

5.8 Community Development

5.8.1 General

(1) RESULTS OF THE BARANGAY KEY INFORMANT SURVEY FOR MISAMIS ORIENTAL

I. BARANGAY

A. General

The barangay is the smallest political unit in the Philippines. A barangay captain who is elected for a three-year term heads it. 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 three barangays representing two municipalities in Misamis Oriental. 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: Amoros (El Salvador); Bulwa (Medina); and, Poblacion (Claveria).

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 are 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 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 can provide water service in the barangays surveyed. None of the respondents 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

The three barangay councils manifested their willingness to facilitate, even pay for, the training of community members/volunteers on the operation and maintenance of WATSAN facilities.

II. COMMUNITY PARTICIPATION

A. General

The 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 operationalization. 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 ranges from P500 to P2,000. The list of economic activities shows the following: livestock raising, farming, single motor operator, vegetable gardening, and sari-sari-store. The list shows that both genders are equally involved in these economic activities.

2. Waterborne/Water Related Diseases

Incidence of water borne and water related diseases was reported in all the barangays surveyed. The most prevalent diseases are diarrhea, intestinal disorder, dengue fever and

amoebiasis. This could be traced to lack of drainage facilities and garbage disposal systems in the areas.

C. Willingness to Participate

1. Initiating the Organization of a WATSAN Association

Each of the three barangays surveyed has a committee on water and sanitation within its barangay council. The respondents indicated that all barangay councils are willing to participate in sector projects by initiating the formation of a water and sanitation association. All of the interviewees indicated that the barangay council is willing to pay for and/or facilitate the training for the user-beneficiary volunteers on O&M. In the area of health and sanitation education, almost all of the key informants believed that the barangay council has the capability to implement information dissemination activities.

D. Status of BWSAs/NGOs/CBOs/POs

1. Number of Barangay with Functional BWSAs

Two out of the three barangays surveyed have organized their Barangay Water and Sanitation Associations (BWSAs), both of which have been formed by the barangay councils in coordination with the DPWH. Men dominate BWSA membership, as indicated by most respondents.

2. Status of NGOs/CBOs/POs

The majority of the key informants reported having NGOs/CBOs that do work in their communities. The areas of concern include livelihood, youth development, and, maternal and child health care. Specifically related to sector needs are the Amoros Women Association (headed by Ernita Manabat) that specializes in livelihood and skills training for women, and the Protection of Women and Child Foundation (headed by Alice Montecillo) which promotes maternal and child health care.

E. O&M Practices by Beneficiaries

1. Facility Conditions

Ground and surface water is utilized as main sources of water in the three barangays. Most of the existing water facilities are deep wells, which were constructed during the '80s. Shallow wells and springs were also developed in the three barangays. Almost all of

the systems/facilities are still functional but occasionally have problems. All of the respondents indicated that the water from their present water systems is fit for drinking.

2. Common Difficulties and O&M Problems Encountered

Common problems cited by the key informants vary from defective pumps to lack of funds for the maintenance work. The problems show that the users/beneficiaries still have the thinking that O&M is a task that belongs to other groups such as the barangay council or the municipality.

F. Water Charges Adopted and Collection Efficiency

1. Sufficiency of Collected Charges for O&M

Residents pay for the use of their water facilities. The majority of the respondents indicated that people pay monthly fees amounting from P11.00 to P20.00.

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

The BWSA collector is the one responsible for collecting water fee although in some sectors, the barangay treasurer undertakes the collection.

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

1. Government Subsidies Requested by End Users

Barangay Amores received assistance from the provincial government in the form of technical supervision during the construction of water systems or the deepwells. The province, meanwhile, provided the materials needed in the construction. Barangay Bulwa also received from the province some pipes and other materials for the construction of water systems. On the institutional development aspect, the province conducted skills training and seminars for the barangay officials and selected leaders.

III. GENDER

A. General

The survey results do not point to a severe lack of gender responsiveness to sector projects, although greater awareness as to why there must be gender equality must be better emphasized.

B. Gender in the Composition of the Barangay Council

There were 26 members comprising the barangay councils in the three barangays. Of this number, 18 were males and 8 were females. Two barangay captains are male and one is female.

C. Gender in the Composition of the BWSA

Barangays Amoros and Bulwa have existing BWSAs in their respective barangays. Male members outnumbered women in the BWSA. Officers and members of the associations meet once a month to discuss problems and issues affecting the operation of the BWSAs. Meanwhile, respondents from Barangay Poblacion, which has no BWSA, expressed willingness to form one.

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

Most of the key informants indicated that women actively participate in the O&M of the water facilities. The women, according to the respondents, can be tasked in the recording and inspection of facilities status, collect water fee, undertake minor repair and maintenance of the system and can maintain the cleanliness of water facilities.

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, and O&M practices.

(2) BARANGAY GROUP INTERVIEWS – MISAMIS ORIENTAL

A. General

Group interviews were conducted in two selected barangays representing two municipalities in the province of Misamis Oriental. 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: Manaas (Medina) and Amoros (El Salvador).

B. Demographic Profile

1. Population

The aggregate population in the two barangays totaled 4,623, breakdown of which is as follows: Manaas, 3,227 (1,549 males, 1,678 females) and Amoros, 1,396 (642 males, 754 females).

2. Households

As indicated by the respondents, there are 1,014 households in the two barangays. Breakdown per barangay is : Manaas, 605 and Amoros, 409. The figure represents an average of five members per household.

TABLE 1: TOTAL POPULATION OF BARANGAYS AND NUMBER OF HOUSEHOLDS

BARANGAY (MUNICIPALITY)	M	F	T	NO. OF HH
1. Manaas (Medina)	1,549	1,678	3,227	605
2. Amoros (El Salvador)	642	754	1,396	409
TOTAL	2,191 (47%)	2,432 (53%)	4,623 (100%)	1,014

3. Composition of Barangay Councils

There are 16 barangay council members in the two barangays. Of the barangay council members, thirteen are males and three are females. All barangay captains are males.

C. Respondents' Profile

1. Number and Gender of Respondents

There were 52 respondents in the group interviews. Of these, 20 or 38 percent were males and 32, or 62 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. Manaas (Medina)	10	21	31
2. Amoros (El Salvador)	10	11	21
TOTAL	20 (38%)	32 (62%)	52 (100%)

2. Age Bracket

The majority of the respondents or 22 belonged to 46 to 60 age bracket, with females outnumbering males, 12 to 10. A total of 18 interviewees (7 males, 11 females) were under the 15 to 45 age bracket, while 12 participants (4 males, 8 females) belonged to 60 and above age bracket.

TABLE 3: AGES OF THE RESPONDENTS

AGE BRACKET	M	F	T	%
15 and Below	-	-	-	-
15-45	7	11	18	35
46-60	10	12	22	42
60 and above	4	8	12	23
TOTAL	21	31	52	100

3. Level of Education

The majority of the respondents (16) graduated from high school. Thirteen interviewees were elementary graduates. Eleven respondents reached college level while another 11 pursued vocational course.

TABLE 4: RESPONDENT'S LEVEL OF EDUCATION

EDUCATION LEVEL	M	F	T	%
1. Elementary Level	-	-	-	-
2. Elementary Graduate	3	10	13	25
3. High School Level	-	-	-	-
4. High School Graduate	6	10	16	31
5. College Level	-	-	-	-
6. College Graduate	8	3	11	21
7. Vocational	3	8	11	21
8. Post Graduate	-	-	-	-
9. Not Indicated	-	1	1	2
TOTAL	20	32	52	100

4. Occupation

The majority of the respondents (12) are presently engaged in either farming or fishing. The males outnumbered the females in this work category, 9 to 3. Other occupations of the respondents include: service worker (6) office worker (4), business (3) and professional (1). The rest belonged to other various occupation.

TABLE 5: OCCUPATION OF RESPONDENTS

OCCUPATION	M	F	T	%
1. Farmer/Fisherfolk	9	3	12	23
2. Laborer	-	-	-	-
3. Service Worker	4	2	6	12
4. Businessman/woman	2	1	3	5
5. Professional	-	1	1	2
6. Office Worker	3	1	4	8
7. Tech. Equipment Operator	1	-	1	2
8. Others	1	24	25	48
TOTAL	20	32	52	100

D. Socio Economic Profile

1. Ages of Household Members

As pointed out by most male and female respondents (46), the majority of the household members belonged to the 15-45 age bracket. The 15 and below age level was the second largest age group; the 46-60 age group was third; while the 60 and above age bracket had the least number.

TABLE 6: AGE OF HH MEMBERS

AGES	M	F	T	%
15 and Below	17	10	27	24
15-45	27	19	46	40
46-60	19	3	22	49
60 and above	11	8	19	17
TOTAL	74	40	114	100

2. Level of Education of Household Members

The majority of the respondents (29) indicated that their household members have reached high school education. Meanwhile, 22 respondents said their members attended elementary. A high number among household members have pursued college degree. Meanwhile, three respondents reported members took up vocational courses.

TABLE 7: LEVEL OF EDUCATION OF HH MEMBERS

EDUCATIONAL LEVEL	EDUCATED HOUSEHOLD MEMBERS		
	M	F	T
1. Elementary Level	-	-	-
2. Elementary Graduate	17	10	27
3. High School Level	-	-	-
4. High School Graduate	15	14	29
5. College Level	8	12	20
6. College Graduate	-	-	-
7. Vocational	3	-	3
8. Post Graduate	-	-	-
9. Not Indicated	-	-	-

3. Employed Household Members

The majority of the respondents reported that household members who were gainfully employed belonged to 15-45 year of age bracket. This was followed by 46-60 age level. Only one is included in the 60 and above age household.

TABLE 8: EMPLOYED HH MEMBERS

RESPONSE	M	F	T	%
15 and Below	-	-	-	-
15-45	32	31	63	49
46-60	-	1	1	2
60 and above	-	1	1	13
TOTAL	32	33	65	100

4. Occupation of Household Heads and Other Members

Most of the household heads and members as indicated by the majority of the respondents (14) were engaged in either farming or fishing where they derived income. Males constituted the majority of workers in this field. There were also laborers (7), service workers (3) while other respondents are engaged in other occupations such as technician, equipment operator, and businessmen/women.

TABLE 9: OCCUPATION OF HH MEMBERS

OCCUPATION	M	F	T
1. Farmer/Fisherfolk	14	-	14
2. Laborer	7	-	7
3. Service Worker	3	-	3
4. Businessman/woman	-	-	-
5. Professional	1	1	2
6. Office Worker	1	4	5
7. Others	-	-	-

Most of the household members who were gainfully employed as indicated by 39 respondents, earned an average monthly income of P5,000.00 and below. Nine respondents reported members earning a monthly income ranging from P5,000 to P14,000, while only four female respondents said their earnings reached from P15,000 to P24,999.

TABLE 10: AVERAGE MONTHLY INCOME OF HH MEMBERS

ITEM	M	F	T	%
Below P 5,000	17	22	39	75
P 5,000 to 14,999	3	6	9	17
P 15,000 to 24,999	-	4	4	8
Above P 25,000	-	-	-	-
TOTAL	20	32	52	100

6. Average Expenditures of Household

As indicated by the majority of the respondents (48), the average monthly expenditure of a family was below P5,000. The rest of the respondents claimed their family earned an income ranging from P5,000 to P14,000.

TABLE 11: AVERAGE MONTHLY EXPENSES OF HH MEMBERS

ITEM	M	F	T	%
Below P 5,000	18	27	45	87
P 5,000 to 14,999	2	5	7	13
P 15,000 to 24,999	-	-	-	-
Above P 25,000	-	-	-	-
TOTAL	20	32	52	100

7. Practices

Source of Drinking Water. The majority of the respondents (38) indicated that the people get their source of drinking water from deepwells. The other source mentioned was communal shallow well (22 respondents).

TABLE 12: SOURCES OF DRINKING WATER

SOURCES	USER RESPONDENT		T	%
	M	F		
1. Communal Shallow Well	15	7	22	43
2. Communal Deep Well	13	25	38	73
3. Communal Dug Well	-	-	-	2
4. Communal Faucet	1	-	1	2
5. Private Shallow Well	1	-	1	-
6. Private Deep Well	-	-	-	-
7. Piped Water Supply	-	-	-	-
8. Others	-	-	-	-
TOTAL	20	32	52	100

Responsible for Fetching Water. All female respondents indicated that the female children were the ones responsible for fetching the water for domestic use. For most of male respondents, the wife was doing the task, followed by the husband and the male children.

TABLE 13: RESPONSIBLE FOR FETCHING DRINKING WATER

FAMILY MEMBER	USERRESPONDENT		T	%
	M	F		
1. Husband	6	-	6	11
2. Wife	13	-	13	25
3. Male Children	1	-	1	2
4. Female Children	-	32	32	62
5. Others	-	-	-	-
6. Uncertain	-	-	-	-
TOTAL	20	32	52	100

Frequency of Fetching Water. The majority of male respondents indicated that families fetch drinking water more than five times a day. For the female respondents, a family fetched water twice a day. Ten interviewees said they got water three times a day; eight indicated four times a day, and five said once a day.

TABLE 14: FREQUENCY OF FETCHING DRINKING WATER

DURATION	RESPONDENTS		T	%
	M	F		
1. Once a Day	2	3	5	10
2. Twice a Day	-	18	18	35
3. 3x a Day	4	6	10	19
4. 4x a Day	3	5	8	15
5. More than 5 days	11	-	11	21
6. No Response	-	-	-	-
TOTAL	20	32	52	100

Duration of Fetching Water. For most of the male and female respondents (22), it took about 10 minutes to fetch water from the source to their house. Thirteen respondents (9 males, 4 females) indicated 20 minutes; 9 respondents said they needed about 30 minutes but 8 interviewees said it was more than 30 minutes to fetch water.

TABLE 15: DURATION FOR FETCHING DRINKING WATER

DURATION	RESPONDENTS		T	%
	M	F		
1. About 10 Minutes	10	12	22	43
2. About 20 Minutes	9	4	13	25
3. About 30 Minutes	1	8	9	17
4. More Than 30 Minutes	-	8	8	15
5. No Response	-	-	-	-
TOTAL	20	32	52	100

Problems with Source. About 94% of respondents or 49 said that they have no problems with the current water source. On the other hand 3 male respondents said they have problems with the current situation.

TABLE 16: PROBLEM WITH SOURCE OF WATER

RESPONSE	RESPONDENTS		T	%
	M	F		
1. No Problem	17	32	49	94
2. There are problems	3	-	3	6
TOTAL	20	32	52	100

E. Institutional

1. Presence of BWSA

All except one female respondents indicated that there is a BWSA in their communities. At the same time, majority of the respondents (38) indicated that they were members of BWSA.

TABLE 17: KNOWLEDGE OF THE EXISTENCE OF BWSA

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	20	31	51	98
2. No	-	1	1	2
TOTAL	20	32	52	100

TABLE 18: MEMBERSHIP TO THE BWSA

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	17	21	38	73
2. No	3	11	14	27
TOTAL	20	32	52	100

Asked whether they were actively involved in the affairs of the BWSA, the majority of the respondents (35) said they were not actively involved in the affairs of the BWSA. Seventeen interviewees indicated active participation: six as BWSA officers, 10 assisted in the repair and maintenance, and one assisted in water fee collection.

TABLE 19: HOW ACTIVELY ARE YOU INVOLVE IN THE AFFAIRS OF THE BWSA

RESPONSE	RESPONDENTS		T	%
	M	F		
1. As BWSA Officer	4	2	6	12
2. As Collection Officer	1	-	1	2
3. Assist in the repair maintenance of facilities	10	-	10	19
4. Attend/ Facilitate Training	-	-	-	-
5. Not active	5	30	35	67
TOTAL	20	32	52	100

2. Who maintains the facilities of the BWSA?

Half of the male respondents (10) said somebody from BWSA was the one maintaining the facilities of the BWSA. Another half believed someone from the barangay was doing

the task. For female respondents, majority indicated a professional caretaker was doing the task, while the rest of the female interviewees said it was somebody in the barangay.

TABLE 20: RESPONSIBLE FOR MAINTAINING FACILITIES OF THE BWSA

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Someone in the Barangay	10	11	21	40
2. Professional caretaker	-	21	21	40
3. Someone from the BWSA	10	-	10	20
4. No one	-	-	-	-
5. Don't know	-	-	-	-
TOTAL	20	32	52	100

3. Interested to be a member of BWSA

Significantly, all respondents expressed willingness in becoming members of BWSA once the existing association is fully activated or a new one is organized in their respective barangays.

TABLE 21: INTEREST OF RESPONDENTS TO JOIN BWSA

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Interested	20	32	52	100
2. Not Interested	-	-	-	-
3. No Response	-	-	-	-
TOTAL	20	32	52	100

4. How can respondents become actively involve in BWSA affairs?

All female respondents indicated they would just serve as members of the BWSA. On the other hand, the majority of the male interviewees (12) opted to contribute free labor as their manifestation of their active involvement with the BWSA. Four other male respondents were willing to contribute cash. Two would assist in the collection of fees while one would do the repair and maintenance.

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

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Contribute Cash	4	-	4	8
2. Contribute labor	12	-	12	23
3. Be Officer	-	-	-	-
4. Collection of Fees	2	-	2	4
5. Do Repair/Maintenance	1	-	1	2
6. Just Member	1	32	33	63
TOTAL	20	32	52	100

5. If not interested, where to get source of water

Since respondents were all interested to be members and actively involved in the affairs of BWSA, nobody responded to this issue.

6. Responsible for minor repairs of water facilities

For all female respondents, somebody in the barangay was responsible for minor repairs of WATSAN facilities. For male interviewees on the other hand, it was either the male family member or a hired plumber.

TABLE 23: RESPONSIBLE FOR MINOR REPAIRS

SOURCE OF WATER	RESPONDENTS		T	%
	M	F		
1. Female Member	-	-	-	-
2. Male Member	10	-	10	19
3. Somebody in the Brgy.	-	32	32	62
4. Professional Caretaker	-	-	-	-
5. Owner of the Well	-	-	-	-
6. Other (Plumber)	10	-	10	19
TOTAL	20	32	52	100

F. Training Activities

1. Training Program attended in 1997

Majority of the respondents, 16 male and 23 female said they did not attend any training program in 1997. However, 13 respondents (4 male and 9 female) said they were able to attend training programs/seminars.

TABLE 25: TRAINING ATTENDED BY RESPONDENTS IN 1997

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	4	9	13	25
2. No	16	23	39	75
TOTAL	20	32	52	100

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
1. Manaas (Medina)	Livelihood	WATSAN Lectured by DPWH
2. Amoros (El Salvador)		Health and Sanitation

3. On BWSA Training

All female respondents the respondents were not aware of any training program for BWSA members. On the other hand, 50% or 10 male interviewees were aware of BWSA training program. All female and the other 10 male respondents wanted to attend in any BWSA training program for the barangay. All other 16 respondents could not determine whether they would attend or not.

TABLE 27: AWARENESS ON THE FOLLOWING TRAINING FOR BWSA

RESPONSE	YES		
	M	F	T
1. Caretaker's Training	4	-	4
2. Collection/Finance	3	-	3
3. Repair/O&M	3	-	3
4. No Response	10	32	42
TOTAL	20	32	52

TABLE 28: WILLINGNESS TO ATTEND BWSA-RELATED TRAINING PROGRAMS

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	20	32	52	100
2. No	-	-	-	-
3. Uncertain	-	-	-	-
TOTAL	20	32	52	100

4. Training on Health Education

The majority of the respondents (38) have not attended health education training program. The other interviewees, or 13 females and one males have knowledge on some health training program. If given a chance, however, the respondents wanted to attend WATSAN related training programs such as: BWSA Skills Training Program (O&M); Health and Sanitation; WS Maintenance; Farming and, Livelihood.

TABLE 29: PARTICIPATION IN HEALTH EDUCATION AND TRAINING

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	1	13	14	27
2. No	19	19	38	73
TOTAL	20	32	52	100

TABLE 30: TYPES OF TRAINING RESPONDENTS WISH TO ATTEND

BARANGAY	MALE	FEMALE
1. Manaas (Medina)	Livelihood Program Farming O^M of Water System	WS Maintenance
2. Amoros (El Salvador)	WS Maintenance	Health and Sanitation Training

In relation to this, 50 percent of male respondents wanted to attend training programs that would be conducted for two days and the other half for more than three days. On the other hand, most female respondents desired for training program that will last for more than three days, while the rest wanted a two-day training schedule.

TABLE 31: DESIRABLE TRAINING PERIOD

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Less Than 1 Day	-	-	-	-
2. One (1) Day	-	-	-	-
3. Two (2) Days	10	11	21	40
4. Three (3) Days	-	-	-	-
5. More Than Three Days	10	21	31	60
6. Uncertain	-	-	-	-
TOTAL	20	32	52	100

G. Community Development

1. CBOs and contact person

All respondents were not aware of any NGO/CBO working in their community.

TABLE 32: ARE THERE NGOs WORKING IN THE BARANGAY

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	-	-	-	-
2. No	20	32	52	100
3. Uncertain	-	-	-	-
TOTAL	20	32	52	100

TABLE 33: NGOS/CBOS IN THE BARANGAYS

BARANGAY	CONTACT PERSON
1. Manaas (Medina)	
2. Amoros (El Salvador)	

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

All female respondents indicated they were not consulted and/or briefed on their proposed 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 all claimed they were not consulted. On the other hand, about 10 male respondents said they were consulted on their involvement in the construction; 5 in the O&M of the system; 4 in financing of their water system; and one in the planning and design.

In the same manner, 50% of the male and female respondents were 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. The other half was not consulted.

TABLE 34: RESPONDENTS CONSULTED/INVOLVED IN PAST WATSAN PROJECTS

BWSA ACTIVITIES	YES		NO	
	M	F	M	F
1. Planning & Design	1	-	19	32
2. Construction Facilities	10	-	10	32
3. O&M of the System	5	-	15	32
4. Financing of the System	4	-	16	32

TABLE 35: WERE YOU CONSULTED WHEN:

ACTIVITIES	YES		NO	
	M	F	M	F
1. BWSA was formed in the Brgy.	10	11	10	21
2. Water fee was decided upon	10	11	10	21
3. Level or type of service was agreed upon	10	-	10	21
4. Facilities were constructed	-	-	-	-
TOTAL				

3. How did the respondents participate in past construction projects?

Half of the male and female respondents did not participate in the construction of previous WATSAN facilities. The other half participated but through other minor activities which are not included in the list.

TABLE 36: PARTICIPATION IN PAST CONSTRUCTION PROJECTS

TYPE OF PARTICIPATION	RESPONDENTS		T	%
	M	F		
1. Contributed Cash	-	-	-	-
2. Provided labor	-	-	-	-
3. Donated Site	-	-	-	-
4. Provided Materials	-	-	-	-
5. Others	10	21	31	60
6. No Participation	10	11	21	40
TOTAL	20	32	52	100

4. Will the respondents participate in future projects?

For future projects, all male respondents indicated that they would participate and/or contribute for certain activities. On the other hand only 60% of all female respondents will participate in various activities.

TABLE 37: WILLINGNESS/TYPE OF PARTICIPATION IN FUTURE PROJECTS

PROJECT ACTIVITIES	YES		NO	
	M	F	M	F
1. Formation of BWSA	20	21	-	11
2. Formulation of water rates	20	32	-	-
3. Selection of sites and levels of services	20	21	-	11
4. Construction of facilities	20	21	-	11
5. Operation and maintenance	20	21	-	11

G. Financial Aspects

1. Are respondents presently paying for their water supply?

All except three male respondents, were paying for their water supply.

TABLE 38: NUMBER OF RESPONDENTS PRESENTLY PAYING WATER FEE

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	17	32	49	94
2. No	3	-	3	6
TOTAL	20	32	52	100

2. If so, how much per household?

Of those presently paying, the majority indicated that they were paying from P21.00 to P 30.00. Some 21 respondents (10 males, 11 females) said they were paying between P6.00 to P 10.00.

TABLE 39: PRESENT WATER FEES PAID

WATER FEES	RESPONDENTS		T	%
	M	F		
Below P 5.00	-	-	-	-
P 6.00 to P 10.00	10	11	21	40
P 11.00 to P 20.00	-	-	-	-
P 21.00 to P 30.00	10	21	31	60
P 31.00 to P 40.00	-	-	-	-
P 41.00 to P 50.00	-	-	-	-
Above P 50.00	-	-	-	-
No Response	-	-	-	-
TOTAL	20	32	52	100

3. Is the water fee enough for O&M?

For respondents who were paying water fees, all female respondents agreed that the fees being collected were enough to operate and maintain the facilities. Only 50% of the male respondents agreed that the water fee was enough.

TABLE 40: ADEQUACY OF WATER FEE FOR O&M

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	10	32	42	81
2. No	10	-	10	19
TOTAL	20	32	52	100

For those who said water fee is not enough, 50% of male respondents said the reason could be that the water fee is low. Half of the male interviewees, together with all female respondents did not respond in this issue.

TABLE 41: IF NOT ADEQUATE, STATE THE REASON/S

REASON/S	M	F	T	%
1. Water fee is low	10	-	10	19
2. O&M cost is too high	-	-	-	-
3. Not all water users pay their Water fee	-	-	-	-
5. No Response	10	32	42	81
TOTAL	20	32	52	100

4. Who shoulders the O&M of Facilities?

All the respondents could not determine which group/s in the community shouldered the operation and maintenance of the water supply facilities.

TABLE 42: RESPONSIBILITY FOR SHOULDERING THE O&M COSTS

PERSON	RESPONDENTS		T	%
	M	F		
1. Barangay Council	-	-	-	-
2. WATSAN Association	-	-	-	-
3. Private Owner	-	-	-	-
4. Don't know	20	32	52	100
TOTAL	20	32	52	100

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

All the respondents expressed willingness to pay/contribute for the operation and maintenance of future facilities.

TABLE 43: RESPONDENTS' WILLINGNESS TO PAY FOR FUTURE FACILITIES

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	20	32	52	100
2. No/Uncertain	-	-	-	-
TOTAL	20	32	52	100

6. How much are respondents willing to pay?

For male respondents, the majority was willing to pay water fee ranging from P 31.00 to P40.00. For female respondents, the majority would shell out P 21.00 to P 30.00 for water fee. Twenty respondents (9 males, 11 females) would pay from P 11.00 to P 20.00.

TABLE 44: AMOUNT RESPONDENTS ARE WILLING TO PAY

RESPONSE	RESPONDENTS		T	%
	M	F		
Below P 5.00	-	-	-	-
P 6.00 to P 10.00	1	-	1	2
P 11.00 to P 20.00	9	11	20	38
P 21.00 to P 30.00	-	21	21	40
P 31.00 to P 40.00	10	-	10	20
P 41.00 to P 50.00	-	-	-	-
Above P 50.00	-	-	-	-
TOTAL	20	32	52	100

7. Are you willing to contribute for future projects?

Significantly, all the respondents indicated their willingness to contribute in cash or kind for the construction of WATSAN facilities in their respective barangays.

TABLE 45: WILLINGNESS TO RESPONDENTS TO CONTRIBUTE FOR FUTURE FACILITIES

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	20	32	52	100
2. No	-	-	-	-
TOTAL	20	32	52	100

8. If so, what kind?

All of the female respondents, together with 75% of male interviewees preferred to contribute free labor during the construction. The other five male respondents would provide materials during construction.

TABLE 46: TYPES OF CONTRIBUTION

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Will free provide labor	15	32	47	90
2. Will donate site	-	-	-	-
3. Will provide materials	5	-	5	10
4. Others	-	-	-	-
TOTAL	20	32	52	100

I. Health and Sanitation

1. Type of toilet

The majority of male respondents (12) indicated that the popular toilet being used in the community was the one that flushes to on-site septic tank. For majority of the female interviewees, the popular type was the toilet which flushes/drops straight to the sea. Three male participants reported to have used shared flush toilet with septic tank, while another male members use private pit latrine.

TABLE 47: TYPES OF TOILETS RESPONDENTS USE

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Toilet w/ flushes to septic tank on the site	12	11	23	44
2. Toilet w/ flushes/ drops straight to sea	4	21	24	48
3. Private pit latrine	1	-	1	2
4. Shared flush toilet w/ septic tank	3	-	3	6
5. Public toilet	-	-	-	-
6. Bush or other open outdoor site	-	-	-	-
TOTAL	20	32	52	100

2. Who got sick during the past year? What sickness?

The majority of the male respondents indicated that the male and female children were mostly afflicted by water-related illnesses in 1997. For female interviewees the majority could not determine who got sick in 1997, although six female respondents said the female children were afflicted with these water-borne diseases while another five said it was the male children who mostly got sick last year.

Most of the respondents (25) could not pinpoint the most dreaded water-related diseases which afflicted them in 1997. But for 19 respondents (8 males, 11 females), it was gastroenteritis, followed by malaria (4); diarrhea (2); and one each for kidney trouble and skin disease.

TABLE 48: HOUSEHOLD MEMBERS FREQUENTLY GOT SICK IN 1997

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Husband	-	-	-	-
2. Wife	-	-	-	-
3. Father	-	-	-	-
4. Mother	-	-	-	-
5. Male Children	10	5	15	29
6. Female Children	10	6	16	31
7. Grandmother	-	-	-	-
8. Grandfather	-	-	-	-
9. Others	-	-	-	-
10. Uncertain	-	21	21	40
TOTAL	20	32	52	100

TABLE 49: WATER-RELATED ILLNESSES

DISEASE	RESPONDENTS		T	%
	M	F		
1. Diarrhea	2	-	2	3
2. Kidney trouble	1	-	1	2
3. Gastro-enteritis	8	11	19	37
4. Cholera	-	-	-	-
5. Typhoid fever	-	-	-	-
6. Malaria	4	-	4	8
7. Skin Disease	1	-	1	2
8. Schistosomiasis	-	-	-	-
9. Others/Uncertain	4	21	25	48
TOTAL	20	32	52	100

3. Health and hygiene practices

All male respondents, together with 13 female interviewees were able to receive information about health and sanitation. Nineteen other female participants did not get any health-related information.

Most of those who received information got messages from radio (18 males, 19 females) and health workers/inspection (13 males, 13 females). The school was also a good source of information as 10 male respondents relied from the school. Five other male members received from health clinics and hospitals; four from television; and four from family and friends.

TABLE 50: DO YOU RECEIVE/GET INFORMATION ABOUT HEALTH AND SANITATION

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Yes	20	13	33	63
2. No	-	19	19	37
TOTAL	20	32	52	100

TABLE 51: WHERE PEOPLE LEARNED HEALTH AND HYGIENE EDUCATION

RESPONSE	RESPONDENTS		T	%
	M	F		
1. Radio	8	19	27	52
2. Newspapers	-	-	-	-
3. Television	4	-	4	8
4. NGOs	-	-	-	-
5. Family and Friends	4	-	4	8
6. Health Sanitation/Clinics/Hospitals	5	-	5	10
7. Health workers/ inspection	13	13	26	50
8. School	10	-	10	19
9. Others/HMO	-	-	-	-

5.8.5 Utilization of NGOs

List of NGOs/CBOs for Misamis Oriental

	NAME OF NGOS/PSO'S/PO'S	CONTACT PERSONS	ADDRESS / TEL. #
1.	Regional Agricultural & Fisheries Council/ Provincial Agricultural & Fisheries Council (RAFC/PAFC)	Edgardo Layug	DA-X Administrative Division, Antonio Luna St., Cagayan de Oro City Tel.: 726 475 / 728 236
2.	Family Planning Organization of the Philippines (FPOP)	Ramon Velez	Osmeña Street, Cagayan de Oro City Tel.: 726 965
3.	Technical Outreach and Community Help Foundation (TOUCH Foundation)	Virginia Pacunio	Abellanos-Vega Streets, Cagayan de Oro City Tel.: 724 663
4.	Hagdan Sa Pag-Uswag Foundation, Inc.	Yoleta C. Sareno	RER Highway, Cagayan de Oro City Tel.: 724 262
5.	Girl Scout of the Philippines (GSP)	Dorothy Jean Pabayo	GSP Building, Apolinar Velez Street, Cagayan de Oro Tel.: 728 548
6.	United Way Philippines, Inc.	Guerrero Adaza	Anotnio Luna Street, Capitol Road, Cagayan de Oro City Tel.: 722 463
7.	Misamis Oriental Agri Ventures Multi Purpose Cooperative (MORAVEMCO)	Carlito S. Verga	Balingasag, Misamis Oriental Tel.:
8.	Balingasag-Lagonglong First Livelihood Association of Growers Incorporated	Ching Eng Khu	Balingasag, Misamis Oriental Tel.:
9.	Association of Concerned Advocacy for Livelihood Development	Atty. Ellie dela Serna	#128 Dongallo Compound, Archbishop James Hayes Ext., Cagayan de Oro City Tel.:
10.	Association for Community and Rural Development Foundation, Inc.	Eliezer Daayala	Agawin Building, Capistrano-Kalambagohan Str., Cagayan de Oro City Tel.:
11.	Oro Recue 9000	J. Antonio T. Siojo	#189 Camp Alagar road, Lapasan, Cagayan de Oro Tel.:
12.	Kapunungan Sa Pagpangusisa Labot Sa Gingoog	Mr. Donald Calingin	City Planning Office, Gingoog City
13.	Coalition of Balingasag Non-Governmental Organization	Digno Cagas	Balingasag, Misamis Oriental

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 Funds

Table 6.2.1 Income and Expenditure of Misamis Oriental, 1994-1998

Unit: In Million Pesos

Municipality	1994	1995	1996	1997	1998 1/
1. Alubijid					
RECEIPTS					
Local Revenues 1/	0.797	0.886	1.771	2.679	3.042
IRA	7.372	8.170	9.403	12.308	13.857
Other Income (Loans & borrowings)	-	-	-	1.120	1.120
Total Revenues	8.169	9.056	11.174	16.107	18.019
Expenditures					
Current Operating Expenditures:	5.298	6.335	8.821	11.710	13.707
Personal Services (P.S.)	4.483	4.950	6.000	9.911	11.902
Maint. & Other Oper. Exp. (MOOE)	0.815	1.385	2.821	1.799	1.805
NET INCOME	2.871	2.721	2.353	4.397	4.312
Less: Capital Outlays 2/	1.638	2.700	2.272	0.614	0.302
Loan Amortization	-	-	-	0.190	0.930
Others (Non-Office)	1.222	0.210	0.810	3.057	3.970
Sub-Total Other Expenditures	2.860	2.910	3.082	3.861	5.202
Net Income	0.011	(0.189)	(0.729)	0.536	(0.890)
2. Balingasag					
RECEIPTS					
Local Revenues 1/	1.470	1.633	3.211	2.616	7.752
IRA	12.075	13.417	14.513	19.276	21.748
Other Income (Grants & Aids)	1.014	1.127	-	-	0.480
Total Revenues	14.559	16.177	17.724	21.892	29.980
Expenditures					
Current Operating Expenditures:	9.463	10.515	11.572	18.057	22.595
Personal Services (P.S.)	8.007	8.897	9.792	16.025	20.133
Maint. & Other Oper. Exp. (MOOE)	1.456	1.618	1.780	2.032	2.462
NET INCOME	5.096	5.662	6.152	3.835	7.385
Less: Capital Outlays 2/	2.912	3.235	3.561	0.236	1.049
Other Non-Office	2.184	2.427	2.671	2.715	6.406
Loan Amortization	-	-	-	-	-
Sub-Total Other Expenditures	5.096	5.662	6.232	2.951	7.455
Net Income	-	-	(0.080)	0.884	(0.070)
3. Balingoan					
RECEIPTS					
Local Revenues 1/	0.542	0.602	0.678	2.265	3.679
IRA	4.768	5.270	5.723	7.382	8.337
Other Income	-	-	-	-	-
Total Revenues	5.310	5.872	6.401	9.647	12.016
Expenditures					
Current Operating Expenditures:	3.435	3.817	4.161	8.790	10.960
Personal Services (P.S.)	2.907	3.230	3.521	6.424	7.615
Maint. & Other Oper. Exp. (MOOE)	0.528	0.587	0.640	2.366	3.345
NET INCOME	1.875	2.055	2.240	0.857	1.056
Less: Capital Outlays 2/	1.057	1.174	1.280	0.024	0.056
Non Office	0.793	0.881	0.960	-	1.000
Sub-Total Other Expenditures	1.850	2.055	2.240	0.024	1.056
Net Income	0.025	-	-	0.833	-
4. Binuangan					
RECEIPTS					
Local Revenues 1/	0.179	0.199	2.091	2.599	2.599
IRA	4.119	4.724	4.923	6.347	7.157
Other Income (Surplus)	-	-	-	-	-
Total Revenues	4.298	4.923	7.014	8.946	9.756
Expenditures					
Current Operating Expenditures:	2.880	3.200	4.574	8.163	8.163
Personal Services (P.S.)	2.437	2.708	3.870	7.681	7.681
Maint. & Other Oper. Exp. (MOOE)	0.443	0.492	0.704	0.482	0.482
NET INCOME	1.418	1.723	2.440	0.783	1.593
Less: Capital Outlays 2/	0.886	0.985	1.407	0.360	0.360
Non Office	0.665	0.738	1.055	0.250	0.250
Sub-Total Other Expenditures	1.551	1.723	2.462	0.610	0.610
Net Income	(0.133)	-	(0.022)	0.173	0.983

Table 6.2.1 Income and Expenditure of Misamis Oriental, 1994-1998

Unit: In Million Pesos

Municipality	1994	1995	1996	1997	1998 1/
5. Claveria					
RECEIPTS					
Local Revenues 1/	0.923	1.026	1.842	1.842	3.133
IRA	20.003	22.226	23.338	30.255	34.492
Other Income (loans/borrowings/Grants&Aids)	-	-	-	-	-
Total Revenues	20.926	23.252	25.180	32.097	37.625
Expenditures					
Current Operating Expenditures:					
Personal Services (P.S.)	13.602	15.114	16.736	20.666	22.716
Maint. & Other Oper. Exp. (MOOE)	11.509	12.789	14.161	14.594	22.230
NET INCOME	2.093	2.325	2.575	6.072	0.486
Less: Capital Outlays 2/	7.324	8.138	8.444	11.431	14.909
Non Office	4.185	4.650	5.150	10.621	10.093
Loan Amortization	3.139	3.488	3.862	-	4.816
Sub-Total Other Expenditures	7.324	8.138	9.012	10.621	14.909
Net Income	-	-	(0.568)	0.810	-
6. El Salvador					
RECEIPTS					
Local Revenues 1/	4.455	4.950	9.039	6.727	11.149
IRA	9.405	10.439	11.273	14.078	15.907
Other Income (Grants & Aids)	-	-	-	-	-
Total Revenues	13.860	15.389	20.312	20.805	27.056
Expenditures					
Current Operating Expenditures:					
Personal Services (P.S.)	9.003	10.003	13.261	20.389	22.001
Maint. & Other Oper. Exp. (MOOE)	7.618	8.464	11.221	15.225	18.724
NET INCOME	1.385	1.539	2.040	5.164	3.277
Less: Capital Outlays 2/	4.857	5.386	7.051	0.416	5.055
Non Office	2.770	3.078	4.080	0.416	2.271
Sub-Total Other Expenditures	2.077	2.308	3.060	-	2.784
Net Income	4.847	5.386	7.140	0.416	5.055
7. Gitagum					
RECEIPTS					
Local Revenues 1/	0.824	0.916	1.207	0.594	0.663
IRA	5.266	5.845	6.326	8.121	9.163
Other Income	-	-	-	-	-
Total Revenues	6.090	6.761	7.533	8.715	9.826
Expenditures					
Current Operating Expenditures:					
Personal Services (P.S.)	3.955	4.395	4.913	8.245	10.284
Maint. & Other Oper. Exp. (MOOE)	3.347	3.719	4.157	6.700	8.471
NET INCOME	0.608	0.676	0.756	1.545	1.813
Less: Capital Outlays 2/	2.135	2.366	2.620	0.470	0.458
Sub-Total Other Expenditures	1.217	1.352	1.512	0.055	0.006
Net Income	1.217	1.352	1.512	0.055	0.006
8. Initao					
RECEIPTS					
Local Revenues 1/	2.745	3.050	3.382	1.401	1.541
IRA	8.384	9.316	10.071	12.164	13.760
Other Income (Grants & Aids)	0.083	0.092	-	0.019	-
Total Revenues	11.212	12.458	13.453	13.584	15.301
Expenditures					
Current Operating Expenditures:					
Personal Services (P.S.)	7.288	8.098	8.744	10.427	10.923
Maint. & Other Oper. Exp. (MOOE)	6.167	6.852	7.399	9.391	9.938
NET INCOME	1.121	1.246	1.345	1.036	0.985
Less: Capital Outlays 2/	3.924	4.360	4.709	3.157	4.378
Non Office	2.242	2.492	2.691	0.124	2.015
Sub-Total Other Expenditures	1.682	1.868	2.018	3.829	2.363
Net Income	3.924	4.360	4.709	3.953	4.378
9. Jasaan					
RECEIPTS					
Local Revenues 1/	8.210	9.122	14.318	10.527	17.334
IRA	9.310	10.352	11.051	14.669	16.542
Other Income (Loans/borrowings/Grants & Aids)	-	-	-	-	-
Total Revenues	17.520	19.474	25.369	25.196	33.876

Table 6.2.1 Income and Expenditure of Misamis Oriental, 1994-1998

Unit: In Million Pesos

Municipality	1994	1995	1996	1997	1998 1/
Expenditures					
Current Operating Expenditures:	11.393	12.658	16.622	21.352	30.366
Personal Services (P.S.)	9.640	10.711	14.065	12.935	16.167
Maint. & Other Oper. Exp. (MOOE)	1.753	1.947	2.557	8.917	14.139
NET INCOME	6.127	6.816	8.747	3.344	3.570
Less: Capital Outlays 2/	3.505	3.895	5.115	1.151	3.570
Others	2.629	2.921	3.836	1.275	0.032
Loan Amortization	-	-	-	0.886	-
Sub-Total Other Expenditures	6.134	6.816	8.951	3.312	3.602
Net Income	(0.007)	-	(0.204)	0.032	(0.032)
10. Kinoguitan					
RECEIPTS					
Local Revenues 1/	0.293	0.325	0.801	1.309	2.226
IRA	4.662	5.456	5.900	7.775	8.784
Other Income (Loans/borrowings)	0.062	0.069	-	-	-
Total Revenues	5.017	5.850	6.701	9.084	11.010
Expenditures					
Current Operating Expenditures:	3.422	3.803	4.375	6.314	7.291
Personal Services (P.S.)	2.896	3.218	3.702	5.569	6.644
Maint. & Other Oper. Exp. (MOOE)	0.526	0.585	0.673	0.745	0.647
NET INCOME	1.595	2.047	2.326	2.770	3.719
Less: Capital Outlays 2/	1.053	1.170	1.346	0.037	0.189
Non Office	0.790	0.877	1.010	2.597	2.521
Sub-Total Other Expenditures	1.843	2.047	2.356	2.634	2.710
Net Income	(0.248)	-	(0.030)	0.136	1.009
11. Lugalit					
RECEIPTS					
Local Revenues 1/	2.667	2.963	5.261	5.244	12.930
IRA	5.182	5.769	6.257	8.116	9.172
Total Revenues	7.849	8.732	11.518	13.360	22.102
Expenditures					
Current Operating Expenditures:	5.108	5.676	7.498	11.489	16.320
Personal Services (P.S.)	4.322	4.803	6.344	9.496	10.666
Maint. & Other Oper. Exp. (MOOE)	0.786	0.873	1.154	1.993	6.154
NET INCOME	2.741	3.056	4.020	1.871	5.282
Less: Capital Outlays 2/	1.572	1.746	2.307	1.636	3.742
Non Office	1.179	1.310	1.730	-	1.232
Sub-Total Other Expenditures	2.751	3.056	4.037	1.636	4.974
Net Income	(0.010)	-	(0.017)	0.235	0.308
12. Laganglong					
RECEIPTS					
Local Revenues 1/	0.281	0.312	0.877	0.884	0.884
IRA	5.906	6.542	7.066	9.938	11.218
Total Revenues	6.187	6.854	7.943	10.822	12.102
Expenditures					
Current Operating Expenditures:	4.010	4.455	5.188	7.718	7.724
Personal Services (P.S.)	3.393	3.770	4.390	6.127	6.127
Maint. & Other Oper. Exp. (MOOE)	0.617	0.685	0.798	1.591	1.597
NET INCOME	2.177	2.399	2.755	3.104	4.378
Less: Capital Outlays 2/	1.234	1.371	1.596	0.768	2.306
Others (Non-Office)	0.925	1.028	1.197	2.304	0.768
Sub-Total Other Expenditures	2.159	2.399	2.793	3.072	3.074
Net Income	0.018	-	(0.038)	0.032	1.304
13. Laguindingan					
RECEIPTS					
Local Revenues 1/	0.965	1.072	4.254	3.822	3.400
IRA	6.115	6.799	7.363	9.027	10.171
Total Revenues	7.080	7.871	11.617	12.849	13.571
Expenditures					
Current Operating Expenditures:	4.604	5.116	7.570	10.002	13.560
Personal Services (P.S.)	3.896	4.329	6.405	7.766	9.394
Maint. & Other Oper. Exp. (MOOE)	0.708	0.787	1.165	2.236	4.166
NET INCOME	2.476	2.755	4.047	2.847	0.011
Less: Capital Outlays 2/	1.417	1.574	2.329	0.079	0.011
Non Office	1.063	1.181	1.746	-	-
Sub-Total Other Expenditures	2.480	2.755	4.075	0.079	0.011
Net Income	(0.004)	-	(0.028)	2.768	(0.000)

Table 6.2.1 Income and Expenditure of Misamis Oriental, 1994-1998

Unit: In Million Pesos

Municipality	1994	1995	1996	1997	1998 1/
14. Libertad					
RECEIPTS					
Local Revenues 1/	0.461	0.512	0.988	1.070	1.856
IRA	4.831	5.352	5.787	7.223	8.140
Other Income (Grants & Aids)	-	-	-	0.085	-
Total Revenues	5.292	5.864	6.775	8.378	9.996
Expenditures					
Current Operating Expenditures:	3.431	3.811	4.421	7.628	9.458
Personal Services (P.S.)	2.903	3.225	3.741	6.589	6.701
Maint. & Other Oper. Exp. (MOOE)	0.528	0.586	0.680	1.039	2.754
NET INCOME	1.861	2.053	2.354	0.750	0.532
Less: Capital Outlays 2/	1.055	1.173	1.361	0.191	-
Non Office	0.792	0.880	1.020	0.554	0.537
Sub-Total Other Expenditures	1.847	2.053	2.381	0.745	0.537
Net Income	0.014	-	(0.027)	0.005	(0.005)
15. Magsaysay					
RECEIPTS					
Local Revenues 1/	0.488	0.542	0.965	0.803	1.194
IRA	9.308	10.278	11.058	13.567	15.301
Total Revenues	9.796	10.820	12.023	14.370	16.495
Expenditures					
Current Operating Expenditures:	6.330	7.033	7.891	11.448	12.425
Personal Services (P.S.)	5.356	5.951	6.677	9.872	10.092
Maint. & Other Oper. Exp. (MOOE)	0.974	1.082	1.214	1.576	2.333
NET INCOME	3.466	3.787	4.132	2.922	4.070
Less: Capital Outlays 2/	1.947	2.164	2.428	2.454	3.985
Others	1.461	1.623	1.821	-	-
Sub-Total Other Expenditures	3.408	3.787	4.249	2.454	3.985
Net Income	0.058	-	(0.117)	0.468	0.085
16. Manticao					
RECEIPTS					
Local Revenues 1/	1.343	1.492	4.757	2.766	7.231
IRA	7.906	8.876	9.747	12.206	13.836
Other Income (Grants & Aids)	-	-	-	1.000	0.200
Total Revenues	9.249	10.368	14.504	15.972	21.267
Expenditures					
Current Operating Expenditures:	6.065	6.739	9.427	13.463	14.078
Personal Services (P.S.)	5.132	5.702	7.977	11.198	12.501
Maint. & Other Oper. Exp. (MOOE)	0.933	1.037	1.450	2.265	1.577
NET INCOME	3.184	3.629	5.077	2.509	7.189
Less: Capital Outlays 2/	1.866	2.074	2.901	0.629	0.002
Non Office	1.400	1.555	2.176	0.208	6.888
Sub-Total Other Expenditures	3.266	3.629	5.077	0.837	6.890
Net Income	(0.082)	-	-	1.672	0.299
17. Medina					
RECEIPTS					
Local Revenues 1/	1.289	1.432	2.333	1.644	3.219
IRA	8.449	9.360	10.097	13.263	14.983
Other Income (Loans and Borrowings)	0.016	0.018	-	-	-
Total Revenues	9.754	10.810	12.430	14.907	18.202
Expenditures					
Current Operating Expenditures:	6.324	7.026	8.080	11.136	13.062
Personal Services (P.S.)	5.351	5.945	6.837	9.475	11.864
Maint. & Other Oper. Exp. (MOOE)	0.973	1.081	1.243	1.661	1.198
NET INCOME	3.430	3.784	4.350	3.771	5.140
Less: Capital Outlays 2/	1.946	2.162	2.486	1.687	1.350
Non Office	1.459	1.622	1.864	2.073	3.707
Sub-Total Other Expenditures	3.405	3.784	4.350	3.760	5.057
Net Income	0.025	-	-	0.011	0.083
18. Naawan					
RECEIPTS					
Local Revenues 1/	1.053	1.170	1.890	3.050	2.312
IRA	6.320	7.002	7.559	9.677	10.947
Other Income (Loans/Borrowings)	0.003	0.003	-	-	-
Total Revenues	7.376	8.175	9.449	12.727	13.259

Table 6.2.1 Income and Expenditure of Misamis Oriental, 1994-1998

Unit: In Million Pesos

Municipality	1994	1995	1996	1997	1998 1/
Expenditures					
Current Operating Expenditures:	4.783	5.314	6.180	9.439	12.233
Personal Services (P.S.)	4.047	4.496	5.229	7.453	8.619
Maint. & Other Oper. Exp. (MOOE)	0.736	0.818	0.951	1.986	3.614
NET INCOME	2.593	2.861	3.269	3.238	1.026
Less: Capital Outlays 2/	1.471	1.635	1.902	1.319	1.026
Non Office	1.104	1.226	1.426	-	-
Sub-Total Other Expenditures	2.575	2.861	3.328	1.319	1.026
Net Income	0.018	-	(0.059)	1.969	(0.000)
19. Opol					
RECEIPTS					
Local Revenues 1/	1.737	1.930	5.472	4.040	9.088
IRA	8.679	9.592	10.325	12.292	14.700
Other Income (Grants & Aids)	0.072	0.080	-	-	-
Total Revenues	10.488	11.602	15.797	16.332	23.788
Expenditures					
Current Operating Expenditures:	6.787	7.541	10.334	15.592	16.674
Personal Services (P.S.)	5.743	6.381	8.744	9.350	13.486
Maint. & Other Oper. Exp. (MOOE)	1.044	1.160	1.590	6.242	3.188
NET INCOME	3.701	4.061	5.463	0.740	7.114
Less: Capital Outlays 2/	2.088	2.321	3.180	1.832	7.114
Others (Non Office)	1.566	1.740	2.385	-	-
Sub-Total Other Expenditures	3.654	4.061	5.565	1.832	7.114
Net Income	0.047	-	(0.102)	(1.092)	-
20. Salay					
RECEIPTS					
Local Revenues 1/	0.384	0.427	0.905	0.761	1.206
IRA	6.862	7.365	8.258	10.894	12.321
Other Income (Loans/Borrowings)	-	-	-	-	-
Total Revenues	7.246	7.792	9.163	11.655	13.527
Expenditures					
Current Operating Expenditures:	4.558	5.065	5.985	10.674	12.619
Personal Services (P.S.)	3.857	4.286	5.064	9.013	9.816
Maint. & Other Oper. Exp. (MOOE)	0.701	0.779	0.921	1.661	2.803
NET INCOME	2.688	2.727	3.178	0.981	0.908
Less: Capital Outlays 2/	1.403	1.558	1.841	0.491	0.908
Others (Non Office)	1.052	1.169	1.381	-	-
Sub-Total Other Expenditures	2.455	2.727	3.222	0.491	0.908
Net Income	0.233	-	(0.044)	0.490	-
21. Sugbongcogon					
RECEIPTS					
Local Revenues 1/	1.288	1.431	0.937	0.511	3.384
IRA	4.240	3.853	5.121	6.701	7.552
Other Income (Loans/Borrowings)	-	-	-	-	-
Total Revenues	5.528	5.284	6.058	7.212	10.936
Expenditures					
Current Operating Expenditures:	3.092	3.434	3.921	6.371	8.251
Personal Services (P.S.)	2.616	2.906	3.318	5.643	7.293
Maint. & Other Oper. Exp. (MOOE)	0.476	0.528	0.603	0.728	0.958
NET INCOME	2.436	1.850	2.137	0.841	2.685
Less: Capital Outlays 2/	0.951	1.057	1.206	0.841	0.986
Non Office	0.713	0.793	0.905	-	1.699
Sub-Total Other Expenditures	1.664	1.850	2.111	0.841	2.685
Net Income	0.772	-	0.026	-	-
22. Tagoloan					
RECEIPTS					
Local Revenues 1/	3.635	4.039	6.273	9.713	19.664
IRA	10.141	10.405	12.224	17.123	19.347
Other Income (Loans/Borrowings/Grants&Aids)	0.089	0.099	0.160	2.760	-
Total Revenues	13.865	14.543	18.657	29.596	39.011
Expenditures					
Current Operating Expenditures:	8.508	9.453	12.164	13.467	27.640
Personal Services (P.S.)	7.199	7.999	10.293	9.481	17.812
Maint. & Other Oper. Exp. (MOOE)	1.309	1.454	1.871	3.986	9.828
NET INCOME	5.357	5.090	6.493	16.129	11.371

Table 6.2.1 Income and Expenditure of Misamis Oriental, 1994-1998

Unit: In Million Pesos

Municipality	1994	1995	1996	1997	1998 1/
NET INCOME	5.357	5.090	6.493	16.129	11.371
Less: Capital Outlays 2/	2.618	2.909	3.743	5.150	11.360
Non Office	1.963	2.181	2.807	7.360	0.011
Loan Amortization				2.400	
Sub-Total Other Expenditures	4.581	5.090	6.550	14.910	11.371
Net Income	0.776	-	(0.057)	1.219	-
23. Talisayan					
RECEIPTS					
Local Revenues 1/	1.319	1.465	0.740	0.907	0.867
IRA	7.665	7.791	9.135	11.975	13.555
Total Revenues	8.984	9.256	9.875	12.882	14.422
Expenditures					
Current Operating Expenditures:	5.415	6.017	6.477	10.701	14.422
Personal Services (P.S.)	4.582	5.091	5.481	8.019	8.133
Maint. & Other Oper. Exp. (MOOE)	0.833	0.926	0.996	2.682	6.289
NET INCOME	3.569	3.239	3.398	2.181	0.000
Less: Capital Outlays 2/	1.666	1.851	1.993	-	1.975
Non Office	1.250	1.388	1.495	-	-
Sub-Total Other Expenditures	2.916	3.239	3.488	0.000	1.975
Net Income	0.653	-	(0.090)	2.181	(1.975)
24. Villanueva					
RECEIPTS					
Local Revenues 1/	4.867	5.408	7.206	6.989	5.589
IRA	6.639	14.027	7.969	10.912	12.301
Other Income (Grants & Aids)	1.125	1.250	-	1.000	1.000
Total Revenues	12.631	20.685	15.175	18.901	18.890
Expenditures					
Current Operating Expenditures:	8.205	9.118	9.886	13.155	15.831
Personal Services (P.S.)	6.943	7.715	8.365	7.900	8.050
Maint. & Other Oper. Exp. (MOOE)	1.262	1.403	1.521	5.255	7.781
NET INCOME	4.426	11.567	5.289	5.746	3.059
Less: Capital Outlays 2/	2.525	2.805	3.042	3.402	2.438
Non Office	1.894	2.104	2.281	2.344	-
Sub-Total Other Expenditures	4.419	4.909	5.323	5.746	2.438
Net Income	0.007	6.658	(0.034)	-	0.621
25. Gingoog					
RECEIPTS					
Local Revenues 1/	57.137	63.486	56.243	23.183	26.513
IRA	131.380	140.313	150.570	160.443	175.500
Other Income (Grants & Aids)	-	-	-	-	-
Total Revenues	188.517	203.799	206.813	183.626	202.013
Expenditures					
Current Operating Expenditures:	119.222	132.469	134.441	164.037	163.331
Personal Services (P.S.)	100.880	112.039	113.758	122.906	120.032
Maint. & Other Oper. Exp. (MOOE)	18.342	20.380	20.683	41.181	43.299
NET INCOME	69.295	71.330	72.372	19.539	38.682
Less: Capital Outlays 2/	36.684	40.760	41.367	19.093	55.706
Non Office	27.513	30.570	31.025	19.410	-
Sub-Total Other Expenditures	64.197	71.330	72.392	38.503	55.706
Net Income	5.098	-	(0.020)	(18.964)	(17.024)

Table 6.2.2 Past Internal Revenue Allotment for the Province of Misamis Oriental

Unit: (In Million Pesos)

Item		1994	1995	1996	1997	1998
1.	IRA to All Municipalities (National)	16,325.89	18,768.93	19,607.72	24,849.00	28,245.82
2.	IRA by Municipalities	315.036	348.579	371.019	445.732	497.945
	Alubijid	7.372	8.170	9.404	12.308	13.857
	Balingasag	12.075	13.417	14.513	19.276	21.748
	Balingoan	4.768	5.270	5.684	7.382	8.337
	Binuangan	4.119	4.724	4.923	6.347	7.157
	Claveria	20.053	22.226	23.338	30.255	34.492
	El Salvador	9.405	10.439	11.273	14.078	15.907
	Gitagum	5.266	5.845	6.326	8.121	9.163
	Initao	8.384	9.316	10.071	12.164	13.760
	Jasaan	9.310	10.352	11.051	14.669	16.542
	Kinoguitan	4.662	5.496	5.900	7.775	8.784
	Lagonglong	5.906	6.542	7.066	9.938	11.218
	Laguindingan	6.115	6.799	7.363	9.027	10.171
	Libertad	4.831	5.352	5.787	7.223	8.140
	Lugait	5.182	5.769	6.257	8.116	9.172
	Magsaysay	9.308	10.278	11.058	13.567	15.301
	Manticao	7.906	8.876	9.747	12.206	13.836
	Medina	8.449	9.360	10.097	13.263	14.983
	Naawan	6.320	7.002	7.559	9.677	10.947
	Opol	8.679	9.592	10.325	12.292	13.854
	Salay	6.862	7.365	8.258	10.894	12.321
	Sugbongcogon	4.240	3.853	5.121	6.701	7.552
	Tagoloan	10.140	10.405	12.224	17.123	19.347
	Talisayan	7.665	7.791	9.135	11.975	13.555
	Villanueva	6.639	14.027	7.969	10.912	12.301
	Gingoog	131.380	140.313	150.570	160.443	175.500
3.	% Share by Municipality	1.930	1.857	1.892	1.794	1.763
	Alubijid	2.340	2.344	2.535	2.761	2.783
	Balingasag	3.833	3.849	3.912	4.325	4.368
	Balingoan	1.513	1.512	1.532	1.656	1.674
	Binuangan	1.307	1.355	1.327	1.424	1.437
	Claveria	6.365	6.376	6.290	6.788	6.927
	El Salvador	2.985	2.995	3.038	3.158	3.195
	Gitagum	1.672	1.677	1.705	1.822	1.840
	Initao	2.661	2.673	2.714	2.729	2.763
	Jasaan	2.955	2.970	2.979	3.291	3.322
	Kinoguitan	1.480	1.577	1.590	1.744	1.764
	Lagonglong	1.875	1.877	1.904	2.230	2.253
	Laguindingan	1.941	1.950	1.985	2.025	2.043
	Libertad	1.533	1.535	1.560	1.620	1.635
	Lugait	1.645	1.655	1.686	1.821	1.842
	Magsaysay	2.955	2.949	2.980	3.044	3.073
	Manticao	2.510	2.546	2.627	2.738	2.779
	Medina	2.682	2.685	2.721	2.976	3.009
	Naawan	2.006	2.009	2.037	2.171	2.198
	Opol	2.755	2.752	2.783	2.758	2.782
	Salay	2.178	2.113	2.226	2.444	2.474
	Sugbongcogon	1.346	1.105	1.380	1.503	1.517
	Tagoloan	3.219	2.985	3.295	3.842	3.885
	Talisayan	2.433	2.235	2.462	2.687	2.722
	Villanueva	2.107	4.024	2.148	2.448	2.470
	Gingoog	41.703	40.253	40.583	35.995	35.245

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 1:250,000 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 and PEO.
- Water source information by Water Districts.

(2) Approach and Methodology

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

1) Prepare a base map with an approximate scale of 1:600,000 (fit to the A4 map size). 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 7.3.1, Main Report.

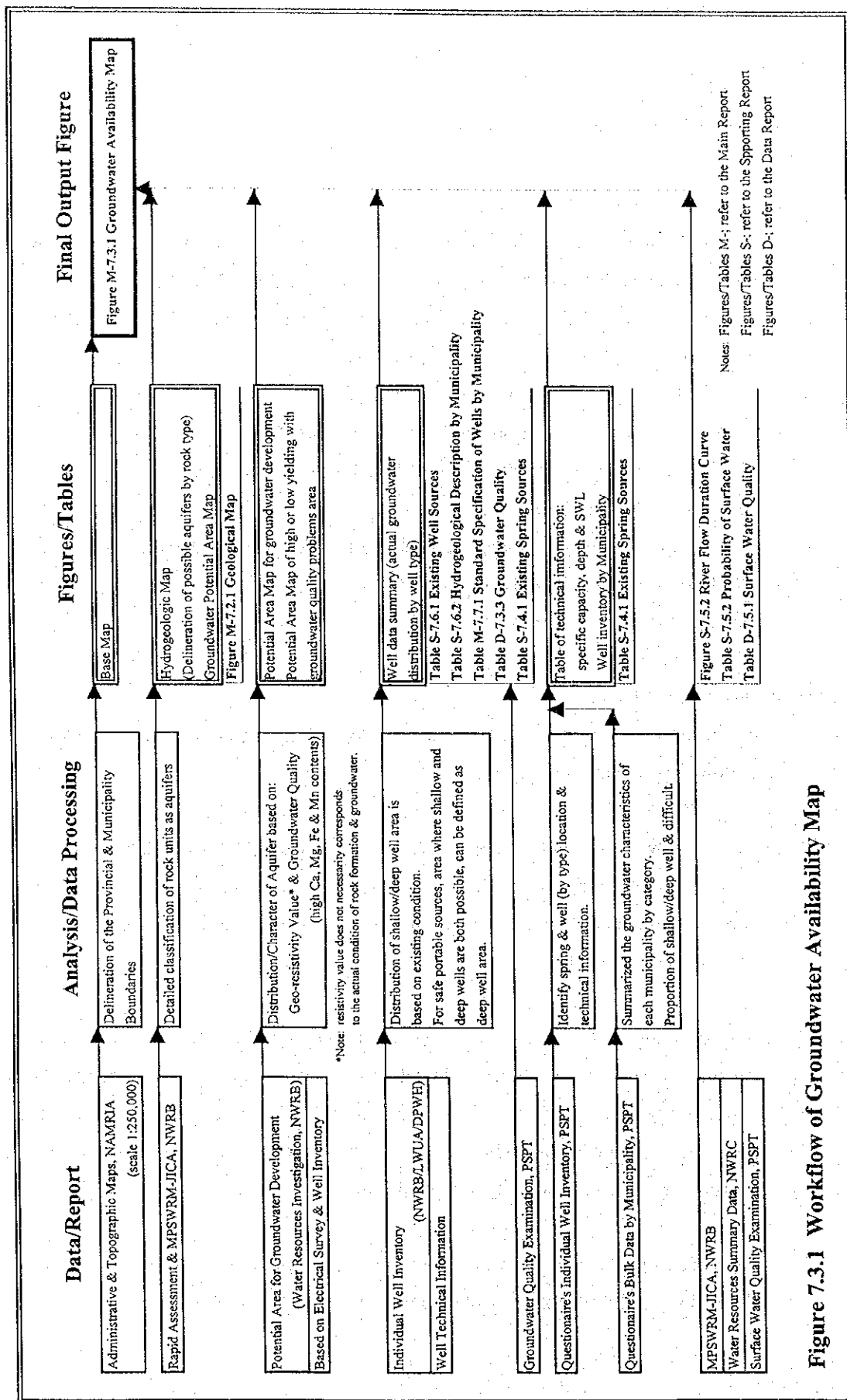


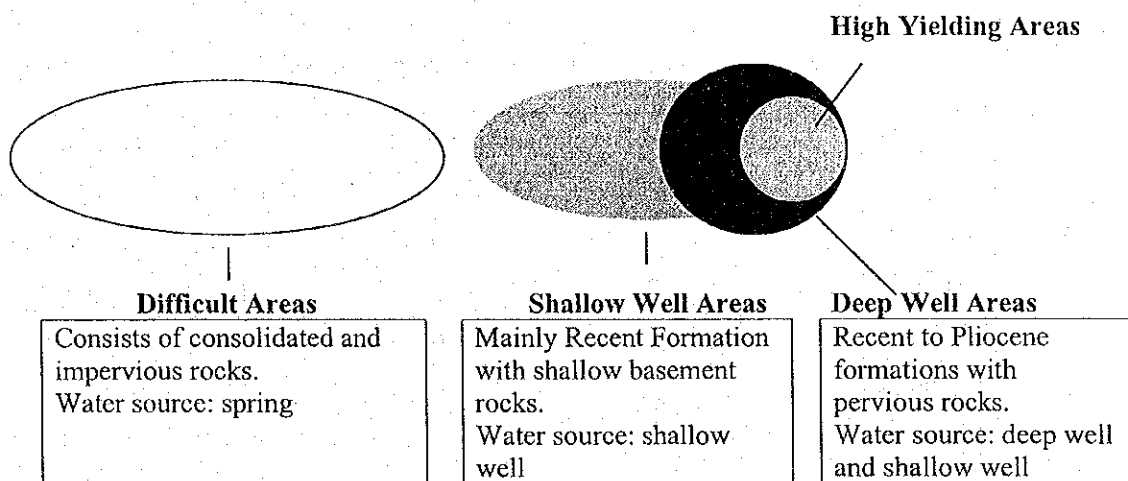
Figure 7.3.1 Workflow of Groundwater Availability Map

- 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 7.3.1, Main Report, 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 7.3.2 presents the categorization in terms of groundwater utilization.

Figure 7.3.2 Area Category by Groundwater Utilization



Solo 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 specifications for each municipality is established as shown in the map. These specifications are used as references in evaluating the groundwater availability in each locality. Individual well locations with technical information are presented in Figure 7.6.1, Data Report.

(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 Sources Information, Data Report.

Table 7.4.1 Existing Spring Sources

Municipality	No. of Developed Spring		Untapped Spring		
	Q<2.8lps	Q>2.8lps	No.	Ave. lps	Range lps
Alubijid	25	0	0	-	- ~ -
Balingasag	17	0	7	16.0	4.0 ~ 70.0
Balingoan	10	0	0	-	- ~ -
Binuangan	8	0	3	1.6	1.3 ~ 1.9
Claveria	1	0	0	-	- ~ -
El Salvador	22	0	0	-	- ~ -
Gingoog City	3	0	0	-	- ~ -
Gitagum	0	0	1	1.5	1.5 ~ 1.5
Initao	2	0	0	-	- ~ -
Jasaan	7	0	0	-	- ~ -
Kinoguitan	18	0	1	7.4	7.4 ~ 7.4
Lagonglong	10	0	0	-	- ~ -
Laguindingan	10	0	0	-	- ~ -
Libertad	4	0	2	0.9	0.9 ~ 0.9
Lugait	9	0	0	-	- ~ -
Magsaysay	29	0	0	-	- ~ -
Manticao	20	1	1	0.3	0.3 ~ 0.3

Notes; "Ave.lps" & "Range lps" mean the average discharge and the range of discharges in lps (liter/second).

Table 7.4.1 Existing Spring Sources (cont'd)

Municipality	No. of Developed Spring		Untapped Spring		
	Q<2.8lps	Q>2.8lps	No.	Ave. lps	Range lps
Medina	27	2	0	-	- ~ -
Naawan	24	0	0	-	- ~ -
Opol	4	0	0	-	- ~ -
Salay	11	0	0	-	- ~ -
Sugbongcogon	14	0	3	1.3	1.2 ~ 1.3
Tagoloan	16	1	1	50.0	50.0 ~ 50.0
Talisayan	9	0	0	-	- ~ -
Villanueva	15	1	0	-	- ~ -

Notes; "Ave.lps" & "Range lps" mean the average discharge and the range of discharges in lps (liter/second).

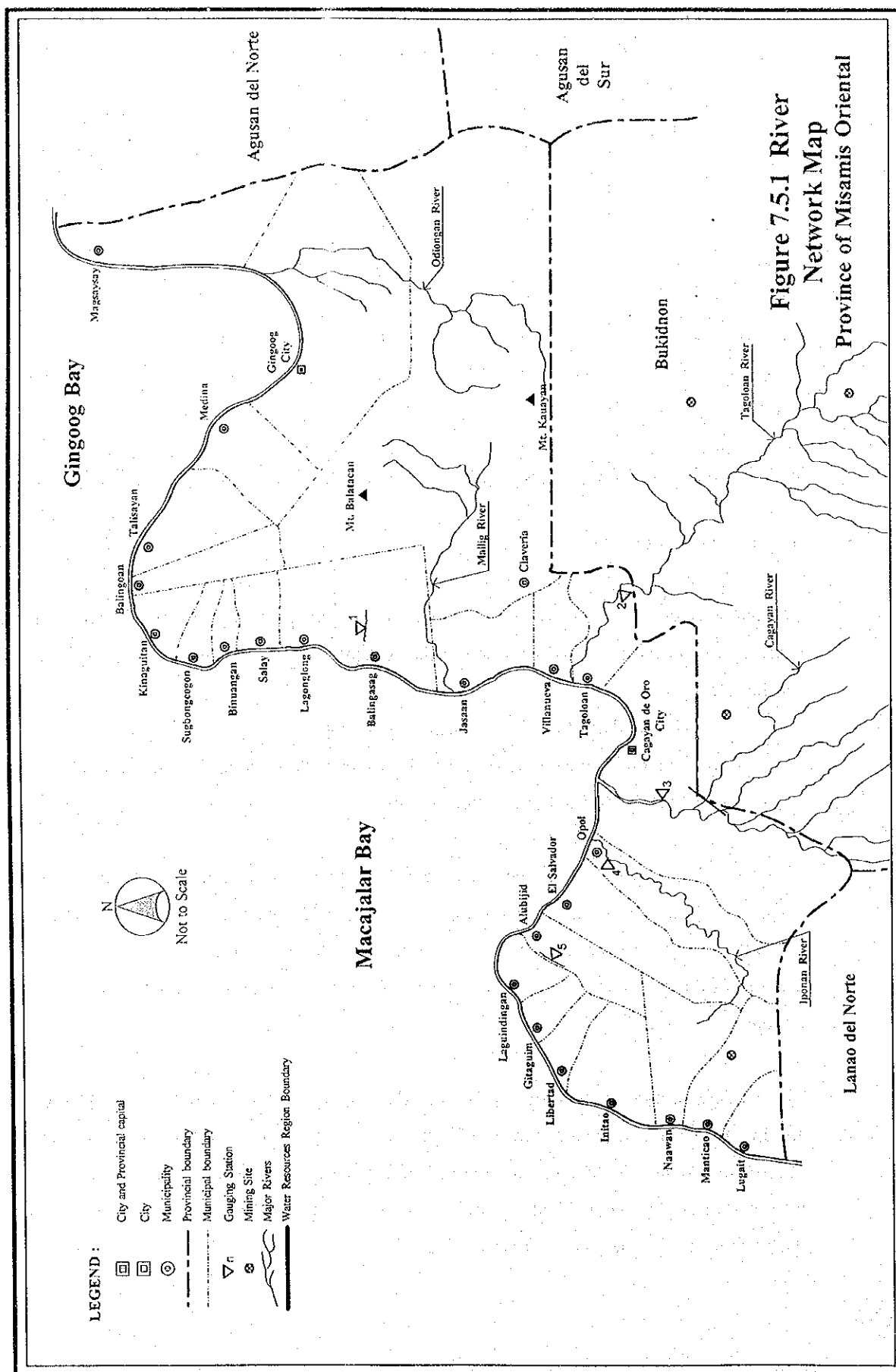
7.5 Surface Water Sources

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 with watershed of 100 km² or more, and
- rivers with watershed of 100 km² or more.

Based on the above criteria, the selected major rivers are Odiongan, Mallig, Tagoloan, Cagayan & Iponan rivers as shown in Figure 7.5.1 River Network Map. There are two major rivers that originate from the province of Bukidnon. These are Tagoloan & Cagayan rivers. The rest of the rivers originate in the province. All rivers in the province belong to the Water Resources Region-X.

The gauging stations in the province are located at the Kihangad, Tagoloan, Cagayan, Iponan and Lipatan rivers, 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.



(1) Surface Water Utilization/Water Rights

As seen in Table 7.5.1, the present water utilization in the watersheds of the major rivers totals to 17.1 m³/sec. Of this total, the water rights of 12.7 m³/sec are registered in the adjoining province. Hence, only 4.4 m³/sec from the major rivers are used in the province. At present, there is no surface water use for domestic water supply in the province. Industrial water use of 3.3 m³/sec is being tapped in Mallig and Tagoloan river basins. A BOT water supply scheme is ongoing with the NPC as a partner and is expected to start on year 2002. According to the Cagayan de Oro WD, this scheme is to provide 100,000m³/day of surface water from the Cagayan River.

(2) River Flow Analysis

The flow duration curves, derived from the available runoff records, are shown in Figure 7.5.2. Also, for the Kihangad and Lipatan rivers duration curve, the specific discharge at the Balingasag and Alubijid Gauging Stations in the province were 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 the 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 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 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.

Percent of Time (%) (No. in Figure 7.5.1)	Specific Discharge (cum/sec/100sq.km)				
	Kihangad 1	Tagoloan 2	Cagayan 3	Iponan 4	Lipatan 5
10%	9.03	7.58	5.97	6.91	2.58
20%	4.31	6.11	5.18	5.45	1.87
30%	3.06	5.31	5.09	4.78	1.49
40%	2.44	4.49	5.09	4.31	1.11
50%	1.78	4.06	4.64	3.46	0.85
60%	1.45	3.63	4.55	2.94	0.63
70%	1.25	3.31	3.85	2.62	0.50
80%	0.67	2.83	3.68	2.03	0.40
90%	0.30	2.57	2.72	1.50	0.30
100%	0.04	1.99	1.13	0.52	0.06
Period of Data Used	1968-'70	1960-'70	1954-'64	1957-'70	1950-'70

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

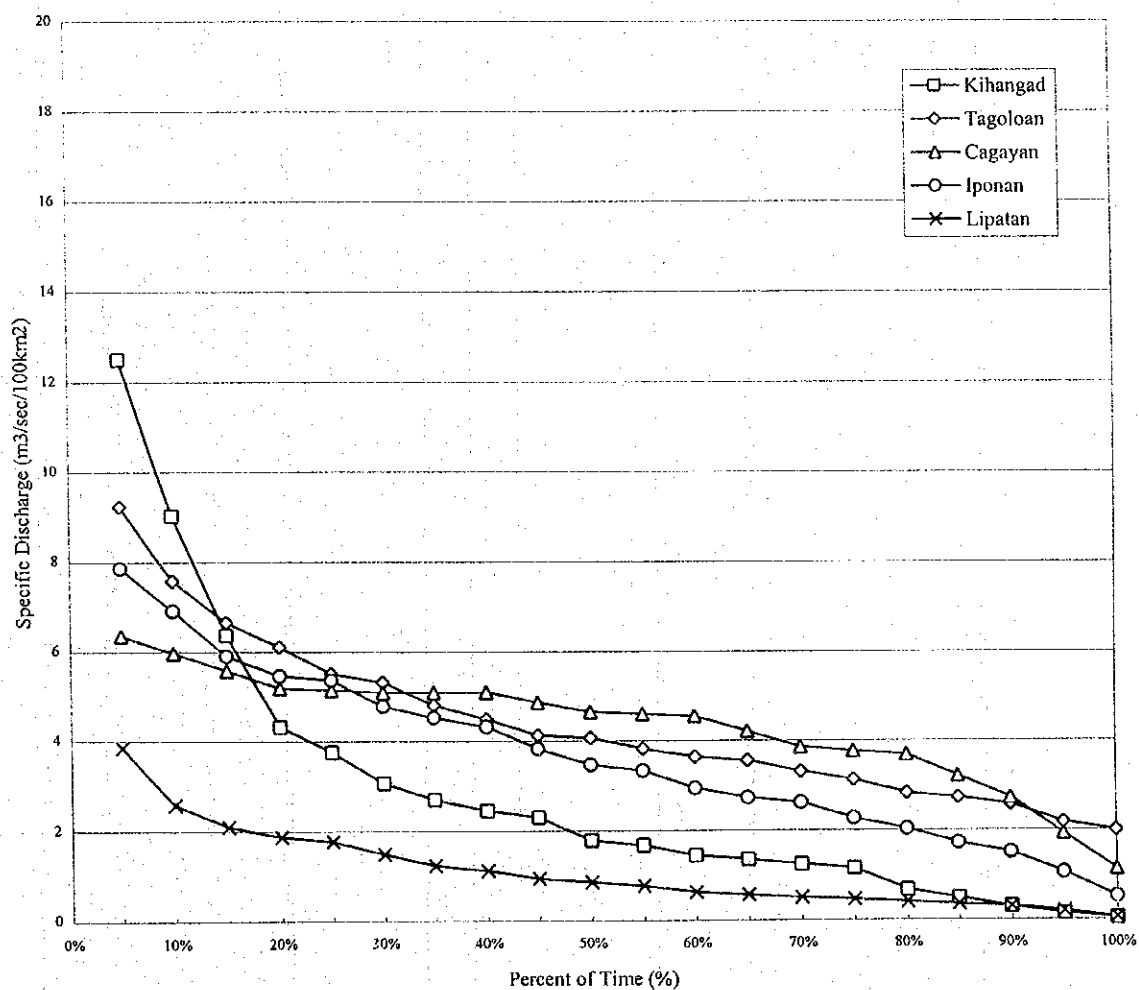


Figure 7.5.2 River Flow Duration Curve

Table 7.5.2 Probability of Surface Water

River Water Sources		Related Data				Probability of Surface Water (10-year return-period)									
Major River Water	System & Main	Location Municipality & other Province	River Connection	Watershed Area in		Sp. D (return-period)		Inlet Flow to Municipality				Outlet Flow from Municipality			
				Location (1)	Upstream (2)	10-year (3)	5-year (4)	S/Flow (5) (13M3)/100	M/Flow (6) (23+6)/100x10%	Use (7)	Potential (8) (9-10+7)	S/Flow (9) (9-11M3)/100	M/Flow (10) (9-11+4)/100x10%	Use (11)	Potential (12) (9-11+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
Odiongan		Claveria		235.31	0.00	0.30	0.67	0.00	0.00	0.00	0.00	0.71	0.16	0.00	0.55
		Gingog City		154.67	235.31	0.30	0.67	0.71	0.16	0.00	0.55	1.17	0.26	0.30	0.61
Mallig		Claveria		179.28	0.00	0.30	0.67	0.00	0.00	0.00	0.00	0.54	0.12	0.26	0.16
		Balingasag		9.81	179.28	0.30	0.67	0.54	0.12	0.26	0.16	0.57	0.13	0.26	0.18
		Jasaan	Ind'l Intake	10.53	189.09	0.30	0.67	0.57	0.13	0.26	0.18	0.60	0.13	0.44	0.03
Tagaloan		Tagaloan	Ind'l Intake	38.45	1,656.00	2.57	2.83	42.56	4.69	7.74	30.13	43.55	4.80	7.88	30.87
Cagayan		Cagayan de Oro		183.63	1,337.40	2.72	3.68	36.38	4.92	4.99	26.47	41.37	5.60	4.99	30.78
Iponan		Naawan		22.01	0.00	1.50	2.03	0.00	0.00	0.00	0.00	0.33	0.04	0.00	0.29
		El Salvador		89.02	22.01	1.50	2.03	0.33	0.04	0.00	0.29	1.67	0.23	0.00	1.44
		Opol		154.40	111.03	1.50	2.03	1.67	0.23	0.00	1.44	3.98	0.54	0.50	2.94

Notes: Sp. D (Specific Discharge) was analyzed by monthly mean flow records from gauging station.

S/Flow (Stream Flow) was estimated specific discharge (10-year return-period) multiplied 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.

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

(3) Surface Water Quality

There are mining sites located upstream of the Tagoloan and Cagayan rivers. These are located in the province of Bukidnon as 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 basically selected 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 "A", although the tested parameters are limited. However, the Tagoloan and Cagayan rivers were found to have high Fe and Mn contents in the analysis of this study.

7.6 Future Development Potential of Water Sources

(1) Groundwater

A well inventory covering all the municipalities shows that there are 2,402 existing wells in the province, while only 229 wells are recorded in the inventory prepared by PSPT (refer to Table 7.1.1 and 7.3.2, Data Report). Despite the smaller number of wells included in the PSPT data, these were used in the analysis, since these provided technical information. Of the total 229 wells, 134 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 depths ranging from 110m to 180m in the municipality of Initao. The good yielding wells have static water levels varying from about 3.0 mbgs to 80.0 mbgs and specific capacity of about 0.8 lpsm to 1.7 lpsm.

Based on the hydraulic characteristics and location of wells in Misamis Oriental, aquifers are distributed along the seashore side. Shallow well area is not distributed in the

province. The volcanic and metamorphic rock units of Miocene and older are widely distributed in the mountainous area of each peninsula and these are classified as difficult area for groundwater development.

Table 7.6.1 Existing Well Sources

Municipality/ City	Type	No.	Depth (m)		SWL (mbgs)		Sp. Cap. (lpsm)	
			Ave.	Range	Ave.	Range	Ave.	Range
Alubijid	DW	12	37.7	22.0 - 73.1	20.9	12.0 - 36.0	0.15	- - -
	SW	10	8.0	6.0 - 12.0	6.2	3.5 - 9.0	-	- - -
Balingasag	DW	17	44.0	30.0 - 65.0	35.6	24.0 - 50.0	-	- - -
	SW	15	13.6	12.0 - 18.0	10.1	9.0 - 17.0	-	- - -
Balingoan	DW	1	45.7	45.7 - 45.7	25.9	25.9 - 25.9	-	- - -
	SW	2	14.4	12.0 - 19.1	8.5	5.5 - 10.0	-	- - -
Binuangan	DW	0	-	- - -	-	- - -	-	- - -
	SW	0	-	- - -	-	- - -	-	- - -
Claveria	DW	3	50.6	42.7 - 54.9	24.3	24.0 - 25.9	-	- - -
	SW	1	12.0	12.0 - 12.0	9.0	9.0 - 9.0	-	- - -
El Salvador	DW	11	39.2	24.0 - 79.0	25.8	10.0 - 68.0	0.12	0.05 - 0.21
	SW	3	14.0	10.0 - 15.0	4.5	3.0 - 6.0	-	- - -
Gingoog City	DW	4	-	- - -	-	- - -	1.10	0.80 - 1.40
	SW	0	-	- - -	-	- - -	-	- - -
Gitagum	DW	7	78.4	24.0 - 200.0	7.1	2.0 - 21.0	0.15	0.15 - 0.15
	SW	8	12.1	2.5 - 20.0	3.9	1.0 - 6.1	-	- - -
Initao	DW	4	136.5	110.0 - 180.0	80.0	80.0 - 80.0	1.32	0.14 - 1.70
	SW	0	-	- - -	-	- - -	-	- - -
Jasaan	DW	2	27.8	27.4 - 29.4	18.3	18.3 - 18.3	0.95	0.95 - 0.95
	SW	0	-	- - -	-	- - -	-	- - -
Kinoguitan	DW	2	34.5	21.3 - 42.7	20.2	18.3 - 21.3	0.23	0.23 - 0.23
	SW	1	9.1	9.1 - 9.1	3.0	3.0 - 3.0	-	- - -
Lagonglong	DW	6	35.1	24.3 - 40.0	6.0	4.0 - 12.2	-	- - -
	SW	6	10.4	9.1 - 12.0	3.8	3.0 - 5.0	-	- - -
Laguindingan	DW	5	66.2	45.0 - 76.2	36.4	12.2 - 53.4	0.32	0.10 - 0.52
	SW	0	-	- - -	-	- - -	-	- - -

Notes: The values of "Ave. depth, SWL and Sp.Cap." by municipality are estimated using the weighted average based on 1995 census population in respective barangays at well location.

Legend; SWL=static water level, Sp.Cap.=specific capacity, Ave.=average, SW=shallow well and DW=deep well

Table 7.6.1 Existing Well Sources (cont'd)

Municipality/ City	Type	No.	Depth (m)		SWL (mbgs)		Sp. Cap. (lpsm)	
			Ave.	Range	Ave.	Range	Ave.	Range
Libertad	DW	9	41.1	30.0 - 64.0	26.5	18.0 - 45.0	0.14	0.14 - 0.21
	SW	6	7.5	6.0 - 12.0	3.7	3.0 - 6.0	-	- - -
Lugait	DW	4	36.0	36.0 - 36.0	21.8	21.3 - 22.0	0.13	0.10 - 1.14
	SW	8	8.1	6.0 - 9.0	4.2	4.0 - 5.0	-	- - -
Magsaysay	DW	2	36.6	36.6 - 36.6	14.4	12.2 - 18.3	-	- - -
	SW	3	9.1	9.1 - 9.1	3.4	3.0 - 4.0	4.0	- - -
Manticao	DW	0	-	- - -	-	- - -	-	- - -
	SW	5	9.5	9.1 - 12.2	3.4	3.0 - 6.1	-	- - -
Medina	DW	10	36.0	30.0 - 57.9	24.1	22.0 - 30.0	0.33	0.15 - 0.38
	SW	11	9.1	9.1 - 9.1	3.8	3.0 - 4.1	-	- - -
Naawan	DW	8	24.8	20.4 - 36.6	11.6	FF* - 32.9	0.10	0.05 - 0.20
	SW	8	9.2	6.1 - 12.2	4.0	1.5 - 9.1	-	- - -
Opol	DW	6	32.4	24.3 - 42.7	24.0	18.3 - 36.6	0.10	0.10 - 0.10
	SW	4	7.4	6.0 - 12.2	4.4	4.0 - 5.0	-	- - -
Salay	DW	3	33.8	30.5 - 42.7	20.0	18.3 - 24.4	-	- - -
	SW	4	12.0	9.1 - 12.2	5.9	3.0 - 6.1	-	- - -
Sugbongcogon	DW	0	-	- - -	-	- - -	-	- - -
	SW	0	-	- - -	-	- - -	-	- - -
Tagoloan	DW	3	28.0	24.3 - 36.6	18.3	18.3 - 18.3	0.10	0.10 - 0.10
	SW	3	9.1	9.1 - 9.1	3.1	3.0 - 3.2	-	- - -
Talisayan	DW	2	27.9	24.3 - 36.4	18.8	18.3 - 30.5	-	- - -
	SW	3	9.1	9.1 - 9.1	3.0	3.0 - 3.0	-	- - -
Villanueva	DW	1	18.2	18.2 - 18.2	9.1	9.1 - 9.1	-	- - -
	SW	6	9.3	9.1 - 12.0	3.2	3.0 - 6.0	-	- - -

Notes: The values of "Ave. depth, SWL and Sp.Cap." by municipality are estimated using the weighted average based on 1995 census population in respective barangays at well location.

Legend; SWL=static water level, Sp.Cap.=specific capacity, Ave.=average, SW=shallow well and DW=deep well

As indicated in Figure 7.3.1 Main Report, the province faces the Mindanao Sea, consequently, saline water intrusion is observed along the seashore belts of Opol and Manticao. Also, some of the shallow and deep wells in Balingoan contain high Fe and Mn concentration.

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 huge numbers of

spring fields are seen in the central peninsula (Bagacay Point). The existing spring sources which total to 320 are utilized for water supply and these originate from the high mountains in each peninsula. The 19 untapped springs and the improvement of the existing sources are proposed as future water sources in the areas of the central peninsula.

The detailed hydrogeological characteristics of each municipality are summarized in Table 7.6.2, while the individual well location with technical information are shown in Figure 7.6.1 individual Well Location and Specification Map, Data Report.

Additional wells shall be designed employing "gravel packed well" with a filtration thickness at annular space of about 50mm or more depending on the grain sizes of aquifers and pumping capacity. While, natural gravel packed well may be adopted within the areas where well-sorted natural gravel formation is distributed at the expected aquifer. Such areas are usually the upstream areas of alluvial fans or plains in the province. The formations suitable for natural gravel packed method can be observed mostly at shallower depth. The application of such method for Level I well is also justifiable, since the inflow velocity of groundwater through the screen is very low because of minimal pumping rate by means of hand-pump operation.

Generally, shallower well has higher possibility to be constructed by the natural gravel packed method than the deeper one in areas formed by recent deposits. This is because the layers at different depths of alluvial plain or fan deposits had been formed by different conditions of transportation and sedimentation between varied grain sizes. Therefore, the availability of the natural packed well development in the province is experimentally assumed considering the limited information such as topography, geology, static water levels, etc., as shown in Table 7.6.3. However, the different proportions of the two kinds of deep well structures (gravel packed and natural gravel packed wells) are not estimated by the accurate results based on the hydrogeological study.

Examination on effective grain sizes and uniformity coefficient by sieve analysis at influential aquifers (composed of coarse sand and/or fine gravel) should be conducted during the implementation period. Such analysis and actual well construction results are very helpful in considering the natural gravel packed method for future planning.

Table 7.6.2 Hydrogeological Descriptions by Municipality

Municipality	Ground Information					Well Information					Groundwater Information						
	Topography		Geology			Depth		SWL		Sp.Cap.	L-III	Availability	Potential	Quality			
	Area Proportion (%)		Lithofacies (Major Aquifers)	Stratigraphy of Geological Age*		m		mbgs		lpsm							
	Plain-Plateau	Hilly-Piedmont		Q	Tertiary Neo. Paleoc.	mini.	max.	mini.	max.	ave.					well		
Alabid	12%	84%	4%	X	X	22.0	73.1	12.0	36.0	0.15	3	0%	96%	4%	partly good	poor	partly saline
	40%	22%	38%	X	X	30.0	65.0	24.0	50.0	-	0	0%	62%	38%	good	rich	
	1%	77%	22%	X	X	45.7	45.7	25.9	25.9	-	0	0%	78%	22%	fair	rich	Fe/Mn
	1%	99%	0%	X	X	-	-	-	-	-	0	0%	100%	0%	fair	rich	
Cagayan de Oro	36%	43%	21%	X	X	-	-	-	-	-	14	0%	79%	21%	good	poor	partly saline mining
			terrace gravel														
Claveria	0%	57%	43%	X	X	42.7	54.9	24.0	25.9	-	0	0%	57%	43%	fair	fair	partly saline
	6%	48%	46%	X	X	24.0	79.0	10.0	68.0	0.12	2	0%	54%	46%	partly good	poor	
El Salvador			limestone														
			pyroclastics														
Gigong City	38%	59%	3%	X	X	-	-	-	-	1.10	4	0%	97%	3%	good	rich	
	1%	98%	1%	X	X	24.0	200.0	2.0	21.0	0.15	0	0%	99%	1%	fair	poor	
Gitugum	2%	71%	27%	X	X	110.0	180.0	80.0	80.0	1.32	2	0%	73%	27%	fair	poor	
	2%	98%	0%	X	X	27.4	29.4	18.3	18.3	0.95	0	0%	100%	0%	fair	fair	
Jasaan	2%	98%	0%	X	X	21.3	42.7	18.3	21.3	0.23	1	0%	100%	0%	fair	rich	Fe/Mn
	2%	98%	0%	X	X	24.3	40.0	4.0	12.2	-	0	0%	48%	52%	good	rich	
Lagonglong	16%	32%	52%	X	X												
			pyroclastics														
Laguindingan	1%	99%	0%	X	X	45.0	76.2	12.2	53.4	0.32	2	0%	100%	0%	fair	poor	
	1%	73%	26%	X	X	30.0	64.0	18.0	45.0	0.14	1	0%	74%	26%	fair	poor	
Libertad	2%	98%	0%	X	X	36.0	36.0	21.3	22.0	0.13	4	0%	100%	0%	partly good	poor	partly saline
			conglomerate & sandstone														
Lugait	17%	83%	0%	X	X	36.6	36.6	12.2	18.3	-	0	0%	100%	0%	good	poor	
			recent deposits & sandstone														
Magsaysay	3%	53%	44%	X	X	-	-	-	-	-	0	0%	56%	44%	partly good	rich	partly saline mining
			conglomerate & sandstone														
Mandicao	30%	34%	36%	X	X	30.0	57.9	22.0	30.0	0.33	1	0%	64%	36%	good	rich	
			recent deposits & pyroclastics														
Medina	1%	40%	59%	X	X	20.4	36.6	FF*	32.9	0.10	0	0%	41%	59%	partly good	rich	partly saline
			conglomerate & sandstone														
Naawan	7%	56%	37%	X	X	24.3	42.7	18.3	36.6	0.10	0	0%	63%	37%	partly good	poor	partly saline
			recent deposits & limestone														
Opol	2%	96%	2%	X	X	30.5	42.7	18.3	24.4	-	0	0%	98%	2%	fair	rich	
	1%	99%	0%	X	X	-	-	-	-	-	0	0%	100%	0%	fair	rich	
Salay	37%	63%	0%	X	X	24.3	36.6	18.3	18.3	0.10	0	0%	100%	0%	good	fair	mining
	2%	81%	17%	X	X	24.3	36.4	18.3	30.5	-	0	0%	83%	17%	fair	rich	Fe/Mn
Tagoloan	34%	66%	0%	X	X	18.2	18.2	9.1	9.1	-	0	0%	100%	0%	good	fair	
			recent deposits & pyroclastics														

Legend: Geological Age: Q=Quaternary, Neo=Neogene, Paleoc=Paleogene, C=Cretaceous
 Well Information: SWL=static water level, Sp.Cap=specific capacity, L-III=well operated for L-III service, FF=free flowing
 Groundwater Information: SW=solo shallow well area, DW=deep well area, Diff=difficult area

Table 7.6.3 Proportion of Gravel Packed and Natural Gravel Packed Wells

Municipality (only potential area)	Proposed Well Depth	Proportion (%) of Level-I Deep Wells	
		Gravel Packed	Natural Gravel Packed
Alubijid	40 m	90 %	10 %
Balingasag	40 m	90 %	10 %
El Salvador	40 m	95 %	5 %
Gingoog City	40 m	85 %	15 %
Lagonglong	40 m	85 %	15 %
Magsaysay	80 m	95 %	5 %
Medina	40 m	90 %	10 %
Opol	40 m	95 %	5 %
Tagoloan	40 m	90 %	10 %
Villanueva	40 m	90 %	10 %

(2) Spring

Untapped spring source identification data are shown in Table 7.6.4. These data were collected and tabulated in the questionnaire sheets on untapped spring information format, Data Report. Data also include barangay name, owner, discharge, transmission line length, and elevation difference.

Table 7.6.4 Untapped Spring Source Identification

Location		Identification of Untapped Spring			
Municipality	Barangay	Owner	Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
Balingasag	Binitinan	NA	5.0	0.5	NA
	Blanco	NA	70.0	3.0	NA
	Camuayan	NA	12.0	2.0	NA
	Kibanban	NA	6.0	0.5	NA
	Napaliran	NA	5.0	4.0	NA
	Quezon	NA	4.0	3.2	NA
	Samay	NA	10.0	2.5	NA
Binuangan	Nabataan	NA	1.8	2.5	NA
	Poblacion	NA	1.3	2.0	NA
	Valdeconcha	NA	1.9	2.0	NA
Gitagum	Matangad	NA	1.5	2.5	NA
Kinoguitan	Poblacion	NA	7.4	3.0	NA

Table 7.6.4 Untapped Spring Source Identification (cont'd)

Location		Identification of Untapped Spring			
Municipality	Barangay	Owner	Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
Libertad	Tangcub	NA	0.9	8.0	NA
	Taytayan	NA	0.9	11.0	NA
Manticao	Paniangan	NA	0.3	2.8	NA
Sugbongcogon	Ampianga	NA	1.2	1.0	NA
	Kidampas	NA	1.3	1.5	NA
	Mimburahan	NA	1.3	1.0	NA
Tagoloan	Poblacion	NA	50.0	2.0	NA

Notes: T.L.L. : Transmission line length

NA : Data not available

7.7 Water Source Development for Medium-Term Development Plan

7.7.1 Detailed Groundwater Investigation Required

(1) Test Well Investigation on Exploitable Groundwater Potential in the Central Peninsula Area

The core towns of this province are concentrated in this peninsula, namely: Gingoog City, Balingasag and Tagoloan. This Central Peninsula is known as an area with rich spring sources. However, these 3 municipalities/city have high groundwater potential and this has been developed preferentially. For future sustainable groundwater development in term of quantity and quality, therefore, the study on sustainable yield of potable groundwater should be conducted in recent deposits areas.

For Gingoog City area, the recommended tasks are the pumping tests of existing wells with water quality examination, etc. as specified below.

- Study Site; about 25 km² around seashore belt between Gingoog City and Medina
- Review of Electrical Prospecting Survey; Groundwater Investigation, 1982 by NWRC
- Test Wells; existing deep wells owned by the Gingoog City WD
- Pumping Test; Time Draw-down with maximum discharge of 3,000 m³/day and Recovery Test
- Water Quality Examination; to include CI
- Results; exploitable groundwater potential

For Balingasag and Tagoloan areas, the recommended tasks are the test wells with pumping tests, the water quality examination, etc. as specified below.

- Study Site; about 10 km² each of Balingasag and Tagoloan
- Number of Test Wells; one deep well in each municipality
- Tentative Well Design; depth of 120m, diameter of 250mm and screen length of 30m
- Pumping Test; Time Draw-down with maximum discharge of 2,500 m³/day and Recovery Test
- Water Quality Examination; to include Cl
- Results; exploitable groundwater potential

7.7.2 Spacing Allocation for Level II and III Wells

The pumping rates required for Level I facilities are fairly lower compared with that of Level II and III systems. The well interference in Level I facilities need not 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 higher discharges to meet the water demand, the spacing of wells to avoid well interference has to be considered. Spacing allocation for Level II and III wells was examined considering specific capacity, pumping rate, and the assumed drawdown of 1cm at the 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 lpsm to 6.5 lpsm. 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 10m with the average value of specific capacity and pump operation of 16 hours/day. The formula used to determine proper well spacing is the Jacob modified equation. Drawdown at the interference boundary is assumed 1cm after a pumping duration of 16 hours.

Table 7.7.1 presents the estimated spacing requirements and the number of wells to be constructed within a well field of 1km². The spacing interval between adjacent wells to avoid well interference is planned to be more than twice the distances of the calculated interference radius.

Table 7.7.1 Spacing Arrangements for Planned Wells

Range of Specific Capacity (lpsm)	Estimated Pumping Rate (m³/day)	Estimated Interference Radius (m)	Estimated Number of wells/km²
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