5.5 Sector Agencies at the Local Level

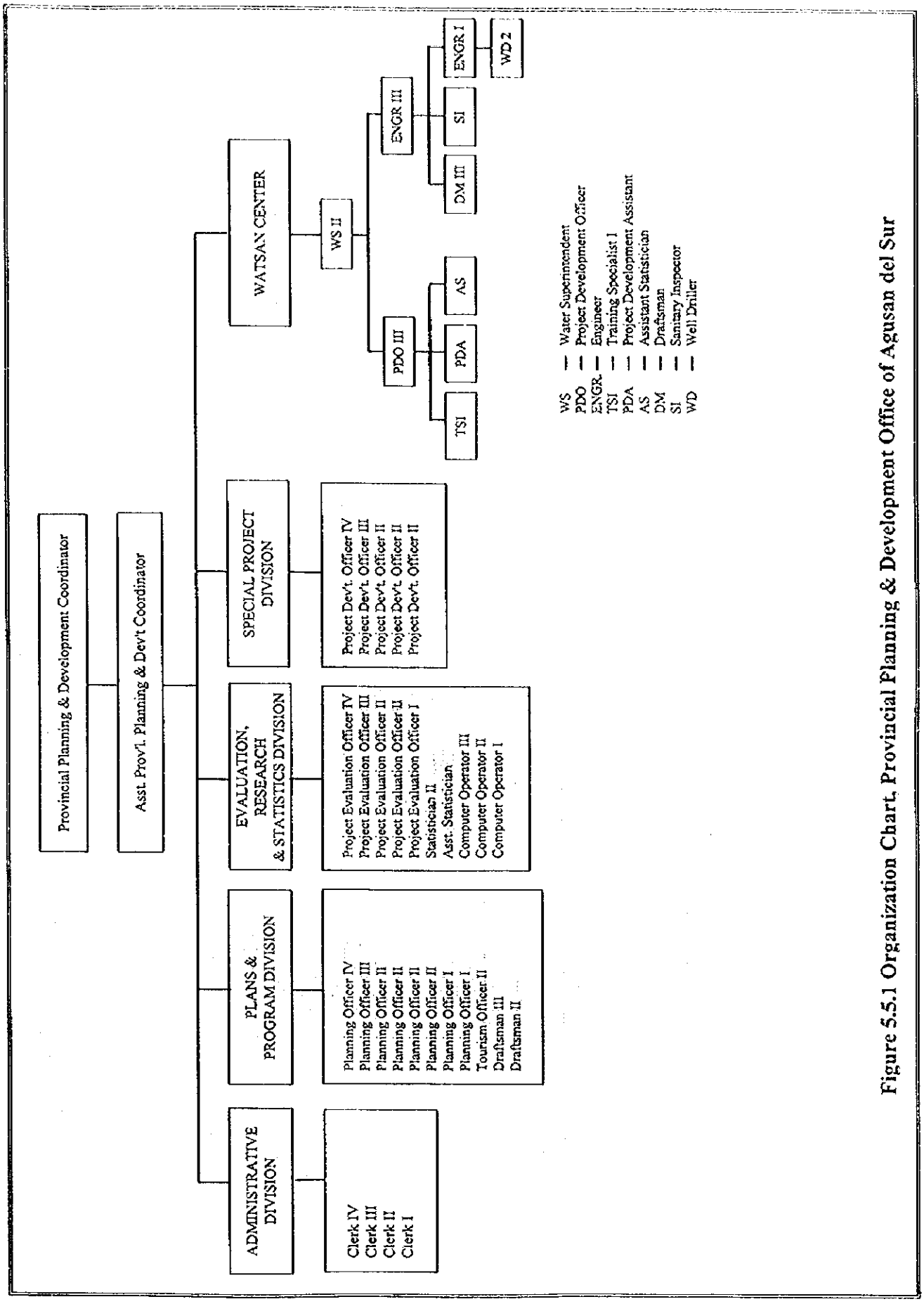


Figure 5.5.1 Organization Chart, Provincial Planning & Development Office of Agusan del Sur

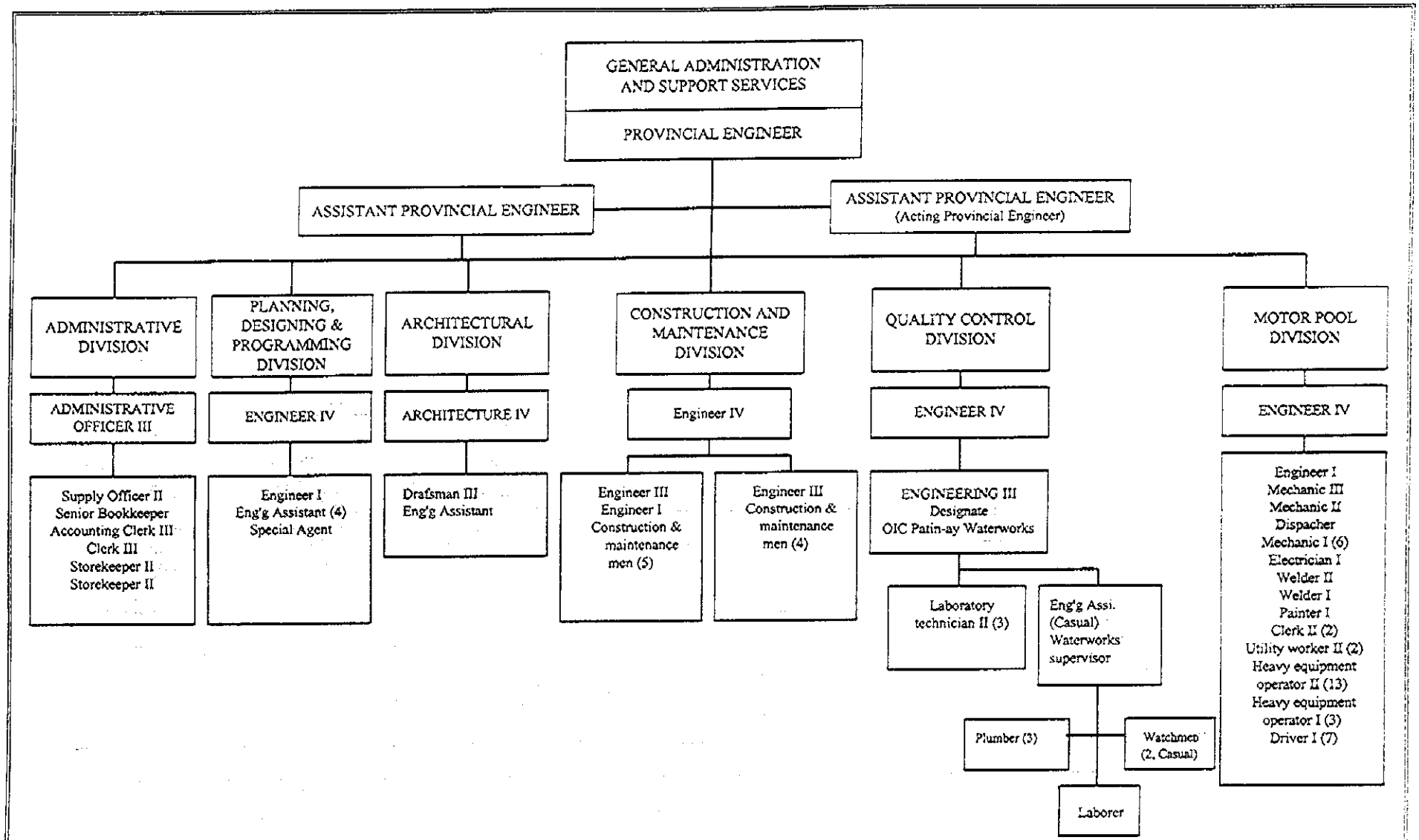


Figure 5.5.2 Organization Chart, Provincial Engineering Office of Agusan del Sur

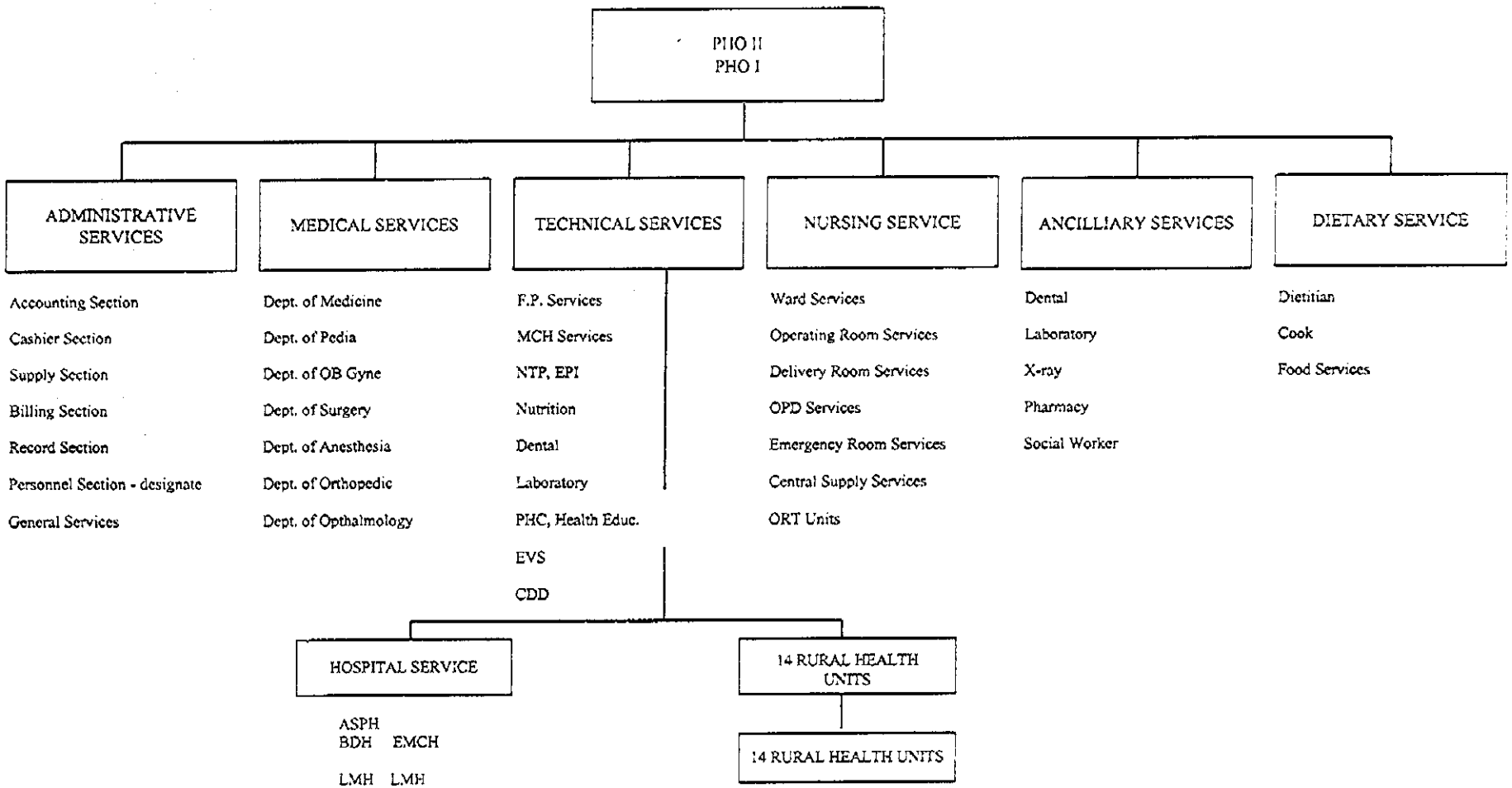


Figure 5.5.3 Organization Chart, Provincial Health Office of Agusan del Sur

WATSAN Center (WC).

A precursor of the Provincial Water Supply Task Force that was established in 1995, the WATSAN Center (division) was created and operationalized in the PPDO in May 1997 by virtue of ***Sangguniang Panlalawigan Ordinance No. 10, series of 1997.*** The ordinance aims at rationalizing the implementation of all water supply and sanitation projects in the province in coordination with the different government agencies and private entities.

The main function of the Center is to undertake the whole gamut of project development process of WATSAN - from planning, designing, construction, O&M, monitoring, finance to coordination with other agencies. Specifically, the Center is tasked with the following: i) coordination of water supply and sanitation projects in the province; ii) establishment of a water source data bank; iii) sourcing of funds for WATSAN projects; and iv) ensure that institutional development component of WATSAN projects is properly handled, disseminate institutional development skills through training and seminars, and monitor and coordinate BWSAs.

As a newly formed division, staffing is on an interim basis (detailed), mostly permanent employees coming from other divisions and offices (PEO and PHO) and some casuals hired for the Center. Except for the training specialists that work part-time, the rest are on a full-time basis. Almost all positions are filled up as shown in the next page.

Position and Activities of WATSAN Center

Assumed Position in WC	Actual Position	Specialization	Activities
Water Superintendent II	Planning Officer IV, PPD-PPDO	Supervising planning and coordination	Supervises the implementation of the project Oversees all watsan activities coordinates with concerned agencies
Project Development Officer III	Project Development Officer III. SPD-PPDO	Training mngt., Monitoring and evaluation both institution/capability building & facilities implementation	Prepares project proposal and status reports Reviews engineering design Conduct institutional dev. training to watsan beneficiaries Coordinates with agencies re: implementation of projects
Engineer III	Engineer III/OIC Patin-ay Waterworks, MTWCD-PEO	Design, Construction	Conducts engineering survey Prepares detailed design Supervises proj. implementation
Training Specialist I	1) Proj. Evaluation Officer III ERSD-PPDO 2) Local Gov't Operations Officer II DILG-Provincial Office 3)	Trainer, Training facilitator	Facilitate training activities Assists in the M&E of institutional capability building of watsan projects
Project Development Assistant	Casual WC-PPDO	Mechanical engr., CO/CD	Assist in eng'g. surveys Acts as community devt. worker Supervises proj. implementation
Assistant Statistician	Computer Operator II ERSD-PPDO	Computer operator	Data encoding
Draftsman III	Draftsman III PPD-PPDO	Construction O&M	Conducts prelim. Eng'g. survey Supervises implementation of facilities Facilitate inst. devt. Training
Sanitary Inspector	Engineer III ES-PHO	Health & sanitation engineer	Certifies/checks the potability of water supply projects Acts as resource person in health and related matters
Engineer I	Vacant	....	....
Well Drillers (2)	Casuals WC-PPDO		Supervise drilling activity of project (deepwells) Conduct prelim. Survey

Note: corresponds to the designated position in the plantilla

Patin-ay Waterworks System.

The Patin-ay Waterworks System provides water supply to provincial offices, national offices, hospital, school and barangay stand posts. The province subsidizes operation of this system. This includes personal services (doing maintenance work), maintenance and other operating expenses (repair of pipelines) and power bills. The staff assigned to the Patin-ay Waterworks System are:

Position	Responsibilities
Officer in Charge	Oversees the operation of the system
Engineering Assistant (casual)	Assist the OIC in the operation of the system
Waterworks Supervisor (proposed item)	Supervises all assigned tasks of the staff
Plumber (3 - casuals) (2 - proposed item)	Monitor the transmission/distribution lines Repair and conduct meter reading
Power tender/Watchman (2 casuals)	Oversee the electric motor pump
Laborer (1)	Do labor work

Note: ( ) - indicates number and status.

5.6 External Support Agencies in the Sector

Table 5.6.1
Priority Areas/Terms and Conditions, Programs and Projects by Donor

Donor	Priority Areas/Terms and Conditions	Programs and Projects in the Sector/Executing Agency
OECF	Providing project loans for *capital infrastructure (urban.rural), agricultural development, export promotion.* Can finance 75% of total project cost of total foreign exchange component, whichever is higher. Interest Rate: 2 to 3%; 30-year amortization with 10-year grace period. Environmental projects, Interest free.	Water Supply and Sanitation Project-23rd Yen Package/DILG; Co-financing AWSOP, with World Bank and ADB/MWSS.
ADB	Providing both capital and technical assistance; Project loans: *agriculture, agri-industry, energy, social infra.,transport and communications;* Program Loans: sector loans (e.g., *forestry, livestock, environment*). Can finance 60% of total project cost or 100% of foreign exchange cost whichever is higher. Special cases can finance up to 80% of total project cost. Terms: Interest rate- pool-based variable; commitment charge of 0.75% per annum; 25 years amortization period including 5-year grace period.	Rural Water Supply and Sanitation Sector Project/DPWH; Small Towns Water Supply Sector Project/LWUA; Technical Assistance for Water Supply and Sanitation Sector Study/NEDA; Co-financing AWSOP with World Bank and OECF/MWSS.
AUSAID	Providing grant aid for *education, training, development planning, resource management, environmental management, health/population, infrastructure (e.g. water supply, coal energy development), social infrastructure, community development and agriculture;* providing also supplies of commodities (steel cattle, drilling).	Water supply program in Central Visayas/RDCs and LGUs; Feasibility Study for Northern Mindanao Water and Sanitation Project.
DANIDA	Providing capital and technical assistance for *water supply and sanitation services and facilities, telecom ancillary equipment, small-scale power projects, environmental project, fishery and cold storage and past-harvest facilities;* Can finance up to 100% of foreign exhcange goods and services of Danish origin, 10% local cost on a case-to-case basis. Technical assistance can be negotiated for conduct of feasibility studies if implementation of the project will require Danish financing in the future.	Water supply projects for 10 towns/LWUA; Feasibility Study for control of pollution in the Pasig River-Metro Manila; Water Supply and Sanitation Data Bank.
Government of France	Grants for feasibility studies and detailed design for projects in priority areas, e.g., *power generation, telecommunication, research involving high technology, water supply, air navigational equipment, etc.* Can finance 100% of foreign exchange costs of goods and services of French origin.	Feasibility Study for water supply project in Rizal province.

Donor	Priority Areas/Terms and Conditions	Programs and Projects in the Sector/Executing Agency
German Agency for Technical Cooperation (GTZ)	Providing grants for technical assistance. Promotion of *small and medium-scale industries, rural development, technical training, health/family planning, and environmental protection (forest management).*	Water Supply for 20 Towns/LWUA; a national water supply and sanitation on-going program; special TA programs for cost recovery, monitoring and evaluation.
JICA	Providing a combination of capital assistance thru grant-aid and technical assistance thru Technical Cooperation for development survey and project type assistance which is a combination of experts, equipment and training. Technical assistance for *conduct of feasibility studies/master plans, provision of training, limited provision of equipment.* Capital assistance for *provision of euqipment/materials for construction of hospitals, schools, research, social welfare centers.* Priority areas include *basic infrastructure, e.g., construction of facilities and supply of equipment; project development for sectors dealing with basic services (agriculture, health public welfare, environment) and human resource development (education, research, training).* Can finance 100% of foreign exchange costs of covil works, equipment, training (in Japan) and of all goods and services of Japanese origin.	Groundwater study in Manila; Feasibility Study for Balara Water Treatment Plant Feasibility Study.
UNDP	Providing technical assistance for capacity building, human resource training, technology transfer, policy research, planning, technology development and pre-investment studies; Technical assistance are formulated within country program (CP) frameworks: 6th CP (1997-2001) *-poverty and sustainable livelihood, protection and regeneration of the environment and sound governance, gender equality.*	WATSAN Program for LGUs and selected BWSAs/DILG.
UNICEF	Providing grant aids for technical assistance. Priority area: *social services, particularly for children.*	Community-based water supply program in Palawan Province; Water supply and sanitation Study for Southern Mindanao.
USAID	Providing grant aid within its strategic objectives. Six strategic objectives and one special objectives are: *Accelerate the economic transformation of Mindanao; Improve national systems for trade and investment; Reduce population growth and improve maternal and child health; Enhance management of renewable national resouces; reduce emissions of greenhouse gas; broaden participation in public formulation/implementation (selected areas); prevent rapid increase of HIV/AIDS.*	Barangay Water Program (BWP) for communities with populations of less than 10,000; TA for private sector participation in the sector.
World Bank	Providing capital assistance in the form of under IBRD and IDA. IBRD (Project/Program) Loans: Interest rate = less than 7%; 20 years amortization with 5 years grace period; IDA Loans: interest free with 30 to 40-year amortization period. Providing also tehnical assistance in the form of ESW, IDF, Poverty and Human Resource Development Project Preparation and Policy Notes. Can finance 100% of foreign exchange costs of the project. Priority areas: *powerand energy, roads and railways, telecommunications, ports, water supply and sanitation, agriculture and social services.*	AWSOP co-financed with ADB and OECF/MWSS; TA for a Water Supply Sector Program Study/DILG; TA on private sector participation in the water supply and sanitation sector; Water Districts Development Project.

5.7 Project Management Arrangement, and Issues and Problems

5.7.2 Institutional Aspect

Table 5.7.1 Office/Agencies involved in WATSAN project

Office/Agencies	Nature of Involvement
Provincial Engineering Office	Assists in the construction, operation and maintenance of the WATSAN facilities
Provincial Health Office	Conducts water quality examination Provides toilet facilities
DILG, Provincial Office	Conducts/assists training especially on topics related to human resource development
Barangay/Municipal governments thru MPDO	Identifies projects Provides counterpart support during implementation
District Engineering Offices I & II, DPWH Water Districts	Provides pipes Implements central govt. funded projects Provides water supply coverage in urban areas
CIDA-PMO Regional Office	Provides technical and financial assistance through its Local Govt. Support Program
Provincial General Services Office	Responsible in procurement of materials
Provincial Accounting and Audit Office, Provincial Budget Office & Provincial Treasury Office	Responsible in financial releases
NGOs	Provides consultancy services especially in CO/CD works
Sangguniang Panlalawigan	Appropriates funds

5.7.4 Institutional Arrangements/Capability of the Municipal Government

(1) Municipality of Rosario

1) Existing Water Supply System

The municipality is operating a waterworks covering 7 barangays out of the total 11 barangays in the municipality. Water source is a spring and the service level covers Level II and III with a of 24-hour service. About 600 households/ consumers are currently served by Level III and an additional 200 HHs are scheduled to be served within this year (1998). In addition, there are a number of Level I facilities.

2) Management of the Waterworks

The municipal government (MEO&MPDO) constructed the water supply system. Up to the present, it has a total investment of 9 million pesos. Prior to the commencement of the project, barangay assembly was held 2 to 3 times. The project started in 1994, partially funded by the Province and the national wealth share. National wealth share comes from the share of LGUs in natural resources in the area (such as a paper production company-PICOP and mining activities). The counterpart of the barangays was labor contribution.

The system is managed currently in the interim by the municipality (Budget Office plays a role of Interim General Management of the Waterworks). The waterworks is considered as municipal Economic Enterprise. However, in the interim, it is incumbent of the municipality to manage the waterworks, because of the low income generation in the initial operating stage. The employees of the municipality are detailed to do required functions for the waterworks, without additional compensation. Except for the four casual maintenance crew hired for the waterworks, others are regular employees assigned to do billing and collection. The members of the board of directors are also municipal employees who are heads of different offices. Bookkeeping and accounting are also integrated into the municipal regular accounting function, but classified under economic enterprise.

The municipality is not yet definite at this time, whether the waterworks will be autonomous from the municipality or not in the future. However, the municipality

plans to make the waterworks a separate unit, after full implementation of Level III coverage. Meanwhile, O&M and accounting of income and expenditures are lodged in the municipality. At the present time, O&M requirements are still subsidized by the municipality.

a. O&M and cost recovery practiced at the Waterworks

The Level II service(a total of about 20 faucets) for 7 to 15 households per faucet is not provided with water meters. At present users at 3 faucets pay monthly water charges(P10/HH) while, no collection of charges from other users served by remaining faucets. The municipality gave an incentive of one year free of water charges to the users in provision of labor during construction.

For Level III services, water charges are set as follows:

Minimum charge up to 10 cu.m; P 35.00

More than 11 cu.m; P 2.00/cu.m for residential and P 3.00/cu.m for commercial use.

The municipality has a plan to increase the water rate, since no increase was made last three years.

In 1997, actual disbursement amount including the four casuals was P 400,000 plus. The budget includes facility expansion cost8Repair and pipe installation expenses are not segregated in the accounting book. The budget for the year 1998 is estimated at P 574,000

b. Existing Level I Water Supply Facilities

The municipality plans to construct other waterworks, where they are currently served by Level I. In this case, the following are requisites.

- Form the association in the relevant barangays
- Exchange MOA with the association
- The association shall do water charge collection. A certain amount to remit to the Municipality and retain some by themselves for O&M.

The municipality recognizes the need of M/P and F/S preparation in the study areas. With regard to the training to organize the association, the municipality was one of the recipients of the UNDP program provided by ITN.

(2) Municipality of San Luis

1) Current Water Supply in the Municipality

The municipality has a total of 24 barngays . Level I and Level II systems were constructed either by the LGUs, NGOs and DPWH. UNDP-WATSAN project also provided some facilities these days. Barangays included in the WATSAN pilot areas are Poblacion, San Jose, Anislagan, San Pedro and Policarpio.

a. Level I Water Supply Service

There are 10 operating BWSAs at present, of which barangays Poblacion, San Jose and Anislagan BWSAs are collecting monthly charges.

The municipal office supported by provincial task force organized the BWSAs. It had experiences on failure and success of the formation of BWSAs depending on the extent of participation by the community. The municipal officers tried to involve the community in the formation process of the BWSAs and also requested the technical assistance to the PEO in site selection, prior to get concurrence from the community.

b. Level II Water Supply Service

The Level II system was constructed in Barangay Maratula in 1995 through the assistance of NGOs called Bread for Relief. The sharing for the construction of the facilities was made among concerned parties; P100,000 from provincial government, technical supervision by municipal office and labor by barangay people.

Currently, about 70% of the total number of HHs in the barangay are served (since 1996). The system is managed by RWSA and the officers were elected. Water charge is set at P10/HH/month. As of now no repair work was experienced.

5.8 Community Development

5.8.1 General

(1) RESULTS OF THE BARANGAY KEY INFORMANT SURVEY FOR AGUSAN DEL SUR

I. BARANGAY

A. General

The barangay is the smallest political unit in the Philippines. It is headed by a barangay captain who is elected for a three-year term. Together with the barangay council, the barangay captain is responsible for running the affairs of the barangay. Water supply and sanitation sector projects are important to the barangay. Benefits are directly related to health and productivity, as well to improved economic activities in the community.

The key informant survey was conducted in 10 barangays representing eight municipalities in Agusan del Sur. The key informants were either an official of the barangay council, an official of the BWSA, or a recognized community leader. The purpose of the survey was to find out the degree and type of government assistance on the sector that cascades from the national government down to the barangay level. The barangays surveyed were: Wawa, Bayugan; Wasian, Rosario; San Vicente, Sibagat; Los Arcos and Azpetia in Prosperidad; Cuevas, Trento; Bunawan, San Teodoro; Dona Flavia and Dona Maxima in San Luis; and Sta. Isabel, Sta. Josefa.

B. Community Organization

1. Manner of Participation in Sector Development

The need for water supply and sanitation facilities is discussed within and prioritized by the barangay development council (BDC). If the barangay is not able to finance the WATSAN project from its own funds, the BDC then endorses the project to the municipality. Again, the prioritization and funding of the endorsed project is discussed in the municipal development council (MDC). If the municipality can finance said project, then it does so, usually by providing technical and material support. The barangay is asked to contribute its share, which is usually in the form of free labor. If, however, the municipality cannot fund the barangay's request, the project is once again endorsed, but

this time to the province. The project is then discussed/prioritized and provided funding by the provincial development council. If implemented by the province, a counterpart is asked of the barangay and sector participation is in the form of free labor and/or donations in cash or in kind.

2. Existing Community Organization Serving /Acting as the Water Association

The BWSA is still the WATSAN organization that serves the community. None of the barangays was able to identify any community-based organization that could act as a water association, aside from the BWSA.

3. Role of the Barangay Council in O&M Assistance in the Form of Funds/ Manpower/Materials

Of the four BWSAs that have been organized, two depended on the barangay council for operation and maintenance assistance because its water users do not have training on O&M. The other two BWSAs had association members who have been sufficiently trained to operate and maintain the facilities

II. COMMUNITY PARTICIPATION

A. General

Beneficiaries'participation is recognized as one of the determining factors in the success of the WATSAN sector plans on the community level. Participation by the barangay people is measured by their willingness to organize themselves into a water association and contribute their share towards its sustained operations. This may come in the form of free labor, donations in kind or in cash, or their active involvement in the management, operation and maintenance of the WATSAN facilities.

B. Socio-Economic Conditions

1. Average Monthly Income in the Rural Area

The average monthly income of the households in the barangays surveyed range from ₱4,000.00 to ₱5,000.00. The list of economic activities shows the following: livestock,

farming, vegetable gardening, sari-sari-store, poultry raising and fishing. The list shows both genders equally involved in these economic activities.

2. Water Borne/Water Related Diseases

Incidences of water borne and water related diseases were reported in all the barangays surveyed. This could be traced to unsafe sources of supply, especially in the barangays where BWSAs are no longer in operation or in fringe areas not presently served by the BWSA facilities.

C. Willingness to Participate

1. Initiating the Organization of a WATSAN Association

Seven out of the ten barangays surveyed do not have a committee on water and sanitation. In spite of this, all the respondents indicated the barangay council's willingness to participate in sector projects by initiating the formation of a water and sanitation association in their communities. A big majority also indicated that the barangay council is willing to pay for the training for the user-beneficiary volunteers on O&M. In the area of health and sanitation education, the majority also believed that the barangay council has the capability to implement information dissemination activities.

D. Status of BWSAs/NGOs/CBOs/POs

1. Number of Barangays with Functional BWSAs

Four out of ten barangays surveyed have a BWSA organized in their communities. Of these, only two barangays have functional BWSAs. These are the barangays where the recent WATSAN UNDP-PHI project had been implemented. Meanwhile, one barangay revealed that the municipal government is maintaining its WATSAN facilities; and another barangay is served by privately owned water supply facilities that are being maintained by their owner.

2. Status of NGOs/CBOs/POs

All the barangays reported having NGOs/CBOs that do work in their communities. The areas of concern are in cooperative development, livelihood, peace and order, agriculture.

Those specifically related to sector needs are: (1) BDCAD (headed by Mr. Edward Rosales) that specializes in community organizing; and (2) Rural Improvement Club/Women's Organization (headed by Candie Baguio/Rosemarie Melescion) for health assistance.

E. O&M Practices by Beneficiaries

1. Facility Conditions

The barangays are supplied with water from a combination of sources: shallow wells, deep wells and springs. Two barangays also depend on rainwater. Seven barangays reported that the facilities are still functional but occasionally have problems; three said their facilities are no longer functioning. Most, however, believe that water is safe for drinking.

2. Common Difficulties and O&M Problems Encountered

Common problems cited by the respondents range from defective pumps, to no funds for maintenance work, lack of financial support, wells drying up and rusty, foul smelling water. The problems show that the users/beneficiaries still have the thinking that O&M is a task that belongs to others such as the barangay council or the municipality. Prevalent is also the dole-out mentality; where the people just wait for O&M funds rather than generating this through water fees.

F. Water Charges Adopted and Collection Efficiency

1. Sufficiency of Collected Charges for O&M

Majority of key informants believes that fees charged are not sufficient to cover for the operation and maintenance of the WATSAN facilities. The users in four barangays were reported to be paying their water fee; while another four were delinquent. Two barangays did not respond to the question.

2. Current Practices with Affordability by Users and Manner of Fee Collection

The BWSA treasurer was responsible for collecting the fees in two barangays, the municipality in one of the barangays, and the private owner in the case of the privately

owned system. No one was identified to collect the fees in the six other barangays surveyed. The cost of water for the 28 respondents varied as follows: Below ₱10.00, five respondents; between ₱10.00-20.00, seven respondents; between ₱21.00-30.00, one respondent; between P31.00-40.00, four respondents; between P41.00-50.00, two respondents; above P50.00, six respondents. Three respondents paid for water only when the need arose.

G. Requests by the Beneficiaries on O&M of the Facilities from LGUs and other Sources

1. Government Subsidies Requested by End Users

Four barangays were recipients of technical, institutional and financial assistance from the provincial government. The amounts of financial assistance ranged from ₱70,000.00 to ₱100,000.00 for the years 1996-1997. Technical assistance was in the form of pipes; while institutional was by BWSA formation. Two municipalities also came to the aid of the barangays, one provided technical and another gave financial assistance in the amount of P80,000 for the year 1996. Another barangay was provided financial assistance from CDF funds; while another from the poverty alleviation fund (PAF). One barangay mentioned the support of the DPWH, particularly in the provision of labor for O&M.

III. GENDER

A. General

The importance placed on gender is still something new in the province. Although most of the survey results do not point to a severe lack of responsiveness to sector projects, the awareness as to why there must be gender equality was not yet fully comprehended by most of the key informants.

B. Gender in the Composition of the Barangay Council

In the 10 barangays surveyed, the total number of barangay council members is 86. Of this number, 59 were males and 27 females. The barangay councils are still male-dominated; that is, there was no case that the women outnumbered men in the composition of the council. All barangay are also headed by male barangay captains.

C. Gender in the Composition of the BWSA

The board of the four BWSAs organized is also male-dominated. Of the 51 BWSA board members, 32 are male and 19 females. To the women members were reserved the traditional roles, such as that of secretary or treasurer of the board.

D. Gender in Participation in the O&M of the Water Facilities

The men believe that they participate more in the O&M of the water facilities. On the other hand, the women almost overwhelmingly indicated that they also participate in operating and maintaining the WATSAN facilities. The men stated their functions as: (1) being the chairman, or an officer of the BWSA, (2) doing repair of facilities; and (3) maintaining the cleanliness of the facilities. The women stated their functions as: (1) being the collector; (2) maintaining the surroundings of the facilities; and (3) monitoring if the facility is defective.

E. Gender in Knowledge or Awareness of Sector Related Information

There is no gender bias when it came to awareness of sector related information. Both women and men were knowledgeable as seen from the answers to questions such as assistance extended by LGUs, facility conditions, O&M practices, and the status of BWSA.

(2) RESULT OF GROUP INTERVIEW (AGUSAN DEL SUR)

1.1 General

Group interviews were conducted in five selected barangays representing four municipalities in the province of Agusan del Sur. The objectives of the group survey/interviews were to identify potential service population and service level desired by the community, to assess the degree of involvement of both men and women in planning, managing, operating and maintaining WATSAN projects, and the willingness and capacity to pay of potential users.

The Project Team conducted the interviews on two sets of interviewees: an all female group and an all male group, each consisting of a minimum of 10 and a maximum of 20 participants. None of the respondents belonged to the same household. Answers to interview questionnaires were made by raising of hands. The group interviews were conducted in the following barangays: Los Arcos and Azpitia (Prosperidad); San Vicente (Sibagat); Wasian (Rosario); and Wawa (Bayugan).

1.2 Demographic Profile

(1) Population

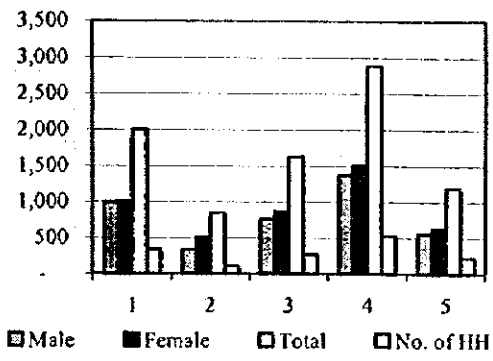
The aggregate population in five barangays totaled 8,928, breakdown of which is as follows: Los Arcos, 2,004 (993 males, 1,011 females); San Vicente, 844 (334 males, 510 females); Azpetia, 1,630 (766 males and 864 females); Wasian, 3,258 (1,748 males, 1,510 females); and, Wawa, 1,192 (560 males and 632 females). Female population out-numbered males, 4527 to 4.028

(2) Households

As indicated by the respondents, there were 1,479 households in the five barangays. Breakdown per barangay is: Los Arcos, 341; San Vicente, 114; Azpitia, 267; Wasian, 528; and, Wawa, 229. The figure represents an average of 5.7 members per household.

TABLE 1: TOTAL POPULATION OF BARANGAYS AND NUMBER OF HOUSEHOLDS

BARANGAY (MUNICIPALITY)	M	F	T	NO. OF HH
1. Los Arcos (Prosperidad)	993	1,011	2,004	341
2. San Vicente (Sibagat)	334	510	844	114
3. Azpetia (Prosperidad)	766	864	1,630	267
4. Wasian (Rosario)	1,375	1,510	2,885	528
5. Wawa (Bayugan)	560	632	1,192	229
TOTAL	4,028	4,527	8,555	1,479



(3) Composition of Barangay Councils

There are 46 barangay council members in the five barangays. Of the barangay council members, 32 were males and 14 females. All barangay captains were males.

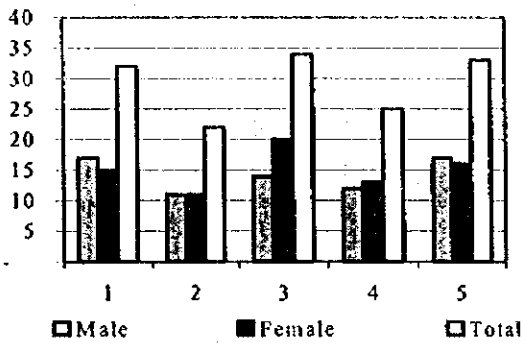
1.3 Respondents' Profile

(1) Number and Gender of Respondents

There were 146 respondents in the group interviews. Of these, 71 or 48.65 percent were males and 75, or 51.35 percent were females. Below is the breakdown of the number of respondents by gender for each barangay:

TABLE 2: NUMBER OF RESPONDENTS

BARANGAY (MUNICIPALITY)	M	F	T
1. Los Arcos (Prosperidad)	17	15	32
2. San Vicente (Sibagat)	11	11	22
3. Azpetia (Prosperidad)	14	20	34
4. Wasian (Rosario)	12	13	25
5. Wawa (Bayugan)	17	16	33
TOTAL	71	75	146

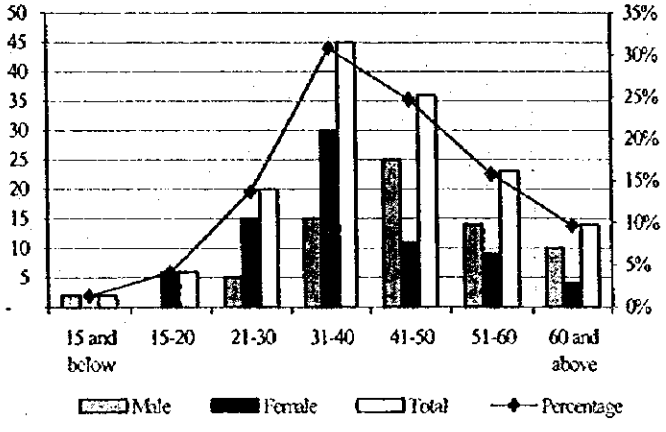


(2) Age Bracket

The majority of the respondents or 45 belonged to 31 to 40 age bracket, with females outnumbering males, 30 to 15. A total of 36 (25 males, 11 females) were under the 41 to 50 age bracket, while 23 respondents (14 males, 9 females) belonged to 51 to 60 age bracket. Five males and 15 females, or a total of 20 respondents belonged to the 21-30 age bracket.

TABLE 3: AGES OF THE RESPONDENTS

AGE BRACKET	M	F	T	%
15 and Below	2	-	2	1.35
15-20	-	6	6	4.10
21-30	5	15	20	13.70
31-40	15	30	45	30.80
41-50	25	11	36	24.65
51-60	14	9	23	15.75
60 and above	10	4	14	9.65
TOTAL	71	75	146	100.00

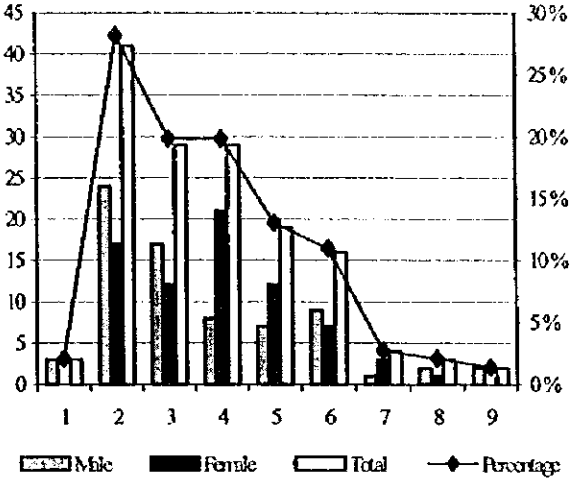


(3) Level of Education

Most of the respondents (41) attended elementary level of education. Twenty-nine were elementary graduates. Another 29 respondents reached the high school level, of which 19 respondents were able to graduate. A total of 16 attended college education but did not complete it. Only four respondents obtained a college degree; while two pursued post graduate courses.

TABLE 4: RESPONDENTS' LEVEL OF EDUCATION

EDUCATIONAL LEVEL	M	F	T	%
1. No Education	3	-	3	2.05
2. Elementary Level	24	17	41	28.15
3. Elementary Graduate	17	12	29	19.85
4. High School Level	8	21	29	19.85
5. High School Graduate	7	12	19	13.00
6. College Level	9	7	16	10.95
7. College Graduate	1	3	4	2.75
8. Vocational	2	1	3	2.05
9. Post Graduate	2	-	2	1.35
TOTAL	73	73	146	100.00

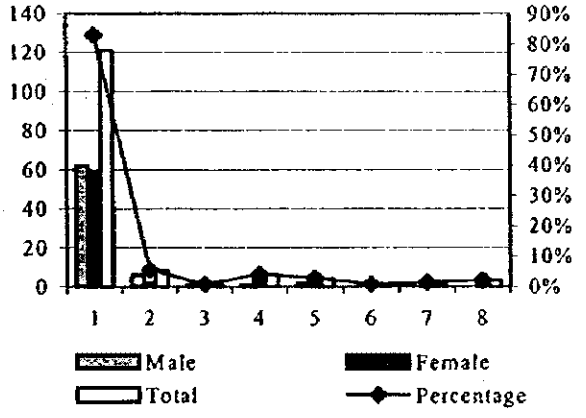


(4) Occupation

Majority of the respondents (121) are presently engaged in either farming or fishing. The males outnumbered the females in this work category, 62 to 59. Other occupations of the respondents include: laborer, 8 (6 males, 2 females); business, 6 (1 male, 5 females); professional, 4 (2 males, 2 females); 6 office workers, dressmakers and others.

TABLE 5: OCCUPATION OF RESPONDENTS

OCCUPATION	M	F	T	%
1. Farmer/Fisherfolk	62	59	121	82.90
2. Laborer	6	2	8	5.45
3. Service Worker	1	-	1	0.70
4. Businessman/woman	1	5	6	4.10
5. Professional	2	2	4	2.75
6. Office Worker	-	1	1	0.70
7. Dressmaker	-	2	2	1.35
8. Others	-	3	3	2.05
TOTAL	76	70	146	100.00



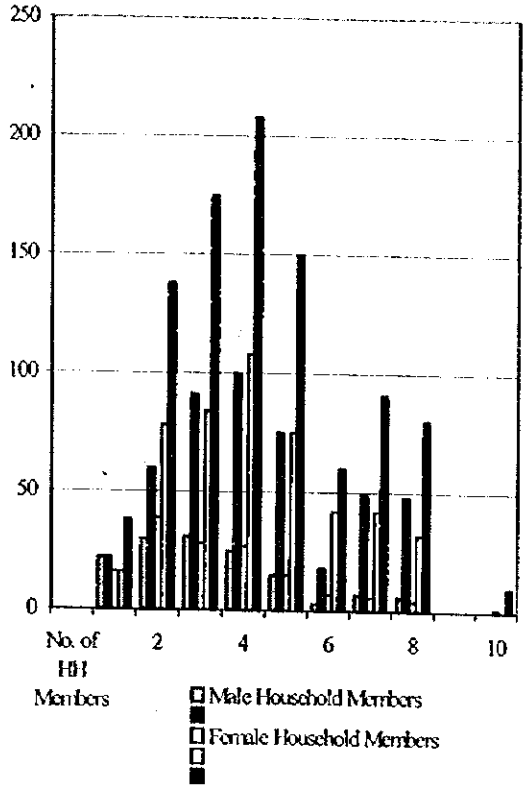
1.4 Socio Economic Profile

(1) Number of Household Members

The total number of household members of the respondents is 950. Consistent with the male-female population ratio in the study areas, females outnumber males in the respondents' households. There were 487 or 51.25% females; while there are 463 or 48.75% males. The figures represent an average of six members per household consisting mostly of four females and two males.

TABLE 6: NUMBER OF HOUSEHOLD MEMBERS

NO. OF HH MEMBERS	MALE HOUSEHOLD MEMBERS		FEMALE HOUSEHOLD MEMBERS		TOTAL HOUSEHOLD MEMBERS
	NO. OF RESPONDENTS	TOTAL MALE HH MEMBERS	NO. OF RESPONDENTS	TOTAL FEMALE HH	
1	22	22	16	16	38
2	30	60	39	78	138
3	31	91	28	84	175
4	25	100	27	108	208
5	15	75	15	75	150
6	3	18	7	42	60
7	7	49	6	42	91
8	6	48	4	32	80
9	-	-	-	-	-
10	-	-	1	-	10
TOTAL	146	463 (48.75%)	146	487 (51.25%)	950 (100%)

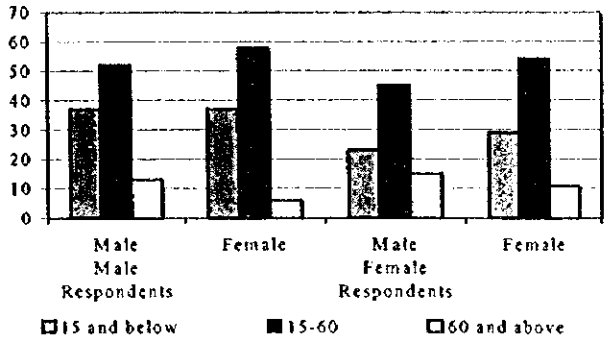


(2) Ages of Household Members

As pointed out by most male and female respondents, the majority of the household members belonged to the 15-60 age bracket. Female household members outnumber male members in this age bracket. The 15 and below age level was the second largest age group; while the 60 and above age group has the least number in it.

TABLE 7: AGES OF HH MEMBERS

AGES	MALE RESPON-DENTS		FEMALE RESPON-DENTS	
	M	F	M	F
15 and below	37	37	23	29
15-60	52	58	45	54
60 and above	13	6	15	11

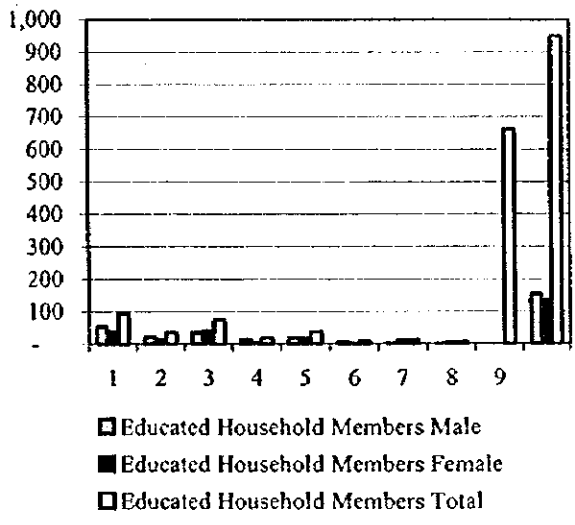


(3) Level of Education of Household Members

Out of the total household members, the respondents listed 289 members to have attained different levels of education. Just like the respondents themselves, the majority of their household members have only reached elementary education. On the other hand, a total of 76 had attended, but did not finish, high school. Nineteen were high school graduates. Meanwhile, 38 pursued, but did not complete, college education. There were nine who graduated from college. There were 27 without formal education; while 12 finished vocational courses. Six pursued postgraduate education. Some of the respondents could not determine the level of education (if any) of the majority of the household members (661).

TABLE 8: LEVEL OF EDUCATION OF HH MEMBERS

EDUCATIONAL LEVEL	EDUCATED HOUSEHOLD MEMBERS		
	M	F	T
1. Elementary Level	55	39	94
2. Elementary Graduate	22	13	35
3. High School Level	35	41	76
4. High School Graduate	14	5	19
5. College Level	19	19	38
6. College Graduate	7	2	9
7. Vocational	2	10	12
8. Post Graduate	1	5	6
9. Not Indicated	-	-	661
TOTAL	155	134	950

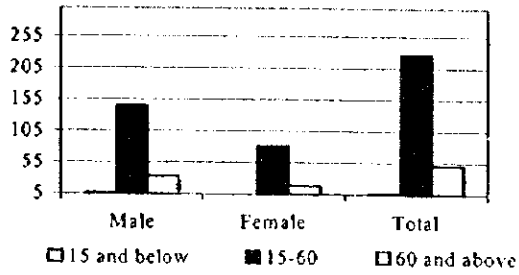


(4) Employed Household Members

There are 283 among the respondents' household members who are gainfully employed or had a regular source of income. Employed men outnumbered working women, 226 to 99. The majority of these productive people belonged to the 15 to 60 age bracket with 145 males and 81 females, for a total of 226. There were 51 people, or 33 males and 18 females belonging to the 60 years old and above who were still working. On the other hand, only six males under the 15 and below age bracket had some form of employment

TABLE 9: EMPLOYED HH MEMBERS

AGE BRACKET	M	F	T
15 and below	6	-	6
15-60	145	81	226
60 and above	33	18	51
TOTAL	226	99	283

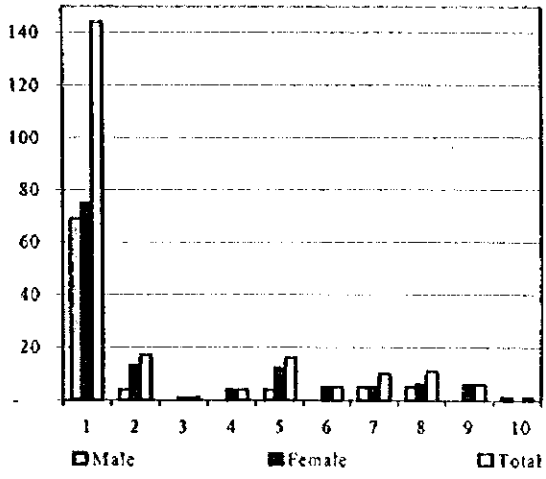


(5) Occupation of Household Heads and Other Members

The majority of the household heads and members (144) were engaged in either farming or fishing where they derived income. The interviewees indicated that the females constituted the majority of workers in this field, with 38. There were some professionals (engineers, teachers or doctors) who were also mostly females. Other household heads and members were either laborers, businessmen/women, service workers, vendors, carpenters, dressmakers, technician and equipment operators or office workers. Almost all of those who were gainfully employed earned an average monthly income of ₱5,000.00 and below. Only five workers earned more than ₱5, 000.

TABLE 10: OCCUPATION OF HH MEMBERS

OCCUPATION	M	F	T
1. Farmer/Fisherfolk	69	75	144
2. Professional	4	13	17
3. Technician	-	1	1
4. Office Worker	-	4	4
5. Laborer	4	12	16
6. Equipment Operator/Welder	-	5	5
7. Service Worker	5	5	10
8. Businessman/woman	5	6	11
9. Vendor/Carpenter/Dressmaker	-	6	6
10. Others	1	-	1
TOTAL	88	127	215

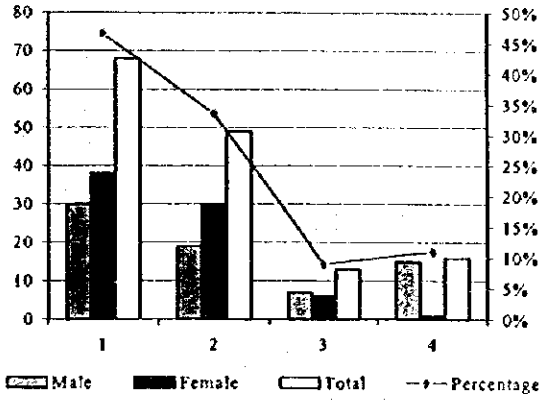


(6) Economic Activities

Aside from their regular source of income, household members engaged in other economic activities to augment their monthly income. The respondents listed only three livelihood projects that their family members were engaged with. These are livestock/poultry raising, vegetable gardening and sari-sari store operation. As indicated by most of the respondents or 68 of them, livestock/poultry raising was the main livelihood project of the people. According to the respondents, the women were more involved in economic activities than men. Vegetable gardening was the second most popular livelihood project followed by sari-sari store operation. From these economic activities, almost all of the household members earned less than ₱500.00. Only seven members earned more than ₱500.00.

TABLE 11: ECONOMIC ACTIVITIES OF HH MEMBERS

ECONOMIC ACTIVITY	M	F	T	%
1. Livestock/Poultry	30	38	68	46.55
2. Vegetable/Gardening	19	30	49	33.55
3. Sari-Sari Store	7	6	13	8.95
4. No Response	15	1	16	10.95
TOTAL	71	75	146	100.00

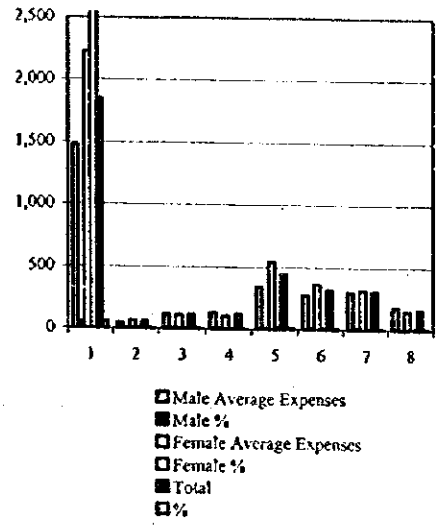


(7) Average Expenditures of Household

As indicated by the respondents, the average monthly expenditures of a family was ₱3,370.85. The female respondents indicated higher monthly expenditures at ₱3,869.55 as compared with the male respondents who placed it at ₱2,872.55. Both male and females interviewees said the biggest expenditure was allotted to food at ₱1,849.80, which is 54.85% of the total monthly expenditures. Again, the female respondents gave a higher figure for food expenses than the males (see Table 12). The lowest family expenditure for both male and female interviewees was for water. However, not everybody was paying for it and for those who did, the average cost was P56.05 a month or 1.65% of the monthly expenses. The female group indicated a higher expenditure for water at P66.00 as compared to males who placed this expense item at ₱46.10. Education was the second highest expenditure with an average of ₱442.50 (13.15%), followed by clothing (₱319.95 or 9.55%), recreation (₱310.45 or 9.25%), house rental (₱119.00 or 3.55%), and electricity (₱111.85 or 3.35%). Miscellaneous expenses were pegged at ₱161.25 per month or 4.65%. The female respondents gave higher estimates in all items except in house rental, electricity and miscellaneous where the males gave higher figures.

TABLE 12: AVERAGE EXPENDITURES OF HH MEMBERS

ITEM	MALE		FEMALE		TOTAL	%
	AVERAGE EXPENSES	%	AVERAGE EXPENSES	%		
1. Food	₱1,473.40	51.30	₱2,226.25	57.55	₱ 1,849.80	54.85
2. Water	46.10	1.60	66.00	1.70	56.05	1.65
3. Electricity/ Fuel	114.15	4.00	109.60	2.80	111.85	3.30
4. House Rental	132.05	4.60	106.00	2.75	119.00	3.55
5. Education	344.00	12.00	541.10	14.00	442.50	13.10
6. Clothing	278.55	9.70	361.40	9.35	319.95	9.45
7. Recreation	304.35	10.60	316.60	8.15	310.45	9.20
8. Others	179.95	6.25	142.60	3.65	161.25	4.80
TOTAL	₱2,872.55	100.00	₱3,869.55	100.00	₱ 3,370.85	100.00



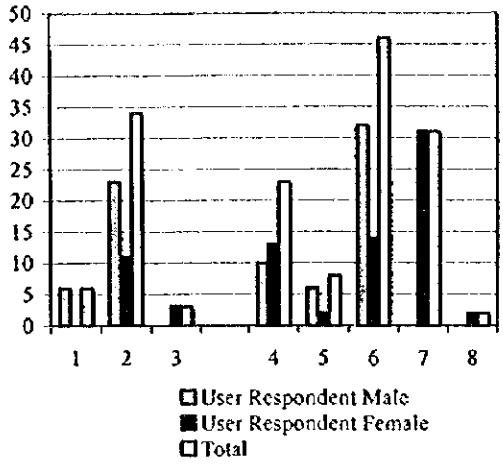
(8) Practices

Source of Drinking Water. The majority of the male respondents (32) indicated that the people get their source of drinking water from communal dugwells. On the other hand, majority of the female respondents (31) said that more people utilize communal spring as their source of drinking water. Other sources mentioned were: communal faucet (34

respondents), level III system (23), communal free flow well, communal spring; private spring water (3) and rainwater (2). It should be noted that some respondents got water from a combination of sources.

TABLE 13: SOURCES OF DRINKING WATER

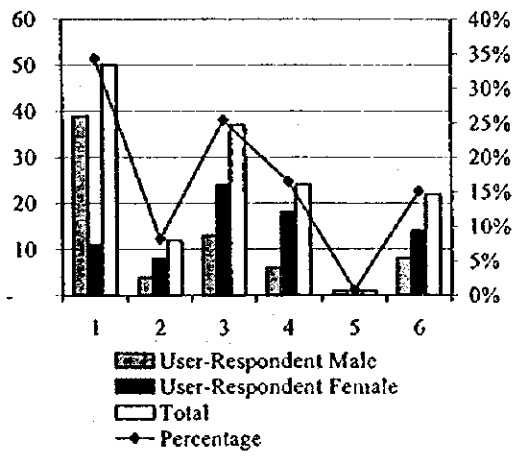
SOURCE	USER-RESPON-DENT		T
	M	F	
1. Communal Free Flow Well	6	-	6
2. Communal Faucet	23	11	34
3. Private SW	-	3	3
4. Level III	10	13	23
5. Communal SW	6	2	8
6. Communal Dugwell	32	14	46
7. Communal Spring	-	31	31
8. Rainwater	-	2	2
TOTAL	77	76	153



Responsible for Fetching Water. The majority of the male respondents, or 39 of them said that the husbands are still the one responsible for hauling drinking water for family use. However, only eleven female respondents agreed with them because for most (24) females, it is the male children who are responsible for fetching water. But, the women also shared the burden of fetching water. A total of 24 respondents, mostly females, indicated that female children fetched water, while 12 interviewees, or 4 males, 8 females indicated that the wives did the task. As many as 22 respondents were uncertain on this issue.

TABLE 14: RESPONSIBLE FOR FETCHING DRINKING WATER

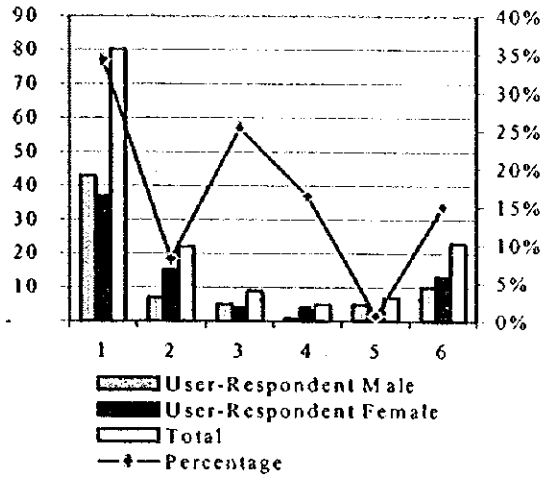
FAMILY MEMBER	USER-RESPON-DENT		T	%
	M	F		
1. Husband	39	11	50	34.25
2. Wife	4	8	12	8.20
3. Male Children	13	24	37	25.35
4. Female Children	6	18	24	16.45
5. Others	1	-	1	0.70
6. Uncertain	8	14	22	15.05
TOTAL	71	75	146	100.00



Frequency of Fetching Water. The majority of both male and female respondents, or 43 males and 37 females indicated that families fetch drinking water just once a day. Twenty-two interviewees said they haul water twice a day; nine indicated three times a day, and five said four times a day. Another seven respondents agreed that they fetch water more than four times a day. Some 23 respondents did not reply.

TABLE 15: FREQUENCY OF FETCHING DRINKING WATER

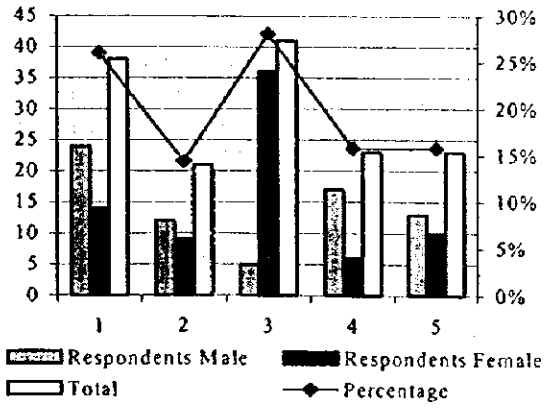
DURATION	RESPON-DENTS		T	%
	M	F		
1. Once a Day	43	37	80	34.25
2. Twice a Day	7	15	22	8.20
3. 3x a Day	5	4	9	25.35
4. 4x a Day	1	4	5	16.45
5. More	5	2	7	0.70
6. No Response	10	13	23	15.05
TOTAL	71	75	146	100.00



Duration of Fetching Water. For 24 male respondents and another 14 females, it takes only about 10 minutes to fetch water from the source to their house. For most of the female interviewees (36), however, it took longer or about 30 minutes to haul water. Twenty-one respondents (12 males, 9 females) indicated 20 minutes; while 23 respondents said it takes more than 30 minutes. As many as 23 respondents did not respond to this question.

TABLE 16: DURATION FOR FETCHING DRINKING WATER

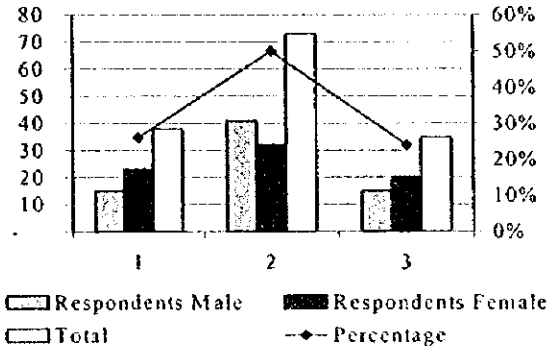
DURATION	RESPON-DENTS		T	%
	M	F		
1. About 10 Minutes	24	14	38	26.00
2. About 20 Minutes	12	9	21	14.40
3. About 30 Minutes	5	36	41	28.10
4. More Than 30 Minutes	17	6	23	15.75
5. No Response	13	10	23	15.75
TOTAL	71	75	146	100.00



Problems with Source. Half of the respondents (73), both male and female, admitted that they have problems with the current water source. Thirty-eight respondents, however, refuted this statement. The rest of the respondents (20 females, 10 males) could not determine whether they have problems with their water source or not.

TABLE 17: PROBLEMS WITH SOURCE OF WATER

RESPONSE	RESPONDENTS		T	%
	M	F		
1. No Problem	15	23	38	26.00
2. There are Problems	41	32	73	50.00
3. Uncertain	15	20	35	24.00
TOTAL	71	75	146	100.00



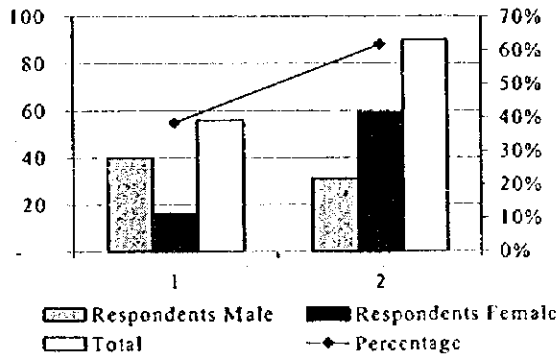
1.5 Institutional

(1) Presence of BWSA

Majority of the male respondents (40) indicated that there is a BWSA in their communities. On the other hand, most of the female respondents (59) said there was no BWSA. Overall, more than half of the respondents indicated the non-existence of a BWSA in their community.

TABLE 18: KNOWLEDGE OF THE EXISTENCE OF BWSA

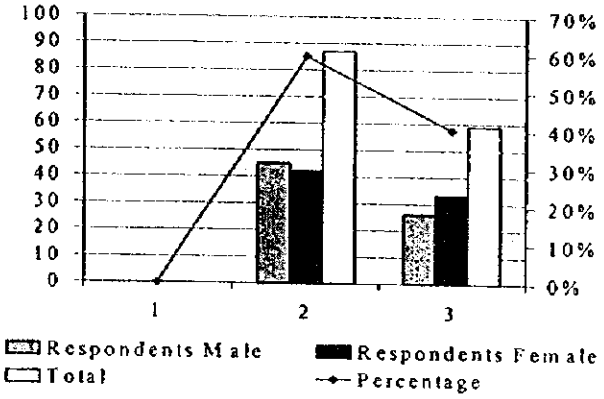
RES-PONSE	RESPONDENTS		T	%
	M	F		
1. Yes	40	16	56	38.35
2. No	31	59	90	61.65
TOTAL	71	75	146	100.00



Corollary to this, nobody among the respondents indicated that he or she is BWSA officer or a member. The respondents also said that they are not actively involved in the affairs of the BWSA.

TABLE 19: MEMBERSHIP TO THE BWSA

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Yes	-	-	-	0.00
2. No	45	42	87	59.60
3. No Response	26	33	59	40.40
TOTAL	71	75	146	100.00

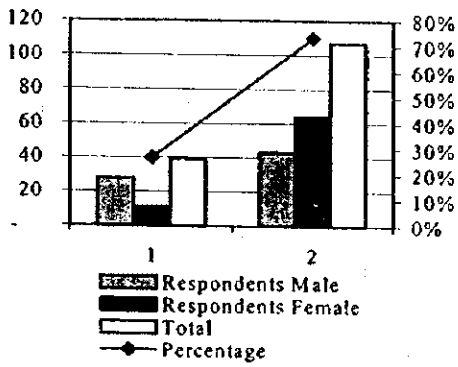


(2) Who maintains the facilities of the BWSA?

Only a few of the respondents (39) indicated that someone in the barangay maintains the facilities, if any, of the BWSA. All other respondents could not determine the people responsible for maintaining the facilities.

TABLE 20: RESPONSIBLE FOR MAINTAINING WATSAN FACILITIES

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Someone in the Barangay	28	11	39	26.71
2. No Response	43	64	107	73.29
TOTAL	71	75	146	100.00

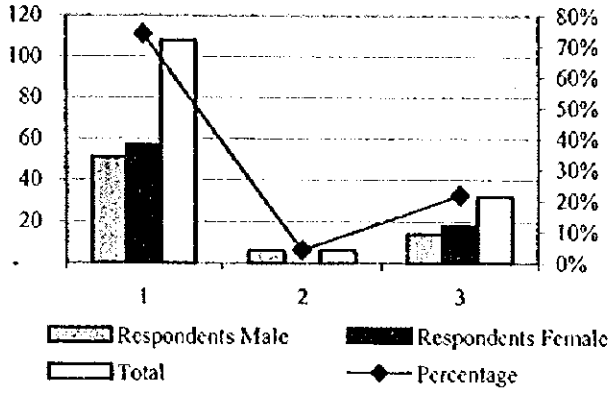


(3) Interested to be a member of BWSA

Significantly, the majority of the respondents (108 or 74%) indicated interest in becoming a member of BWSA once it is formed and/or activated in their respective barangays. Only six respondents, all males, were not interested to being a member of the BWSA. The rest of the interviewees (32, 14 males and 18 females) did not respond.

TABLE 21: INTEREST OF RESPONDENTS TO JOIN BWSA

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Interested	51	57	108	74.00
2. Not Interested	6	-	6	4.10
3. No Response	14	18	32	21.90
TOTAL	71	75	146	100.00

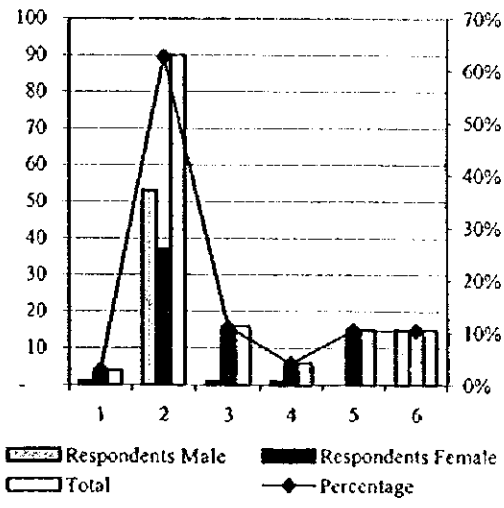


(4) How can respondents become actively involve in BWSA affairs?

A total of 90 respondents (53 males and 37 females) are willing to contribute free labor as a manifestation of their active involvement with the BWSA. Only 4 respondents (1 male, 3 females) would contribute cash for the operation of BWSA. Fifteen female respondents expressed willingness to serve as BWSA officer; while another 15 female and 1 male interviewee could undertake repair and maintenance works. On the other hand, 15 male respondents preferred to be just members of the BWSA.

TABLE 22: HOW RESPONDENTS CAN BECOME ACTIVELY INVOLVED IN WATSAN PROJECTS

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Contribute Cash	1	3	4	2.75
2. Contribute Labor	53	37	90	61.65
3. Do Repair/Maintenance	1	15	16	10.90
4. Collection of Fees	1	5	6	4.10
5. Be Officer	-	15	15	10.30
6. Just Member	15	-	15	10.30
TOTAL	71	75	146	100.00

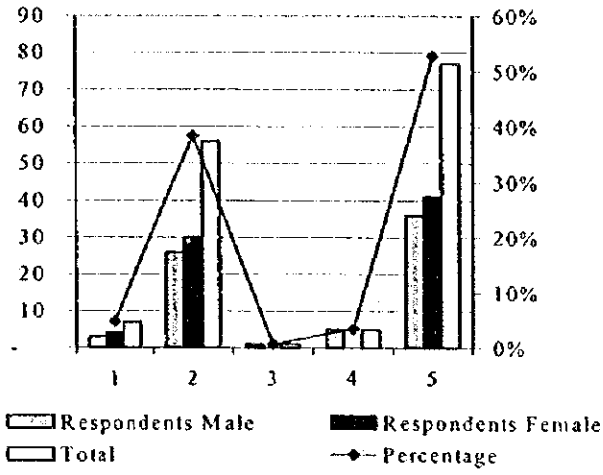


(5) If not interested, where to get source of water

In the event that these respondents will not be members of the BWSA, majority (26 males, 30 females) said that they will be obliged to fetch water from existing spring water nearest their abodes. Some will still avail from existing communal well, communal faucets or dug wells. A total of 77 respondents were uncertain on this aspect.

TABLE 23: SOURCES OF DRINKING WATER OF NON-BWSA MEMBERS

SOURCE OF WATER	RESPON-DENTS		T	%
	M	F		
1. Communal Well	3	4	7	4.80
2. Spring	26	30	56	38.35
3. Vendor	1	-	1	0.70
4. Others	5	-	5	3.40
5. Uncertain	36	41	77	52.75
TOTAL	71	75	146	100.00

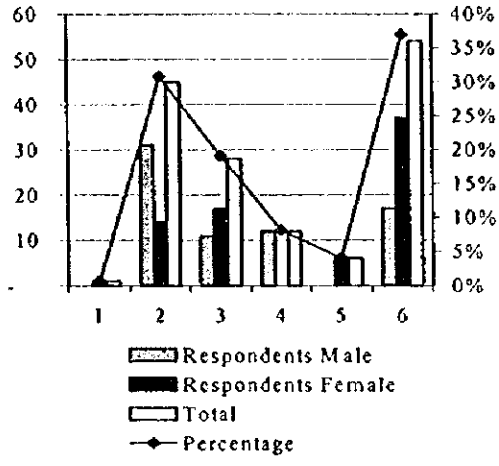


(6) Responsible for minor repairs of water facilities

The male members of the household, according to 31 male respondents and 14 female interviewees, were responsible for doing minor repairs of the family's water supply facility. For most of female respondents (17), and some male respondents (11), someone in the barangay is doing the repair works. Twelve male respondents indicated professional caretakers are the ones handling the job. Only one respondent said it was the female member who does repair works. The rest (54) were uncertain on this matter.

TABLE 24: RESPONSIBLE FOR MINOR REPAIRS

SOURCE OF WATER	RESPON-DENTS		T	%
	M	F		
1. Female Member	-	1	1	0.70
2. Male Member	31	14	45	30.80
3. Somebody in the Barangay	11	17	28	19.15
4. Professional Caretaker	12	-	12	8.20
5. Owner of the Well	-	6	6	4.10
6. Uncertain	17	37	54	37.00
TOTAL	71	75	146	100.00



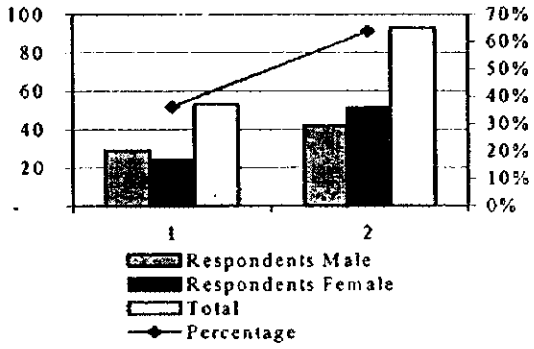
1.6 Training Activities

(1) Training Program attended in 1997

Majority of the respondents, 42 male and 51 male respondents, said they did not attend any training program in 1997. For 29 male and 24 female interviewees, they were able to attend training programs/seminars on the following subject matters: Farmer's Training/Agriculture; Sanitation; Barangay Administrative; Cooperative; Community Voluntarism; Health Program (Malaria Control); Mother Classes; and Crime Prevention.

TABLE 25: TRAININGS ATTENDED BY RESPONDENTS IN 1997

RES-PONSE	RESPON-DENTS		T	%
	M	F		
1. Yes	29	24	53	36.30
2. No	42	51	93	63.70
TOTAL	71	75	146	100.00



(2) Kinds of Training Program

The respondents attended various training programs in 1997. Table 26 summarizes the training programs/seminars attended by the respondents during the year.

TABLE 26: TRAINING COURSES ATTENDED BY RESPONDENTS IN 1997

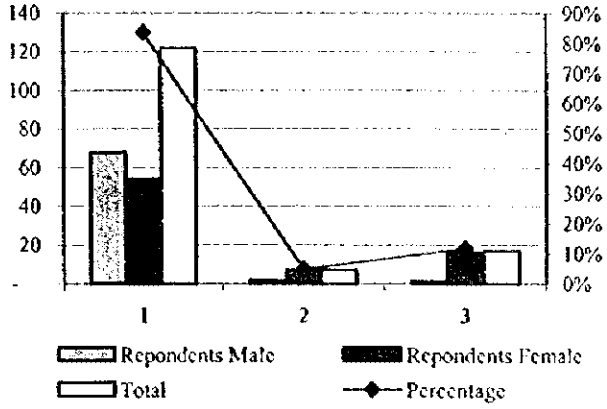
BARANGAY	MALE	FEMALE
Barangay Azpitia (Prosperidad)	1. Agriculture 2. Community Volunteers Organization	1. Malaria Control Program
San Vicente (Sibagat)	1. Civilian Volunteers Organization	1. Cooperative Development 2. Farmer's Training
Los Arcos (Prosperidad)	1. Barangay Administrative Training Program	
Wasian (Rosario)	1. Sanitation 2. Farmer's Training	
Wawa (Bayugan)	1. Cooperative Development 2. Citizens Crime Watch 3. Agricultural Productivity	1. Mother's Class 2. Women in Development 3. Farmer's Organization 4. Health and Sanitation/Malaria Training

(3) On BWSA Training

All the respondents were not aware of any training program for BWSA members. However, the majority (68 males and 54 females) wanted to attend in any BWSA training program for the barangay. Only seven respondents (2 males, 5 females) were not interested to be trained. All the other 17 respondents (1 male and 16 females) could not determine whether they would attend or not.

TABLE 27: WILLINGNESS TO ATTEND BWSA-RELATED TRAINING PROGRAMS

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Yes	68	54	122	83.55
2. No	2	5	7	4.80
3. Uncertain	1	16	17	11.65
TOTAL	71	75	146	100.00

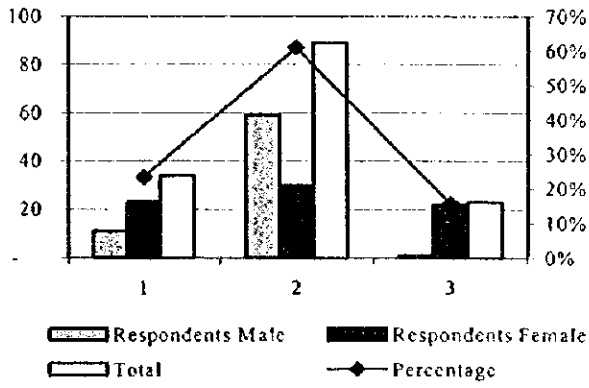


(4) Training on Health Education

Only 34 respondents, or 11 males and 23 females have attended health education training program. The majority or 59 males and 30 females have not heard of any health training program. The rest or 23 respondents did not indicate any response. If given a chance, however, the respondents wanted to attend WATSAN related training programs such as: BWSA Skills Training Program (O&M); Management Skills; and, Livelihood.

TABLE 28: PARTICIPATION IN HEALTH EDUCATION AND TRAINING

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Yes	11	23	34	23.30
2. No	59	30	89	61.00
3. No Response	1	22	23	15.70
TOTAL	71	75	146	100.00

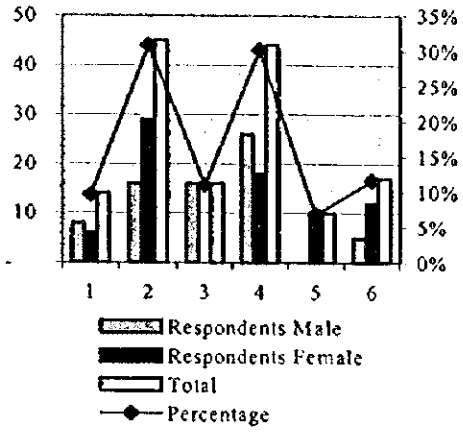


In relation to this, 29 of the female and 16 male respondents wanted to attend training programs that would be conducted for only one day. On the other hand, more male respondents or 26 of them, together with 18 female interviewees, desired for a 3-day training period. Sixteen male participants opted for 2-day training period while 14 or eight males and six females preferred less than one day. Ten female respondents were

eight males and six females preferred less than one day. Ten female respondents were willing to spend more than 3 days attending training courses. There were 17 respondents, or five males and 12 females who did not respond to this item.

TABLE 29: DESIRABLE TRAINING PERIOD

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Less Than One (1) Day	8	6	14	9.60
2. One (1) Day	16	29	45	30.80
3. Two (2) Days	16	-	16	10.95
4. Three (3) Days	26	18	44	30.15
5. More Than Three (3) Days	-	10	10	6.85
6. Uncertain	5	12	17	11.65
TOTAL	71	75	146	100.00



1.7 Community Development

(1) CBOs and contact persons

As pointed out by the respondents, some community-based organizations have been doing different development works in the barangays. Table 30 lists down these NGOs/CBOs and their contact persons:

TABLE 30: NGOS/CBOS IN THE BARANGAYS

BARANGAY	CONTACT PERSON
A. Barangay Los Arcos (Prosperidad)	
1. Los Arcos Multi-Purpose Cooperative	Mr. Alberto Onito
2. Rural Improvement Club	Bgy. Capt. Cerila Quire-Quire
3. Farmer's Association	Mr. Alberto Onita
4. Los Arcos-Azpetia Irrigation Assoxition	Mr. Eremo Dibibar
B. Barangay Wawa (Bayugan)	
1. FFCI	Mardona Otal
2. KASAMA KA	Mr. Castro
3. PCA	Roduldo Catalunia
C. Barangay San Vicente (Sibagat)	
1. PMS	Mr. Edward Rosales
2. EDACS	Mr. Virgilio Balais
3. Women's Club	Ms. Juvy Hegita/Comelia Bangue
4. Rural Improvement Club (RIC)	Ms. Ester Puzon
5. Farmer's Association	Mr. Edwin Recitu
6. SKA	Mr. Daniel Bangue
D. Barangay Wasian (Rosario)	
1. Wasian Communal Irrigation System	Mr. Melchor Taboco
2. Rural Improvement Club	Mrs. Gorgonia dela Cruz
3. Senior Citizens Organiztion	Mrs. Juanita Jayima
4. Women of Wasian	Mrs. Minda Martinez
5. Social Employment Association	Mrs. Sayna Onipas
6. DAYUNG	Mr. Juan Gargi
E. Barangay Azpitia (Prosperidad)	
1. ACARBEMCO/Farmers Association	Mr. Nicasio de Castro
2. Farmers Association	Mr. Godofredo Pontillo
3. Rural Improvement Club	Mr. Mesina Miranda

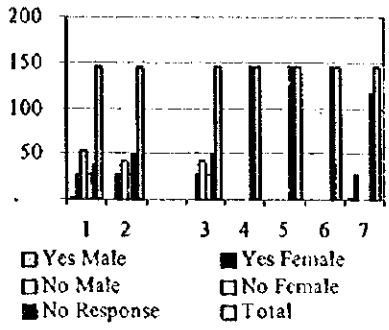
(2) Were the respondents consulted on their respective roles and responsibilities?

The majority of the respondents, 52 males and 27 females, were not consulted and/or briefed about their respective roles and responsibilities on the planning, design and construction of their water supply facilities. This is also true for the operation and maintenance and financing aspects of the system where the same number of respondents claimed they were not consulted.

In the same manner, all the respondents indicated that they were never consulted when the BWSA was formed in their respective barangays as well as when the level/type of services and water fees were agreed upon. Only when the facilities were constructed that about 30 of the respondents, or 2 males, 28 females, claimed they were consulted.

TABLE 31: RESPONDENTS CONSULTED/INVOLVED IN PAST WATSAN PROJECTS

BWSA ACTIVITIES	YES		NO		NO RES-PONSE	T
	M	F	M	F		
1. Planning and Design	2	28	52	27	37	146
2. O&M of the System	-	28	42	27	49	146
3. Financing of the System	-	28	42	27	49	146
4. BWSA Formation	-	-	-	-	146	146
5. Water Fee Decision	-	-	-	-	146	146
6. Level of Service Decided	-	-	-	-	146	146
7. Construction of Facilities	2	28	-	-	116	146

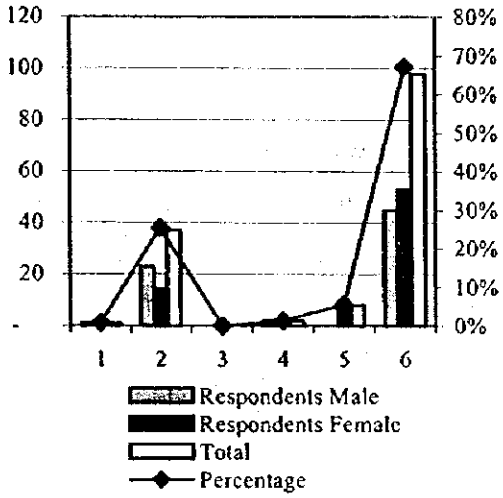


(3) How did the respondents participate in past construction projects?

Only 48 of the respondents, or 26 males and 22 females, participated in the construction of previous WATSAN facilities. Most, or 37 of them, provided free labor; eight contributed materials and two donated sites during the construction. Only one respondent provided cash for the completion of the project. The rest of the respondents or 98 did not respond to the question.

TABLE 32: PARTICIPATION IN PAST CONSTRUCTION PROJECTS

TYPE OF PARTICIPATION	RESPON-DENTS		T	%
	M	F		
1. Provided Cash	1	-	1	0.70
2. Provided Labor	23	14	37	25.35
3. Do Repair/Maintenance	-	-	-	0.00
4. Donated Site	2	-	2	1.35
5. Provided Materials	-	8	8	5.50
6. No Response	45	53	98	67.10
TOTAL	71	75	146	100.00



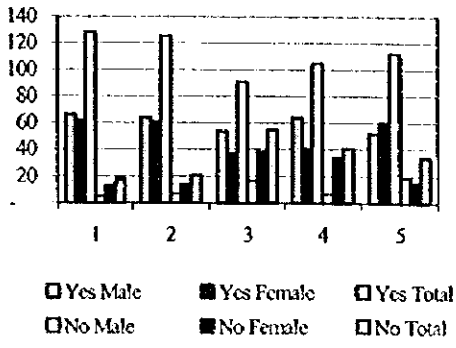
(4) Will the respondents participate in future projects?

For future projects, however, the majority of the respondents indicated that they would participate and/or contribute for the success of the projects. A total of 126 respondents, or

66 males and 62 females, said they would cooperate in the formation of the BWSA and in the formulation of water rates. About 105 respondents, or 64 males and 41 females, would participate in the construction of the facilities. In the selection of facilities sites, 101 respondents, or 64 males and 41 females, would be involved. The majority of the respondents, 112, or 52 males and 60 females, indicated that they would likewise participate in the operation and maintenance of future facilities.

TABLE 33: WILLINGNESS/TYPE OF PARTICIPATION IN FUTURE PROJECTS

PROJECT ACTIVITY	YES			NO		
	M	F	T	F	M	T
1. Formation of BWSA	66	62	128	5	13	18
2. Formulation of Water Rates	64	61	125	7	14	21
3. Selection of Site	54	37	91	17	38	55
4. Construction of Facilities	64	41	105	7	34	41
5. Operation and Maintenance	52	60	112	19	15	34



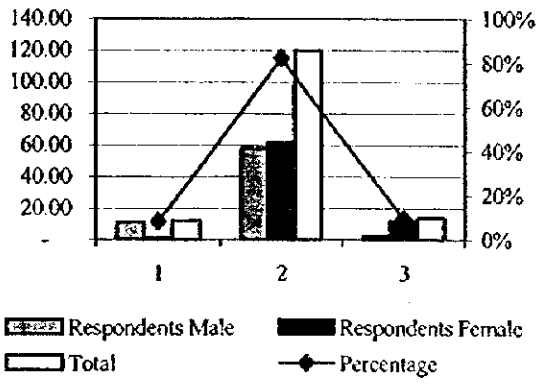
1.8 Financial Aspects

(1) Are respondents presently paying for their water supply?

Only 12 of the respondents, or 11 males and 1 female, said they are presently paying for their water supply. The rest of the interviewees don't pay.

TABLE 34: NUMBER OF RESPONDENTS PRESENTLY PAYING WATER FEE

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Yes	11	1	12	8.20
2. No	58	62	120	82.20
3. No Response	2	12	14	9.60
TOTAL	71	75	146	100.00

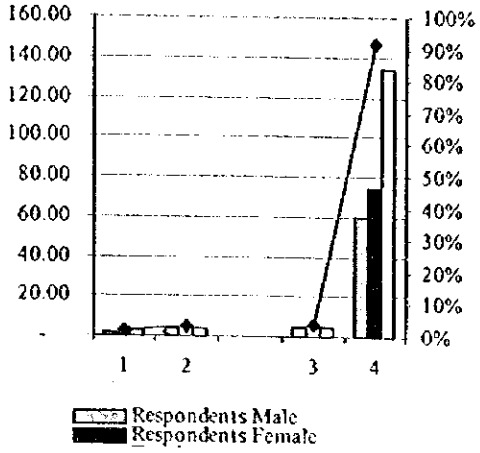


(2) If so, how much per household?

Of the 12 respondents, three (2 males and 1 female) indicated that they were paying ₱31.00 up to ₱40.00; four (all males) paid about ₱40.00; and, five (all males) pay about ₱50.00 and above. The rest of the respondents had no response.

TABLE 35: PRESENT WATER FEES PAID

WATER FEES	RESPON-DENTS		T	%
	M	F		
1. ₱31.00 – ₱40.00	2	1	3	2.05
2. ₱41.00 – ₱50.00	4	-	4	2.75
3. Above ₱50.00	5	-	5	3.40
4. No Response	60	74	134	91.80
TOTAL	71	75	146	100.00

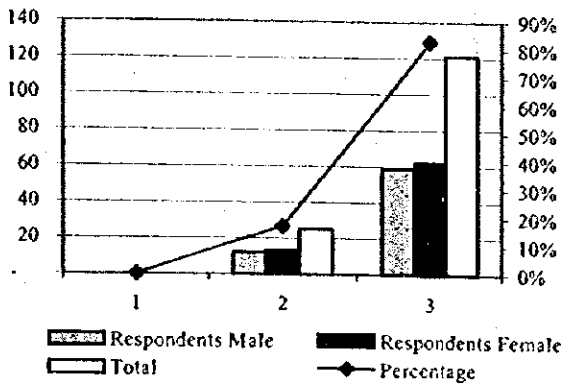


(3) Is the water fee enough for O&M?

For respondents who were paying water fees, all agreed that the fees being collected were not enough to operate and maintain the facilities. Since the majority of the respondents did not pay water fees, they could not determine if the fees were enough or not.

TABLE 36: ADEQUACY OF WATER FEE FOR O&M

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Yes	-	-	-	
2. No	12	13	25	17.10
3. No Response	59	62	121	82.90
TOTAL	71	75	146	100.00

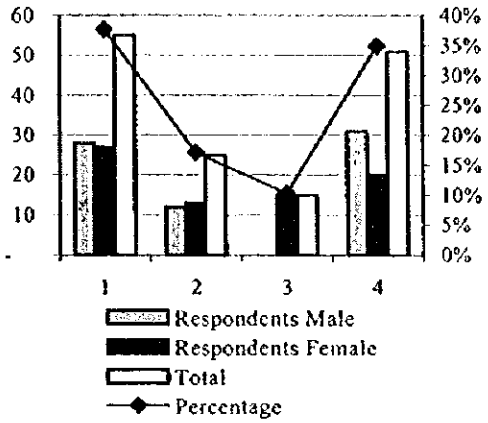


(4) Who shoulders the O&M of Facilities?

In areas where water fees were not being collected, a total of 55 respondents or 28 males and 27 females, claimed it was the barangay council which shouldered the operation and maintenance costs of the facilities. Twenty-five respondents or 12 males and 13 females, indicated it was the municipal government, which subsidized for the maintenance costs; while 15 female interviewees said it was the owner of the wells who maintained the system. The other 51 respondents, or 31 males and 20 females, could not determine which group/s shouldered the O&M.

TABLE 37: RESPONSIBILITY FOR SHOULDERING THE O&M COSTS

PERSON	RESPON-DENTS		T	%
	M	F		
1. Barangay Council	28	27	55	37.70
2. Municipal Government	12	13	25	17.10
3. Owner of the Well	-	15	15	10.30
4. Uncertain	31	20	51	34.95
TOTAL	71	75	146	100.00

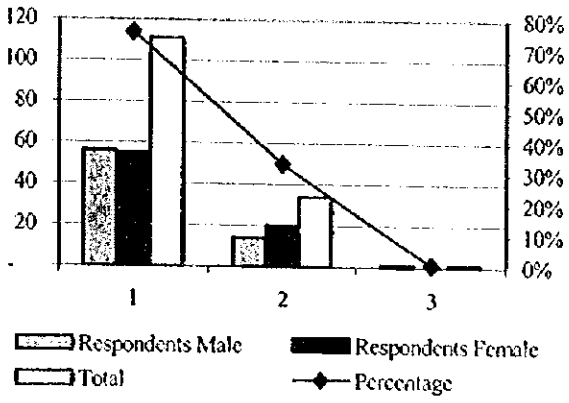


(5) Are the people willing to pay for O&M of future facilities?

A total of 111 respondents, or 56 males and 55 females, expressed willingness to pay/contribute for the operation and maintenance of future facilities. Thirty-four interviewees, or 14 males and 20 females, indicated they are not inclined to pay. One male respondent was uncertain whether to pay or not.

TABLE 38: RESPONDENTS' WILLINGNESS TO PAY FOR FUTURE FACILITIES

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	56	55	111	76.60
2. No	14	20	34	33.30
3. No Response	1	-	1	0.70
TOTAL	71	75	146	100.00

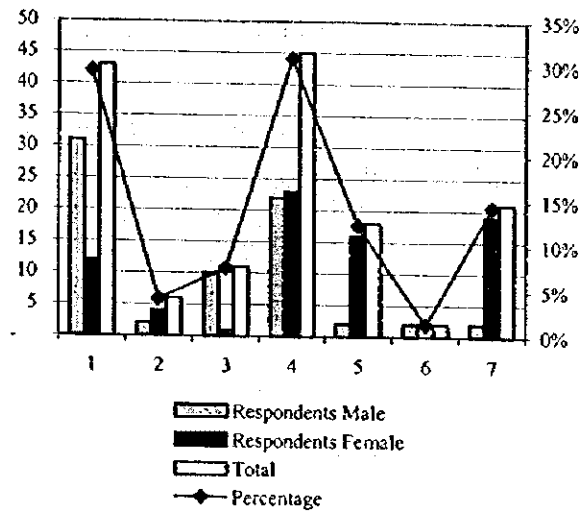


(6) How much are respondents willing to pay?

Of those who are willing to pay, 43 respondents, or 31 males and 12 females said they can pay from ₱2.00 to ₱5.00. Six respondents, or two males and four females agreed to shell out ₱6.00 to ₱10.00; while 11, or 10 males and one female, from ₱11.00 to ₱20.00. Forty-five interviewees, or 22 males and 23 females were willing to pay from ₱21.00 to ₱30.00; while 18 respondents, or two males and 16 females, ₱31.00 to ₱40.00; and, finally two males, at ₱41.00 to ₱50.00. Twenty-one respondents had no response.

TABLE 39: AMOUNT RESPONDENTS ARE WILLING TO PAY

RESPONSE	RESPONDENTS		T	%
	M	F		
1. ₱2.00 - ₱5.00	31	12	43	29.45
2. ₱6.00 – ₱10.00	2	4	6	4.10
3. ₱11.00 – ₱20.00	10	1	11	7.55
4. ₱21.00 – ₱30.00	22	23	45	30.85
5. ₱31.00 – ₱40.00	2	16	18	12.35
6. ₱41.00 – ₱50.00	2	-	2	1.35
7. No Response	2	19	21	14.40
TOTAL	71	75	146	100.00

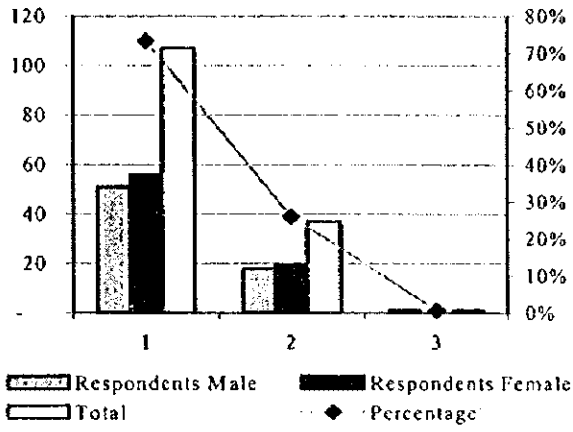


(7) Are you willing to contribute for future projects?

Significantly, 107 respondents or 51 males and 56 females indicated their willingness to contribute in cash or kind for the construction of WATSAN facilities in their respective barangays. On the other hand, 2 males and another 19 females were not willing to contribute.

TABLE 40: WILLINGNESS OF RESPONDENTS TO CONTRIBUTE FOR FUTURE FACILITIES

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Yes	51	56	107	73.30
2. No	19	19	38	26.00
3. No Response	1	-	1	0.70
TOTAL	71	75	146	100.00

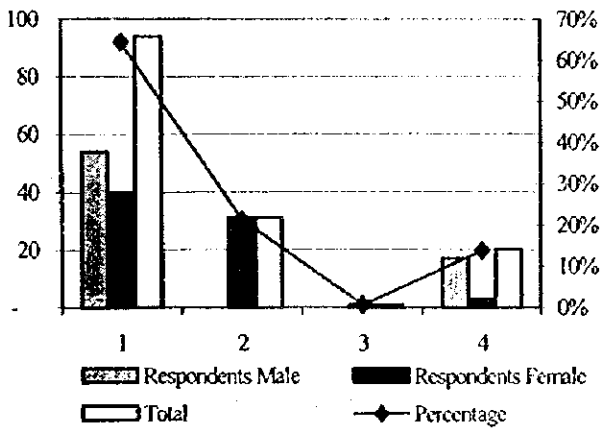


(8) If so, what kind?

Of those willing to share, 94 respondents or 54 males and 40 females, preferred to contribute free labor during the construction. Only 31 female respondents were prepared to contribute cash, which varies from ₱10.00 to ₱30.00. Some 20 interviewees remained uncertain whether to pay or not.

TABLE 41: TYPES OF CONTRIBUTION

RESPONSE	RESPON-DENTS		T	%
	M	F		
1. Labor	54	40	94	64.40
2. Cash	-	31	31	21.25
3. Materials	-	1	1	0.70
4. Uncertain	17	3	20	13.70
TOTAL	71	75	146	100.00



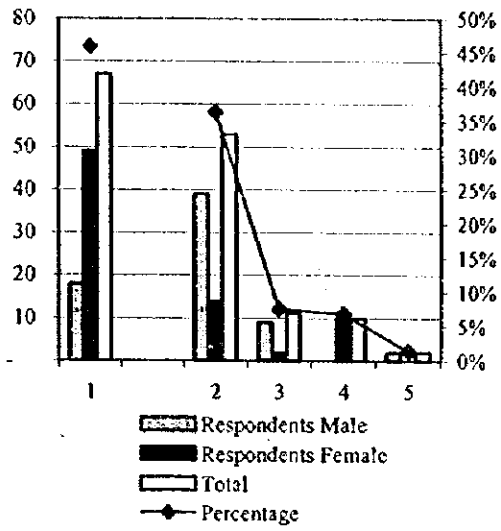
1.9 Health and Sanitation

(1) Type of toilet

Majority of the female respondents (49) indicated that private household toilets which flush to a septic tank on the site are widely used. For the majority of the male respondents, the private household pit latrine was the popular type. Eleven interviewees, or nine males and two females use shared flush toilet; while 10 female participants utilize the shared pit latrine. Two male respondents indicated that they use open outdoor sites.

TABLE 42: TYPE OF TOILETS RESPONDENTS USE

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Private HH Toilet Flushed to Septic Tank on the Site	18	49	67	45.90
2. Private HH Pit Latrine	39	14	53	36.30
3. Shared Flushed Toilet	9	2	11	7.55
4. Shared Pit Latrine	-	10	10	6.85
5. Open Outdoor Site	2	-	2	1.35
6. No Response	3	-	3	2.05
TOTAL	71	75	146	100.00



(2) Who got sick during the past year? What sickness?

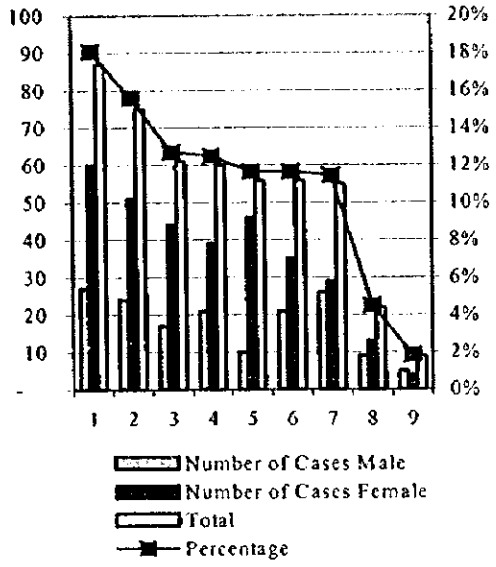
The respondents indicated that in 1997, some 481 persons related to them were afflicted with various water-related diseases. The leading cause of illnesses was stomach pain, which afflicted 87 persons. The second leading illness was skin disease, which afflicted 75 persons. Gastroenteritis came in third with 61 cases; diarrhea, 60 cases; kidney trouble, 56 cases; schistosomiasis, 56; intestinal flu, 55 cases; malaria, 22; and, typhoid fever, 9.

The women were most afflicted with these water-related diseases during the year. A total of 221 mothers were afflicted with various illnesses, with high cases of stomach pain, 37; skin diseases, 31; and diarrhea, 28. Daughters were also highly susceptible as 36 eldest daughters, 33 middle daughters, and another 33 youngest daughters were afflicted with intestinal flu, skin disease, stomach pain and schistosomiasis. Ninety-three men also

suffered from these diseases, with stomach pain at 37 cases and intestinal flu, 10 cases. Another 61 sons also suffered, mostly from skin disease and schistosomiasis.

TABLE 43: WATER-RELATED ILLNESSES

DISEASE	NUMBER OF CASES		T	%
	M	F		
1. Stomach Pain	27	60	87	18.10
2. Skin Diseases	24	51	75	15.60
3. Gastroenteritis	17	44	61	12.70
4. Diarrhea	21	39	60	12.50
5. Kidney Trouble	10	46	56	11.65
6. Schistosomiasis	21	35	56	11.65
7. Intestinal Flu	26	29	55	11.45
8. Malaria	9	13	22	4.50
9. Typhoid Fever	5	4	9	1.85
TOTAL	160	321	481	100.00

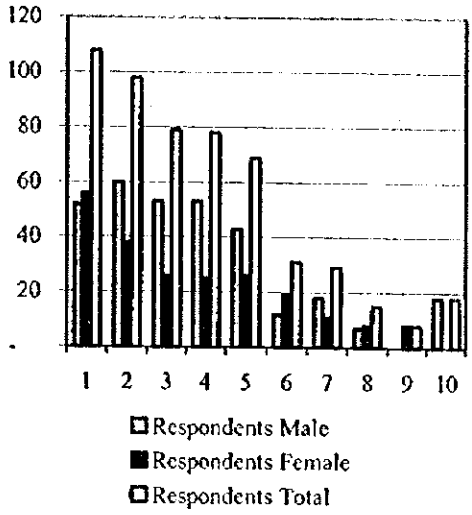


(3) Health and hygiene practices

Most respondents recognized the importance of good health and hygiene practices. As indicated by them, the respondents learned about health and sanitation matters mostly from health workers and their relatives and friends. The majority of the male respondents or 60 of them learned mostly from health workers/inspectors; while most female respondents, or 56 of them got educational information from their relatives and friends. Respondents also learned health education from various media.

TABLE 44: WHERE PEOPLE LEARNED HEALTH AND HYGIENE EDUCATION

RESPONSE	RESPONDENTS		T
	M	F	
1. Relatives and Friends	52	56	108
2. Health Worker/Inspector	60	38	98
3. Radio	53	26	79
4. Television	53	25	78
5. School	43	26	69
6. Newspaper	12	19	31
7. Health Clinics	18	11	29
8. Hospitals	7	8	15
9. NGOs	-	8	8
10. Others	18	-	18



5.8.5 Utilization of NGOs

LIST OF NGOs / CBOs for AGUSAN DEL SUR

NAME OF NGOs / CBOs	CONTACT PERSON
1. Sibagat Association for Verdant Environment (SAVE)	Ephraim Badajos, Sr.
2. Kiwanis Club of Bayugan	Romualdo Mamac
3. Integrated Professional Association for Social Development of Rosario, Inc. (IPASDRI)	Artemio Acopiado
4. Agus Development Foundation, Inc. (ADFI) San Francisco, Agusan Sur	Oscar Solidor
5. Women's Federation of Bunawan (Bunawan)	Maria Elizabeth Embalsado
6. Kalambuan Foundation, Inc. (Veruela)	Herculano O. Fabe
7. Good Shepherd Tribal Filipino Ministry (San Luis)	Sis. Mary John Dumaog
8. Mindanao Rural Reconstruction Movement, Inc. (MRRM), San Francisco, ADS	Dr. Alex Amador
9. Agusan Shepherd Management and Consultancy Group Corp., SFADS	Engr. Hilarion Susarno
10. Agusan Ecotech Foundation	Mansueta Salise
11. Tag-oyango MPDC Sibagat	
12. Sinai Farmers MPC Sibagat	Dalmacio Duarte
13. Mahayahay Coconut Farmers MPV	Aquilino Lugo
14. Afga Farmers MPC	Wenceslao Villabas
15. Sibagat Coconut Farmers MPC	Abdul Onsing
16. Knights of Columbus (KC)	Conrado Mosquito
17. Skyline Multi-Purpose Cooperative	Leopoldo Lawas
18. Maygatasan United Farmers Multi-Purpose Cooperative	Pedrito Sarigumba
19. Noli-Canayugan Multi-Purpose Cooperative	Samson A. Pama
20. Task Force Detainees of the Phils., Inc. (Agusan del Sur Branch)	Primitiva Santiago
21. Lapana Multi-Purpose Cooperative	Maximo Aparente
22. Bayanihan Council for Datus (BACODA)	Amador Pama
23. New Bohol Multi-Purpose Cooperative	Felipe Labastilla
24. SAMACAN Irrigators Multi-Purpose Cooperative	Zosimo Butingana
25. REACT Toog Group Bayugan	Adriano Gavia
26. Agusan Radio Club (ARC)	Simion Enong
27. Agusan del Sur Free Farmers Cooperative (ASFFCI)	Alejandro Oclarit
28. Daughters of Army Immaculate	Thelma Oclarit
29. Sta. Ana Multi-Purpose Cooperative	Remedios Gallardo
30. KAGAMARAS	Segundo Piamonte
31. Gawasnong Mag-uuma sa Rosario	Pedro Roquino
32. Bayugan SBIDA Cooperative, Inc.	Francisco Natividad
33. Bayugan S Citizen Multi-Purpose Cooperative, Inc.	Joseph Bayron
34. Women Association of the Barangay, Inc. (Bayugan S. Rosario)	Elma Tadle
35. Rosario Farmers Association and CARP Beneficiaries, Inc.	Eusebio Bamaja
36. Bayanihan Farmers Association (Wasian, Rosario)	Carlito De Paz
37. Mablay Farmers Multi-Purpose Cooperative (Marfil, Rosairo)	Girardo Relatores
38. Lakas Ng Magsasakang Pilipino	Pepito dela Paz

NAME OF NGOs / CBOs	CONTACT PERSON
39. Womens' Federation of Bunawan	Ma. Elizabeth Embalasado
40. Tandawan Uplans Farmers Association	Ernesto Doran
41. Bunawan Market Vendors Association	Eduardo Florimo
42. Agsao Integrated Social Forestry Association	Henelito Otacan
43. LAKAS-ODISCO	Faustino Asis
44. Kaisahan Tungo sa Kaunlaran sa Kanayunan at Repormang Pansakahan	Ma. Len Pineda
45. NACOMA (Nagkahiusang Cooperatibang Mag-uuma sa Angas)	Eduardo Cagatin
46. KABASKUG (Kababaye-an sa Sta. Josefa karon ug ugma)	Mansueto Salise
47. Awao Multi-Purpose Cooperative	Florida Aldirete
48. Magkahiusang Gagmay ng Mag-uuma alang sa Tinuod nga Agrikultura (NAGMATA)	Constancio Espiton
49. Sta. Josefa Tribal Association, Inc.	Pablo Plaza
50. Angas Irrigation Association	Brigido Plaza, Jr.
51. Sampaguita Multi-Purpose Cooperative	Pedro Ramirez
52. Del Monte Agrarian Reform Beneficiaries Association (DARBA)	Pastor Temonio Quitoriano
53. Self Reliance Management for Social Progress	Andres Cullates
54. Municipal Federation of Farmers Association	Ernesto Salinas
55. Dona Flavia Rattan Spilt Association	Nicanor Casil

5.8.6 Existing Community Development Process

Detailed Typical CD Process in Agusan del Sur

1) **Make courtesy calls.** Courtesy calls are made to barangay/sitio officials prior to the conduct of meetings with the community. Then, a series of meetings and community assemblies are done where the WATSAN program is introduced, its significance and impact taken up and the importance of organizing promoted. This is followed by a more detailed presentation/orientation of the project – its concept, features, history, stakeholders, and the CO process utilized. Depending on the level of community awareness regarding the program/project, two or three meetings/assemblies are needed before doing the baseline survey.

2) **Preparation of profile (secondary information) and survey forms.**

(a) ***General information.*** Distance from barangay to poblacion, mode of travel, time and fare; no. of sitio/purok; dominant ethnic groups, common occupation of residents; demographic data (no. of household, male and female population) by sitio/purok, no. of dwelling structures, school buildings, other buildings, availability of electricity by sitio/purok.

(b) ***Barangay WATSAN status.*** Existing water supply systems, by sitio/purok, by type and service level, no. of facilities (functioning), potability, no. of HH served, who installed, who operates, user charges, if any; HHs toilet facilities, by sitio/purok, no. of HHs with private toilets by type, no. of HH using shared toilets by type, no. of HH without toilets; no. of community waste disposal systems by sitio/purok, by method and wastewater system; no. of reported morbidity and mortality cases of water-borne/contact/vector-borne diseases of barangay residents.

c) ***WATSAN related programs and projects in the barangay.*** Existing WATSAN programs/project by type of activity, implementing organization/agency, sponsoring funding agency, specify years when operated in barangay, name of community association organized, if any; past WATSAN programs/projects by type of activity, implementing organization/agency, sponsoring funding agency, specify years when operated, name of community association organized, if any; Community organizations in the barangay, watsan related groups/organization and other community organizations, its name of group/organization, sitios where members are, sponsoring agencies, year organized and status; other barangay facilities.

(d) ***Resources for barangay water supply and toilet facilities fabrication.*** Brief description of water sources-undeveloped springs, streams and other water sources which can be tapped and developed, sources which can be improved including estimated distance to center of HHs to be served, availability of water, estimated flows during dry and wet seasons; water and well depths by sitio/purok, by season; availability of construction materials for water supply and toilet if available for free at barangay or at hardware/other stores, its sources, name and address of store, materials available, distance from barangay and means of transport for materials; sources of pumps and spare parts for pumps – name and address of dealer/store, types of pumps/parts available and distance from barangay; barangay residents with skills in water supply system construction and maintenance, type of skill, no. of persons and remarks; well drillers and water supply contractors who can be tapped for barangay works, their name address, services rendered and charging rates; local fabricators of toilet bowls, their name, location, type/description of toilet bowl.

3. **Identify of community volunteers.** As an initial step in community organizing, a core group of about 7 persons consisting of community leaders is formed. This is the formation of an informal community organization that will assist the CD worker in the preparation of CO strategies, community profiling, identification of project sites, and other work.

4. **Conduct baseline survey.** In the conduct of this survey, focus group discussion was applied and the results validated during barangay spot mapping. The barangay spot map reflects the location of structures (scaled) and different facilities/infrastructure. This serves as a planning tool in the development of WATSAN program for the area.

5. **Inspect/identify project sites and validate projects.** An assembly is called again to present the results of the survey, its profile, assessment and needs. The CD team situates the community, i.e., *where they are now in the sector.* A member of the CD team will then facilitate the surfacing of thoughts from the group in terms of identifying the needs for WATSAN facilities, how project will be implemented in their area, how the facility will be designed and constructed, and how the community perceives their role in the project. In some cases, the community request technical assistance from the Center on site selection of identified areas.

6. **Conduct technical and community consultative meetings** of members and officers together with barangay officials. By this time, the core group has already specific

projects to be implemented. Together with these interim officers, meetings with barangay officials are undertaken to determine local counterpart funding support to the program/project.

7. **Facilitate project implementation.** After funding has been assured, the CD team facilitates the implementation of the project through supervision and monitoring progress of construction. Contribution from the community comes in the form of free labor (*pahina*).

8. **Consolidate BWSA Organization.** The core group formulates the by-laws and policies of the organization and have these ratified by the members. The election of BWSA officers follows. A barangay resolution is passed endorsing the association and submitted to the Municipal Development Council/Sangguniang Bayan for registration/accreditation. Parallel to this activity is the completion of the facility and in most cases, the turn-over of the facility to the newly-organized BWSA, which can coincide with the swearing-in of BWSA officials.

9. **Conduct training on skills and management to BWSA officials** by the Center. The module includes topics on: human resource development (self and group awareness, communication skills, group facilitation and conducting meeting, effective community work, leadership skills and roles of officers and members, and conflict management); technical (hydrogeology and site selection, well construction and identification of handpump parts, equipment plumbing tools and materials for construction and repairs, hand pump principles of operation, maintenance and approach in trouble shooting, spring development, types of spring, their characteristics and method of developing, operation and maintenance of tank, spring box and distribution line, excreta, liquid and solid disposal system, water related diseases-prevention/control and water quality surveillance); financial management; project planning management; and action planning.

10. **Undertake follow-up activities.** The CD team after the construction of the WATSAN facilities undertakes follow-up activities such as monitoring and evaluation and the provision of recommendations/adjustments on the O&M of the facilities, where needed.

Source: DILG/WATSAN UNDP-PHI as modified by Province of Agusan del Sur

6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6.2 Past Public Investment

6.2.1 Sources of Local Fund

Table 6.2.1 Statement of Income and Expenditures of Agusan del Sur, 1994-1998

Particulars	1994	1995	1996	1997	1998
1. Sibagat					
Income	-	43,340,925.43	26,874,564.22	-	-
IRA		15,527,392.53	16,589,026.36		
Tax Revenues		3,392,564.80	324,596.47		
Non-Tax Revenues		24,420,968.10	9,260,841.39		
Expenditures	14,507,908.78	16,893,886.92	23,030,304.44	30,819,746.88	30,562,494.50
Personal Services (P.S.)	7,621,423.22	9,195,681.59	13,320,014.44	14,766,141.73	19,817,120.87
Maint. & Other Oper. Exp. (MOOE)	6,088,765.54	4,850,605.88	8,603,046.95	4,691,436.80	5,351,456.62
Capital Outlay (CO)	797,719.52	2,847,599.45	8,107,243.05	10,562,166.35	6,093,917.01
Others (Non-Office)	-	-	-	-	-
2. Bayugan					
Income	-	n.a	n.a	-	-
IRA					
Tax Revenues					
Non-Tax Revenues					
Expenditures	22,087,072.89	-	36,119,742.04	40,978,408.64	-
Personal Services (P.S.)	11,970,436.98	-	21,902,767.22	27,674,133.97	-
Maint. & Other Oper. Exp. (MOOE)	8,143,453.87	-	9,216,312.12	9,999,133.03	-
Capital Outlay (CO)	1,973,182.04	-	5,000,662.70	3,305,141.64	-
Others (Non-Office)	-	-	-	-	-
3. Prosperidad					
Income	-	n.a	8,384,000.00	-	-
IRA			7,206,000.00		
Tax Revenues			47,000.00		
Non-Tax Revenues			1,131,000.00		
Expenditures	14,544,769.69	-	13,202,000.00	16,252,000.00	17,912,000.00
Personal Services (P.S.)	9,921,293.66	-	9,489,000.00	13,106,000.00	14,078,000.00
Maint. & Other Oper. Exp. (MOOE)	2,438,509.39	-	3,518,000.00	2,939,000.00	3,483,000.00
Capital Outlay (CO)	2,184,876.64	-	195,000.00	207,000.00	351,000.00
Others (Non-Office)	-	-	-	-	-
4. San Francisco					
Income	-	27,991,692.17	28,974,540.66	-	-
IRA		19,285,692.00	19,555,297.66		
Tax Revenues		5,231,045.15	4,667,653.87		
Non-Tax Revenues		4,474,954.02	4,751,589.13		
Expenditures	25,208,897.80	26,345,959.11	27,903,836.75	34,920,468.82	-
Personal Services (P.S.)	14,788,914.52	15,783,324.32	19,023,468.96	22,797,797.34	-
Maint. & Other Oper. Exp. (MOOE)	7,649,765.80	8,616,734.72	6,769,965.63	9,653,843.37	-
Capital Outlay (CO)	3,270,217.48	1,945,900.07	2,109,702.16	2,468,827.43	-
Others (Non-Office)	-	-	-	-	-
5. Rosario					
Income	-	n.a	n.a	-	-
IRA					
Tax Revenues					
Non-Tax Revenues					
Expenditures	17,530,670.19	-	16,321,790.00	22,118,433.00	24,850,049.00
Personal Services (P.S.)	6,870,666.71	-	9,623,208.00	12,693,049.00	15,956,718.00
Maint. & Other Oper. Exp. (MOOE)	8,898,840.77	-	4,795,465.00	8,455,578.00	7,659,000.00
Capital Outlay (CO)	1,761,162.71	-	1,903,117.00	969,806.00	1,234,331.00
Others (Non-Office)	-	-	-	-	-
6. Bunawan					
Income	-	23,050,666.67	23,825,962.00	-	-
IRA		19,216,866.38	21,583,766.00		
Tax Revenues		-	-		
Non-Tax Revenues		3,833,800.29	2,242,196.00		
Expenditures	39,706,201.71	19,594,054.67	28,804,588.43	28,834,588.43	28,160,376.00
Personal Services (P.S.)	7,675,218.92	8,173,296.00	16,625,307.35	16,625,307.35	14,861,875.00
Maint. & Other Oper. Exp. (MOOE)	27,956,319.34	4,838,833.67	6,413,277.24	6,413,277.24	6,324,400.00
Capital Outlay (CO)	4,074,663.45	6,581,925.00	5,766,003.84	5,766,003.84	6,974,101.00
Others (Non-Office)	-	-	-	-	-
7. Trento					
Income	-	32,551,000.00	28,102,000.00	-	-
IRA		17,010,000.00	18,199,000.00		
Tax Revenues		12,917,000.00	1,225,000.00		
Non-Tax Revenues		2,624,000.00	8,678,000.00		
Expenditures	27,508,433.04	25,953,000.00	26,738,000.00	43,424,000.00	40,134,000.00
Personal Services (P.S.)	6,323,426.57	10,982,000.00	14,207,000.00	20,045,000.00	21,708,000.00
Maint. & Other Oper. Exp. (MOOE)	18,885,195.69	10,277,000.00	11,383,000.00	12,216,000.00	18,426,000.00
Capital Outlay (CO)	2,299,810.78	4,694,000.00	1,148,000.00	11,163,000.00	-
Others (Non-Office)	-	-	-	-	-

Table 6.2.1 Statement of Income and Expenditures of Agusan del Sur, 1994-1998

Particulars	1994	1995	1996	1997	1998
8. San Jose/a					
Income	-	33,761,513 14	32,583,638 98	-	-
IRA		9,662,106 46	10,782,843 00		
Tax Revenues		8,655,033 40	269,622 98		
Non-Tax Revenues		2,444,373 28	4,531,168 00		
Expenditures	10,877,553 60	12,252,086 60	12,252,086 60	26,615,000 00	30,210,000 00
Personal Services (P S)	4,163,382 79	5,092,753 63	5,092,753 63	11,464,000 00	16,163,000 00
Maint & Other Oper Exp (MOOE)	6,117,625 61	3,980,857 30	3,980,857 30	6,703,000 00	12,739,000 00
Capital Outlay (CO)	592,545 20	3,178,475 67	3,178,475 67	8,448,000 00	1,290,000 00
Others (Non Office)	-	-	-	-	-
9. Veruela					
Income	-	21,503,914 67	22,568,653 52	-	-
IRA		19,829,482 00	19,822,996 00		
Tax Revenues		380,945 70	2,440,789 05		
Non-Tax Revenues		1,293,486 97	304,868 47		
Expenditures	16,553,395 13	24,796,445 03	21,167,111 15	21,184,533 78	26,775,479 00
Personal Services (P S)	6,376,976 69	10,367,303 05	8,283,337 16	12,727,635 83	16,983,241 00
Maint & Other Oper Exp (MOOE)	5,754,506 26	12,041,895 65	12,852,423 46	7,059,455 04	5,855,258 00
Capital Outlay (CO)	4,421,912 18	2,387,247 33	31,350 53	1,347,436 91	3,936,980 00
Others (Non Office)	-	-	-	-	-
10. Loreto					
Income	-	41,865,409 33	46,194,147 62	-	-
IRA		31,761,875 00	36,344,146 06		
Tax Revenues		5,132,645 68	3,765,136 54		
Non-Tax Revenues		4,999,888 65	6,064,865 02		
Expenditures	16,081,919 31	33,390,491 54	22,223,776 47	41,065,328 46	43,398,735 40
Personal Services (P S)	8,494,429 89	15,543,731 40	11,712,915 59	22,037,923 64	24,551,908 89
Maint & Other Oper Exp (MOOE)	5,236,450 06	8,658,323 83	7,706,493 26	7,093,653 30	7,799,632 36
Capital Outlay (CO)	2,351,039 36	9,188,436 31	2,804,367 62	11,933,753 52	11,047,194 15
Others (Non Office)	-	-	-	-	-
11. La Paz					
Income	-	22,755,139 90	23,158,105 41	-	-
IRA		20,344,872 79	23,405,833 42		
Tax Revenues		5,815,727 96	1,751,796 62		
Non-Tax Revenues		1,594,534 85	1,993,475 67		
Expenditures	11,358,092 34	25,717,646 97	27,892,262 64	41,485,815 64	47,475,000 08
Personal Services (P S)	7,838,647 91	9,494,064 85	14,730,133 94	16,874,295 25	24,944,259 96
Maint & Other Oper Exp (MOOE)	3,323,657 93	9,766,330 54	7,445,773 14	20,723,375 93	14,464,546 12
Capital Outlay (CO)	195,786 50	6,547,251 58	5,716,357 56	3,888,147 66	8,066,194 00
Others (Non Office)	-	-	-	-	-
12. Talacogon					
Income	-	n a	20,405,506 52	-	-
IRA			14,836,346 19		
Tax Revenues			783,343 26		
Non-Tax Revenues			5,956,017 07		
Expenditures	14,497,250 18	-	18,153,196 08	18,972,190 36	45,495,151 56
Personal Services (P S)	6,493,583 92	-	9,091,070 23	12,260,616 45	13,834,159 74
Maint & Other Oper Exp (MOOE)	4,245,340 18	-	4,959,560 42	5,101,477 92	2,360,991 76
Capital Outlay (CO)	3,258,326 08	-	4,102,565 43	1,590,095 99	-
Others (Non Office)	-	-	-	-	-
13. San Luis					
Income	-	24,270,737 59	25,347,203 14	-	-
IRA		18,373,135 18	19,585,130 72		
Tax Revenues		465,892 31	1,204,323 44		
Non-Tax Revenues		5,431,710 10	4,557,748 98		
Expenditures	27,658,398 03	21,184,498 77	30,659,231 69	29,300,000 00	31,000,000 00
Personal Services (P S)	6,977,067 54	8,125,145 04	9,599,803 35	13,000,000 00	14,100,000 00
Maint & Other Oper Exp (MOOE)	15,206,330 49	9,245,342 28	6,329,439 48	7,800,000 00	11,300,000 00
Capital Outlay (CO)	475,000 00	3,814,011 45	14,929,928 86	6,500,000 00	5,600,000 00
Others (Non Office)	-	-	-	-	-
14. Esperanza					
Income	-	n a	36,704,523 52	-	-
IRA			27,800,364 85		
Tax Revenues			575,589 23		
Non-Tax Revenues			8,328,569 44		
Expenditures	25,461,015 85	-	35,298,835 78	38,269,955 58	26,301,366 36
Personal Services (P S)	15,294,674 15	-	18,332,994 20	22,252,533 76	21,245,134 56
Maint & Other Oper Exp (MOOE)	9,816,360 33	-	10,458,596 58	11,911,650 78	3,634,233 80
Capital Outlay (CO)	349,961 37	-	6,507,255 00	4,106,271 03	1,422,000 00
Others (Non Office)	-	-	-	-	-

Source Municipalities and PPDO

Table 6.2.2 Past Internal Revenue Allotment to Municipalities from Central Government

	1994	1995	1996	1997	1998
1. IRA to all municipalities (National total)	16,325,288,074	18,768,952,000	19,607,715,553	24,848,688,251	28,245,815,434
2. IRA to municiaplities in Agusan del Sur					
Total	239,221,800	263,291,024	286,113,083	348,653,431	345,992,322
Bayugan	21,554,626	25,541,933	27,573,214	35,449,284	36,842,855
Bunawan	15,994,088	17,277,623	18,608,751	19,588,853	20,597,235
Esperanza	23,891,468	26,144,439	27,800,364	34,940,700	27,301,987
La Paz	18,704,390	20,344,878	23,405,837	29,943,777	32,003,360
Loreto	29,263,324	31,671,875	33,605,037	34,754,813	37,284,693
Prosperidad (Capital)	19,545,918	20,966,298	23,178,262	30,307,354	24,862,640
Rosario	11,873,293	13,096,629	14,253,020	17,626,505	18,574,735
San Francisco	16,534,480	18,285,692	19,660,601	25,236,409	24,788,395
San Luis	16,885,901	18,373,165	19,585,131	24,500,506	22,927,013
Santa Josefa	14,158,692	15,701,473	16,589,126	21,475,887	22,591,320
Sibagat	6,158,920	6,808,488	10,783,299	15,404,349	16,154,893
Talacogon	11,028,352	12,238,294	11,864,666	15,750,651	16,386,118
Trento	15,485,101	17,010,755	18,199,047	23,798,482	24,908,339
Veruela	18,143,247	19,829,482	21,006,728	19,875,861	20,768,739
3. Share (%) in national total by municipality					
Total	1.4653	1.4028	1.4592	1.4031	1.2249
Bayugan	0.1320	0.1361	0.1406	0.1427	0.1304
Bunawan	0.0980	0.0921	0.0949	0.0788	0.0729
Esperanza	0.1463	0.1393	0.1418	0.1406	0.0967
La Paz	0.1146	0.1084	0.1194	0.1205	0.1133
Loreto	0.1793	0.1687	0.1714	0.1399	0.1320
Prosperidad (Capital)	0.1197	0.1117	0.1182	0.1220	0.0880
Rosario	0.0727	0.0698	0.0727	0.0709	0.0658
San Francisco	0.1013	0.0974	0.1003	0.1016	0.0878
San Luis	0.1034	0.0979	0.0999	0.0986	0.0812
Santa Josefa	0.0867	0.0837	0.0846	0.0864	0.0800
Sibagat	0.0377	0.0363	0.0550	0.0620	0.0572
Talacogon	0.0676	0.0652	0.0605	0.0634	0.0580
Trento	0.0949	0.0906	0.0928	0.0958	0.0882
Veruela	0.1111	0.1057	0.1071	0.0800	0.0735

Sources: (1) Deparetment of Budget and Management and (2) Bureau of Local Government Finance.

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 reference (detailed list of reference is presented in Table 7.3.1, Data Report):

- Administrative and Topographical Maps of the Province published by NAMRIA with scales of 1:150,000 and 1:50,000, respectively.
- Geological Map of the Philippines published by BMGS with a scale of 1:1,000,000.
- Water Resource Investigation conducted by NWRB, 1986.
- Well Inventory Database prepared by NWRB, LWUA and DPWH.
- Well Inventory Database in the province.
- General information on groundwater condition by DPWH-DEO and PPDO.
- Well Log Data by DPWH-DEO.
- Water source information by Water Districts.

(2) Approach and Methodology

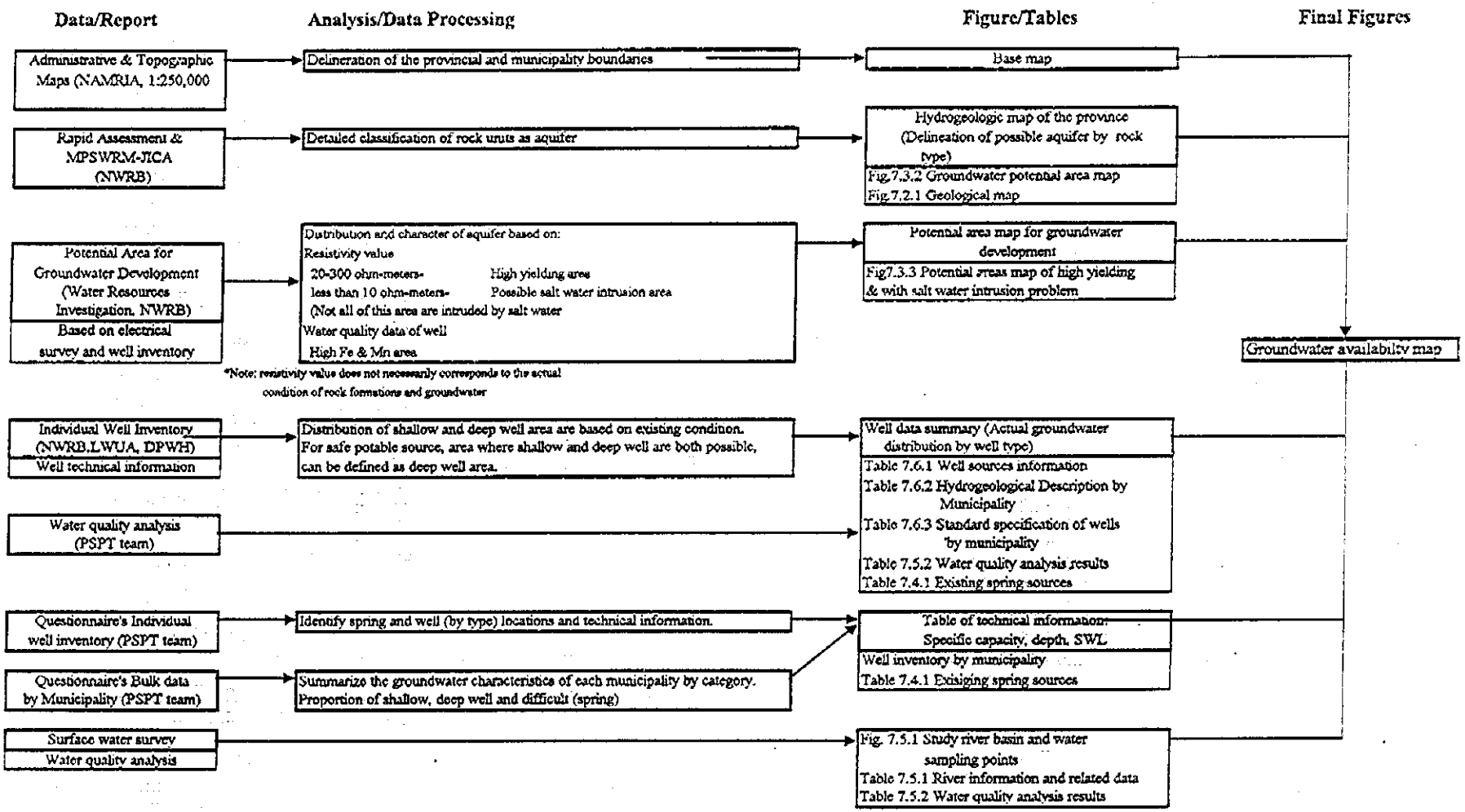
The procedure in preparing the Groundwater Availability Map is explained below with work flow depicted in Figure 7.3.1.

1) Prepare a base map with a scale of 1:250,000. The topographical map of NAMRIA (1:250,000) was used as a reference map. 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-Quaternary sedimentary formation (clay, silt, sand and gravel) and Pliocene-Quaternary volcanic rock units (pyroclastics, debris flow and tuff) are regarded as possible aquifers considering their high porosity and permeability.

Boundaries between groundwater development potential area and difficult area were defined and delineated as presented in Figure 7.3.2.

Figure 7.3.1 WORK FLOW OF GROUNDWATER AVAILABILITY MAP



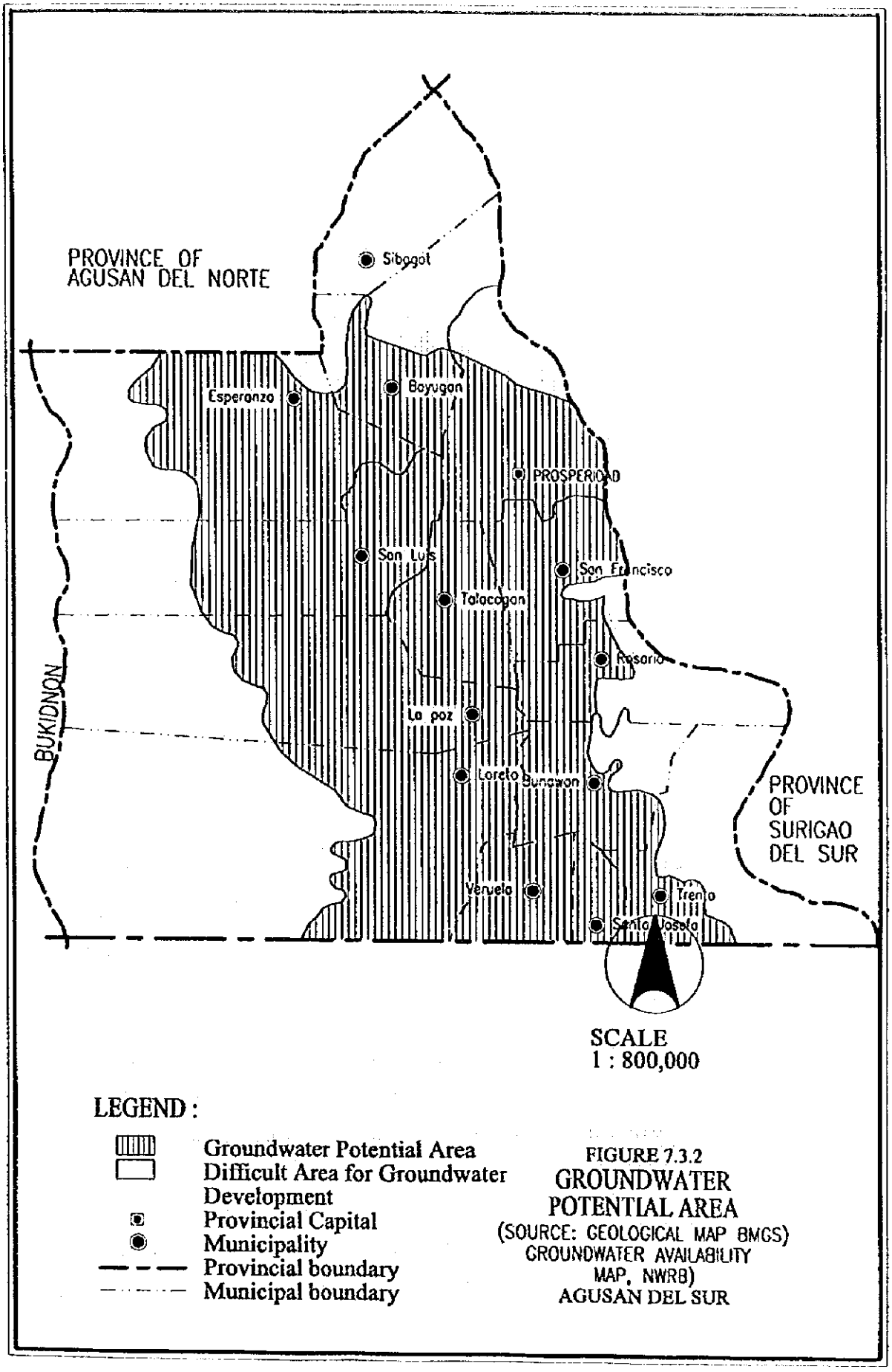


FIGURE 7.3.2
GROUNDWATER POTENTIAL AREA
(SOURCE: GEOLOGICAL MAP BMGS)
GROUNDWATER AVAILABILITY MAP, NWRB)
AGUSAN DEL SUR

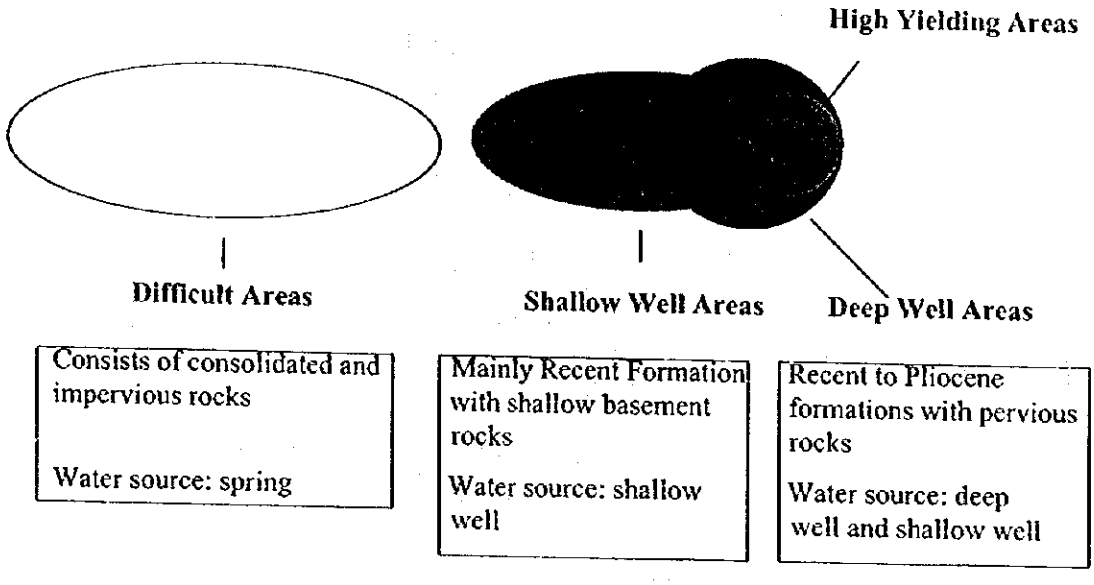
DISK NAME : AGUSAN-DELSUR(DISK1)
FILENAME : AGUSAN-DELSUR(GPA)

3) Areas with potential high yielding aquifer in the Water Resources Investigation of NWRB, are reflected in the defined groundwater potential areas.

Based on the results of electric resistivity survey of the above investigation, resistivity values from 20 to 210 ohm-meter indicate a potential high yielding formation. Values less than 10 ohm-meter suggest clayey layer. Figure 7.3.3 shows the boundaries of areas with high and low yielding aquifers.

4) Delineate shallow and deep well areas based on well database of NWRB and DPWH-central office, well inventory of DPWH-DEO (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

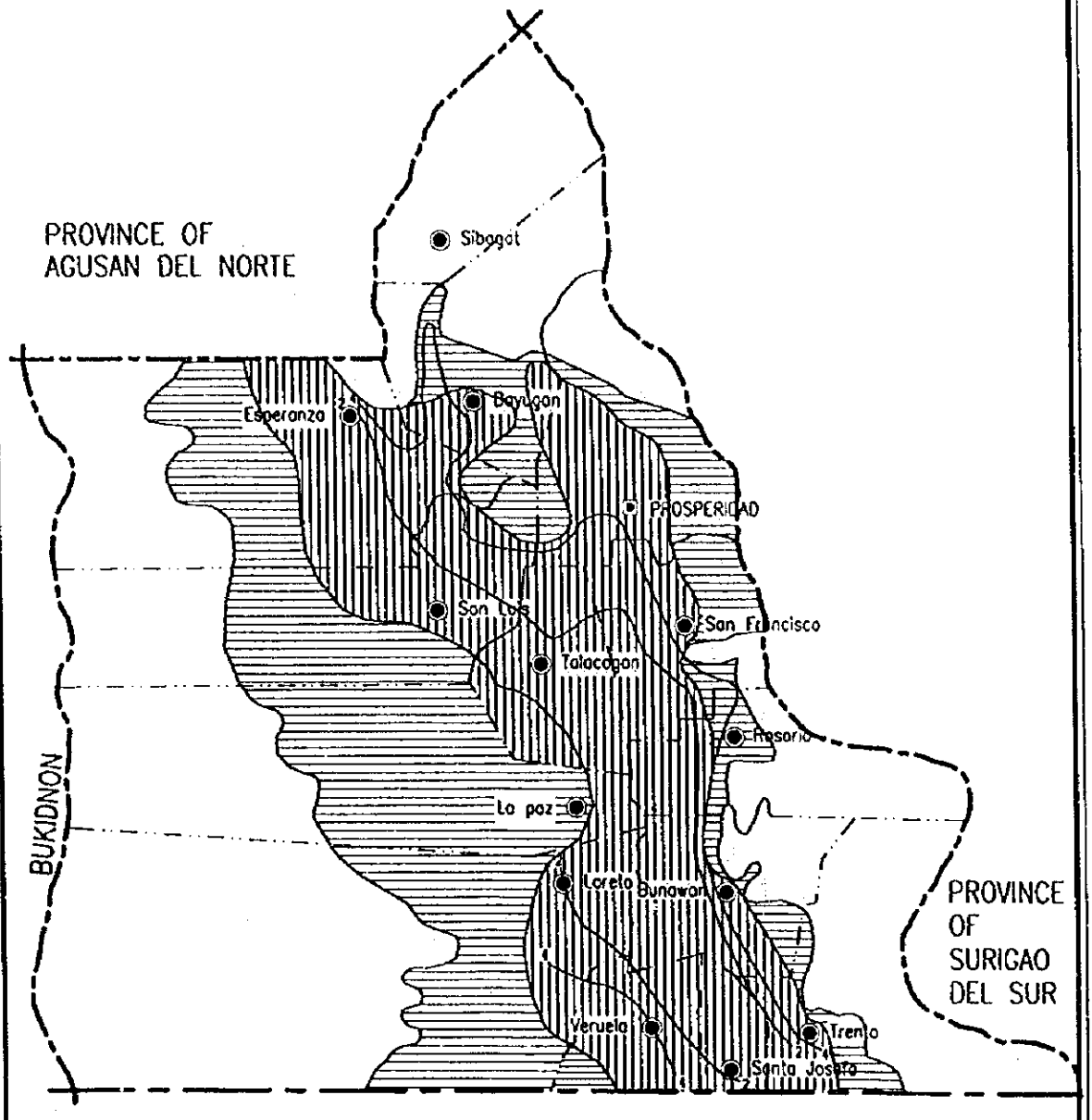


Shallow well areas are defined on the following basis:

(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 NWRB's well inventory and the data obtained through the questionnaires, well specification for each municipality are established as shown in the map. These specifications are used as references in



LEGEND :

- Potential Area of High Yielding
- Low Yielding Area
- Mountain range & difficult area for groundwater development
- Provincial Capital
- Municipality
- Provincial boundary
- Municipal boundary
- Depth of Water Level Contour

SCALE
1 : 800,000

FIGURE 7.3.3
POTENTIAL AREA
OF HIGH YIELDING
AGUSAN DEL SUR

DISK NAME : AGUSAN-DELSUR(DISK1)
DISKETTE NO. AGUSAN-DELSUR(PAMY)

evaluating the groundwater availability in each locality. Individual well location with technical information are presented in Figure 7.6.1, Data Report.

(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, re-define the potential area for groundwater development by applying the aforementioned procedures.

2) Update the provincial database using the questionnaire made for the study to make necessary revision of the delineated boundaries of groundwater categories.

7.4 Spring Sources

The numbers and discharge of developed and untapped springs by municipality are shown in Table 7.4.1. The data are derived from and the information obtained through the questionnaires and Table 7.1.1 Water Source Information, Data Report.

Table 7.4.1 Existing Spring Sources

Municipality	Developed Spring		Untapped Spring		
	Number	Discharge (l/sec)	Discharge (l/sec)		
			Number	Ave.	Range
Sibagat	47	< 10	24	0.26	0.11 – 0.5
Bayugan	44	< 2.8	9	0.41	0.25 – 1.0
	2	> 2.8			
Prosperidad	23	< 2.8	1	1.61	1.6
	3	> 2.8			
San Francisco	25	< 2.8	2	1.61	0.2 - 3.0
	4	> 2.8			
Talacogon	12	< 2.8	3	0.36	0.03 – 1.0
Rosario	9	< 2.8	1	31.6	31.6
	4	> 2.8			
Bunawan	11	< 2.8			
	8	> 2.8			

Municipality	Developed Spring		Untapped Spring		
	Number	Discharge (l/sec)	Discharge (l/sec)		
			Number	Ave.	Range
Trento	8	< 2.8	2	0.31	0.31
Sta. Josefa	4	< 2.8			
Esperanza	5	< 2.8	12	0.77	0.14 - 3.25
San Luis	22	< 2.8	8	0.28	0.14 - 0.39
La Paz	4	< 2.8			
Loreto	11	< 2.8			
	1	> 2.8			
Veruela	13	< 2.8	3	8.81	7.61 – 10.0
	6	> 2.8			
TOTAL	266		65	45.8	

7.5 Surface Water Sources

The major rivers in the province were selected to evaluate their potential as water supply sources to meet the future water needs of the province. The following criteria were adopted for the selection:

- rivers currently utilized for domestic water supply
- rivers which have gauging stations, and
- rivers with watershed of 100 sq.km or more.

Based on the above criteria, the selected major rivers were the Agusan River and tributaries as shown in Table 7.5.1. The Agusan River and the Haoan-Umayan stream originate from Davao del Norte.

The gauging stations in the province are located at the Agusan River and its tributaries, excluding the Maasin and Libang streams, which are shown in Figure 7.5.1. The runoff records are obtained from the "Philippine Water Resources Summary Data" prepared by the NWRC in 1980. The information on the gauging stations and the present uses (water rights) of the major rivers in the province is summarized in Table 7.5.1.

Table 7.5.1 Gauging Station & River Water Use by Major River Basins

River Basin		Information from Gauging Station						Surface Water Use (Water Rights) in Watershed				
Major River	Stream & Main Systems	Drainage*1 sq.km	Location No. in Figure 7.5.1	River Flow Rate (Q: cum/sec) Peak Qp	Max. Qdx	Mini. Qdn	Data Period	Municipality in watershed	Domestic cum/sec	Industrial cum/sec	Irrigation cum/sec	Others*3 cum/sec
Agusan	Panusgan	180.0	(11); Bunawan Proper	60.20	NA*2	2.73	1967-'68	Bunawan	0.00	0.00	0.21	0.00
	Haoan-Umayan							(Davao del Norte)*5	0.03	0.09	1.86	0.00
		1,559.0	(9); near Santa Josefa	1,200.06	1,113.72	51.30	1956-'59	Santa Josefa	0.00	0.00	0.12	0.00
								Veruela	NR*4	NR*4	NR*4	NR*4
		667.0	(10); near Loreto Proper	341.30	NA*2	7.47	1967-'68	Loreto (Umayan)	NR*4	NR*4	NR*4	NR*4
	Simurao-Gibong	427.0	(6); Prosperidad Proper	282.00	239.00	2.30	1968-'69	Prosperidad	0.00	0.00	2.73	0.00
								San Francisco	0.03	0.00	0.60	0.00
								Rosario	0.00	0.00	2.26	0.00
	Adgaoan-Kawayan							Loreto	NR*4	NR*4	NR*4	NR*4
		348.0	(7); Saganto	720.48	557.75	6.88	1970	La Paz (Kawayan)	0.00	0.00	0.14	0.00
		820.0	(8); near La Paz Proper	511.33	140.65	12.07	1968-'70	La Paz (Adgaoan)				
	Kasilayan							La Paz	0.00	0.00	0.03	0.00
								San Luis	0.00	0.00	0.06	0.00
		209.0	(5); Santa Ines	95.30	NA*2	2.45	1968-'69	Talacogon	0.00	0.00	0.00	0.00
	Maasim	No Existing Gauging Station						La Paz	0.00	0.00	0.02	0.00
								San Luis	0.00	0.00	0.38	0.00
	Libang	No Existing Gauging Station						San Luis	0.00	0.00	0.09	0.00
								Esperanza	0.00	0.00	0.12	0.00
	Busirao	316.0	(3); near Milagros	209.00	199.90	1.40	1968-'69	Esperanza	0.00	0.00	0.67	0.00
	Wawa-Andanan							Sibagat	NR*4	NR*4	NR*4	NR*4
		201.0	(1); Buyagan Proper	147.50	128.75	0.52	1968-'70	Buyagan	0.00	0.00	4.12	0.00
		396.0	(2); near Guadalupe	351.39	184.98	2.86	1964-'70	Esperanza	0.00	0.00	0.03	0.00
	Agusan Main							(Davao del Norte)*5	0.11	0.31	6.60	0.00
								Trento	0.00	0.00	1.27	0.00
								Santa Josefa	0.00	0.00	2.93	0.00
								Bunawan	0.00	0.00	0.26	0.00
								Loreto	NR*4	NR*4	NR*4	NR*4
								La Paz	0.00	0.00	0.01	0.00
								Talacogon	0.00	0.00	0.60	0.00
		7,390.0	(4); Los Martires	3,149.75	3,392.72	241.53	1955-'62	San Luis	0.00	0.00	0.14	0.00
								Esperanza	0.00	0.00	0.07	0.00
								(Agusan del Norte)*5	-	-	-	-

Source; Philippine Water Resources Summary Data, established January 1980 by NWRC

Notes; Drainage*1 : Watershed Area at Gauging Station
NA*2 : Record is lacking.
Qp : Peak Discharge of Daily Maximum Discharge
Qdx : Maximum Daily Discharge of Weighted Daily Discharge
Qdn : Minimum Daily Discharge of Weighted Daily Discharge
Others*3 : Including Livestock, Recreation & Fisheries
NR*4 : Surface water utilization was not registered in NWRB Database, as of March 1997.
(Province)*5 : Out of Applicable Area

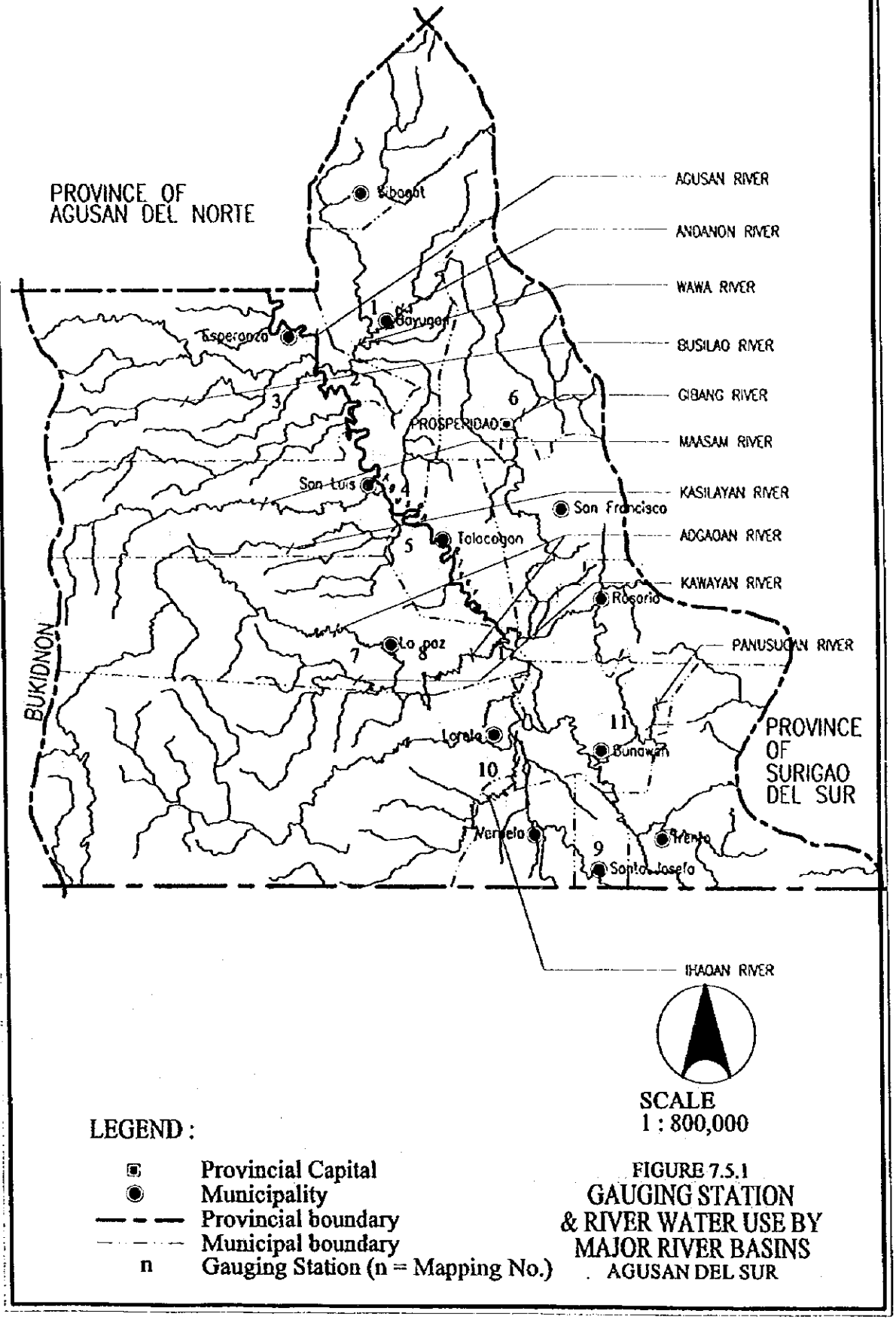


FIGURE 7.5.1
GAUGING STATION & RIVER WATER USE BY MAJOR RIVER BASINS
AGUSAN DEL SUR

DISK NAME : AGUSAN DEL SUR(DISK1)
FILENAME : AGUSAN-DELSUR(A4)

(1) Surface Water Utilization/Water Rights

As seen in Table 7.5.1, the present water uses in the watershed of the Agusan River and its tributaries total 25.89 cu.m/sec. Of this total, the water rights, 9.00 cu.m/sec are registered in the adjoining province. Therefore, 16.90 cu.m/sec from the Agusan River are used in the province. The actual surface water use for domestic water supply in the Agusan River basin is only 0.7%, including other uses in Davao del Norte.

(2) River Flow Analysis

The flow duration curves, derived from the available runoff records, are shown in Figure 7.5.2. Also, for the Agusan River duration curve, the specific discharge at the Monkao Gauging Station in the province of Davao del Norte was added for comparison.

The stream flow, maintenance flow, diversion flow and return flow are usually used to estimate the exploitable surface water potential. In this study, the stream flow was considered as flow potential for domestic use and the diversion flow value was treated as the equivalent to the discharge of water rights registration in surface water use. No detailed study on the return flow has been performed yet due to the difficulties in investigating the irrigation, evapotranspiration and recharge value to groundwater, etc. within entire watersheds in the province. Therefore, the return flow was not considered for the estimation of exploitable potential.

It is generally accepted that to secure the required volume for water supply, each water use sector adopts the different return periods. Usually, the dependability of domestic water supply is taken to be 90% or higher (10-year or longer return-period) of the whole hydrological period.

In determining the river maintenance flow, such factors as runoff characteristics, navigation, fishing, picturesque scenery, salt water intrusion, clogging of river mouth, riparian structures, groundwater table, flora and fauna, and river water quality shall be considered to maintain the normal function of the river. In the Philippines, 10% of the dependable flow of the river is at least required as minimum maintenance flow. Therefore, the maintenance flow was calculated as the dependable flow for irrigation, which equals to 80% (5-year return-period) of the whole hydrological period.

Finally, the exploitable potential of surface water in the province was studied in case of

Percent of Time (%) (No. in Figure 7.5.1)	Specific Discharge (cum/sec/100sq km)											
	Andanan 1	Wawa 2	Busilao 3	Agusan 4	Kasilayan 5	Gibong 6	Kawayan 7	Adgaoan 8	Umayan 9	Haoan 10	Panusgan 11	Agusan-MP NWRB-MP
10%	12.19	11.16	11.00	8.40	14.69	8.38	28.65	17.98	7.71	23.74	11.14	16.27
20%	6.01	6.50	7.32	7.62	5.50	7.06	15.95	16.18	5.88	16.65	7.90	11.96
30%	4.92	5.19	6.91	6.24	4.39	5.99	12.60	14.76	5.15	9.56	5.06	9.96
40%	3.57	4.53	6.17	5.86	3.82	4.89	9.80	12.97	4.37	6.63	4.66	8.36
50%	3.33	3.90	4.13	5.50	3.34	4.41	8.10	9.96	4.01	5.79	4.23	7.27
60%	3.05	3.14	3.81	5.21	3.24	3.87	5.70	8.47	3.68	5.73	3.88	6.31
70%	1.90	2.60	3.34	5.03	3.08	3.65	5.12	6.66	3.07	4.78	3.71	5.37
80%	1.20	2.22	3.08	4.83	2.65	2.79	3.51	5.80	2.76	2.08	3.61	4.23
90%	0.58	1.69	2.62	4.61	1.70	1.94	2.26	4.66	2.44	1.14	2.73	2.08
100%	0.19	0.97	0.52	3.82	1.27	0.60	1.63	1.35	1.34	1.08	0.81	0.67
Period of Data Used	'67-'70	'64-'70	'67-'70	'55-'62	'68-'69	'65-'70	'67-'70	'67-'70	'55-'70	'67-'68	'67-'68	'79-'83

Source; Philippine Water Resources Summary Data, as of Jan. 1980 by NWRC
Interim Report, Master Plan Study on Water Resources Management, as of Oct. 1997 by NWRB

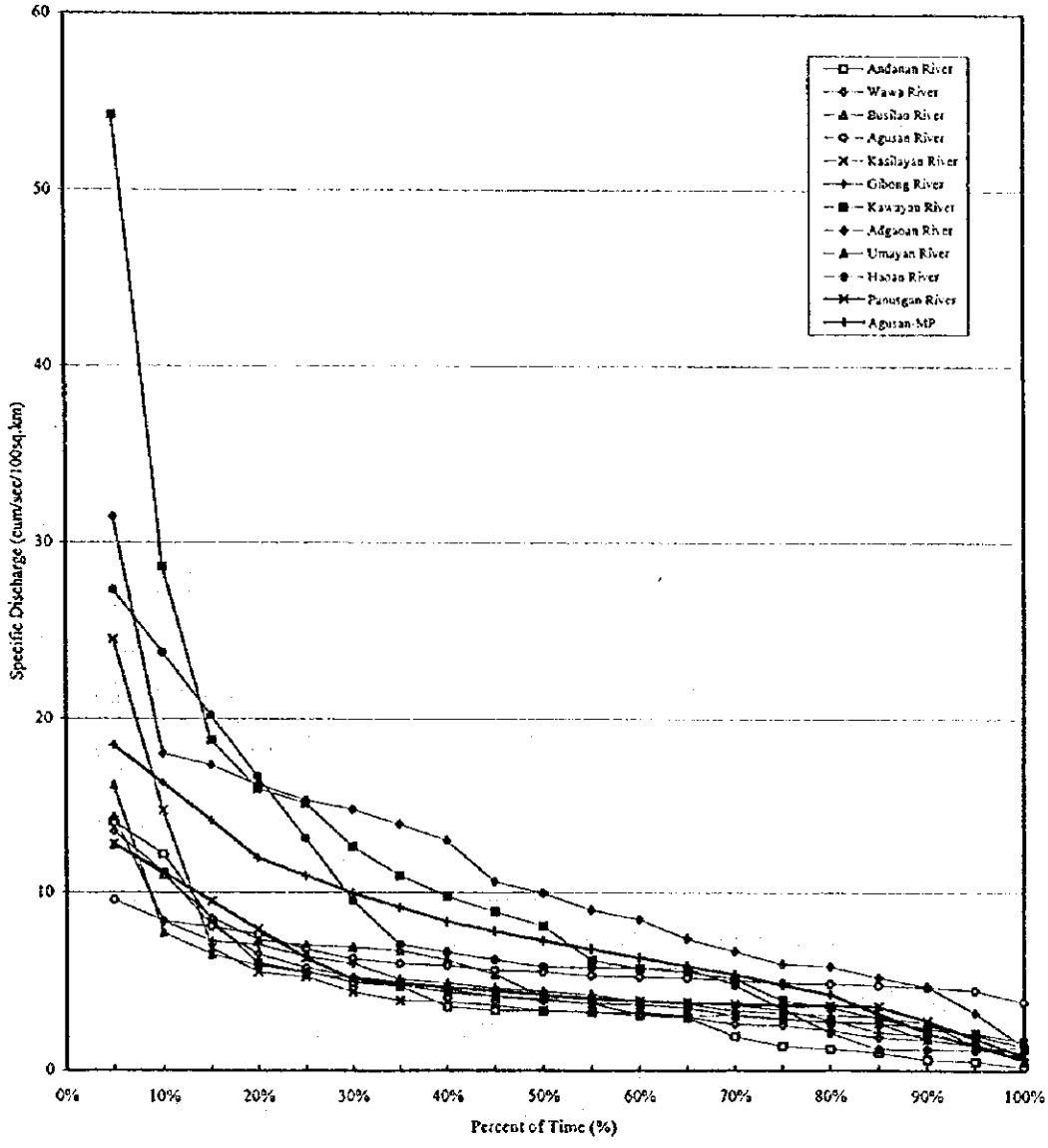


Figure 7.5.2 River Flow Duration Curve

inflow to and outflow from the respective municipalities. The results are summarized in Table 7.5.2.

(3) Surface Water Quality

Mining sites exist upstream of the Simurao-Gibong stream which is connected to the Agusan River. The location of the mining sites is shown in Figure 7.5.1.

The results of water quality analysis are summarized in Table 7.5.1, Data Report. The sampling locations were selected basically upstream of the respective municipalities. In the said table, Class AA and Class A of the DENR "Water Quality Criteria for Fresh Water" are shown as reference for raw water evaluation. The PNSDW-1994 is also used to evaluate water quality with reference to turbidity and trace elements. The water quality of the selected rivers is classified as class AA", although the tested parameters are limited. However, the Wawa stream was found to have high Fe and Mn contents in the analysis of this study.

7.6 Future Development Potential of Water Sources

7.6.1 Groundwater

A well inventory covering all the municipalities shows that there are 1,846 existing wells in the province, while 54 wells are recorded in the inventory made by NWRB (See Table 7.1.1 and 7.3.1, Data Report). Despite the smaller number of wells included in NWRB data, they were used in the analysis, since they provided technical information. Of the total 54 wells, 38 have complete information: depth, static water level and specific capacity. Data are summarized in Table 7.6.1 Existing Well Sources.

Considering the well information, the most productive wells are those having depth ranging from 7 m to 19 m and from 21 m to 127 m. The good yielding wells have static water level varying from about 2 m to 9 mbgl and specific capacity of about 0.5 l/sec/m to 0.87 l/sec/m

Based on the hydraulic characteristics and locations of wells in Agusan del Sur, aquifers are widely distributed along the both sides of the Agusan River crossing in the central portion of the province from southeast to northwest. Shallow well area is not distributed in the province. The Pliocene and older rock units are widely distributed in the northern, the eastern, and the western parts of the province and in the mountainous areas that are classified into

Table 7.5.2 Probability of Surface Water

Surface Water Sources		Related Data						Probability of Surface Water (10-year returen-period)							
				Watershed Area in		Sp. D (return-period)		Inflow to Municipality				Outflow from Municipality			
Major Surface Water	Stream & Main Systems	Location Municipality & *other Province*	River Connection	Location (1)	Upstream (2)	10-year (3)	5-year (4)	S/Flow (5) (2)x(3)/100	M/Flow (6) (2)x(4)/100x10%	Use (7)	Potential (8) (5)-(6)-(7)	S/Flow (9) (5)+(1)x(3)/100	M/Flow (10) (6)+(1)x(4)/100x10%	Use (11)	Potential (12) (9)-(10)-(11)
		upstream to down	outlet or inlet	sq.km	sq.km	Q	Q	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec
Agusan	Panusgan	Bunawan	to Agusan Main	324.15	0.00	2.73	3.61	0.00	0.00	0.00	0.00	8.85	1.17	0.21	7.47
	Haoan-Umayan	*Davao del Norte*		321.95	0.00	1.14	2.08	0.00	0.00	0.00	0.00	3.67	0.67	1.98	1.02
		Santa Josefa		4.06	321.95	1.14	2.08	3.67	0.67	1.98	1.02	3.72	0.68	2.10	0.94
		Veruela		914.00	326.01	1.14	2.08	3.72	0.68	2.10	0.94	14.14	2.58	2.10	9.46
		Loreto	to Agusan Main	601.46	1,240.01	1.14	2.08	14.14	2.58	2.10	9.46	20.99	3.83	2.10	15.06
	Simurao-Gibong	Prosperidad		601.90	0.00	1.94	2.79	0.00	0.00	0.00	0.00	11.68	1.68	2.73	7.26
		San Francisco		475.80	601.90	1.94	2.79	11.68	1.68	2.73	7.26	20.91	3.01	3.36	14.54
		Rosario		365.00	1,077.70	1.94	2.79	20.91	3.01	3.36	14.54	27.99	4.03	5.63	18.33
		La Paz	to Agusan Main	0.00	1,442.70	1.94	2.79	27.99	4.03	5.63	18.33	27.99	4.03	5.63	18.33
	Adgaoan-Kawayan	Loreto		300.73	0.00	2.26	3.51	0.00	0.00	0.00	0.00	6.80	1.06	0.00	5.74
		La Paz	to Agusan Main	734.90	300.73	2.26	3.51	6.80	1.06	0.00	5.74	23.41	3.64	0.14	19.63
	Kasilayan	La Paz		132.69	0.00	1.70	2.65	0.00	0.00	0.00	0.00	2.26	0.35	0.03	1.88
		San Luis		76.84	132.69	1.70	2.65	2.26	0.35	0.03	1.88	3.56	0.56	0.09	2.92
		Talacogon	to Agusan Main	0.00	209.53	1.70	2.65	3.56	0.56	0.09	2.92	3.56	0.56	0.09	2.92
	Maasim	La Paz		112.28	0.00	2.26	3.51	0.00	0.00	0.00	0.00	2.54	0.39	0.02	2.12
		San Luis	to Agusan Main	486.67	112.28	2.26	3.51	2.54	0.39	0.02	2.12	13.54	2.10	0.41	11.03
	Libang	San Luis		110.99	0.00	1.70	2.65	0.00	0.00	0.00	0.00	1.89	0.29	0.09	1.51
		Esperanza	to Agusan Main	92.47	110.99	1.70	2.65	1.89	0.29	0.09	1.51	3.46	0.54	0.21	2.71
	Busirao	Esperanza	to Agusan Main	495.38	0.00	2.62	3.08	0.00	0.00	0.00	0.00	12.98	1.53	0.67	10.79
	Wawa-Andanan	Sibagat		490.90	0.00	0.58	1.20	0.00	0.00	0.00	0.00	2.85	0.59	0.00	2.26
		Buyugan		944.40	490.90	0.58	1.20	2.85	0.59	0.00	2.26	8.32	1.72	4.12	2.48
		Esperanza	to Agusan Main	19.82	1,435.30	0.58	1.20	8.32	1.72	4.12	2.48	8.44	1.75	4.15	2.54
	Agusan Main	*Davao del Norte*		1,141.45	0.00	2.08	4.23	0.00	0.00	0.00	0.00	23.74	4.83	7.02	11.90
		Trento		914.00	1,141.45	2.08	4.23	23.74	4.83	7.02	11.90	42.75	8.69	8.28	25.77
		Santa Josefa		94.54	2,055.45	2.08	4.23	42.75	8.69	8.28	25.77	44.72	9.09	11.22	24.41
		Bunawan	from Panusgan	368.35	2,149.99	2.08	4.23	44.72	9.09	11.22	24.41	61.23	11.82	11.69	37.72
		Loreto	from Haoan-Umayan	9.11	2,518.34	2.08	4.23	61.23	11.82	11.69	37.72	82.41	15.69	13.79	52.93
		La Paz	from Simurao, Adgaoan	40.83	2,527.45	2.08	4.23	82.41	15.69	13.79	52.93	134.66	23.52	19.57	91.56
		Talacogon	from Kasilayan	348.90	2,568.28	2.08	4.23	134.66	23.52	19.57	91.56	145.48	25.56	20.26	99.66
		San Luis	from Maasin	179.30	2,917.18	2.08	4.23	145.48	25.56	20.26	99.66	162.74	28.42	20.80	113.52
		Esperanza	from Libang, Busirao, Wawa	52.84	3,096.48	2.08	4.23	162.74	28.42	20.80	113.52	188.72	32.45	25.90	130.36

S/Flow (Stream Flow) was estimated specific diacharge (10-year return-period) multilied by upstream area.
M/Flow (Maintenance Flow) was estimated 10% of river flow in case of 5-year return-period.
Sp.D (10-year or 5-year return-period) without gauging station was adopted by the other analysis result from near gauging station.
Inlet & outlet "Use" (Water Rights) are summed up by NWRB Database, as of March 1997.
Unit Q for Specific Discharge is cu.m/sec/100 sq.km.
S/Flow, M/Flow & Use in final outlet flow of each stream system was added to respective inlet flows' of main system.

Table 7.6.1 Existing Well Sources

Municipality	Type	Number	Depth (m)		SWL (m)		Sp. Cap. (l/sec/m)	
			Ave.	Range	Ave.	Range	Ave.	Range
Bayugan	SW	5	16.52	14.63 - 18.29	2.80	0.92 - 4.57	0.72	0.41 - 1.03
	DW	5	32.07	21.34 - 59.76	3.24	1.83 - 3.66	0.45	0.21 - 0.62
	Total	10	24.30		3.02		0.59	
Bunawan	SW	2	15.40	11.59 - 19.21	4.11	3.05 - 5.18	0.24	0.10 - 0.38
	DW	7	47.48	24.39 - 85.37	8.23	2.74 - 16.77	0.72	0.15 - 1.80
	Total	9	40.35		7.31		0.61	
Esperanza	SW	13	14.02	7.62 - 18.29	4.96	0.92 - 12.20	0.49	0.10 - 1.45
	DW	10	33.75	20.42 - 82.67	4.03	0.44 - 7.93	0.39	0.18 - 0.78
	Total	23	22.60		4.56		0.45	
Prosperidad	SW	3	11.00	10 - 11.59	3.05	3.05 - 3.05	0.57	0.29 - 0.72
	DW	6	47.81	21.95 - 126.72	4.36	3.05 - 6.10	0.54	0.23 - 0.72
	Total	9	35.54		3.92		0.55	
Rosario	SW	-						
	DW	2	21.65	21.65 - 21.65	2.89	2.74 - 3.05	0.31	0.29 - 0.33
	Total	2	21.65		2.89		0.31	
San Francisco	SW	3	14.22	12.20 - 15.24	2.94	0.61 - 5.18	0.87	0.29 - 1.45
	DW	2	28.35	24.70 - 32.01	1.52	1.52 - 1.52	0.29	0.29 - 0.29
	Total	5	19.87		2.37		0.64	
Sta. Josefa	SW	2	17.37	16.46 - 18.29	6.09	4.57 - 7.62	0.54	0.37 - 0.72
	DW	-						
	Total	2	17.37		6.09		0.54	
Talacogon	SW	1	12.81	12.81 - 12.81	3.05	3.05 - 3.05	0.72	0.72 - 0.72
	DW	4	64.43	42.98 - 90.24	3.96	3.05 - 4.87	0.11	0.06 - 0.17
	Total	5	54.11		3.78		0.23	
Trento	SW	2	19.81	19.81 - 19.81	1.52	1.52 - 1.52	0.29	0.29 - 0.29
	DW	1	27.44	27.44 - 27.44	8.23	8.23 - 8.23	0.21	0.21 - 0.21
	Total	3	22.35		3.76		0.26	
Veruela	SW	-						
	DW	2	28.35	20.73 - 35.98	5.03	4.57 - 5.49	0.5	0.29 - 0.72
	Total	2	28.35		5.03		0.5	
Provincial	SW	31	15.14	7.62 - 19.81	3.56	0.61 - 12.20	0.55	0.10 - 1.45
	DW	39	36.81	20.42 - 126.72	4.61	0.44 - 16.77	0.34	0.06 - 1.80
	Total	70	27.21		4.15		0.43	

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 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

the difficult area for groundwater development.

As indicated in Figure 7.3.2 Main Report, the province is located inland far from seashore and salt water intrusion is not observed. However, 80 % of shallow and deep wells in most municipalities of Prosperidad, San Francisco, Rosario, Bunawan, Trento, Esperanza, San Luis, Talacogon, La Paz, Loreto, and sta. Josefa contain high iron concentration and methane gas, and rarely even salty water.

As alternative water sources, the untapped springs can be developed for future use. These are the most reliable sources for water supply in the province because groundwater quality has a serious problem of high iron content and methane gas. Existing spring sources of 266 are utilized for water supply and they originate from high mountains in the northern, the eastern, and western parts of the province and diluvial low hills in central part. The untapped springs of 65 are proposed as future water sources in the areas of Sibagat, Bayugan, Prosperidad, San Francisco, Talacogon, Rosario, Trento, Esperanza, San Luis, and Veruela.

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 individual Well Location and Specification Map, Data Report.

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY	EXISTING CONDITIONS																		DATA INTERPRETATION		
	TOPOGRAPHY	GEOLOGIC UNITS (%)					WELL INFORMATION						SPRINGS				GROUND WATER AVAILABILITY (%)			AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (mbgl)	OTHERS
							DEPTH (m)		AVE. SWL (mbd)		MAX.(AVE.) SP. CAP. (l/s/m)		TAPPED		UNTAPPED							
		R	N3	N2	N1	Q	SW	DW	SW	DW	SW	DW	NO.	AVE. Q (l/s)	NO.	AVE. Q (l/s)	SW	DW	DF			
Bayugan	flat to hilly	3	5	42	20	30	14-18	21-59	2.80	3.24	0.41-1.03 (0.72)	0.21-0.62 (0.45)	46	<2.8	9	0.41	0	60	40	Alluvium/Plio-Pleistocene rocks	3-80	Potential aquifer expected in alluvial plain and low relief hills. High iron content and methane gas reported in the area.
Bunawan	flat to hilly	30	0	0	45	25	11-19	24-85	4.11	8.23	0.1-0.38 (0.24)	0.15-1.8 (0.72)	16	<2.8			0	70	30	Alluvium/ formation	4-80	Potential aquifer expected in the alluvial deposits. High iron content and methane gas reported in the area.
Esperanza	flat to mountainous	15	60	15	5	5	7-18	20-82	4.03	3.05	0.1-1.45 (0.49)	0.18-0.7 (0.39)	17	<2.8	12	0.77	0	60	40	Alluvium/Plio-Pleistocene rocks	4 - 80	Potential aquifer expected in the alluvial plain and low relief hills. High iron content and methane gas reported in the area.
Loreto	hilly to mountainous	0	30	30	10	30							13	<2.8			0	20	80	Alluvium/Plio-Pleistocene rocks	4 - 80	Potential aquifer expected in the alluvial plain and low relief hills. High iron content reported in the area.
Prosperidad	flat to hilly	20	30	15	35	0	10-11.5	21.9-126	3.05	4.36	0.29-0.72 (0.57)	0.23-0.72 (0.54)	26	<2.8	1	1.61	0	100	0	Alluvium/Plio-Pleistocene rocks	3-60	Potential aquifer expected in the alluvial plain and low relief hills. High iron content and methane gas reported in the area. Brakish water was also reported in the upper eastern part of the municipality.
Rosario	flat to mountainous	50	10	0	20	20		21.65		2.89		0.29-0.3 (0.31)	13	<2.8	1	31.6	0	40	60	Alluvium/Plio-Pleistocene rocks	3 - 80	Potential aquifer expected in the alluvial plain and low relief hills. High iron content and methane gas reported in the area.
San Francisco	flat	30	50	5	15	0	12.2-15	24-32	2.94	1.52	0.29-1.45 (0.87)	0.29-0.29 (0.29)	28	<2.8	2	1.61	0	95	5	Alluvium/Plio-Pleistocene rocks	3 - 80	Potential aquifer expected in the alluvial plain and low relief hills. High iron content and methane gas reported in the area.
San Luis	hilly to mountainous	5	70	20	0	5							22	<2.8	8	0.28	0	70	30	Alluvium/Plio-Pleistocene rocks	3-80	Potential aquifer expected in the alluvial plain and low relief hills.
Sibagat	mountainous	0	0	10	10	80							47	<2.8	24	0.26	0	0	100	Fractured Miocene and older rocks	-	Largely spring areas
Sta. Josefa	flat	90	10	0	0	0	16-18		6.09		0.37-0.72 (0.54)		5	<2.8			0	100	0	Alluvium/Plio-Pleistocene rocks	6-120	Potential aquifer expected in the alluvial plain and low relief hills. High iron content reported in the area.
Talacogon	flat	20	80	0	0	0	12.81	42-90	3.05	3.96	0.72 (0.72)	0.06-0.17 (0.11)	11	<2.8	3	0.36	0	100	0	Alluvium/Plio-Pleistocene rocks	3-120	Potential aquifer expected in the alluvial plain and low relief hills. High iron content reported in the area.
Trento	hilly to mountainous	5	5	5	0	85	19.81	27.44	1.52	8.23	0.29 (0.29)	0.21 (0.21)	8	<2.8	2	0.31	0	37	70	Alluvium/Plio-Pleistocene rocks	4-120	Potential aquifer expected in the alluvial plain and low relief hills. High iron content and methane gas reprted in the area.
Veruela	flat	60	40	0	0	0		20-35		5.03		0.29-0.72 (0.5)	20	<2.8	3	8.81	0	100	0	Alluvium/Plio-Pleistocene rocks	5 - 80	Potential aquifer expected in the alluvial plain and low relief hills. High iron content reprted in the area.

7.6.2 Springs

Untapped spring source identification data are shown in Table 7.6.3. These data were collected and tabulated by questionnaire sheets-untapped spring information format, Data Report, including the parameters of barangay name, owner, discharge, transmission line length, and elevation difference.

Table 7.6.3 Untapped Spring Source Identification

Municipality	Barangay Name)	Number	Untapped Spring			
			Owner	Discharge (m^3/hr)	T.L.L.* (km)	Elevation Difference (m)
Sibagat	Anahawan (Purok 6)	1	N.A.	0.9	0.3	N.A.
	Banagbanag (Purok 2)	1	N.A.	0.4	2	N.A.
	(Purok IV)	1	N.A.	1.2	0.3	N.A.
	Del Rosario (Purok I-A)	1	N.A.	0.4	1.0	N.A.
	(Purok II-A)	1	N.A.	1.2	1.0	N.A.
	Kauswagan (Purok 1)	1	N.A.	0.4	0.2	N.A.
	Kioya (Purok 4)	1	N.A.	0.6	0.5	N.A.
	Kolambugan (Purok 2)	1	N.A.	1.2	1.2	N.A.
	Magkalape (Purok 2)	1	N.A.	0.7	1.5	N.A.
	Magsaysay (Purok 1)	1	N.A.	0.6	0.3	N.A.
	(Purok 3)	1	N.A.	1.8	1.0	N.A.
	New Tubigon (Purok 1)	1	N.A.	1.2	1.0	N.A.
	(Purok 2)	1	N.A.	0.6	1.0	N.A.
	(Purok 3)	1	N.A.	0.7	0.4	N.A.
	Padiay (Purok 1)	1	N.A.	0.9	1.4	N.A.
	Perez (Purok 3)	1	N.A.	0.5	2.0	N.A.
	San Isidro (Purok 2)	1	N.A.	1.8	1.3	N.A.
	Sinai (Purok 4)	1	N.A.	0.5	1.0	N.A.

Note: T.L.L. Transmission line length
N.A. Data not available

Municipality	Barangay Name	Number	Untapped Spring			
			Owner	Discharge (m^3/hr)	T.L.L.* (km)	Elevation Difference (m)
Sibagat	Sta. Cruz (Purok 1)	1	N.A.	N.A.	2.0	N.A.
	Sta. Maria (Purok 1)	1	N.A.	0.6	1.0	N.A.
	Tabon-tabon (Purok 1)	1	N.A.	1.2	0.4	N.A.
	Tag-oyango (Purok 2)	1	N.A.	1.8	1.0	N.A.
	Villangit (Purok 1)	1	N.A.	0.9	2.5	N.A.
	(Purok 2)	1	N.A.	1.2	2.0	N.A.
Bayugan	Marcelina	1	N.A.	N.A.	0.5	N.A.
		1	N.A.	1.2	0.4	N.A.
	Mt. Carmel	1	N.A.	1.1	1.0	N.A.
	Mt. Olive	1	N.A.	1.1	0.9	N.A.
		1	N.A.	0.9	0.5	N.A.
	Mahayag	1	N.A.	0.9	0.2	N.A.
		1	N.A.	1.2	0.5	N.A.
	Villa Undayon	1	N.A.	3.6	2.5	N.A.
		1	N.A.	1.8	0.1	N.A.
Prosperidad	Awa	1	N.A.	5.8	0.7	5
San Francisco	Bitan-agan	1	Public	0.8	1.6	241.8
	Lucac	1	Public	10.8	0.6	3.5
Talacogon	Buenagracia	1	N.A.	0.2	N.A.	N.A.
	Del Monte	1	N.A.	3.6	0.2	N.A.
	Zamora	1	N.A.	0.1	0.6	N.A.
Rosario	Bayugan	1	N.A.	113.6	3.2	N.A.
Trento	New Visayas (Purok 2)	1	N.A.	1.1	1.7	N.A.
	Pulang-lupa (Purok 1)	1	N.A.	N.A.	N.A.	N.A.
Sta. Josefa	Dwao	1	N.A.	free flowing		N.A.

Note: T.L.L. Transmission line length
N.A. Data not available

Municipality	Barangay Name	Number	Untapped Spring			
			Owner	Discharge (m^3/hr)	T.L.L.* (km)	Elevation Difference (m)
Esperanza	Agsabu (Purok 1)	1	N.A.	0.5	1.5	N.A.
	Anolingan (Purok 2)	1	N.A.	N.A.	1.3	N.A.
	(Purok 6)	1	N.A.	N.A.	1.1	N.A.
	Bakingking (Purok 3)	1	N.A.	3.6	0.3	N.A.
	Balobo (Purok 2)	1	N.A.	1.2	0.6	N.A.
	Bentahon (Purok 1)	1	N.A.	0.8	1.0	N.A.
	Bunaguit (Purok 2)	1	N.A.	3.6	1.0	N.A.
	Hawilian (Purok 1)	1	N.A.	0.9	1.5	N.A.
	Maasin (Purok 3)	1	N.A.	1.3	3.0	N.A.
	New Gingoog (Purok 2)	1	N.A.	1.8	0.4	N.A.
	Hawilian	1	Public	11.7	1.5	3
	Nato	1	Public	2.2	1.7	3.5
San Luis	Taban-od (Purok 1)	1	N.A.	N.A.	N.A.	N.A.
	Kibalabag (Purok 3)	1	N.A.	1.1	0.3	N.A.
	Tambo (Purok 4)	1	N.A.	1.1	0.3	N.A.
	Don Pedro (Purok 1)	1	N.A.	0.5	1.0	N.A.
	Dimsalang (Purok 1)	1	N.A.	0.9	0.4	N.A.
	Sta. Rita	1	N.A.	1.4	1.7	N.A.
	Sta. Ines	1	N.A.	N.A.	0.8	N.A.
	Wegguam	1	N.A.	1.1	1.8	N.A.
Veruela	Sta. Emelia	1	Public	27.4	1.8	150
	Anilao	1	Public	36	3 0	26
	Binongan	1	N.A.	N.A.	N.A.	N.A.

Note: T.L.L. Transmission line length
N.A. Data not available

7.7 Water Source Development for Medium-Term Development Plan

7.7.1 Spacing Allocation for Level II and III Wells

The pumping rates required for Level I systems are fairly lower than that for Level II and III systems. The well interference in Level I systems need not to be studied in terms of spacing of wells and production rate, since most formations in shallow and deep well areas generally have enough groundwater development potential. As Level II and III wells are usually expected to produce larger discharge to meet the water demand, the spacing of wells to avoid the well interference has to be considered. Spacing allocation for Level II and III wells was examined considering specific capacity, pumping rate, and assumed drawdown of 1 cm at interference radius for a pumping duration of 16 hours.

(1) Specific Capacity

According to the existing well source information, specific capacity was considered with ranges from 0.5 l/s/m to 6.5 l/s/m. To simplify the calculation, an average value in each range is adopted in the calculation of interference radius.

(2) Pumping Rate

The pumping rate was estimated by assuming a drawdown of 10 m with the average value of specific capacity and 16 operation hours/day of pumps. The formula used to determine proper well spacing is the Jacob modified equation. Drawdown at the interference boundary is assumed to be 1 cm after a pumping duration of 16 hours.

Table 7.7.1 presents the estimated spacing requirements and number of wells to be constructed per sq. Km. The spacing interval between adjacent wells to avoid the well interference is planned to be more than twice distances of the calculated interference radius.

Table 7.7.1 Spacing Arrangements for Planned Wells

Range of Specific Capacity (l/s/m)	Estimated Pumping Rate (m^3/day)	Estimated Interference Radius (m)	Estimated Number of wells/km^2
0.5 - 1.5	500	80	45
1.5 - 3.0	1,000	120	20
3.0 – 4.5	2,000	160	11
4.5 – 6.0	2,500	200	7
> 6.0	>2,500	>200	>7