1	86	9	97	1,925	97	426	1	80	8	89
	Total	19	1,186	48	1,253	1,283	1	92	4	98	6,483	98	1,405	1	84	3	89
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	659	10	669	742	0	89	1	90	3,408	90	813	0	81	1	82
	Total	0	659	10	669	742	0	89	1	90	3,408	90	813	0	81	1	82
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	4	246	5	255	262	2	94	2	97	1,277	97	288	1	85	2	89
	Total	4	246	5	255	262	2	94	2	97	1,277	97	288	1	85	2	89
Mahatao	Urban	5	76	0	81	82	6	93	0	99	420	99	89	6	85	0	91
	Rural	0	294	0	294	308	0	95	0	95	1,423	95	334	0	88	0	88
	Total	5	370	0	375	390	1	95	0	96	1,843	96	423	1	87	0	89
Sabtang	Urban	0	131	31	162	188	0	70	16	86	820	86	205	0	64	15	79
	Rural	0	146	16	162	185	0	79	9	88	858	88	201	0	73	8	81
	Total	0	277	47	324	373	0	74	13	87	1,678	87	406	0	68	12	80
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	248	2	250	252	0	98	1	99	1,226	99	277	0	90	1	90
	Total	0	248	2	250	252	0	98	1	99	1,226	99	277	0	90	1	90
Provincial Total	Urban	19	1,054	44	1,117	1,161	2	91	4	96	5,798	96	1,273	1	83	3	88
	Rural	9	1,932	68	2,009	2,141	0	90	3	94	10,117	94	2,339	0	83	3	86
	Total	28	2,986	112	3,126	3,302	1	90	3	95	15,915	95	3,612	1	83	3	87

Table 8.2.7 Public School Students and Public Utilities Coverage in Phase I Provided by Existing Facilities in the Base Year

Municipality	Public Schools Toilets					Public Toilets					
	Std. No. of Students that can be Served by Base Year (1995)	Coverage in 1995		Coverage in 2000		Coverage in 1995			Coverage in 2000		
		Total No. of Public School Students	%	Total No. of Public School Students	%	No. of PU in Base Year	No. of PU with Sanitary Toilets in Base Year (1995)	%	No. of PU	No. of PU with Sanitary Toilets	%
Basco (Capital)	1,685	1,685	100	1,842	91	2	2	100	3	2	67
Itbayat	450	1,009	45	1,076	42	1	1	100	2	1	50
Ivana	302	302	100	333	91	1	1	100	2	1	50
Mahatao	405	405	100	477	85	0	0	0	0	0	0
Sabtang	349	349	100	509	69	0	0	0	0	0	0
Uyugan	295	295	100	377	78	0	0	0	0	0	0
Provincial Total	3,486	4,045	86	4,614	76	4	4	100	7	4	57

Note: PU - Public Utilities

8.3 Projection of Frame Values

8.3.1 Review of Past Population Development and Population Projection

(1) Review of past population development

1) Characteristics of past population development

Major statistical data of past population development are shown in Table 8.3.1 in which urban and rural population are adjusted by PPDO to reflect present conditions. Provinces presently belonging to CAR are excluded from the regional population.

Table 8.3.1 Past Population Development

Area	Description	Total		Urban		Rural	
		1980	1990	1980	1990	1980	1990
Region II	Population	1,919,121	2,340,545	363,231	588,065	1,555,890	1,752,480
	Growth Rate	2.0%		4.9%		1.2%	
Batanes	Population	12,091	15,026	3,577	5,058	8,514	9,968
	Growth Rate	2.2%		3.5%		1.6%	
	Percentage 1/	0.6%	0.6%	1.0%	0.9%	0.6%	0.6%

Note: 1/ Provincial population percentage to regional population

During the census decade from 1980 to 1990, the following population development was observed:

- The province recorded 2.2% of average annual growth rate which was almost equivalent to that of the region at 2.0%.
- Percentage of provincial population to the regional population remained unchanged at 0.6% from 1980 to 1990, but its urban population percentage slightly decreased.

The region is classified as the out-migration group of population movement in the country. Lower growth rate of urban population in the province compared to that of the region coincides with the conservative economic activities in the province as discussed in Chapter 3.

2) 1990 population distribution in urban and rural areas

The 1990 population census results conducted by NSO were reviewed in terms of population distribution to urban and rural areas. In application of revised classification of barangays in urban and rural category to reflect present conditions, the population by municipality was adjusted as shown in Table 8.3.2.

Table 8.3.2 Population Distribution in Urban and Rural Areas

Municipality	Total Population	Census Data	
		Urban	Rural
Basco (Capital)	5,729	3,823	1,906
Itbayat	3,448	0	3,448
Ivana	1,190	0	1,190
Mahatao	1,724	373	1,351
Sabtang	1,737	862	875
Uyugan	1,198	0	1,198
Provincial Total	15,026	5,058	9,968

(2) Review of NSO regional population projection mainly on growth rates and the demographic conditions presented in the 1992 Philippine Yearbook

NSO projected population at regional level for the year 1995 and target years based on the 1990 population census considering some factors. In the study, annual growth rates on the projected population by the NSO with ten years interval were calculated in application of a simple compounded formula as described below:

$$Pn = Po \times (1 + r)^n$$

where, Pn: Population in n-th year
Po: Population in the base year
r: Annual population growth rate
n: Growth period in year

Through the review of future regional population, it was leaned that NSO projection coincides with the gradually declining annual growth rates; 1.66% from 1990 to 2000 and 1.13% from 2000 to 2010, while the last census decade from 1980 to 1990 recorded 2.01% (refer to Table 8.3.3). Thus, approximately 0.5% of the growth rate was discounted to every decade.

Review of "1992 Philippine Yearbook" delineated the following demographic characteristics of the region and province:

- The inter-regional migration pattern will continue as a major population development factor, however the migration rate will gradually decline through the future.
- The international migration, on the other hand, is insignificant to the population development.
- Fertility and mortality, another key factors of population growth, will moderately decline through the future, and the national family planning target set forth the family size to arrive 4 persons/household by the year 2010.
- Population of the region and province belongs to low growth group in the country.

When the regional and provincial demographic characteristics are taken into account, the future provincial population is considered to remain under similar conditions as experienced in the last censual decade, unless specific development takes place in the province.

(3) Estimation of the present population (1995)

The present population in 1995 was estimated applying 1980-1990 average annual growth rate of respective municipalities (broken down to urban and rural areas) assuming that the trend of past population development prevailed up to the present. Household size in 1995 is also assumed to be same as that in 1990.

(4) Projection of provincial population by target year

Provincial population was projected by target year as shown in Table 8.3.3 in application of declining percentages of growth rates referring to the discounted growth rate of regional population projection as follows:

- Population in 2000 was projected from the base year 1995 applying the rate of 1.84% (17.4% discount to the growth rate of the province observed during the last census decade, 1980 to 1990).
- Population in 2010 with the base year of 2000 was projected applying the rate of 1.25% (31.9% discount to the growth rate of the province adopted for the years 1996 to 2000).
- Present profile of population distribution both in urban and rural areas is assumed to prevail through the future.
- Household size in the year 2000 is assumed to be same as the 1990 population census results, while that in the year 2010 was assumed to be 4 persons/household for the whole province in accordance with the target of the national family planning.

Table 8.3.3 Growth Rates and Population Projection for Target Years: Region and Province

	Growth Rate (%)				Population and Provincial Share in the Region		
	1980 - 1990	1991 - 1995	1996 - 2000	2000 - 2010	1990	2000	2010
Region II	2.01	1.66 (17.4)		1.13 (31.9)	2,340,545	2,822,000	3,159,000
Batanes	2.22	2.22	1.84	1.25	15,026 0.6%	18,416 0.7%	20,831 0.7%

Note: ( ) shows percentage of growth rate decline from the previous period.

Table 8.3.4 shows provincial population by urban and rural area for the target years and the year 1995. Table 8.3.5 presents projected number of households for the target years.

Table 8.3.4 Provincial Population for Target Years

Area	Population/ Composition	1990	1995	2000	2010
Total	Population	15,026	16,827	18,416	20,831
Urban	Population	5,058	6,028	6,597	7,462
Area	Composition (%)	34	36	36	36
Rural	Population	9,968	10,799	11,819	13,369
Area	Composition (%)	66	64	64	64

Table 8.3.5 Projected Number of Households by Urban and Rural Area by Municipality by Target Year

Municipality	Household Size			Number of Households											
	1990			1990			1995			2000			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Basco (Capital)	5.2	5.1	5.2	732	376	1,108	891	392	1,283	979	426	1,405	1,439	615	2,054
Itbayat	0.0	5.1	5.1	0	676	676	0	742	742	0	813	813	0	1,172	1,172
Ivana	0.0	5.0	5.0	0	237	237	0	262	262	0	288	288	0	408	408
Mahatao	5.2	4.9	4.9	72	278	350	82	308	390	89	334	423	131	464	595
Sabtang	5.1	5.3	5.2	170	166	336	188	185	373	205	201	406	295	302	597
Uyugan	0.0	4.9	4.9	0	244	244	0	252	252	0	277	277	0	383	383
Provincial Total	5.2	5.0	5.1	974	1,977	2,951	1,161	2,141	3,302	1,273	2,339	3,612	1,865	3,344	5,209

8.3.2 School Enrollment Projection

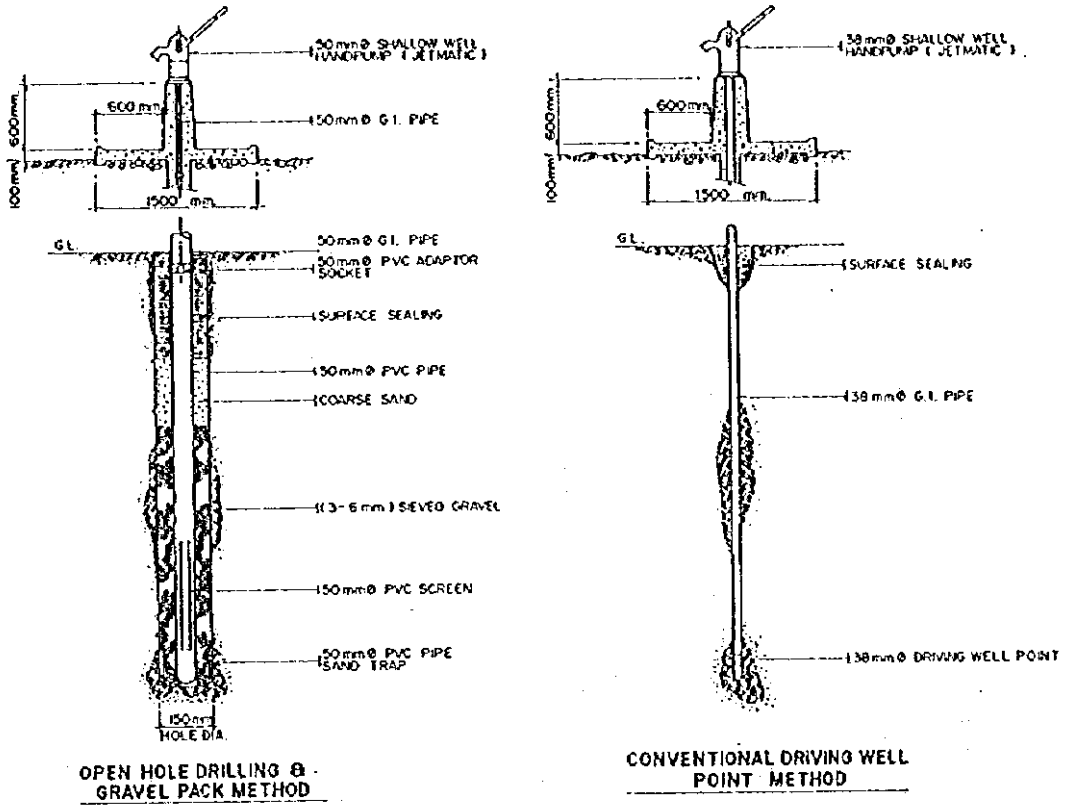
Table 8.3.6 Projected School Enrollment by Municipality by Target Year

Municipality	1995					2000					2010				
	School Age Population	Total Enrollment		Public School Enrollment		School Age Population	Total Enrollment		Public School Enrollment		School Age Population	Total Enrollment		Public School Enrollment	
		Number	Participation Rate	Number	Participation Rate		Number	Participation Rate	Number	Participation Rate		Number	Participation Rate	Number	Participation Rate
Basco (Capital)	1,772	1,685	95	1,685	95	1,939	1,842	95	1,842	95	2,122	2,016	95	2,016	95
Itbayat	1,080	1,009	93	1,009	93	1,182	1,076	91	1,076	91	1,293	1,190	92	1,190	92
Ivana	304	302	99	302	99	333	333	100	333	100	364	364	100	364	100
Mahatao	445	405	91	405	91	487	477	98	477	98	533	528	99	528	99
Sabtang	528	349	66	349	66	578	509	88	509	88	633	563	89	563	89
Uyugan	344	295	86	295	86	377	377	100	377	100	413	413	100	413	100
Provincial Total	4,473	4,045	90	4,045	90	4,896	4,614	94	4,614	94	5,358	5,074	95	5,074	95

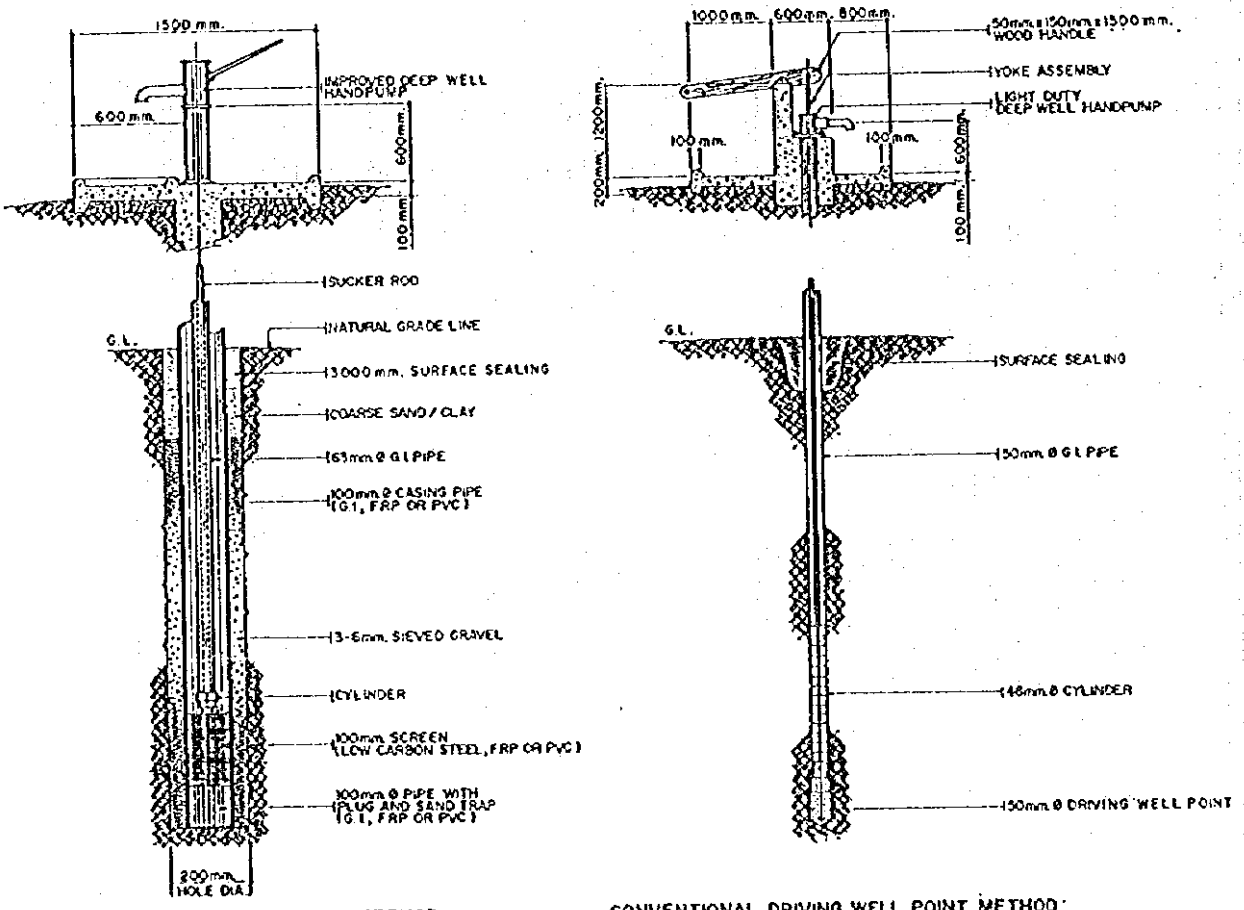
8.3.3 Projection of the Number of Public Utilities

Table 8.3.7 Projected Number of Public Utilities by Municipality by Target Year

Municipality	Type	1995	2000		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Basco (Capital)	Public Markets	1	0	1	0	1
	Bus/Jeep Term.	1	1	2	0	2
	Total	2	1	3	0	3
Itbayat	Public Markets	0	1	1	0	1
	Bus/Jeep Term.	1	0	1	0	1
	Total	1	1	2	0	2
Ivana	Public Markets	0	1	1	0	1
	Bus/Jeep Term.	1	0	1	0	1
	Total	1	1	2	0	2
Mahatao	Public Markets	0	0	0	1	1
	Bus/Jeep Term.	0	0	0	0	0
	Total	0	0	0	1	1
Sabtang	Public Markets	0	0	0	1	1
	Bus/Jeep Term.	0	0	0	0	0
	Total	0	0	0	1	1
Uyugan	Public Markets	0	0	0	1	1
	Bus/Jeep Term.	0	0	0	0	0
	Total	0	0	0	1	1
Provincial Total	Public Markets	1	2	3	3	6
	Bus/Jeep Term.	3	1	4	0	4
	Total	4	3	7	3	10



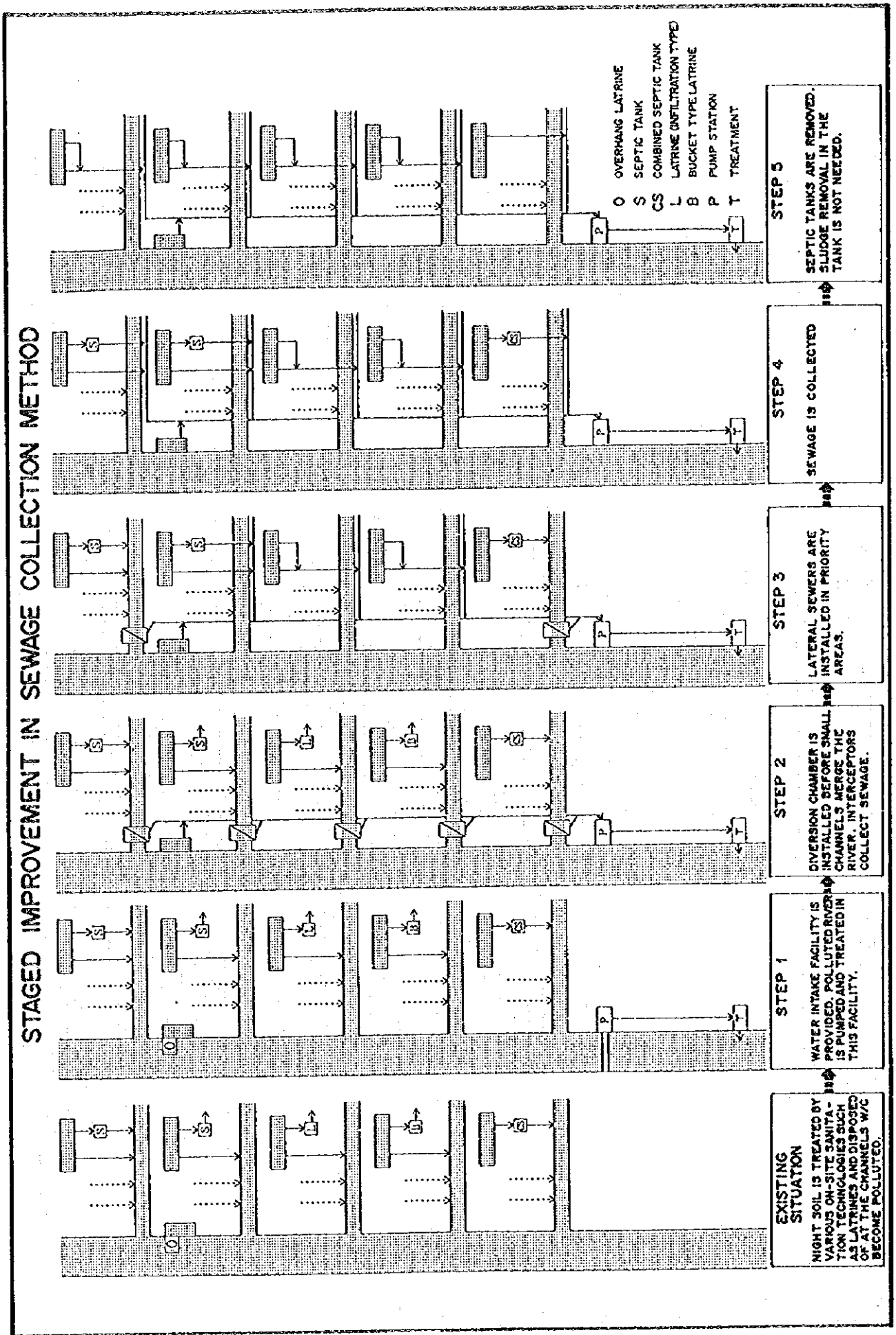
SHALLOW WELLS



DEEP WELLS

FIGURE 8.4.1
STANDARD STRUCTURE OF LEVEL I WELLS

8.4.3 Urban Sewerage



8.5 Service Coverage by Target Year

8.5.1 Water Supply

(1) Population to be served by Level II system in Phase I

One (1) untapped spring source was confirmed to be suitable for Level II systems in rural water supply by the time of PW4SP preparation as shown in Table 8.5.1. Conditions and assumptions applied for this estimate are as follows:

Table 8.5.1 Potential Population to be Served by Level II System in Phase I

Municipality	Number of Untapped Spring	Number of Barangay to be Served	Potential Number of Households to be Served	Population to be Served
Basco (Capital)	0	0	0	0
Itbayat	0	0	0	0
Ivana	0	0	0	0
Mahatao	1	1	100	490
Sabtang	0	0	0	0
Uyugan	0	0	0	0
Provincial Total	1	1	100	490

Source capacity:

The average source capacity of untapped spring was assumed to be capable to meet the need of 100 households based on the review of existing Level II systems with spring sources.

Number of system:

One (1) untapped spring was considered to serve one (1) Level II systems in one (1) rural barangay.

(2) Population to be served by target year

Phase I

For urban area, the additional service coverage was estimated to be served by Level III service. For rural area, the population to be served by Level II systems with untapped springs was firstly calculated and the rest of additional service coverage was estimated to be served by Level I facilities.

Phase II

For urban area, the population served by Level I and II facilities in base year was considered to be absorbed by Level III service aside from the additional service coverage to be estimated by the sector target. For rural area, all existing facilities in Phase I was assumed to be utilized through the future.

The population to be served by target year is exhibited in Table 8.5.2 and Table 8.5.3.

Table 8.5.2 Population to be Served in Phase I (Water Supply)

Municipality	Type	Population Served in the Base Year				Phase I Coverage (2000)								
						Total Population	Service Coverage				Additional Population to be Served			
		Level III	Level II	Level I	Total		Total	Level III	Level II	Level I	Level III	Level II	Level I	Total
Basco (Capital)	Urban	4,316	0	158	4,474	5,090	4,836	4,678	0	158	362	0	0	362
	Rural	1,664	187	108	1,959	2,173	2,064	1,664	187	213	0	0	105	105
	Total	5,980	187	266	6,433	7,263	6,900	6,342	187	371	362	0	105	467
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	3,315	0	3,315	4,144	3,937	0	3,315	622	0	0	622	622
	Total	0	3,315	0	3,315	4,144	3,937	0	3,315	622	0	0	622	622
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,215	25	33	1,273	1,441	1,369	1,215	25	129	0	0	96	96
	Total	1,215	25	33	1,273	1,441	1,369	1,215	25	129	0	0	96	96
Mahatao	Urban	353	0	0	353	464	441	441	0	0	88	0	0	88
	Rural	1,299	50	99	1,448	1,639	1,557	1,299	258	0	0	208	0	208
	Total	1,652	50	99	1,801	2,103	1,998	1,740	258	0	88	208	0	296
Sabtang	Urban	595	0	114	709	1,043	991	877	0	114	282	0	0	282
	Rural	0	375	115	490	1,067	1,014	0	375	639	0	0	524	524
	Total	595	375	229	1,199	2,110	2,005	877	375	753	282	0	524	806
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,205	25	8	1,238	1,355	1,287	1,205	25	57	0	0	49	49
	Total	1,205	25	8	1,238	1,355	1,287	1,205	25	57	0	0	49	49
Provincial Total	Urban	5,264	0	272	5,536	6,597	6,268	5,996	0	272	732	0	0	732
	Rural	5,383	3,977	363	9,723	11,819	11,228	5,383	4,185	1,660	0	208	1,396	1,604
	Total	10,647	3,977	635	15,259	18,416	17,496	11,379	4,185	1,932	732	208	1,396	2,336

Table 8.5.3 Population to be Served in Phase II (Water Supply)

Municipality	Type	Population Served in 2000				Phase II Coverage (2010)								
						Total Population	Service Coverage				Additional Population to be Served			
		Level III	Level II	Level I	Total		Total	Level III	Level II	Level I	Level III	Level II	Level I	Total
Basco (Capital)	Urban	4,678	0	158	4,836	5,757	5,642	5,642	0	0	964	0	0	964
	Rural	1,664	187	213	2,064	2,458	2,409	1,664	187	558	0	0	345	345
	Total	6,342	187	371	6,900	8,215	8,051	7,306	187	558	964	0	345	1,309
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	3,315	622	3,937	4,687	4,593	0	3,315	1,278	0	0	656	656
	Total	0	3,315	622	3,937	4,687	4,593	0	3,315	1,278	0	0	656	656
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,215	25	129	1,369	1,630	1,597	1,215	25	357	0	0	228	228
	Total	1,215	25	129	1,369	1,630	1,597	1,215	25	357	0	0	228	228
Mahatao	Urban	441	0	0	441	525	515	515	0	0	74	0	0	74
	Rural	1,299	258	0	1,557	1,854	1,817	1,299	258	260	0	0	260	260
	Total	1,740	258	0	1,998	2,379	2,332	1,814	258	260	74	0	260	334
Sabtang	Urban	877	0	114	991	1,180	1,156	1,156	0	0	279	0	0	279
	Rural	0	375	639	1,014	1,207	1,183	0	375	808	0	0	169	169
	Total	877	375	753	2,005	2,387	2,339	1,156	375	808	279	0	169	448
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,205	25	57	1,287	1,533	1,502	1,205	25	272	0	0	215	215
	Total	1,205	25	57	1,287	1,533	1,502	1,205	25	272	0	0	215	215
Provincial Total	Urban	5,996	0	272	6,268	7,462	7,313	7,313	0	0	1,317	0	0	1,317
	Rural	5,383	4,185	1,660	11,228	13,369	13,101	5,383	4,185	3,533	0	0	1,873	1,873
	Total	11,379	4,185	1,932	17,496	20,831	20,414	12,696	4,185	3,533	1,317	0	1,873	3,190

Table 8.5.4 Additional Number of Households to be Served in Phase I (Household Toilets)

Municipality	Area	No. of Households Served in the Base Year				No. of Households in 2000	Phase I Coverage (2000)							
							Household Coverage				Additional No. o f Households to be Served			
		Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total
Basco (Capital)	Urban	14	847	13	874	979	192	748	19	959	178	0	6	184
	Rural	5	339	35	379	426	33	376	8	417	28	37	0	65
	Total	19	1,186	48	1,253	1,405	225	1,124	27	1,376	206	37	6	249
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	659	10	669	813	0	781	16	797	0	122	6	128
	Total	0	659	10	669	813	0	781	16	797	0	122	6	128
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	4	246	5	255	288	23	253	6	282	19	7	1	27
	Total	4	246	5	255	288	23	253	6	282	19	7	1	27
Mahatao	Urban	5	76	0	81	89	17	68	2	87	12	0	2	14
	Rural	0	294	0	294	334	26	294	7	327	26	0	7	33
	Total	5	370	0	375	423	43	362	9	414	38	0	9	47
Sabtang	Urban	0	131	31	162	205	40	157	4	201	40	26	0	66
	Rural	0	146	16	162	201	0	193	4	197	0	47	0	47
	Total	0	277	47	324	406	40	350	8	398	40	73	0	113
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	248	2	250	277	22	244	5	271	22	0	3	25
	Total	0	248	2	250	277	22	244	5	271	22	0	3	25
Provincial Total	Urban	19	1,054	44	1,117	1,273	249	973	25	1,247	230	26	8	264
	Rural	9	1,932	68	2,009	2,339	104	2,141	46	2,291	95	213	17	325
	Total	28	2,986	112	3,126	3,612	353	3,114	71	3,538	325	239	25	589

Table 8.5.5 Additional Number of Households to be Served in Phase II (Household Toilets)

Municipality	Area	No. of Households Served in 2000				No. of Households in 2010	Phase II Coverage (2010)							
							Households Coverage				Add'l No. of Households to be Served			
		Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Flush	Total	Flush	Pour Flush	VIP Flush	Total
Basco (Capital)	Urban	192	748	19	959	1,439	705	705	0	1,410	513	0	0	513
	Rural	33	376	8	417	615	60	543	0	603	27	167	0	194
	Total	225	1,124	27	1,376	2,054	765	1,248	0	2,013	540	167	0	707
Itbayat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	781	16	797	1,172	0	1,149	0	1,149	0	368	0	368
	Total	0	781	16	797	1,172	0	1,149	0	1,149	0	368	0	368
Ivana	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	23	253	6	282	408	40	360	0	400	17	107	0	124
	Total	23	253	6	282	408	40	360	0	400	17	107	0	124
Mahatao	Urban	17	68	2	87	131	64	64	0	128	47	0	0	47
	Rural	26	294	7	327	464	45	410	0	455	19	116	0	135
	Total	43	362	9	414	595	109	474	0	583	66	116	0	182
Sabtang	Urban	40	157	4	201	295	145	144	0	289	105	0	0	105
	Rural	0	193	4	197	302	0	296	0	296	0	103	0	103
	Total	40	350	8	398	597	145	440	0	585	105	103	0	208
Uyugan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	22	244	5	271	383	38	337	0	375	16	93	0	109
	Total	22	244	5	271	383	38	337	0	375	16	93	0	109
Provincial Total	Urban	249	973	25	1,247	1,865	914	913	0	1,827	665	0	0	665
	Rural	104	2,141	46	2,291	3,344	183	3,095	0	3,278	79	954	0	1,033
	Total	353	3,114	71	3,538	5,209	1,097	4,008	0	5,105	744	954	0	1,698

Table 8.5.6 Additional Number of Public School Students to be Served in Phases I and II (School Toilets)

Municipality	Std. No. of Public School Student that can be Served in the Base Year	Projected No. of Public School Students in 2000	Phase I Coverage (2000)		Std. No. of Public School Students that can be Served in 2000	Projected No. of Public School Students in 2010	Phase II Coverage (2010)	
			Public School Students Coverage	Add'l No. of Public School Students to be Served			Public School Students Coverage	Add'l No. of Public School Students to be Served
Basco (Capital)	1,685	1,842	1,658	0	1,658	2,016	1,915	257
Itbayat	450	1,076	968	518	968	1,190	1,131	163
Ivana	302	333	300	0	300	364	346	46
Mahatao	405	477	429	24	429	528	502	73
Sabtang	349	509	458	109	458	563	535	77
Uyugan	295	377	339	44	339	413	392	53
Provincial Total	3,486	4,614	4,152	695	4,152	5,074	4,821	669

Table 8.5.7 Number of Public Utilities with Sanitary Toilets in Phases I and II

Municipality	Type	Coverage in 1995		Phase I Coverage (2000)			No. of PU with Sanitary Toilets in 2000	Phase II Coverage (2010)		
		Number of PU	No. of PU with Sanitary Toilet	Number of PU	Add'l No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet		Number of PU	Add'l No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet
Basco (Capital)	Public Market	1	1	1	0	1	1	1	0	1
	Bus/Jeep Term.	1	1	2	1	2	2	2	0	2
	Total	2	2	3	1	3	3	3	0	3
Itbayat	Public Market	0	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	1	1	1	0	1	1	1	0	1
	Total	1	1	2	1	2	2	2	0	2
Ivana	Public Market	0	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	1	1	1	0	1	1	1	0	1
	Total	1	1	2	1	2	2	2	0	2
Mahatao	Public Market	0	0	0	0	0	0	1	1	1
	Bus/Jeep Term.	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	1	1	1
Sabtang	Public Market	0	0	0	0	0	0	1	1	1
	Bus/Jeep Term.	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	1	1	1
Uyugan	Public Market	0	0	0	0	0	0	1	1	1
	Bus/Jeep Term.	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	1	1	1
Provincial Total	Public Market	1	1	3	2	3	3	6	3	6
	Bus/Jeep Term.	3	3	4	1	4	4	4	0	4
	Total	4	4	7	3	7	7	10	3	10

Note: PU - Public Utilities