

4.2 Sanitation and Sewerage

4.2.2 Types of Facilities and Definition of Service Level Standard

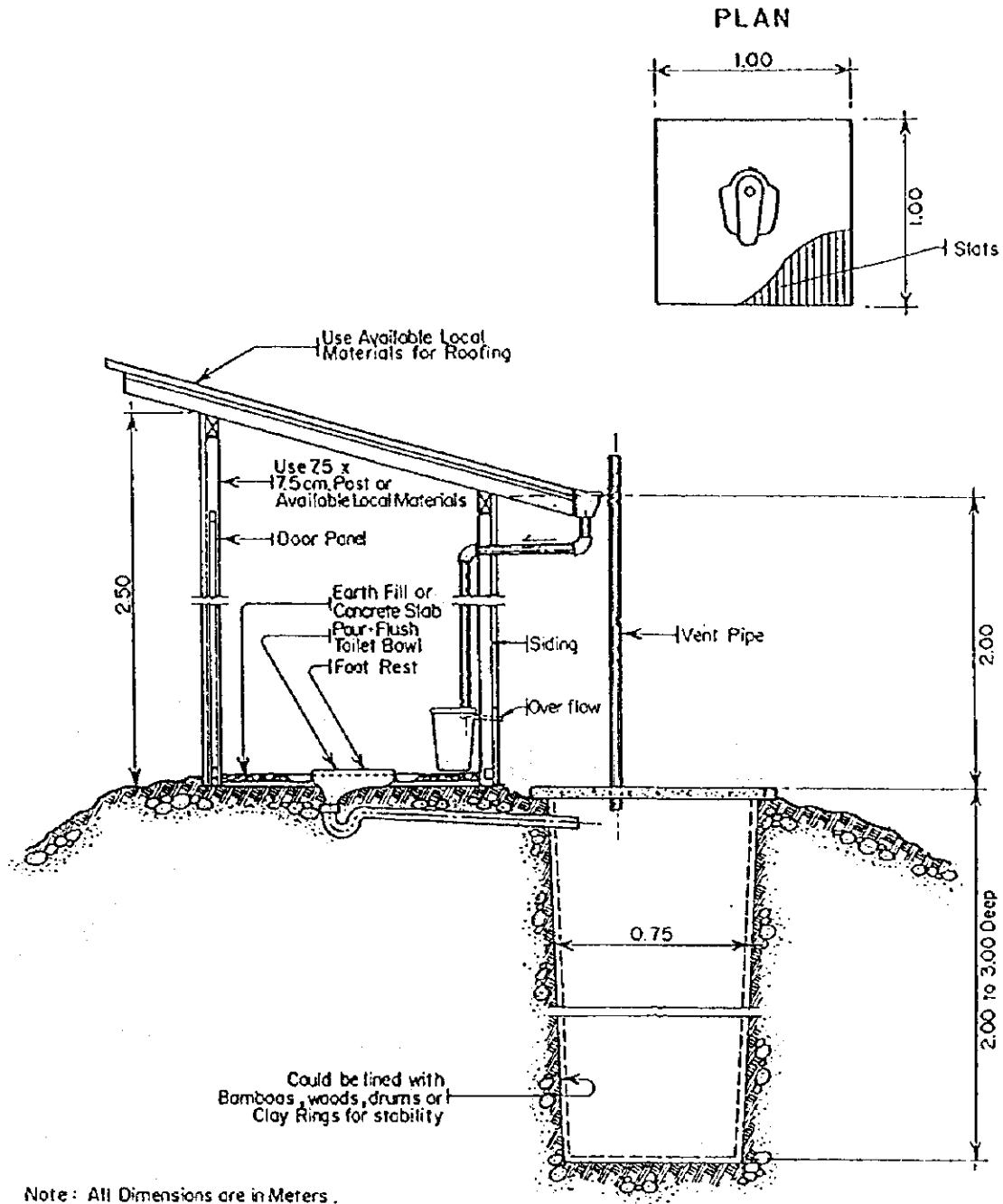
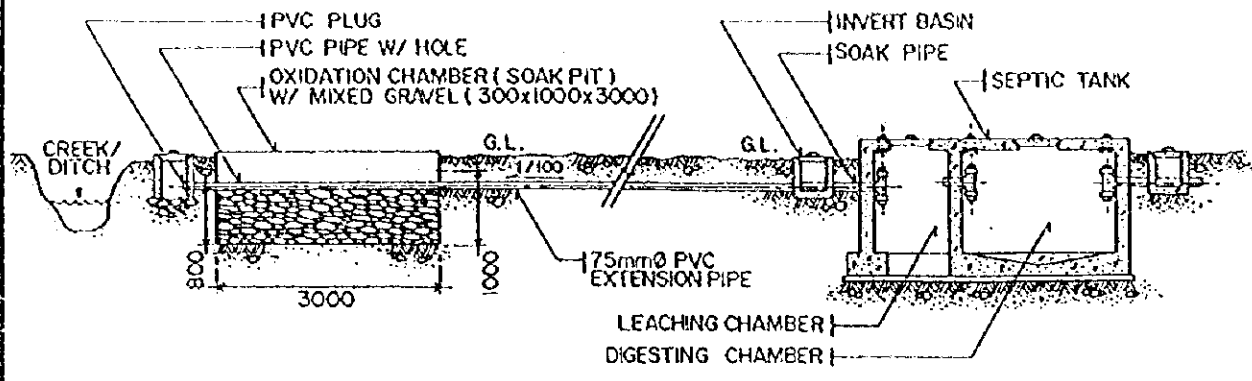
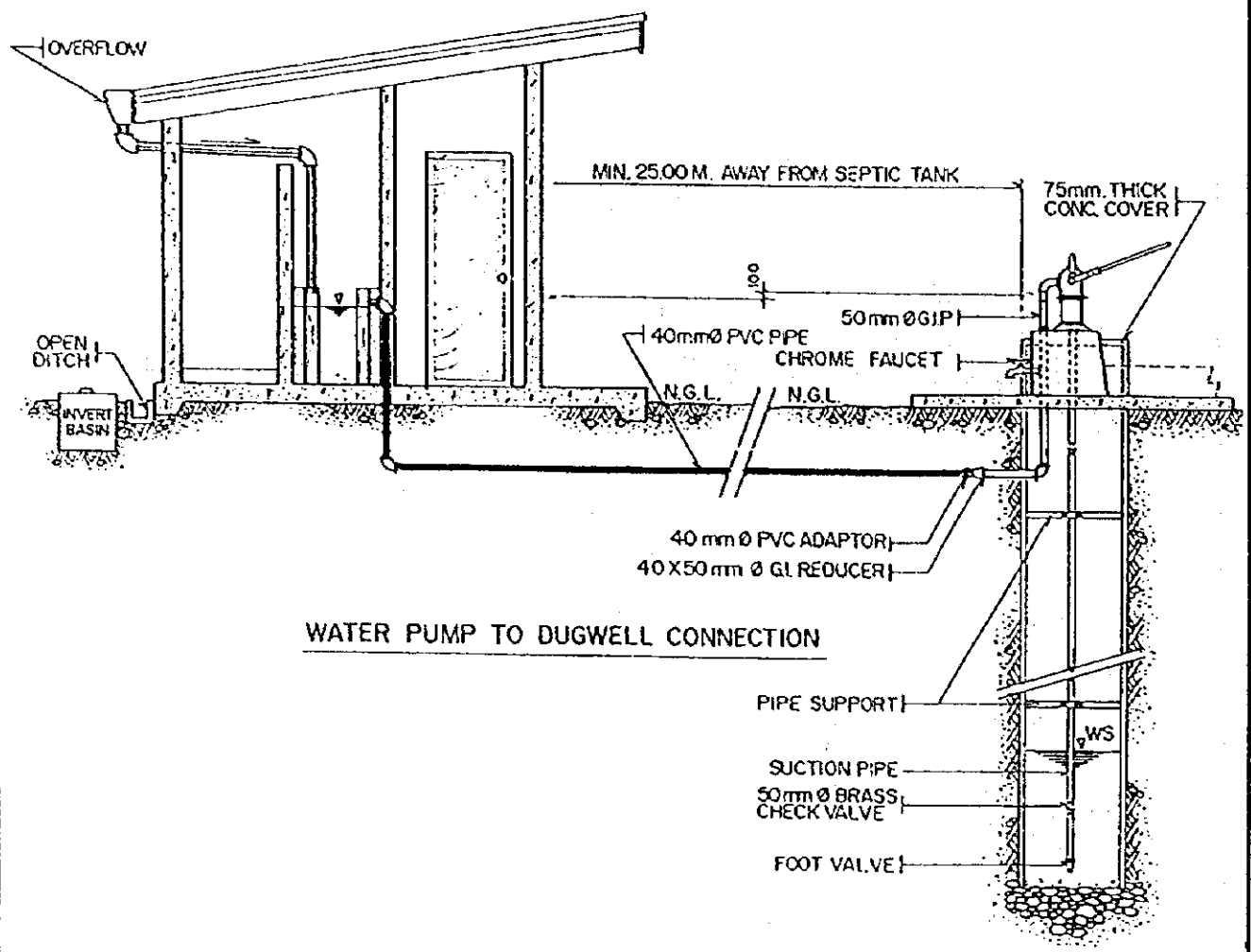


FIGURE 4.2.1
STANDARD STRUCTURE OF PRIVATE TOILET FACILITY

SOURCE : DEPARTMENT OF HEALTH



LAYOUT PLAN OF HIGH GROUND WATER SITE



WATER PUMP TO DUGWELL CONNECTION

FIGURE 4.2.2
STANDARD STRUCTURE OF SCHOOL TOILET FACILITY

SOURCE : JICA - DPWH RURAL ENVIRONMENTAL SANITATION PROJECT .

4.2.3 Sanitation Facilities and Service Coverage

Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets by Type, by Municipality, Urban and Rural 1997

| Name of Municipalities | Area | No. of Households (1997) | Households Served by Sanitary Toilets | | | | | | Underserved/Unserv'd HHs | | | | | |
|--------------------------|-------|--------------------------|---------------------------------------|--------|------------|----|--------|--------|--------------------------|--------|------------|--------|-------------|---|
| | | | Flush Toilet | | Pour Flush | | VIP | | Total | | Unsanitary | | No Facility | |
| | | | Number | % | Number | % | Number | % | Number | % | Number | % | Number | % |
| Alegria | Urban | 893 | | 690 | 77 | | | 696 | 77 | 202 | 23 | | | |
| | Rural | 1,267 | | 775 | 61 | | | 775 | 61 | 42 | 3 | 450 | 36 | |
| | Total | 2,159 | | 1,465 | 68 | | | 1,465 | 68 | 244 | 11 | 450 | 21 | |
| Bacuzag | Urban | 1,502 | | 1,200 | 80 | | | 1,200 | 80 | 302 | 20 | | | |
| | Rural | 723 | | 527 | 73 | | | 527 | 73 | 89 | 12 | 107 | 15 | |
| | Total | 2,225 | | 1,727 | 78 | | | 1,727 | 78 | 391 | 18 | 107 | 5 | |
| Basilisa (Rizal) | Urban | 564 | | 328 | 58 | | | 328 | 58 | 240 | 42 | | | |
| | Rural | 4,079 | | 2,811 | 69 | | | 2,811 | 69 | | | 1,268 | 31 | |
| | Total | 4,643 | | 3,139 | 68 | | | 3,139 | 68 | 240 | 5 | 1,268 | 27 | |
| Burgos | Urban | 458 | | 371 | 81 | | | 371 | 81 | 87 | 19 | | | |
| | Rural | 124 | | 85 | 69 | | | 85 | 69 | 4 | 3 | 35 | 28 | |
| | Total | 582 | | 456 | 78 | | | 456 | 78 | 91 | 16 | 35 | 6 | |
| Cagdianao | Urban | 1,060 | | 531 | 50 | | | 531 | 50 | 214 | 20 | 315 | 30 | |
| | Rural | 1,215 | | 905 | 74 | | | 905 | 74 | 53 | 8 | 215 | 18 | |
| | Total | 2,275 | | 1,436 | 63 | | | 1,436 | 63 | 309 | 14 | 530 | 23 | |
| Claver | Urban | 1,524 | | 1,371 | 90 | | | 1,371 | 90 | 153 | 10 | | | |
| | Rural | 1,418 | | 963 | 68 | | | 963 | 68 | | | 455 | 32 | |
| | Total | 2,942 | | 2,334 | 79 | | | 2,334 | 79 | 153 | 5 | 455 | 15 | |
| Dapa | Urban | 2,400 | | 1,829 | 76 | | | 1,829 | 76 | 571 | 24 | | | |
| | Rural | 952 | | 654 | 69 | | | 654 | 69 | 98 | 10 | 200 | 24 | |
| | Total | 3,352 | | 2,483 | 74 | | | 2,483 | 74 | 669 | 20 | 200 | 6 | |
| Del Carmen | Urban | 671 | | 646 | 96 | | | 646 | 96 | 25 | 4 | | | |
| | Rural | 1,783 | | 867 | 49 | | | 867 | 49 | 141 | 8 | 775 | 43 | |
| | Total | 2,454 | | 1,513 | 62 | | | 1,513 | 62 | 166 | 7 | 775 | 32 | |
| Dinagat | Urban | 523 | | 355 | 68 | | | 355 | 68 | 168 | 32 | | | |
| | Rural | 1,206 | | 779 | 65 | | | 779 | 65 | | | 427 | 35 | |
| | Total | 1,729 | | 1,134 | 66 | | | 1,134 | 66 | 168 | 10 | 427 | 25 | |
| General Luna | Urban | 919 | | 619 | 67 | | | 619 | 67 | 300 | 33 | | | |
| | Rural | 1,556 | | 1,062 | 68 | | | 1,062 | 68 | | | 491 | 32 | |
| | Total | 2,475 | | 1,681 | 68 | | | 1,681 | 68 | 300 | 12 | 491 | 20 | |
| Giguait | Urban | 1,217 | | 865 | 71 | | | 865 | 71 | 352 | 29 | | | |
| | Rural | 1,706 | | 1,283 | 75 | | | 1,283 | 75 | 249 | 15 | 169 | 10 | |
| | Total | 2,923 | | 2,153 | 74 | | | 2,153 | 74 | 601 | 24 | 169 | 6 | |
| Libjo (Albor) | Urban | 602 | | 578 | 96 | | | 578 | 96 | 24 | 4 | | | |
| | Rural | 2,319 | | 1,259 | 54 | | | 1,259 | 54 | 340 | 15 | 720 | 31 | |
| | Total | 2,921 | | 1,837 | 63 | | | 1,837 | 63 | 364 | 12 | 720 | 25 | |
| Loreto | Urban | 1,202 | | 959 | 80 | | | 959 | 80 | 243 | 20 | | | |
| | Rural | 568 | | 222 | 39 | | | 222 | 39 | 51 | 9 | 294 | 52 | |
| | Total | 1,770 | | 1,181 | 67 | | | 1,181 | 67 | 295 | 17 | 294 | 17 | |
| Mainit | Urban | 1,940 | | 1,415 | 73 | | | 1,415 | 73 | 525 | 27 | | | |
| | Rural | 2,255 | | 1,854 | 82 | | | 1,854 | 82 | | | 401 | 18 | |
| | Total | 4,195 | | 3,269 | 78 | | | 3,269 | 78 | 525 | 13 | 401 | 10 | |
| Mulimona | Urban | 1,337 | | 752 | 56 | | | 752 | 56 | 585 | 44 | | | |
| | Rural | 1,499 | | 1,137 | 81 | | | 1,137 | 81 | | | 272 | 19 | |
| | Total | 2,746 | | 1,889 | 69 | | | 1,889 | 69 | 585 | 21 | 272 | 10 | |
| Pilar | Urban | 441 | | 389 | 88 | | | 389 | 88 | 52 | 12 | | | |
| | Rural | 1,113 | | 705 | 63 | | | 705 | 63 | | | 408 | 37 | |
| | Total | 1,554 | | 1,094 | 70 | | | 1,094 | 70 | 52 | 3 | 408 | 26 | |
| Placer | Urban | 2,366 | | 2,072 | 88 | | | 2,072 | 88 | 294 | 12 | | | |
| | Rural | 1,803 | | 1,175 | 65 | | | 1,175 | 65 | 131 | 7 | 497 | 28 | |
| | Total | 4,169 | | 3,247 | 78 | | | 3,247 | 78 | 425 | 10 | 497 | 12 | |
| San Benito | Urban | 388 | | 373 | 96 | | | 373 | 96 | 15 | 4 | 107 | 66 | |
| | Rural | 465 | | 158 | 34 | | | 158 | 34 | | | 307 | 36 | |
| | Total | 853 | | 531 | 62 | | | 531 | 62 | 15 | 2 | 307 | 36 | |
| San Francisco (Anao-Aon) | Urban | 827 | | 552 | 67 | | | 552 | 67 | 275 | 33 | | | |
| | Rural | 1,210 | | 888 | 73 | | | 888 | 73 | 62 | 5 | 260 | 21 | |
| | Total | 2,037 | | 1,440 | 71 | | | 1,440 | 71 | 337 | 17 | 260 | 13 | |
| San Isidro | Urban | 314 | | 301 | 96 | | | 301 | 96 | 13 | 4 | | | |
| | Rural | 735 | | 373 | 51 | | | 373 | 51 | | | 362 | 49 | |
| | Total | 1,049 | | 674 | 64 | | | 674 | 64 | 13 | 1 | 362 | 35 | |
| San Jose | Urban | 2,895 | | 1,966 | 68 | | | 1,966 | 68 | 433 | 17 | 445 | 15 | |
| | Rural | 1,955 | | 1,178 | 60 | | | 1,178 | 60 | | | 777 | 40 | |
| | Total | 4,850 | | 3,144 | 65 | | | 3,144 | 65 | 433 | 10 | 1,222 | 25 | |
| Santa Monica (Sapao) | Urban | 341 | | 175 | 51 | | | 175 | 51 | 166 | 49 | | | |
| | Rural | 966 | | 556 | 58 | | | 556 | 58 | | | 410 | 32 | |
| | Total | 1,307 | | 731 | 56 | | | 731 | 56 | 166 | 13 | 410 | 31 | |
| Sison | Urban | 562 | | 530 | 96 | | | 530 | 96 | 32 | 6 | | | |
| | Rural | 1,146 | | 946 | 83 | | | 946 | 83 | | | 200 | 17 | |
| | Total | 1,708 | | 1,476 | 87 | | | 1,476 | 87 | 32 | 1 | 200 | 12 | |
| Socongo | Urban | 1,359 | | 1,301 | 96 | | | 1,301 | 96 | 58 | 4 | | | |
| | Rural | 1,368 | | 862 | 63 | | | 862 | 63 | | | 506 | 37 | |
| | Total | 2,727 | | 2,163 | 79 | | | 2,163 | 79 | 58 | 2 | 506 | 19 | |
| Surigao City (Capital) | Urban | 13,571 | 1,921 | 14 | 5,617 | 41 | | 5,538 | 56 | 6,033 | 44 | | | |
| | Rural | 7,309 | | 5,845 | 80 | | | 5,845 | 80 | | | 1,464 | 20 | |
| | Total | 20,880 | 1,921 | 9 | 11,462 | 55 | | 11,383 | 64 | 6,033 | 29 | 1,464 | 7 | |
| Tugana-An | Urban | 1,106 | | 938 | 85 | | | 938 | 85 | 168 | 15 | | | |
| | Rural | 1,313 | | 942 | 72 | | | 942 | 72 | 41 | 3 | 330 | 25 | |
| | Total | 2,419 | | 1,880 | 78 | | | 1,880 | 78 | 209 | 9 | 330 | 14 | |
| Tubigon | Urban | 398 | | 398 | 100 | | | 398 | 100 | | | | | |
| | Rural | 871 | | 422 | 48 | | | 422 | 48 | | | 449 | 52 | |
| | Total | 1,269 | | 820 | 65 | | | 820 | 65 | | | 449 | 35 | |
| Tubod | Urban | 295 | | 287 | 97 | | | 287 | 97 | 8 | 3 | | | |
| | Rural | 1,742 | | 1,337 | 77 | | | 1,337 | 77 | | | 405 | 23 | |
| | Total | 2,037 | | 1,624 | 80 | | | 1,624 | 80 | 8 | 0 | 405 | 20 | |
| Provincial Total | Urban | 41,678 | 1,921 | 5 | 27,418 | 66 | | 29,339 | 70 | 11,578 | 28 | 761 | 2 | |
| | Rural | 44,576 | | 30,575 | 69 | | | 30,575 | 69 | 1,341 | 3 | 12,637 | 28 | |
| | Total | 86,254 | 1,921 | 2 | 57,993 | 67 | | 59,914 | 69 | 12,922 | 15 | 13,418 | 16 | |

Table 4.2.2 Number of Student and School Toilet Facilities by Municipality

| Name of Municipality | Number of School | Number of Student | Number of Toilets | | |
|--------------------------|------------------|-------------------|-------------------|------------|-------|
| | | | Sanitary | Unsanitary | Total |
| Alegria | Public | 10 | 3,189 | 26 | 26 |
| | Private | 1 | 185 | | |
| | Total | 11 | 3,374 | 26 | 26 |
| Bacuag | Public | 14 | 2,158 | 77 | 77 |
| | Private | 1 | 421 | | |
| | Total | 15 | 2,579 | 77 | 77 |
| Basista (Rizal) | Public | 27 | 4,460 | 75 | 75 |
| | Private | | | | |
| | Total | 27 | 4,460 | 75 | 75 |
| Burgos | Public | 9 | 1,506 | 6 | 6 |
| | Private | | | | |
| | Total | 9 | 1,506 | 6 | 6 |
| Cagdianao | Public | 19 | 2,928 | 71 | 71 |
| | Private | | | | |
| | Total | 19 | 2,928 | 71 | 71 |
| Claver | Public | 45 | 3,760 | 90 | 90 |
| | Private | | | | |
| | Total | 45 | 3,760 | 90 | 90 |
| Dapa | Public | 23 | 5,631 | 12 | 12 |
| | Private | 2 | 294 | | |
| | Total | 25 | 5,925 | 12 | 12 |
| Del Carmen | Public | 27 | 2,156 | 54 | 54 |
| | Private | | | | |
| | Total | 27 | 2,156 | 54 | 54 |
| Dinagat | Public | 11 | 3,152 | 22 | 22 |
| | Private | | | | |
| | Total | 11 | 3,152 | 22 | 22 |
| General Luna | Public | 16 | 3,136 | 48 | 48 |
| | Private | | | | |
| | Total | 16 | 3,136 | 48 | 48 |
| Gigaquit | Public | 11 | 3,009 | 88 | 88 |
| | Private | 1 | 224 | | |
| | Total | 12 | 3,233 | 88 | 88 |
| Libjo (Albor) | Public | 16 | 3,535 | 13 | 13 |
| | Private | | | | |
| | Total | 16 | 3,535 | 13 | 13 |
| Loreto | Public | 10 | 1,458 | 40 | 40 |
| | Private | 1 | 205 | | |
| | Total | 11 | 1,663 | 40 | 40 |
| Mainit | Public | 21 | 5,690 | 76 | 76 |
| | Private | 1 | 650 | 2 | 2 |
| | Total | 22 | 6,340 | 78 | 78 |
| Malimono | Public | 19 | 3,932 | 42 | 42 |
| | Private | | | | |
| | Total | 19 | 3,932 | 42 | 42 |
| Pilar | Public | 12 | 1,578 | 24 | 24 |
| | Private | | | | |
| | Total | 12 | 1,578 | 24 | 24 |
| Placer | Public | 20 | 4,919 | 220 | 220 |
| | Private | 1 | 231 | | |
| | Total | 21 | 5,150 | 220 | 220 |
| San Benito | Public | 14 | 2,301 | 40 | 40 |
| | Private | | | | |
| | Total | 14 | 2,301 | 40 | 40 |
| San Francisco (Anao-Ann) | Public | 14 | 2,524 | 75 | 75 |
| | Private | 1 | 195 | | |
| | Total | 15 | 2,719 | 75 | 75 |
| San Isidro | Public | 12 | 1,578 | 91 | 91 |
| | Private | | | | |
| | Total | 12 | 1,578 | 91 | 91 |
| San Jose | Public | 13 | | 93 | 93 |
| | Private | 1 | | | |
| | Total | 14 | | 93 | 93 |
| Santa Monica (Sapaog) | Public | 8 | 1,365 | 16 | 16 |
| | Private | | | | |
| | Total | 8 | 1,365 | 16 | 16 |
| Sison | Public | 13 | 2,320 | 46 | 46 |
| | Private | | | | |
| | Total | 13 | 2,320 | 46 | 46 |
| Secoro | Public | 16 | 3,886 | 66 | 66 |
| | Private | | | | |
| | Total | 16 | 3,886 | 66 | 66 |
| Surigao City (Capital) | Public | 71 | 32,028 | 518 | 518 |
| | Private | 4 | 4,200 | 18 | 18 |
| | Total | 75 | 36,228 | 536 | 536 |
| Tagana-An | Public | 13 | 2,775 | 26 | 26 |
| | Private | | | | |
| | Total | 13 | 2,775 | 26 | 26 |
| Tubajan | Public | 12 | 1,869 | 33 | 33 |
| | Private | | | | |
| | Total | 12 | 1,869 | 33 | 33 |
| Tubod | Public | 8 | 2,400 | 24 | 24 |
| | Private | 1 | | | |
| | Total | 9 | 2,400 | 24 | 24 |
| Provincial Total | Public | 474 | 109,243 | 2,012 | 2,012 |
| | Private | 15 | 7,026 | 18 | 18 |
| | Total | 489 | 116,269 | 2,030 | 2,030 |

Table 4.2.3 Number of Public Toilets Facilities in 1997

| Name of Municipality | Public Markets | | | Bus/Jeepney Terminals | | | Parks/Playground | | | Total Number of Toilets |
|--------------------------|-------------------------|---------------------------|-----------|-------------------------|---------------------------|-----------|-------------------------|---------------------------|-----------|-------------------------|
| | No. of Sanitary Toilets | No. of Unsanitary Toilets | Sub-total | No. of Sanitary Toilets | No. of Unsanitary Toilets | Sub-total | No. of Sanitary Toilets | No. of Unsanitary Toilets | Sub-total | |
| Alegria | 1 | | 1 | | | | | | | 1 |
| Bacuzag | 2 | | 2 | | | | | | | 2 |
| Basilisa (Rizal) | 1 | | 1 | | | | | | | 1 |
| Burgos | 1 | | 1 | | | | 2 | | 2 | 3 |
| Cagdianao | 1 | | 1 | | | | | | | 1 |
| Claver | 1 | | 1 | 1 | | 1 | | | 1 | 3 |
| Dapa | 2 | | 2 | 2 | | 2 | | | 1 | 5 |
| Del Carmen | 1 | | 1 | | | | | | | 1 |
| Dinagat | 1 | | 1 | | | | 4 | | 4 | 5 |
| General Luna | | | | | | | | | | |
| Gigaquit | 1 | | 1 | | | | | | 3 | 4 |
| Libjo (Albor) | | | | | | | | | 5 | 5 |
| Loreto | 1 | | 1 | | | | 2 | | 2 | 3 |
| Maimit | 1 | | 1 | 3 | | 3 | | | | 4 |
| Malimono | 1 | | 1 | 1 | | 1 | | | 6 | 8 |
| Pilar | 1 | | 1 | | | | | | 1 | 2 |
| Placer | 1 | | 1 | 2 | | 2 | | | | 3 |
| San Benito | 1 | | 1 | 1 | | 1 | | | 1 | 3 |
| San Francisco (Anao-Aon) | 1 | | 1 | | | | | | | 1 |
| San Isidro | 1 | | 1 | | | | | | | 1 |
| San Jose | 2 | | 2 | | | | 2 | | 2 | 4 |
| Santa Monica (Sapao) | 1 | | 1 | | | | | | | 1 |
| Sison | 1 | | 1 | | | | | | | 1 |
| Socorro | 2 | | 2 | | | | | | 1 | 3 |
| Surigao City (Capital) | 6 | | 6 | 2 | | 2 | | | 2 | 10 |
| Tagana-An | 1 | | 1 | | | | | | | 1 |
| Tubajon | 1 | | 1 | | | | | | | 1 |
| Tubod | 1 | | 1 | | | | | | | 1 |
| Provincial Total | 35 | | 35 | 12 | | 12 | 31 | | 31 | 78 |



5. EXISTING SECTOR ARRANGEMENT AND INSTITUTIONAL CAPACITY

5.5 Sector Agencies at the Local Level

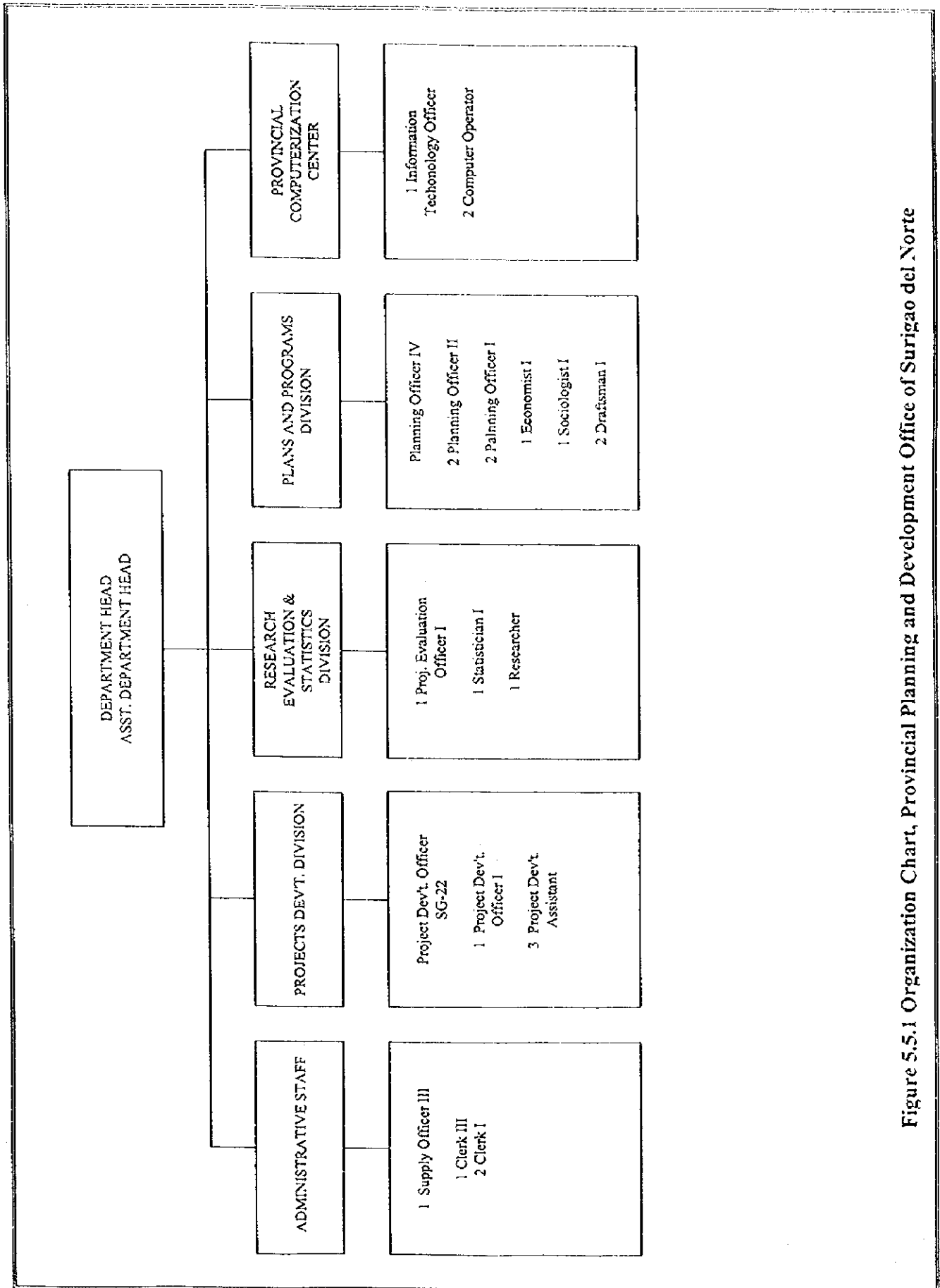


Figure 5.5.1 Organization Chart, Provincial Planning and Development Office of Surigao del Norte

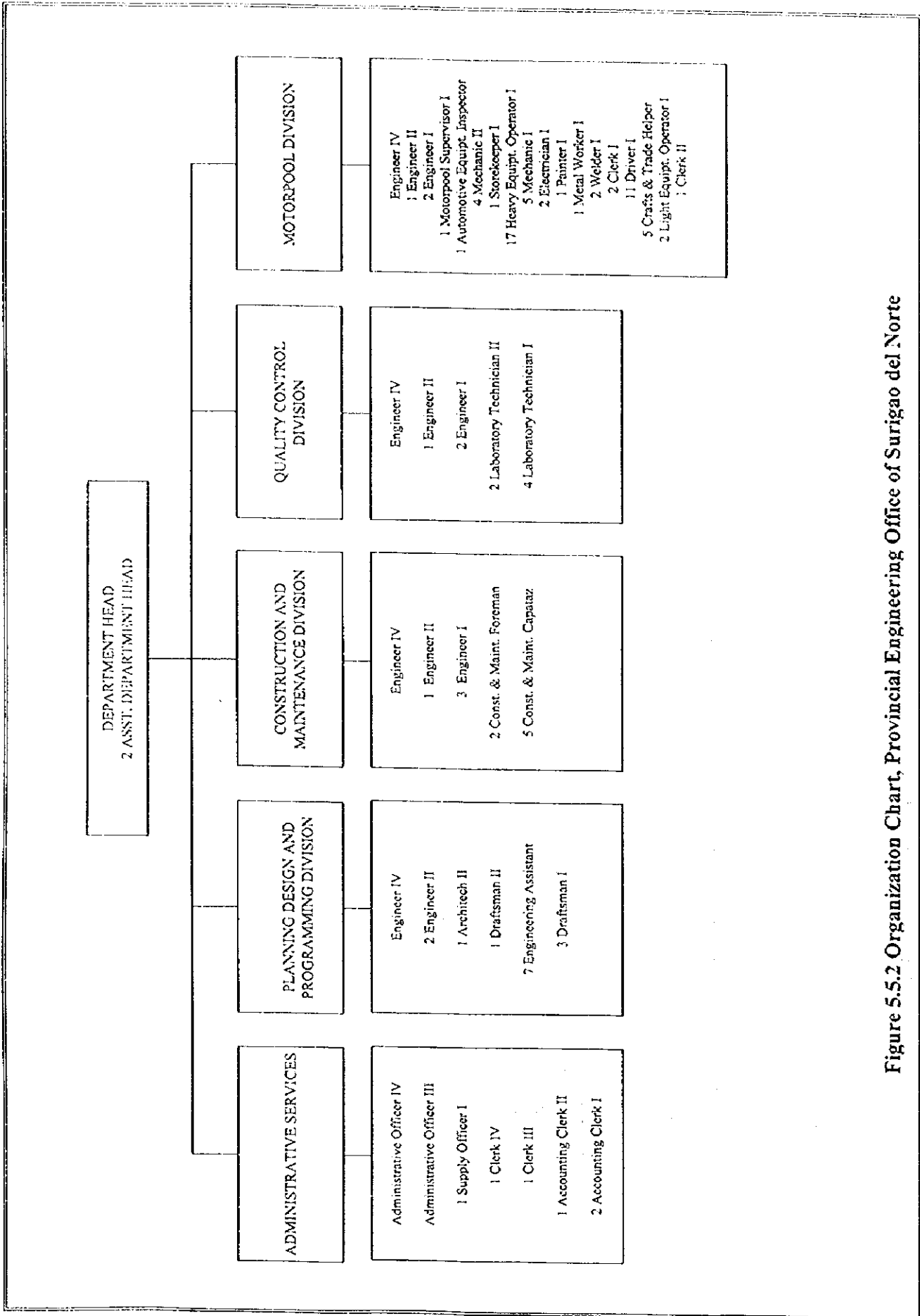


Figure 5.5.2 Organization Chart, Provincial Engineering Office of Surigao del Norte

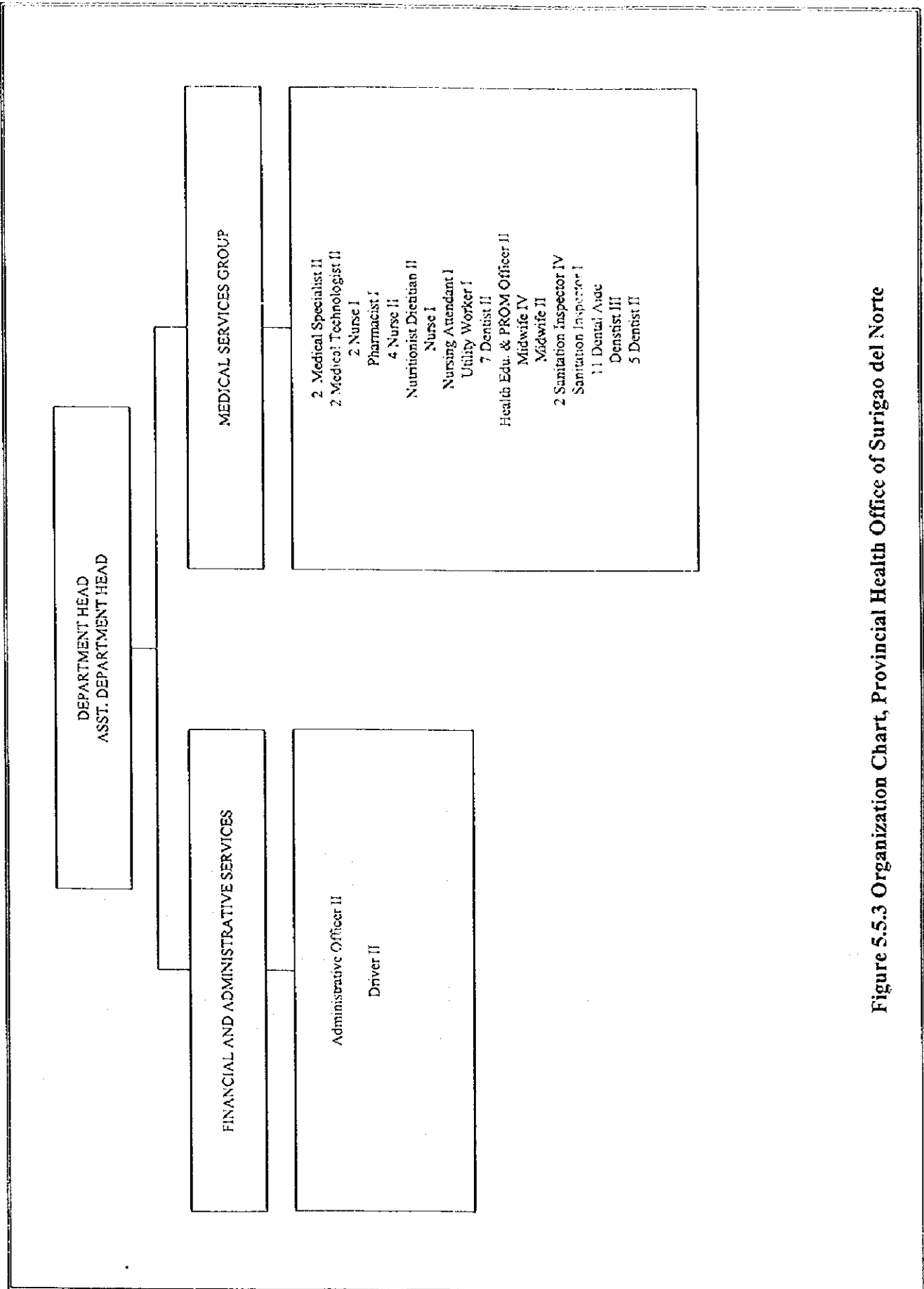


Figure 5.5.3 Organization Chart, Provincial Health Office of Surigao del Norte

5.6 External Support Agencies in the Sector

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

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

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

5.7 Project Management Arrangement, and Issues and Problems
 5.7.2 Institutional Aspect

Table 5.7.1 Office/Agencies involved in WATSAN project

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

5.8 Community Development

5.8.1 General

(I) RESULTS OF THE BARANGAY KEY INFORMANT SURVEY FOR SURIGAO DEL NORTE

I. BARANGAY

A. General

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

The key informant survey was conducted in five (5) barangays representing three municipalities in Surigao del Norte. 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: Matinao, Mainit, Banbanon and Poblacion in San Francisco; and Malinao and Catangnan in Gen. Luna.

B. Community Organization

1. Manner of Participation in Sector Development

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

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

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

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

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

All three BWSAs that have been organized provided training on O&M for their members although their barangay councils are willing to facilitate and pay for additional training of the BWSA members on the O&M of these facilities .

II. COMMUNITY PARTICIPATION

A. General

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

B. Socio-Economic Conditions

1. Average Monthly Income in the Rural Area

The average monthly income of the households in the barangays surveyed range from P2,000.00 to P4,000.00. The list of economic activities shows the following: livestock, farming, vegetable gardening, sari-sari-store, poultry raising and fishing. The list shows both genders equally involved in these economic activities.

2. Water Borne/Water Related Diseases

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

C. Willingness to Participate

1. Initiating the Organization of a WATSAN Association

Only Barangay Catangnan does not have a committee on water and sanitation although its respondents indicated the barangay council's willingness to participate in sector projects by initiating the formation of a water and sanitation association in their communities. A big majority also indicated that the barangay council is willing to pay for the training for the user-beneficiary volunteers on O&M. In the area of health and sanitation education, the majority also believed that the barangay council has the capability to implement information dissemination activities.

D. Status of BWSAs/NGOs/CBOs/POs

1. Number of Barangays with Functional BWSAs

Three of the five barangays have existing and functional BWSAs which were organized by their respective barangay councils. The other two barangays are willing to form BWSAs for the improvement of water supply and sanitation facilities in the areas.

E. Status of NGOs/CBOs/Pos

All barangays except Catangnan, Gen. Luna reported having NGOs/CBOs that do work in their communities. The areas of concern are in cooperative development, livelihood, peace and order, agriculture. Those specifically related to sector needs are: (1) PCHD/World Vision (headed by Mr. Cesar Castro); (2) Catholic Youth Org. (headed by Riza Sepria) and (3) 4-H Club (headed by Roderick Bacol) that specializes in community development.

E. O&M Practices by Beneficiaries

1. Facility Conditions

The barangays are supplied with water from a combination of sources: shallow wells, deep wells and springs. All five barangays have existing water facilities, some of which were constructed as early as 1950. Most of the facilities are still functional but occasionally have problems. Non-functional facilities resulted from dried-up source and poor maintenance. Most of the respondents, however, believe that water from these facilities is safe for drinking.

2. Common Difficulties and O&M Problems Encountered

Common problems cited by the respondents range from poor maintenance to wells drying up. The problems show that the users/beneficiaries still have the thinking that O&M is a task that belongs to others such as the barangay council or the municipality. Prevalent is also the dole-out mentality; where the people just wait for O&M funds rather than generating this through water fees.

F. Water Charges Adopted and Collection Efficiency

1. Sufficiency of Collected Charges for O&M

Respondents from three barangays reported that barangay constituents pay certain fees to the BWSAs. However, the majority believes that the fees are not sufficient to cover for the operation and maintenance of WATSAN facilities.

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

The BWSA treasurer was responsible for collecting the fees in only one barangay, while other community leaders handle collection in three barangays. The cost of water for the 24 respondents varied as follows: Below ₱10.00, 13 respondents; between ₱10.00-20.00, 11 respondents.

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

1. Government Subsidies Requested by End Users

Three out of the five barangays were recipients of financial assistance from the provincial and/or municipal governments. Only one barangay received financial assistance from the province although respondents did not specify the amount. Two barangays reported as having received technical and financial assistance coming from the 20% development fund from their municipalities which ranged from ₱5,000.00 to ₱60,000.00 for the years 1995-1998. The amount was mostly used for the repair and maintenance of WATSAN facilities.

III. GENDER

A. General

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

B. Gender in the Composition of the Barangay Council

In the 5 barangays surveyed, the total number of barangay council members is 44. Of this number, 28 were males and 16 females. The barangay councils are still generally male-dominated, although in one barangay (Catangnan), women outnumbered men in the composition of the council. One barangay was even headed by a female barangay captain.

C. Gender in the Composition of the BWSA

The board of the three BWSAs organized is also male-dominated. Of the 25 BWSA board members, 18 are male and 7 females. To the women members were reserved the traditional roles, such as that of secretary or treasurer of the board.

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

Most of the respondents believe that women and men are equally active in WATSAN activities and that women participate in the O&M of the water facilities. On the other hand, majority, including the female respondents, indicated that women do not participate in operating and maintaining the WATSAN facilities. The respondents stated the functions of women as: (1) collecting fees and (2) maintaining the facilities specifically the cleanliness of the their premises.

D. Gender in Knowledge or Awareness of Sector Related Information

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

(2) RESULT OF GROUP INTERVIEW (SURIGAO DEL NORTE)

1.1 General

A group interview was conducted in two selected barangays representing one municipality in the province of Surigao del Norte. 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 Barangays Malinao and Catangnan, both situated in the municipality of Gen. Luna.

1.2 Demographic Profile

(1) Population

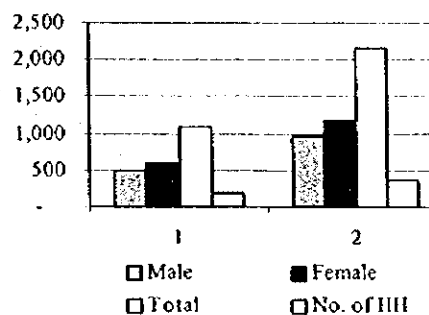
The aggregate population in the two barangays totaled 3,254, breakdown of which follows: Malinao, 1,104 (500 males, 604 females); and, Catangnan, 2,150 (968 males, 1,182 females). Females outnumbered males, comprising 54.90 percent (1,786) of the total population. Males numbered 1,468 or 45.10% of the population.

(2) Households

As indicated by the respondents, there were 529 households in the two barangays. Breakdown per barangay follows: Malinao, 171; and Catangnan, 358. The figure represents an average of six members per household.

TABLE 1: TOTAL POPULATION OF BARANGAYS AND NUMBER OF HOUSEHOLDS

| BARANGAY (MUNICIPALITY) | M | F | T | NO. OF HH |
|--------------------------|--------------------------|--------------------------|------------------------|------------|
| 1. Malinao (Gen. Luna) | 500 | 604 | 1,104 | 171 |
| 2. Catangnan (Gen. Luna) | 968 | 1,182 | 2,150 | 358 |
| TOTAL | 1,468 (45.10%) | 1,786 (54.90%) | 3,254 (100%) | 529 |



(3) Composition of Barangay Councils

As stated by the respondents, membership in the barangay councils in the two barangays numbered 14. Of the barangay council members, eight were males and six were females. All barangay captains were males.

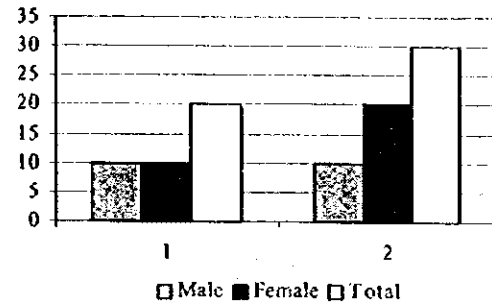
1.3 Respondents' Profile

(1) Number and Gender of Respondents

There were 50 respondents that participated in the group interviews. Of these, 20 are males and 30 are females.

TABLE 2: NUMBER OF RESPONDENTS

| BARANGAY (MUNICIPALITY) | M | F | T |
|--------------------------|--------------------|--------------------|-----------|
| 1. Malinao (Gen. Luna) | 10 | 10 | 20 |
| 2. Catangnan (Gen. Luna) | 10 | 20 | 30 |
| TOTAL | 20 (40%) | 30 (60%) | 50 |

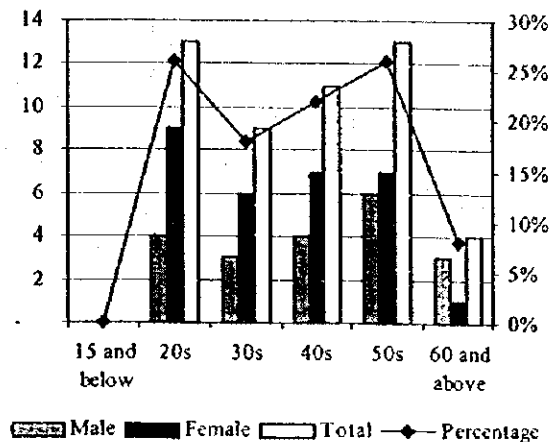


(2) Age Bracket

The 20s and 50s age bracket had 13 respondents each. Eleven interviewees comprised the 40s age group; nine belonged to the 30s while four were under the 60 and above age bracket.

TABLE 3: AGES OF THE RESPONDENTS

| AGE BRACKET | M | F | T | % |
|--------------|-----------|-----------|-----------|---------------|
| 15 and below | - | - | - | - |
| 20s | 4 | 9 | 13 | 26.00 |
| 30s | 3 | 6 | 9 | 18.00 |
| 40s | 4 | 7 | 11 | 22.00 |
| 50s | 6 | 7 | 13 | 26.00 |
| 60 and above | 3 | 1 | 4 | 8.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

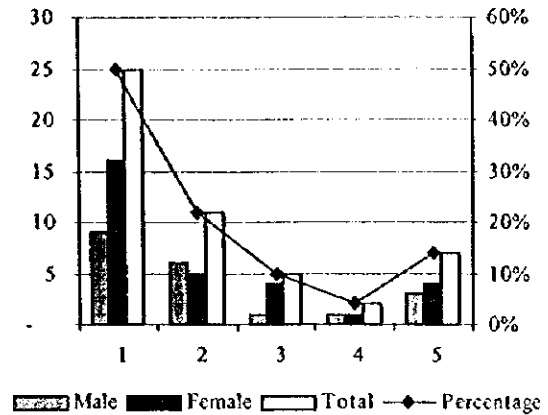


(3) Level of Education

Most of the respondents (25) attended elementary level of education. Another 11 were high school graduates, five (5) pursued college education while two took up vocational course. Seven interviewees had no formal schooling.

TABLE 4: RESPONDENTS' LEVEL OF EDUCATION

| EDUCATIONAL LEVEL | M | F | T | % |
|-------------------|-----------|-----------|-----------|---------------|
| 1. Elementary | 9 | 16 | 25 | 50.00 |
| 2. High School | 6 | 5 | 11 | 22.00 |
| 3. College | 1 | 4 | 5 | 10.00 |
| 4. Vocational | 1 | 1 | 2 | 4.00 |
| 5. No Schooling | 3 | 4 | 7 | 14.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

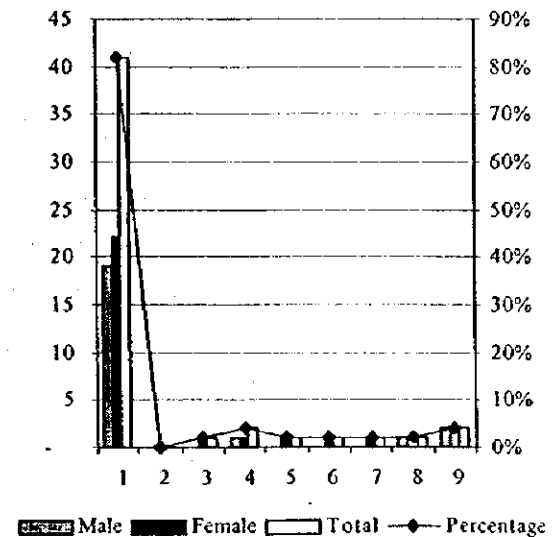


(4) Occupation

The majority, or 41 respondents were engaged in either farming or fishing. The females outnumbered the males in this work category, 22 to 19. Other occupations of the respondents included: service worker, vendors/carpenters/dressmakers; business, professional, 3 females; laborer, office worker, technician, and equipment operator.

TABLE 5: OCCUPATION OF RESPONDENTS

| OCCUPATION | M | F | T | % |
|-----------------------|-----------|-----------|-----------|---------------|
| 1. Farmer/Fisherfolk | 19 | 22 | 41 | 82.00 |
| 2. Technician | - | - | - | 0.00 |
| 3. Laborer | - | 1 | 1 | 2.00 |
| 4. Service Worker | 1 | 1 | 2 | 4.00 |
| 5. Businessman/woman | - | 1 | 1 | 2.00 |
| 6. Professional | - | 1 | 1 | 2.00 |
| 7. Office Workers | - | 1 | 1 | 2.00 |
| 8. Equipment Operator | 1 | - | 1 | 2.00 |
| 9. Others | 2 | - | 2 | 4.00 |
| TOTAL | 23 | 27 | 50 | 100.00 |



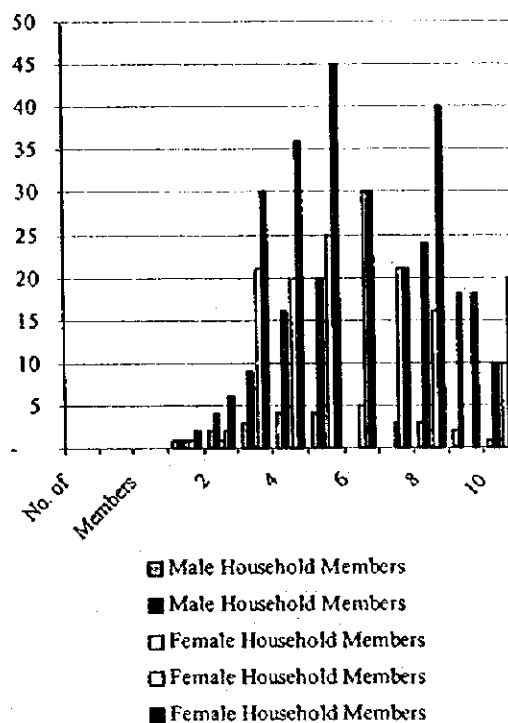
1.4 Socio Economic Profile

(1) Number of Household Members

As indicated by the respondents, total household members were 248. Females outnumber males in the respondents' households. There were 146 or 58.90% females while there are 102 or 41.10% males. The figures represent an average of almost five (5) members per household.

TABLE 6: NUMBER OF HOUSEHOLD MEMBERS

| NO. OF HH MEMBERS | MALE HOUSEHOLD MEMBERS | | FEMALE HOUSEHOLD MEMBERS | | TOTAL HOUSEHOLD MEMBERS |
|-------------------|------------------------|------------------------|--------------------------|------------------------|-------------------------|
| | NO. OF RESPONDENTS | TOTAL MALE MEMBERS | NO. OF RESPONDENTS | TOTAL FEMALE MEMBERS | |
| 1 | 1 | 1 | 1 | 1 | 2 |
| 2 | 2 | 4 | 1 | 2 | 6 |
| 3 | 3 | 9 | 7 | 21 | 30 |
| 4 | 4 | 16 | 5 | 20 | 36 |
| 5 | 4 | 20 | 5 | 25 | 45 |
| 6 | - | - | 5 | 30 | 30 |
| 7 | - | - | 3 | 21 | 21 |
| 8 | 3 | 24 | 2 | 16 | 40 |
| 9 | 2 | 18 | - | - | 18 |
| 10 | 1 | 10 | 1 | 10 | 20 |
| TOTAL | 20 | 102 (41.10%) | 30 | 146 (58.90%) | 248 (100%) |

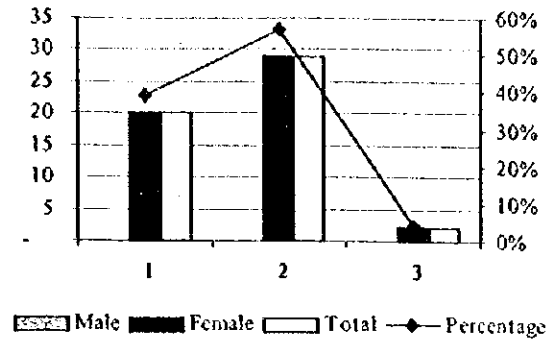


(2) Ages of Household Members

The male respondents could not determine the ages of their respective household members. But as pointed out by most of the female respondents, majority of the household members belonged to the 15-60 age bracket. The 15 and below age level was the second largest age group with while the 60 and above age group has the least number in it.

TABLE 7: AGES OF HH MEMBERS

| AGES | M | F | T | % |
|--------------|---|-----------|-----------|---------------|
| 15 and below | - | 20 | 20 | 39.22 |
| 15-60 | - | 29 | 29 | 56.86 |
| 60 and above | - | 2 | 2 | 3.92 |
| TOTAL | - | 51 | 51 | 100.00 |

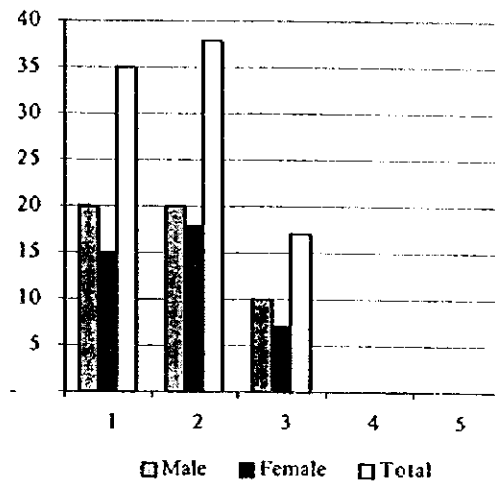


(3) Level of Education of Household Members

Out of the total household members, the respondents listed 90 members to have attained different levels of education. The majority of the household members (38) who have formal education were high school graduates. On the other hand, a total of 35 had elementary education. Seventeen studied in college.

TABLE 8: LEVEL OF EDUCATION OF HH MEMBERS

| EDUCATIONAL LEVEL | EDUCATED HOUSEHOLD MEMBERS | | |
|-------------------|----------------------------|-----------|-----------|
| | M | F | T |
| 1. Elementary | 20 | 15 | 35 |
| 2. High School | 20 | 18 | 38 |
| 3. College | 10 | 7 | 17 |
| 4. Vocational | - | - | - |
| 5. Post Graduate | - | - | - |
| TOTAL | 50 | 40 | 90 |

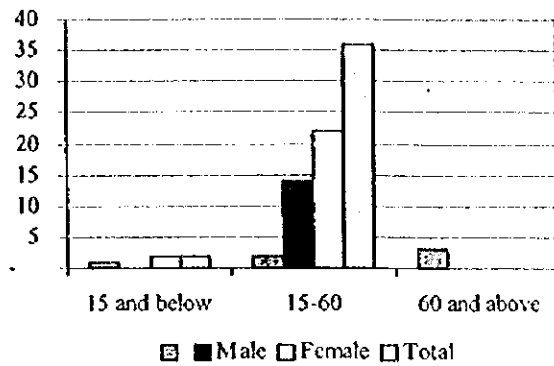


(4) Employed Household Members

The majority of the respondents (36) indicated that the employed household members belonged to the 15 to 60 age bracket. Only two interviewees said the members comprising the 15 and below age group are gainfully employed. Twelve respondents did not answer this question.

TABLE 9: EMPLOYED IHH MEMBERS

| AGE BRACKET | M | F | TOTAL |
|--------------|-----------|-----------|-----------|
| 15 and below | - | 2 | 2 |
| 15-60 | 14 | 22 | 36 |
| 60 and above | - | - | - |
| No Response | 6 | 6 | 12 |
| TOTAL | 20 | 30 | 50 |



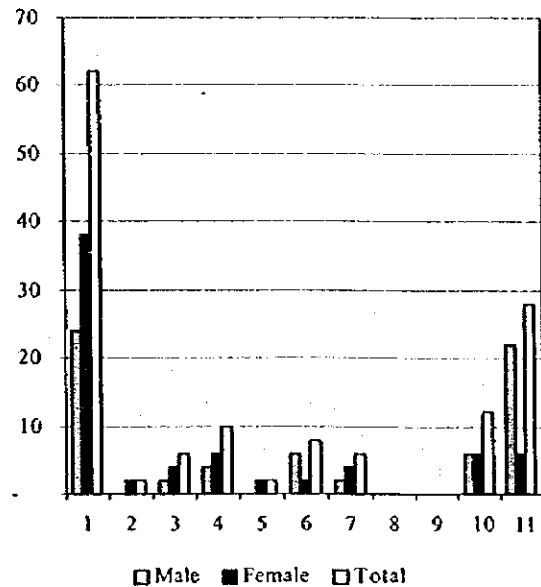
(5) Occupation of Household Heads and Other Members

The majority of the household heads and members (62) were engaged in either farming or fishing where they derived income. The female household members constituted the majority of workers in this field. There were some service workers who were mostly females. Other household heads and members were either laborers, vendors, carpenters, dressmakers, technician, businessmen/women, professionals and office workers.

Most of those who were gainfully employed earned an average monthly income of P5,000.00 and below. Fifteen workers earned more than P5,000.

TABLE 10: OCCUPATION OF IHH MEMBERS

| OCCUPATION | M | F | T |
|-------------------------------------|----|----|----|
| 1. Farmer/Fisherfolk | 24 | 38 | 62 |
| 2. Technician | - | 2 | 2 |
| 3. Laborer | 2 | 4 | 6 |
| 4. Service Worker | 4 | 6 | 10 |
| 5. Businessman/woman | - | 2 | 2 |
| 6. Professional | 6 | 2 | 8 |
| 7. Office Worker | 2 | 4 | 6 |
| 8. Equipment Operator | - | - | - |
| 9. Factory Worker | - | - | - |
| 10. Vendor/Carpenter/ Dressmaker | 6 | 6 | 12 |
| 11. Others | 22 | 6 | 28 |



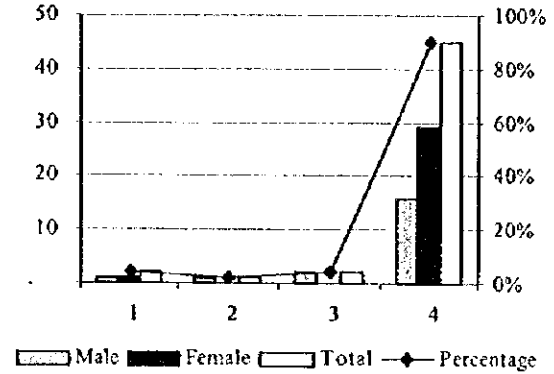
(6) Economic Activities

As claimed by the respondents, very few household members were engaged in other economic activities to augment their monthly income. Only five interviewees indicated that their family members were involved in livelihood projects other than their regular

work. They listed sari-sari operators, livestock/poultry raising and vegetable gardening as the main economic activities of their families. From these economic activities, almost all of the household members earned ₱500.00 per month.

Table 11: Economic Activities of HH Members

| ECONOMIC ACTIVITY | M | F | T | % |
|-------------------------|-----------|-----------|-----------|---------------|
| 1. Livestock/Poultry | 1 | 1 | 2 | 4.00 |
| 2. Vegetable/gardening | 1 | - | 1 | 2.00 |
| 3. Sari-sari store | 2 | - | 2 | 4.00 |
| 4. No Response/Activity | 16 | 29 | 45 | 90.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

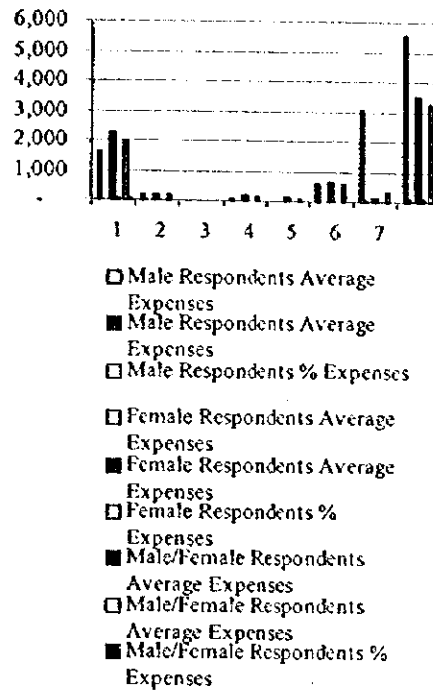


(7) Average Expenditures of Household

As indicated by the respondents, the average monthly expenditure of a family was ₱3,225.55. The female respondents indicated higher monthly expenditures at ₱3,470.00 as compared with the male respondents who placed it at ₱2,981.30. For both male and female respondents, food is the most expensive household item with a monthly average expenditure of ₱1,993.50 or 59.85 percent. Education was the second most budgeted item averaging about P609.40 a month. Water was not included in the list of their monthly expenses. The female respondents included medicines in the list of expenses; but the male interviewees failed to recognize its importance. On the contrary, the male respondents considered recreation, setting aside a monthly average of ₱483.00, bigger than clothing expenditure.

TABLE 12: AVERAGE EXPENDITURES OF III MEMBERS

| EXPENDITURES | MALE RESPONDENTS | | FEMALE RESPONDENTS | | MALE/FEMALE RESPONDENTS | |
|-------------------------|------------------|---------------|--------------------|---------------|-------------------------|---------------|
| | AVERAGE EXPENSES | % | AVERAGE EXPENSES | % | AVERAGE EXPENSES | % |
| 1. Food | ₱1,625.00 | 29.25 | ₱2,242.50 | 64.60 | ₱1,933.50 | 59.85 |
| 2. Clothing | 202.50 | 3.65 | 164.00 | 4.70 | 183.25 | 5.65 |
| 3. Water | - | - | - | - | - | - |
| 4. Electricity/ Fuel | 89.50 | 1.60 | 197.85 | 5.70 | 143.65 | 4.40 |
| 5. Medicines | - | - | 120.20 | 3.45 | 60.10 | 1.85 |
| 6. Education | 581.00 | 10.45 | 637.85 | 18.45 | 609.40 | 18.90 |
| 7. Recreation | 3,055.00 | 55.05 | 108.00 | 3.10 | 295.65 | 9.15 |
| TOTAL. | ₱5,553.00 | 100.00 | ₱3,470.00 | 100.00 | ₱3,225.55 | 100.00 |

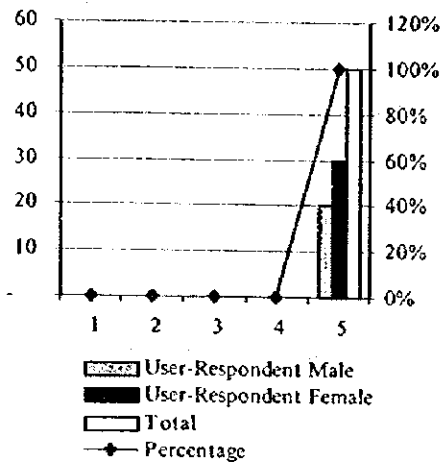


(8) Practices

Source of Drinking Water. All the respondents indicated that the people get drinking water from communal shallow wells.

TABLE 13: SOURCES OF DRINKING WATER

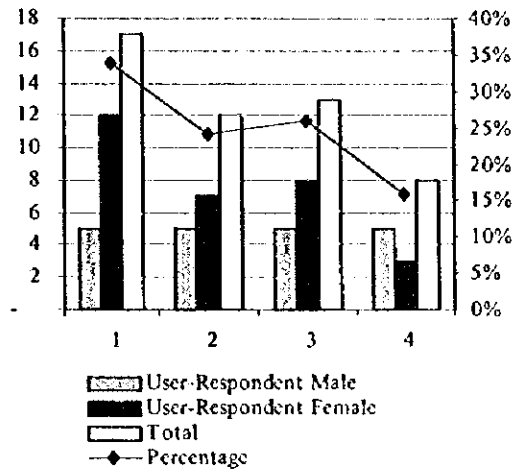
| SOURCE | USER-RESPONDENT | | | |
|----------------------------|-----------------|-----------|-----------|---------------|
| | M | F | T | % |
| 1. Communal Free Flow well | - | - | - | - |
| 2. Communal Deepwell | - | - | - | - |
| 3. Piped Water System | - | - | - | - |
| 4. Communal Dug well | - | - | - | - |
| 5. Communal Shallow well | 20 | 30 | 50 | 100.0 |
| TOTAL. | 20 | 30 | 50 | 100.00 |



Responsible for Fetching Water. The male respondents considered everybody in the household responsible for fetching the family's drinking water. However, the female interviewees still recognized the male members of the family as the principal water fetchers in the house. Twelve female respondents said it is the husband doing the chore, while eight female participants indicated that the male children haul their water needs.

TABLE 14: RESPONSIBLE FOR FETCHING DRINKING WATER

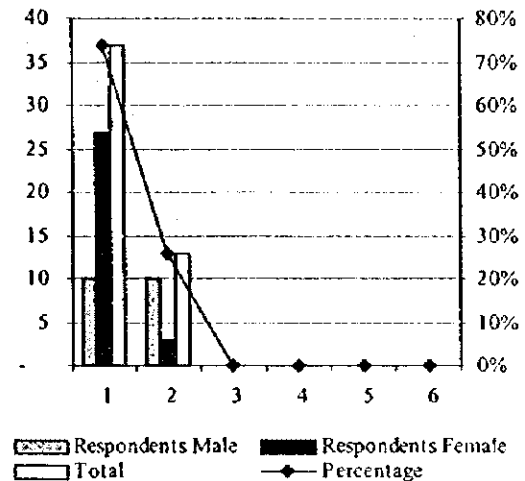
| FAMILY MEMBER | USER-RESPONDENT | | T | % |
|--------------------|-----------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Husband | 5 | 12 | 17 | 34.00 |
| 2. Wife | 5 | 7 | 12 | 24.00 |
| 3. Male Children | 5 | 8 | 13 | 26.00 |
| 4. Female Children | 5 | 3 | 8 | 16.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



Frequency of Fetching Water. The majority of the respondents, or 37, indicated that families fetch drinking water only once a day. Another interviewees (10 males and three females) thought that it takes at least twice a day for the family to fetch drinking water.

TABLE 15: FREQUENCY OF FETCHING DRINKING WATER

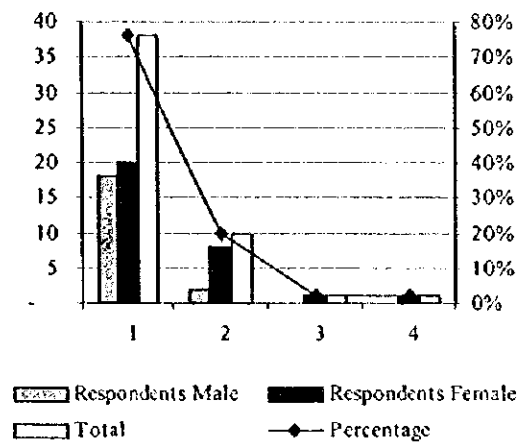
| FREQUENCY | RESPONDENTS | | T | % |
|----------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Once a Day | 10 | 27 | 37 | 74.00 |
| 2. Twice a day | 10 | 3 | 13 | 26.00 |
| 3. 3x a day | - | - | - | - |
| 4. 4x a day | - | - | - | - |
| 5. More | - | - | - | - |
| TOTAL | 20 | 30 | 50 | 100.00 |



Duration of Fetching Water. For most of the respondents, or 18 males and 20 females, it takes only about 10 minutes to fetch water from the source to their house. Ten interviewees, or two males and 8 female respondents, indicated it takes 20 minutes to haul water; while two females said 30 minutes and over is required to handle the job.

TABLE 16: DURATION FOR FETCHING DRINKING WATER

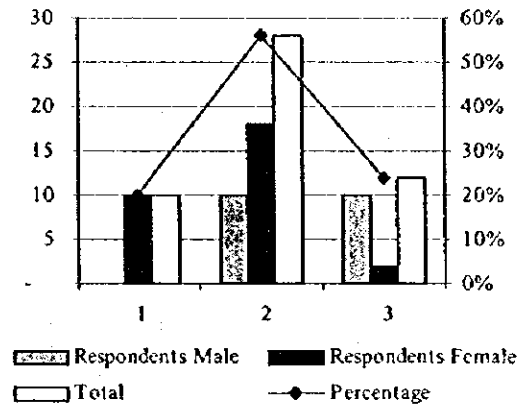
| DURATION | RESPONDENTS | | T | % |
|---------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. About 10 minutes | 18 | 20 | 38 | 76.00 |
| 2. About 20 minutes | 2 | 8 | 10 | 20.00 |
| 3. About 30 minutes | | 1 | 1 | 2.00 |
| 4. Over 30 minutes | | 1 | 1 | 2.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



Problems with Source. The majority of the respondents, or 10 males and 18 females, admitted that they have problems with the current water source. Ten females said they did not have any problem while 12 participants did not reply on this issue.

TABLE 17: PROBLEMS WITH SOURCE OF WATER

| RESPONSE | RESPONDENTS | | T | % |
|-----------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. There are problems | 10 | 18 | 28 | 56.00 |
| 2. No Problem | - | 10 | 10 | 20.00 |
| 3. Uncertain | 10 | 2 | 12 | 24.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



1.5 Institutional

(1) Presence of BWSA

All the respondents said there was no BWSA in their respective barangays and, therefore, nobody was an officer nor a member of the BWSA.

TABLE 18: KNOWLEDGE OF THE EXISTENCE OF BWSA

| RESPONSE | RESPONDENTS | | T | % |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Yes | - | - | - | - |
| 2. No | 20 | 30 | 50 | 100.00 |
| TOTAL | 20 | 38 | 74 | 100.00 |

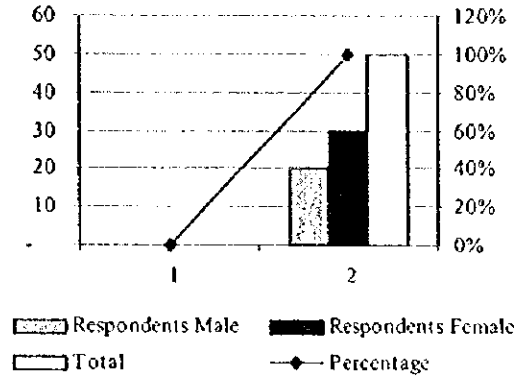
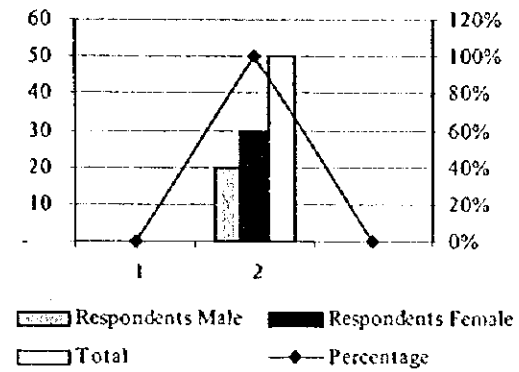


TABLE 19: MEMBERSHIP TO THE BWSA

| RESPONSE | RESPONDENTS | | | |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | T | % |
| 1. Yes | - | - | - | - |
| 2. No | 20 | 30 | 50 | 100.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

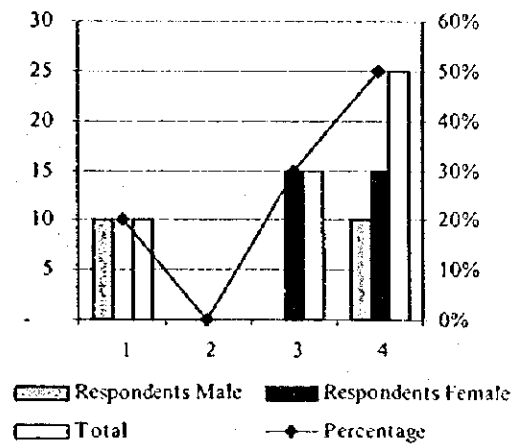


(2) Who maintains the facilities of the BWSA?

The majority of the respondents were not aware of the person/s responsible for maintaining the BWSA facilities, if ever there are. Some even said that there was nobody handling the task; while ten male participants indicated that someone in the barangay could be maintaining the facilities.

TABLE 20: RESPONSIBLE FOR MAINTAINING WATSAN FACILITIES

| RESPONSE | RESPONDENTS | | T | % |
|----------------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Someone in the Barangay | 10 | - | 10 | 20.00 |
| 2. Someone from the BWSA | - | - | - | - |
| 3. No one | - | 15 | 15 | 30.00 |
| 4. Don't Know | 10 | 15 | 25 | 50.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

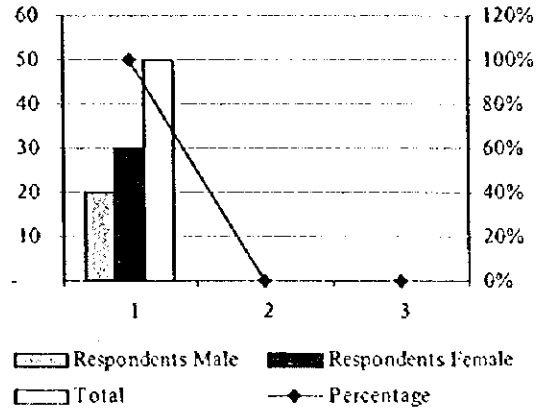


(3) Interested to be a member of BWSA

Significantly, all the respondents indicated interest in becoming a member of BWSA once it is formed and/or activated in their respective barangays.

TABLE 21: INTEREST OF RESPONDENTS TO JOIN BWSA

| RESPONSE | RESPONDENTS | | T | % |
|-------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Interested | 20 | 30 | 50 | 100.00 |
| 2. Not interested | - | - | - | - |
| 3. No Response | - | - | - | - |
| TOTAL | 20 | 30 | 50 | 100.00 |

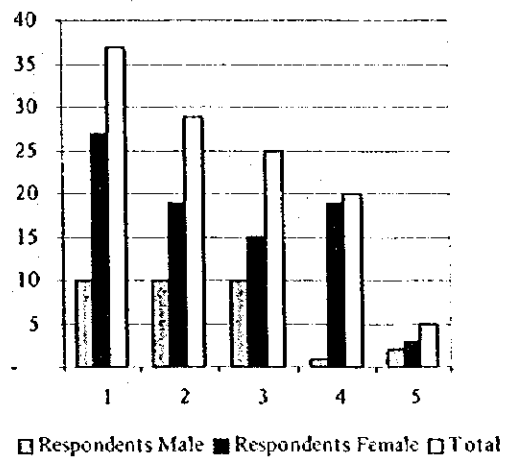


(4) How can respondents become actively involve in BWSA affairs?

A total of 37 respondents or 10 males and 27 females are willing to contribute cash as a manifestation of their active involvement with the BWSA. Another 10 male and 19 female participants are prepared to provide free labor and/or perform repair and maintenance of the facilities. Some 20 respondents (1 male and 19 females) will assist in the collection of fees while 17 female interviewees will just serve as members of the association.

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

| RESPONSE | RESPONDENTS | | T |
|--------------------------|-------------|----|----|
| | M | F | |
| 1. Contribute Cash | 10 | 27 | 37 |
| 2. Contribute Labor | 10 | 19 | 29 |
| 3. Do Repair/maintenance | 10 | 15 | 25 |
| 4. Collection of Fees | 1 | 19 | 20 |
| 5. Be Officer | 2 | 3 | 5 |
| 6. Just Member | - | 17 | 17 |

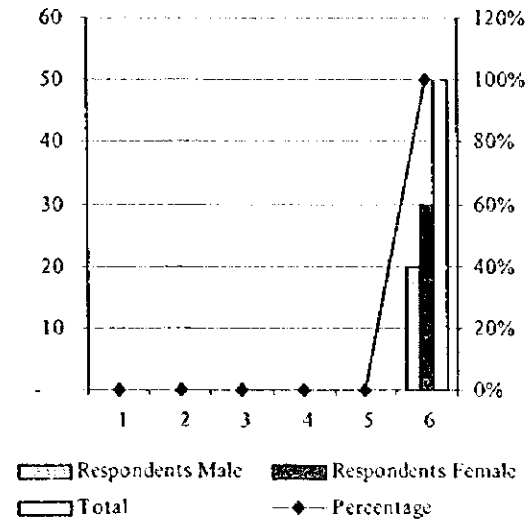


(5) If not interested, where to get source of water

All of the respondents were uncertain as to where to fetch water in the event that they will not be members of the BWSA.

Table 23: Sources of Drinking Water of non-BWSA members

| SOURCE OF WATER | RESPONDENTS | | T | % |
|------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Private Well | - | - | - | - |
| 2. Communal Well | - | - | - | - |
| 3. Spring Source | - | - | - | - |
| 4. Vendor | - | - | - | - |
| 5. Others | - | - | - | - |
| 6. Uncertain | 20 | 30 | 50 | 100.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

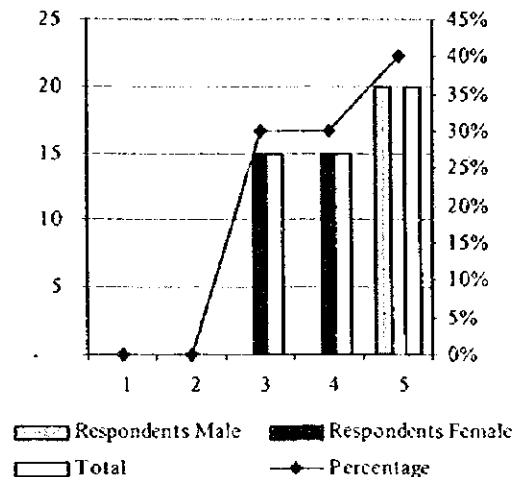


(6) Responsible for minor repairs of water facilities

The majority of the male respondents were uncertain as to who is responsible for doing minor repairs of the family's water supply facility. Half of the female interviewees said a professional caretaker is doing the job while another half of the female participants thought that somebody in the barangay may be doing minor repair works.

TABLE 24: RESPONSIBLE FOR MINOR REPAIRS

| SOURCE OF WATER | RESPONDENTS | | T | % |
|-----------------------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Female Member | - | - | - | - |
| 2. Male Member | - | - | - | - |
| 3. Somebody in the Barangay | - | 15 | 15 | 30.00 |
| 4. Professional caretaker/Plumber | - | 15 | 15 | 30.00 |
| 5. Uncertain | 20 | - | 20 | 40.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



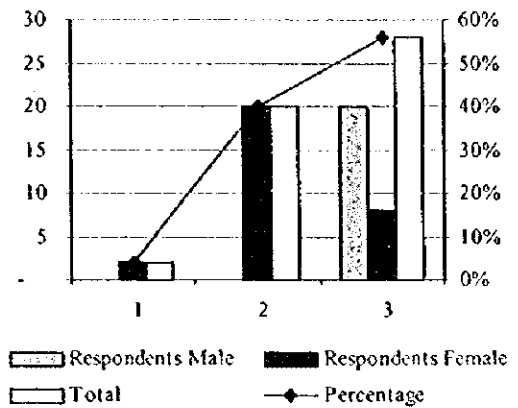
1.6 Training Activities

(1) Training Program attended In 1997

The majority of the female respondents (20) said they have not participated in any training programs in 1997. Only two indicated that they have attended. Eight females and all the male interviewees did not respond to this question.

TABLE 25: TRAINING PROGRAMS ATTENDED BY RESPONDENTS IN 1997

| RESPONSE | RESPONDENTS | | | |
|----------------|-------------|-----------|-----------|---------------|
| | M | F | T | % |
| 1. Yes | - | 2 | 2 | 4.00 |
| 2. No | - | 20 | 20 | 40.00 |
| 3. No response | 20 | 8 | 28 | 56.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



(2) Kinds of Training Program

For those who attended training programs in 1997, Table 26 summarizes the programs participated in 1997.

TABLE 26: TRAINING COURSES ATTENDED BY RESPONDENTS IN 1997

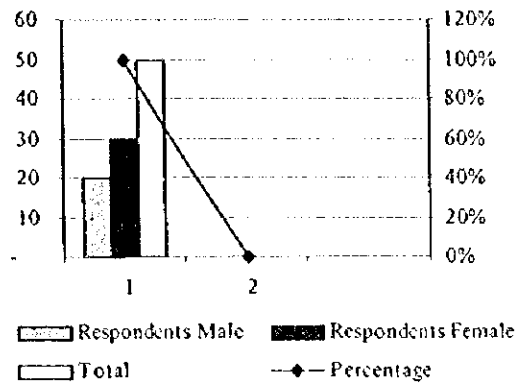
| BARANGAY | MALE | FEMALE |
|---------------------------------|------|---|
| Barangay Malinao (Gen. Luna) | -- | <ol style="list-style-type: none"> 1. Health and Nutrition 2. Women in Development 3. Day-Care Program |

(3) On BWSA Training

All the respondents were also not aware of any training program for BWSA members. However, all the respondents indicated willingness to attend in BWSA training programs.

TABLE 27: WILLINGNESS TO ATTEND BWSA-RELATED TRAINING PROGRAMS

| RESPONSE | RESPONDENTS | | T | % |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Yes | 20 | 30 | 50 | 100.00 |
| 2. No | - | - | - | - |
| TOTAL | 20 | 30 | 50 | 100.00 |

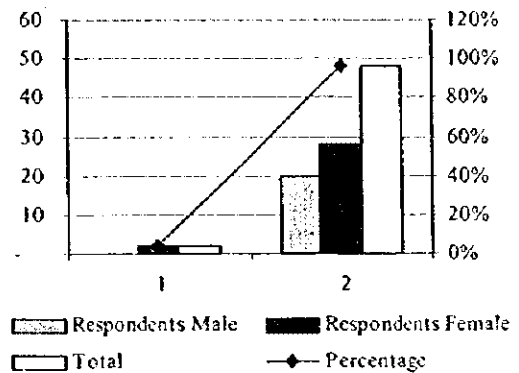


(4) Training on Health Education

Except for two female respondents, all of the interviewees did not attend any health education training program.

TABLE 28: PARTICIPATION IN HEALTH EDUCATION AND TRAINING

| RESPONSE | RESPONDENTS | | T | % |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Yes | - | 2 | 2 | 4.00 |
| 2. No | 20 | 28 | 48 | 96.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



(5) Type of Training Respondents Wish to attend

If given a chance, both the male and female respondents wanted to participate in training programs. The male interviewees can attend in any training program while the female respondents were interested in programs included in the following table:

TABLE 29: TYPES OF TRAINING PROGRAMS

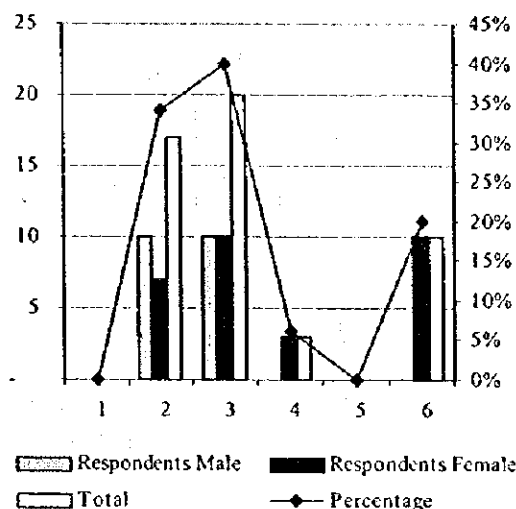
| BARANGAY | MALE | FEMALE |
|----------------------------------|----------------------|---|
| Barangay Malinao (Gen. Luna) | Any Type of Training | 1. Livelihood 2. Fanning 3. Vocational Course |
| Barangay Catangan (Gen. Luna) | Any Type of Training | 1. Livelihood |

(6) Desirable Training Period

In relation to this, the majority of the respondents, or 10 males and 10 females wanted to attend training programs that would be conducted for two days. Another 10 male and seven female interviewees opted for a one-day schedule. Ten female participants did not respond on this matter.

TABLE 30: DESIRABLE TRAINING PERIOD

| RESPONSE | RESPONDENTS | | T | % |
|---------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Less than 1 day | - | - | - | - |
| 2. One day | 10 | 7 | 17 | 34.00 |
| 3. Two days | 10 | 10 | 20 | 40.00 |
| 4. Three days | - | 3 | 3 | 6.00 |
| 5. More than 3 days | - | - | - | - |
| 6. No response | - | 10 | 10 | 20.00 |
| TOTAL. | 20 | 30 | 50 | 100.00 |



1.7 Community Development

(1) CBOs and contact persons

As pointed out by the respondents, some community-based organizations have been doing different development works in the barangays. Table 28 lists down these NGOs/CBOs:

TABLE 31: NGOS/CBOS IN THE BARANGAYS

| BARANGAY | CONTACT PERSON |
|--|----------------|
| A. Barangay Malinao (Gen. Luna) 1. World Vision 2. Dgy. Health Team 3. Multi-Purpose Cooperative | |
| B. Barangay Catangnan (Gen. Luna) 1. Mothers' Club | |

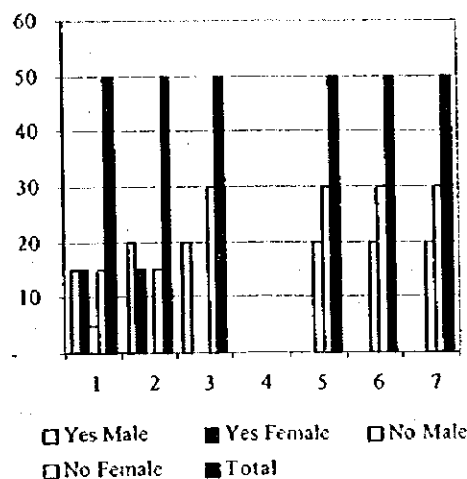
(2) Were the respondents consulted on their respective roles and responsibilities?

The majority of the respondents indicated that they were consulted and/or briefed about their respective roles and responsibilities towards their water supply facilities. In fact, all of the male respondents said they were consulted during on the financing and the operation and maintenance of the system while another 15 were briefed during the planning and design of the system. About 15 female respondents were consulted on the financing and the operation and maintenance of the water supply facilities.

On the other hand, all of the respondents were never consulted when the BWSA was formed in their respective barangays as well as when the level/type of services and water fees were agreed upon. This is also true during the construction of the water facilities.

TABLE 32: RESPONDENTS CONSULTED/INVOLVED IN PAST WATSAN PROJECTS

| BWSA ACTIVITIES | YES | | NO | | T |
|-------------------------------|-----|----|----|----|----|
| | M | F | M | F | |
| 1. Planning and Design | 15 | 15 | 5 | 15 | 50 |
| 2. O&M of the system | 20 | 15 | - | 15 | 50 |
| 3. Financing of the system | 20 | - | - | 30 | 50 |
| 4. BWSA Formation | - | - | - | - | - |
| 5. Water Fee Decision | - | - | 20 | 30 | 50 |
| 6. Level of Service Decided | - | - | 20 | 30 | 50 |
| 7. Construction of Facilities | - | - | 20 | 30 | 50 |

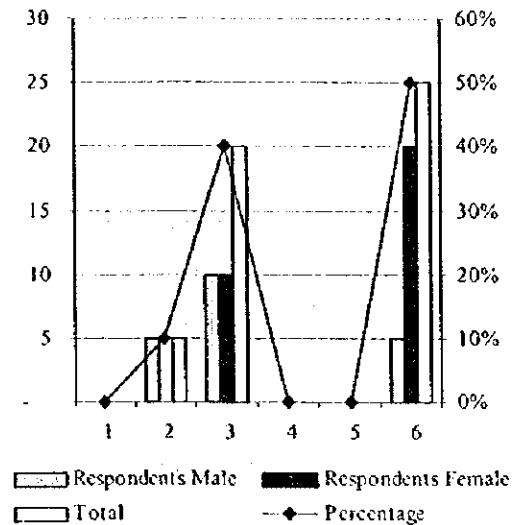


(3) How did the respondents participate in past construction projects?

Half of the respondents, or 15 males and 10 females, participated in past construction projects of WATSAN facilities. Ten males and 10 females provided free labor while five males donated the site. Nobody contributed cash in the construction. Half of the interviewees did not respond on this question.

TABLE 33: PARTICIPATION IN PAST CONSTRUCTION PROJECTS

| TYPE OF PARTICIPATION | RESPONDENTS | | T | % |
|-----------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Provided Cash | - | - | - | - |
| 2. Donated Site | 5 | - | 5 | 10.00 |
| 3. Provided Labor | 10 | 10 | 20 | 40.00 |
| 4. Provided Materials | - | - | - | - |
| 5. Others | - | - | - | - |
| 6. No Response | 5 | 20 | 25 | 50.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

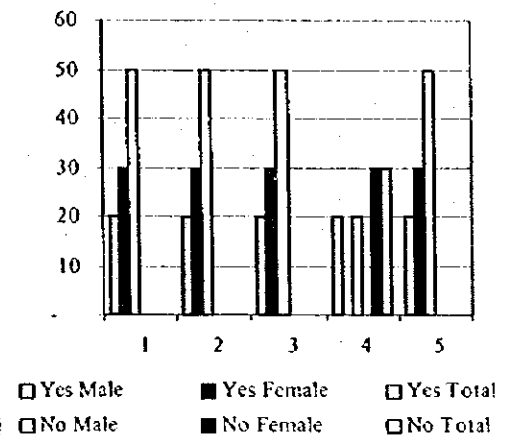


(4) Will the respondents participate in future projects?

For future projects, all of the respondents indicated that they would participate and/or contribute for the success of the projects. Everybody said that he/she would actively be involved in the formation of the BWSA, formulation of water rates, selection of sites and level of service and on the operation and maintenance of the facilities. However, all the female interviewees indicated they will not participate in the construction of the system.

TABLE 34: WILLINGNESS/TYPE OF PARTICIPATION IN FUTURE PROJECTS

| PROJECT ACTIVITY | YES | | | NO | | |
|--|-----|----|----|----|----|----|
| | M | F | T | M | F | T |
| 1. Formation of BWSA | 20 | 30 | 50 | - | - | - |
| 2. Water rates Formulation | 20 | 30 | 50 | - | - | - |
| 3. Selection of sites and Level of Service | 20 | 30 | 50 | - | - | - |
| 4. Construction of facilities | 20 | - | 20 | - | 30 | 30 |
| 5. O & M | 20 | 30 | 50 | - | - | - |



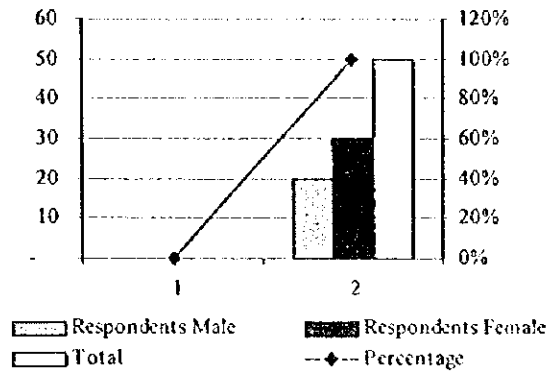
1.8 Financial Aspects

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

All of the respondents indicated that they are not presently paying for their water supply.

TABLE 35: NUMBER OF RESPONDENTS PRESENTLY PAYING WATER FEE

| RESPONSE | RESPONDENTS | | T | % |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Yes | - | - | - | - |
| 2. No | 20 | 30 | 50 | 100.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



(2) If so, how much per household?

Since the respondents were not presently paying, they did not respond to this question.

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

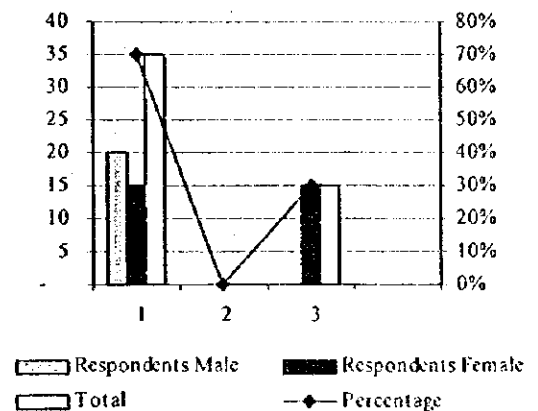
All of the respondents also did not respond on this topic.

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

In areas where water fees were not being collected, all male respondents as well as half of the female interviewees claimed it was the barangay council which shouldered the operation and maintenance costs of the facilities. Another half of the female respondents did not have an answer to the question.

TABLE 36: RESPONSIBILITY FOR SHOULDERING THE O&M COSTS

| PERSON | RESPONDENTS | | T | % |
|-------------------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Barangay Council | 20 | 15 | 35 | 70.00 |
| 2. Municipal Government | - | - | - | - |
| 3. No response | - | 15 | 15 | 30.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

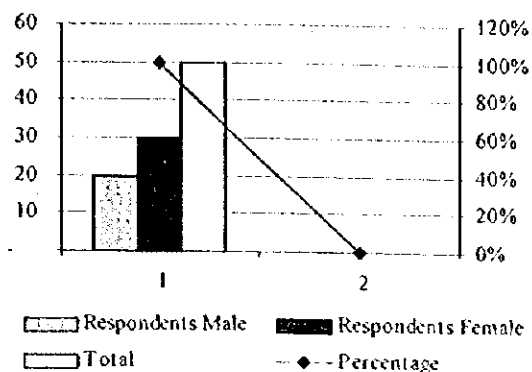


(5) Are the people willing to pay for O&M of future facilities?

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

TABLE 37: RESPONDENTS' WILLINGNESS TO PAY FOR FUTURE FACILITIES

| RESPONSE | RESPONDENTS | | T | % |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Yes | 20 | 30 | 50 | 100.00 |
| 2. No | - | - | - | - |
| TOTAL | 20 | 30 | 50 | 100.00 |

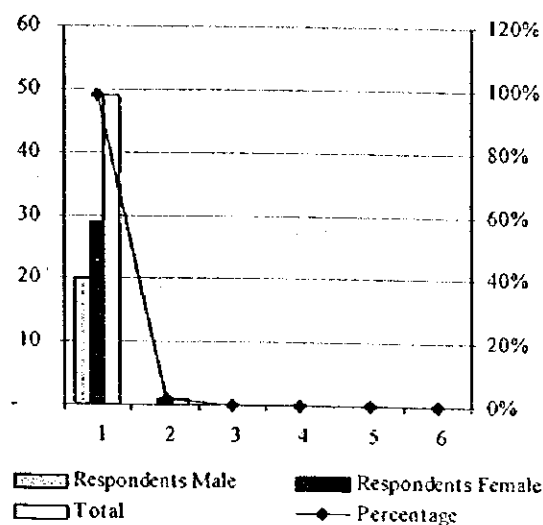


(6) How much are respondents willing to pay?

Of those who are willing to pay, all of the male respondents, together with 29 female interviewees said they can pay from P2.00 to P5.00 for their water consumption. Just one female participant said that she could shell out from P6.00 to P10.00 as water fee.

TABLE 38: HOW MUCH RESPONDENTS ARE WILLING TO PAY

| RESPONSE | RESPONDENTS | | | |
|--------------------|-------------|-----------|-----------|---------------|
| | M | F | T | % |
| 1. P2.00 - P5.00 | 20 | 29 | 49 | 98.00 |
| 2. P6.00 - P10.00 | - | 1 | 1 | 2.00 |
| 3. P11.00 - P20.00 | - | - | - | - |
| 4. P21.00 - P30.00 | - | - | - | - |
| 5. P31.00 - P40.00 | - | - | - | - |
| 6. P41.00 - P50.00 | - | - | - | - |
| TOTAL | 20 | 30 | 50 | 100.00 |

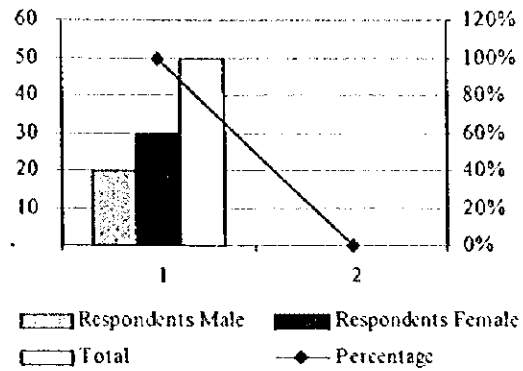


(7) Are you willing to contribute for future projects?

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

TABLE 39: WILLINGNESS OF RESPONDENTS TO FOR FUTURE FACILITIES

| RESPONSE | RESPONDENTS | | | |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | T | % |
| 1. Yes | 20 | 30 | 50 | 100.00 |
| 2. No | - | - | - | - |
| TOTAL | 20 | 30 | 50 | 100.00 |

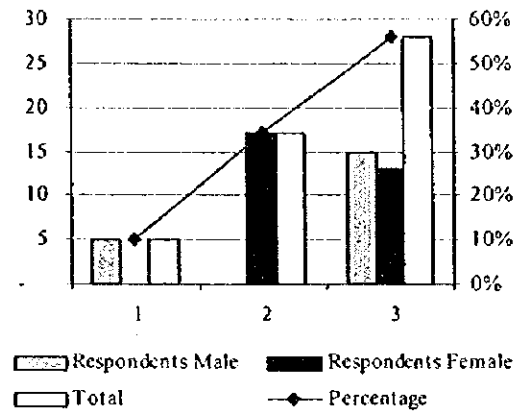


(8) If so, what kind?

Of those willing to share, 28 respondents or 15 males and 13 females, preferred to contribute land for the construction of their water system. About 17 female interviewees were prepared to contribute cash which may vary from P10.00 to P20.00. Five male participants would like to contribute free labor during the construction.

TABLE 40: TYPES OF CONTRIBUTION

| RESPONSE | RESPONDENTS | | T | % |
|--------------|-------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Labor | 5 | - | 5 | 10.00 |
| 2. Cash | - | 17 | 17 | 34.00 |
| 3. Land | 15 | 13 | 28 | 56.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



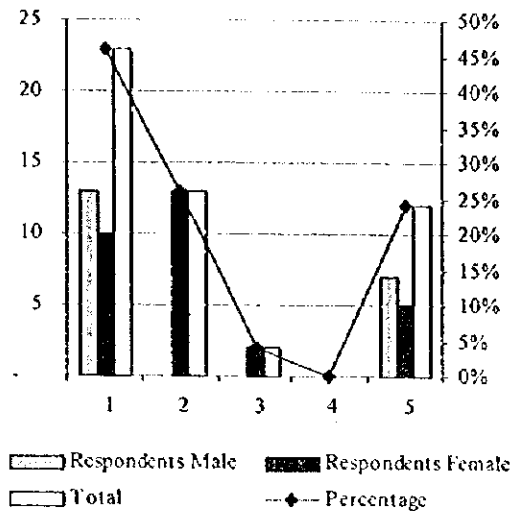
1.9 Health and Sanitation

(1) Type of toilet

The majority of the respondents, or 13 males and 10 females, indicated that they utilize private household toilets which flush to a septic tank on the site. Another 13 female interviewees use private household pit latrine. Twelve (12) participants utilized outdoor open pits as toilet while two female respondents utilized shared toilet pit latrine type.

TABLE 41: TYPE OF TOILETS RESPONDENTS USE

| RESPONSE | RESPONDENTS | | | |
|--|-------------|-----------|-----------|---------------|
| | M | F | T | % |
| 1. Private III Toilet Flushed to Septic Tank on the Site | 13 | 10 | 23 | 46.00 |
| 2. Private III Pit Latrine | - | 13 | 13 | 26.00 |
| 3. Shared Toilet Pit Latrine | - | 2 | 2 | 4.00 |
| 4. Water Seal (Pour Flush) | - | - | - | - |
| 5. Outdoor Open Pit | 7 | 5 | 12 | 24.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |

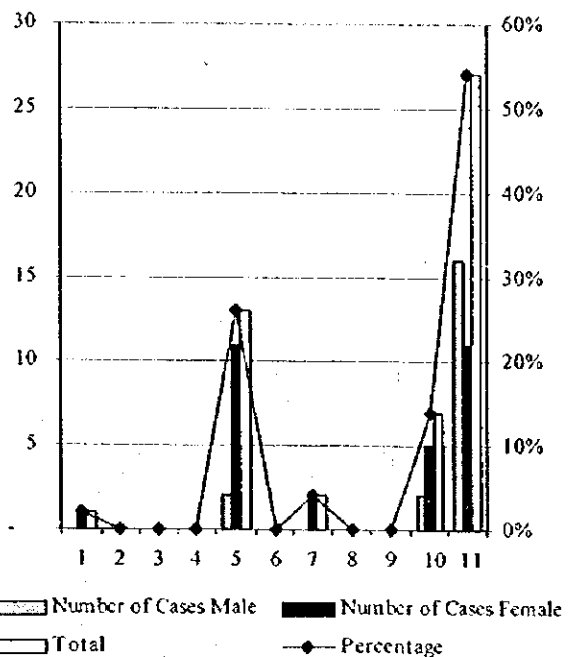


(2) Who got sick during the past year? What sickness?

The majority of the respondents, 16 males and 11 females for a total of 27, did not respond on this matter. Only 13 interviewees indicated that during the calendar year 1997, their family members suffered from kidney trouble, two respondents claimed they had intestinal flu, one with stomach pain and seven with other illnesses during the year.

TABLE 42: WATER-RELATED ILLNESSES

| DISEASE | NUMBER OF CASES | | T | % |
|--------------------|-----------------|-----------|-----------|---------------|
| | M | F | | |
| 1. Stomach Pain | - | 1 | 1 | 2 |
| 2. Skin Diseases | - | - | - | - |
| 3. Gastroenteritis | - | - | - | - |
| 4. Diarrhea | - | - | - | - |
| 5. Kidney trouble | 2 | 11 | 13 | 26.00 |
| 6. Schistosomiasis | - | - | - | - |
| 7. Intestinal Flu | - | 2 | 2 | 4.00 |
| 8. Malaria | - | - | - | - |
| 9. Typhoid Fever | - | - | - | - |
| 10. Others | 2 | 5 | 7 | 14.00 |
| 11. No Response | 16 | 11 | 27 | 54.00 |
| TOTAL | 20 | 30 | 50 | 100.00 |



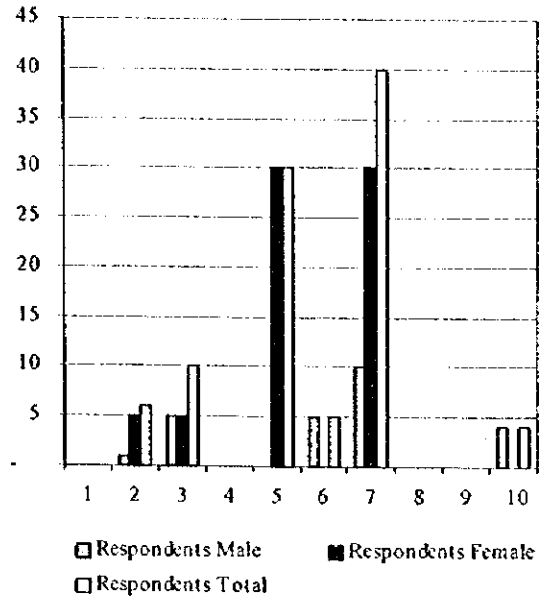
(3) Health and hygiene practices

Most respondents recognized the importance of good health and hygiene practices. As indicated by them, the respondents learned about health and sanitation matters from

various sources. All of the female interviewees and 10 males got information from either the school and/or health clinics. Five male and five female participants learned health education from the radio and the health workers/inspectors. Newspaper was also a source for five other male interviewees.

TABLE 43: WHERE PEOPLE LEARNED HEALTH AND HYGIENE EDUCATION

| RESPONSE | RESPONDENTS | | |
|------------------------------|-------------|----|----|
| | M | F | T |
| 1. Relatives and Friends | - | - | - |
| 2. Health Workers/Inspectors | 1 | 5 | 6 |
| 3. Radio | 5 | 5 | 10 |
| 4. Television | - | - | - |
| 5. School | - | 30 | 30 |
| 6. Newspaper | 5 | - | 5 |
| 7. Health Clinics | 10 | 30 | 40 |
| 8. Hospitals | - | - | - |
| 9. NGOs | - | - | - |
| 10. Others | 4 | - | 4 |



5.8.5 Utilization of NGOs

LIST OF NGOs / CBOs for SURIGAO DEL NORTE

| NAME OF NGOs / CBOs | CONTACT PERSON | ADDRESS / TEL. # |
|---|----------------------------|--|
| 1. Philippine Coconut Producers Federation | Mr. Victor Resullar | San Nicolas St., Surigao City |
| 2. Surigao Economic Development Foundation | Engr. Leonel Santos | Kaskag Village, Surigao City |
| 3. Philippine Association of Medical Technologist, Inc. | Dr. Marietta O. Dumas | Narciso St., Surigao City |
| 4. World Vision International | Ms. Mercy Cataora | Km. 1 Beside Miranda Family Clinic, S.C. |
| 5. Surigaonon Heritage Studies and Research Center Foundation | Mrs. Irinetta Montinola | Surigao City |
| 6. Task Force Detainees of the Philippines | Mr. Constantino Fermilan | 1074 Capitol Road, Surigao City |
| 7. Surigao Women's Alliance for Nationalism Integrity & Equality (SWANIE) | Mrs. Jelly Leyson | San Nicolas St., Surigao City |
| 8. Concerned Citizens for Human Rights | Atty. Hdefonso Mantilla | Capitol Road, Surigao City |
| 9. Puso ng Surigao Foundation | Mr. Manuel Kong | C/o Surtrade, Surigao City |
| 10. Surigao Transport Service Cooperative | Mr. Anastacio Biol | 1574 Gimena, St., Surigao City |
| 11. Rural Enterprise Asst. Center Foundation | Ms. Arceli T. Napalan | IMCA Terminal, Kaskag, Surigao City |
| 12. Philippine Benevolent Missionaries Association, Inc. | Mr. Ruben Ecleo, Jr. | San Jose, Dinagat Island, SDN |
| 13. Surigaonong Mangingisda sa Surigao Norte | Mr. Rodolfo Mozol | 1057 Rizal St., Surigao City |
| 14. Magkahiusang Ma-uma sa Surigao Norte | Mr. Eduardo C. Taliman | 164 Borja St., Surigao City |
| 15. Silingang Dapit sa Sidlakang Mindanao | Mr. Alex Galos | Arnoldus Pastoral Office, Surigao City |
| 16. Family Planning Organization of the Philippines | Mr. Hany Rovillos | Rizal St., Surigao City |
| 17. Free Integrated Employees Association, Inc. | Mr. Doroteo Dichoso | 1844 Vasquez St., Surigao City |
| 18. Sur Norte Rice and Corn Farmers Association, Inc. | Mr. Antonio Lerog | Km. 6 Brgy. Bonifacio, Surigao City |
| 19. Loreto Multi-Purpose Cooperative | Mr. Mariano Espina | Loreto, Surigao del Norte |
| 20. Grupo Nan Kababayen-an sa Surigao | Hon. Regina G. Alaan | 1640 Borja St., Surigao City |
| 21. SDN 1 st Engineering District Multi-Purpose Cooperative | Ms. Josefina Garcia | Capitol Hills, Surigao City |
| 22. PBMA Development Foundation, Inc. | Hon. Elvis A. dela Merced | Capitol Hills, Surigao City |
| 23. Poblacion San Jose Multi-Purpose Cooperative | Mr. Christine Medallo, Sr. | Poblacion San Jose, Surigao del Norte |
| 24. People's Economic Council of Surigao City | Mr. Vedasto F. Euseña | C/o PAO, Capitol Site, Surigao City |
| 25. Targeted Maternal and Child Health Program - Catholic Relief Services | Bishop Miguel Cinches | Arnoldus Pastoral Office, Surigao City |
| 26. Provincial Agriculture and Fishery Council | Mr. Domingo P. Iligan | Capitol Road, Surigao City |
| 27. Surigao Norte Medical Society | Dr. Cesar Morales | Prov'l. Hospital Compound, Surigao City |
| 28. Surigao Nickel Jaycees | Mr. Raul S. Salido | City Hall, Surigao City |
| 29. Rotary Club of Metro Surigao | Atty. Alfonso Casurra | -- |
| 30. Medical Ambassador Christian Ministries | Dr. Amelia R. Nambatac | Nambatac Kaskag Village, Surigao City |
| 31. Surigao Chamber of Commerce, Inc. | Atty. Claro L. Garcia | Villa Corito Subd., Surigao City |
| 32. Surigao Norte Citizens Movement for Good Government (SURCIMO) | Mr. Eduardo Barotac | Borromeo St., Surigao City |
| 33. Surigao Fil-Chinese Chamber of Commerce and Industry (SFCCCI) | Mr. Frank Go | Kaimo St., Surigao City |
| 34. Research and Development Training Center Foundation | Mr. Rolando Cuartero | Gemina St., Surigao City |
| 35. Surigao Chamber of Mines | Engr. Reynaldo O. Damasco | Surigao City |
| 36. Philippine Institute of Civil Engineers | Engr. Vicente r. Madlos | Villa Corito Subd., Surigao City |
| 37. Surigao Integrated Marine Traders Association | Mr. Lolito Maquiling | Surigao City |
| 38. Surigao Metal Industry Association, Inc. | Mrs. Reyes | Surigao City |
| 39. Surigao Jewelers Association, Inc. | Mr. Armand Caba | Borromeo-Kaimo Sts., Surigao City |
| 40. Surigao Bakers Corporation | Mr. Recto Ong | Brgy. Luna, Surigao City |
| 41. Surigao Furniture Makers Association | Mr. Generoso Yee | Borromeo-Burgos Sts., Surigao City |

5.8.6 Existing Community Development Process

Detailed Typical CD Process in Agusan del Sur

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

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

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

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

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

3. **Identify of community volunteers.** As an initial step in community organizing, a core group of about 7 persons consisting of community leaders is formed. This is the formation of an informal community organization that will assist the CD worker in the preparation of CO strategies, community profiling, identification of project sites, and other work.
4. **Conduct baseline survey.** In the conduct of this survey, focus group discussion was applied and the results validated during barangay spot mapping. The barangay spot map reflects the location of structures (scaled) and different facilities/infrastructure. This serves as a planning tool in the development of WATSAN program for the area.
5. **Inspect/identify project sites and validate projects.** An assembly is called again to present the results of the survey, its profile, assessment and needs. The CD team situates the community, i.e., *where they are now in the sector*. A member of the CD team will then facilitate the surfacing of thoughts from the group in terms of identifying the needs for WATSAN facilities, how project will be implemented in their area, how the facility will be designed and constructed, and how the community perceives their role in the project. In some cases, the community request technical assistance from the Center on site selection of identified areas.
6. **Conduct technical and community consultative meetings** of members and officers together with barangay officials. By this time, the core group has already specific

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

7. **Facilitate project implementation.** After funding has been assured, the CD team facilitates the implementation of the project through supervision and monitoring progress of construction. Contribution from the community comes in the form of free labor (*pahina*).
8. **Consolidate BWSA Organization.** The core group formulates the by-laws and policies of the organization and have these ratified by the members. The election of BWSA officers follows. A barangay resolution is passed endorsing the association and submitted to the Municipal Development Council/Sangguniang Bayan for registration/accreditation. Parallel to this activity is the completion of the facility and in most cases, the turn-over of the facility to the newly-organized BWSA, which can coincide with the swearing-in of BWSA officials.
9. **Conduct training on skills and management to BWSA officials** by the Center. The module includes topics on: human resource development (self and group awareness, communication skills, group facilitation and conducting meeting, effective community work, leadership skills and roles of officers and members, and conflict management); technical (hydrogeology and site selection, well construction and identification of handpump parts, equipment plumbing tools and materials for construction and repairs, hand pump principles of operation, maintenance and approach in trouble shooting, spring development, types of spring, their characteristics and method of developing, operation and maintenance of tank, spring box and distribution line, excreta, liquid and solid disposal system, water related diseases-prevention/control and water quality surveillance); financial management; project planning management; and action planning.
10. **Undertake follow-up activities.** The CD team after the construction of the WATSAN facilities undertakes follow-up activities such as monitoring and evaluation and the provision of recommendations/adjustments on the O&M of the facilities, where needed.

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



6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION

6.2 Past Public Investment

6.2.1 Sources of Local Fund

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|--------------|---------------|---------------|---------------|---------------|
| 1. Algeria | | | | | |
| Income | | | | | |
| Local Revenues | 5,600,299.73 | 6,601,069.50 | 6,159,223.00 | 9,464,532.51 | 9,627,528.00 |
| IRA | 273,708.75 | 846,957.50 | - | 946,224.10 | - |
| Grants and Aids | 5,114,590.98 | 5,654,103.00 | 6,159,223.00 | 8,518,358.41 | 9,627,528.00 |
| Borrowings | 212,000.00 | 100,000.00 | - | - | - |
| Expenditures | 5,433,738.23 | 5,163,419.32 | 5,646,015.10 | 8,786,203.05 | 11,362,938.00 |
| Personal Services (P.S.) | 3,781,915.61 | 3,994,069.00 | 4,755,365.29 | 6,490,132.30 | 8,028,093.00 |
| Maint. & Other Oper. Exp. (MOOE) | 1,651,822.62 | 1,169,350.32 | 554,822.92 | 2,166,222.75 | 1,409,337.00 |
| Capital Outlay (CO) | - | - | 100,000.00 | 131,848.00 | 1,925,506.00 |
| Others | - | - | 235,826.89 | - | - |
| 2. Bacuag | | | | | |
| Income | | | | | |
| Local Revenues | 6,214,474.59 | 7,304,176.88 | 6,436,356.00 | 10,418,199.31 | 10,437,789.00 |
| IRA | 536,703.59 | 1,372,337.88 | - | 895,130.71 | - |
| Grants and Aids | 5,362,771.00 | 5,931,839.00 | 6,436,356.00 | 9,222,868.60 | 10,437,789.00 |
| Borrowings | 315,000.00 | - | - | 300,000.00 | - |
| Expenditures | 5,753,540.17 | 7,150,128.84 | 7,663,829.56 | 11,579,381.91 | 12,744,112.80 |
| Personal Services (P.S.) | 4,061,982.70 | 4,239,576.43 | 5,071,748.11 | 8,180,499.00 | 8,180,499.00 |
| Maint. & Other Oper. Exp. (MOOE) | 1,642,217.47 | 2,910,552.41 | 1,795,975.56 | 1,867,192.00 | 1,867,192.00 |
| Capital Outlay (CO) | 49,340.00 | - | 796,105.69 | 734,392.96 | - |
| Others | - | - | - | 797,297.95 | 2,696,421.80 |
| 3. Basilisa | | | | | |
| Income | | | | | |
| Local Revenues | 9,489,490.79 | 10,033,173.59 | 9,478,069.00 | 12,912,167.99 | 13,784,535.00 |
| IRA | 623,987.29 | 1,251,001.59 | - | 787,029.99 | - |
| Grants and Aids | 7,807,615.76 | 8,671,172.00 | 9,478,069.00 | 12,125,138.00 | 13,784,535.00 |
| Borrowings | 1,057,887.74 | 111,000.00 | - | - | - |
| Expenditures | - | - | - | - | - |
| Personal Services (P.S.) | - | - | 10,040,123.38 | 9,315,281.74 | 11,911,150.44 |
| Maint. & Other Oper. Exp. (MOOE) | - | - | 6,460,755.73 | 6,696,446.27 | 8,980,878.00 |
| Capital Outlay (CO) | - | - | 2,335,005.75 | 1,432,732.15 | 1,326,500.00 |
| Others | - | - | 1,244,361.90 | 1,186,103.32 | 1,603,772.44 |
| 4. Burgos | | | | | |
| Income | | | | | |
| Local Revenues | 3,838,267.22 | 4,325,492.71 | 4,080,497.00 | 5,838,923.33 | 6,432,058.00 |
| IRA | 506,451.78 | 570,170.71 | - | 135,139.22 | - |
| Grants and Aids | 3,321,815.44 | 3,755,322.00 | 4,080,497.00 | 5,700,678.00 | 6,432,058.00 |
| Borrowings | 10,000.00 | - | - | 3,106.11 | - |
| Expenditures | 3,101,806.66 | 3,939,074.98 | 4,117,587.38 | 5,215,632.87 | 6,228,541.64 |
| Personal Services (P.S.) | 2,339,418.66 | 3,123,360.52 | 2,983,940.75 | 3,200,093.27 | 4,356,167.40 |
| Maint. & Other Oper. Exp. (MOOE) | 533,214.97 | 586,536.46 | 782,561.63 | 1,203,259.32 | 1,161,922.64 |
| Capital Outlay (CO) | 229,173.03 | 229,178.00 | 351,085.00 | 812,280.28 | 710,451.60 |
| Others | - | - | - | - | - |

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|---------------|---------------|---------------|---------------|---------------|
| 5. Cagdiano | | | | | |
| Income | | | | | |
| Local Revenues | 7,139,667.64 | 8,291,786.97 | 9,211,678.00 | 12,874,234.48 | 13,049,724.00 |
| IRA | 137,182.62 | (331,370.03) | - | 1,862,253.48 | - |
| Grants and Aids | 6,702,485.02 | 8,512,157.00 | 9,211,678.00 | 10,761,889.00 | 13,049,724.00 |
| Borrowings | 300,000.00 | 111,000.00 | - | 250,092.00 | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 7,786,266.82 | 8,981,854.08 | 10,617,824.56 | 12,113,489.80 | 16,143,083.83 |
| Maint. & Other Oper. Exp. (MOOE) | 4,461,511.93 | 4,245,223.28 | 5,069,316.70 | 7,138,599.93 | 9,850,818.29 |
| Capital Outlay (CO) | 3,187,804.89 | 2,300,440.13 | 3,957,419.97 | 2,682,367.67 | 2,353,457.90 |
| Others | 136,950.00 | 300,000.00 | 760,000.00 | - | 505,000.00 |
| | | 2,136,190.67 | 831,087.89 | 2,292,522.20 | 3,433,807.64 |
| 6. Claver | | | | | |
| Income | | | | | |
| Local Revenues | 10,209,281.32 | 13,986,989.79 | 11,185,689.00 | 15,043,617.01 | 14,419,066.00 |
| IRA | 2,748,384.30 | 3,621,778.79 | - | 1,311,172.67 | - |
| Grants and Aids | 7,126,897.02 | 10,365,211.00 | 11,185,689.00 | 13,732,444.34 | 14,419,066.00 |
| Borrowings | 334,000.00 | - | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 8,349,593.70 | 12,007,719.11 | 11,925,753.37 | 15,699,597.41 | 15,313,177.22 |
| Maint. & Other Oper. Exp. (MOOE) | 4,551,557.36 | 6,333,477.92 | 7,876,164.39 | 8,630,913.27 | 9,078,416.00 |
| Capital Outlay (CO) | 3,052,355.20 | 2,592,805.21 | 2,785,525.24 | 1,985,311.63 | 2,376,848.00 |
| Others | 745,681.14 | 3,081,435.98 | 1,264,063.74 | 5,083,372.51 | 3,857,913.22 |
| 7. Dapa | | | | | |
| Income | | | | | |
| Local Revenues | 9,027,727.03 | 16,215,936.27 | 9,741,461.18 | 11,008,871.06 | 14,316,603.00 |
| IRA | 1,380,483.03 | 1,454,416.27 | 1,094,189.18 | 939,407.36 | 2,306,550.00 |
| Grants and Aids | 6,961,244.00 | 7,722,020.00 | 8,433,272.00 | 10,069,463.70 | 11,415,155.00 |
| Borrowings | 686,000.00 | 2,039,500.00 | 214,000.00 | - | 594,898.00 |
| Expenditures | | | | | |
| Personal Services (P.S.) | n.a. | 5,000,000.00 | 7,591,302.03 | 10,391,833.29 | 14,294,276.00 |
| Maint. & Other Oper. Exp. (MOOE) | | | 6,144,244.99 | 8,421,547.37 | 10,318,452.00 |
| Capital Outlay (CO) | | | 1,001,913.54 | 1,276,646.82 | 853,434.00 |
| Others | | | 367,247.50 | 693,639.10 | 3,122,390.00 |
| | | | 77,896.00 | - | - |
| 8. Carmen | | | | | |
| Income | | | | | |
| Local Revenues | 7,180,398.15 | 9,061,709.73 | 7,713,914.00 | 7,848,947.67 | 9,434,000.00 |
| IRA | 945,646.04 | 1,964,246.73 | - | 574,234.20 | - |
| Grants and Aids | 6,180,012.00 | 7,097,463.00 | 7,713,914.00 | 7,274,713.47 | 9,434,000.00 |
| Borrowings | 54,740.11 | - | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 7,267,140.54 | 6,968,318.97 | 7,436,585.07 | 8,029,367.84 | 10,063,601.18 |
| Maint. & Other Oper. Exp. (MOOE) | 4,398,203.63 | 4,113,499.44 | 4,444,222.16 | 4,444,222.16 | 5,733,095.53 |
| Capital Outlay (CO) | 1,831,999.61 | 1,343,134.12 | 1,572,846.64 | 1,572,846.64 | 1,348,878.07 |
| Others | 1,036,937.30 | 107,050.00 | 1,077,050.95 | 1,077,050.92 | 1,439,587.50 |
| | | 1,404,635.41 | 352,455.32 | 935,248.12 | 1,543,040.08 |

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|--------------|---------------|---------------|---------------|---------------|
| 9. Dinagat | | | | | |
| Income | | | | | |
| Local Revenues | 4,703,130.84 | 5,749,383.65 | 5,425,779.00 | 9,274,103.13 | 10,156,341.00 |
| IRA | 215,708.82 | 782,739.65 | - | 327,419.13 | - |
| Grants and Aids | 4,487,422.02 | 4,966,644.00 | 5,425,779.00 | 8,946,684.00 | 10,156,341.00 |
| Borrowings | - | - | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 4,189,970.62 | 5,937,362.77 | 5,255,140.23 | 8,928,573.90 | 10,840,141.00 |
| Maint. & Other Oper. Exp. (MOOE) | 3,175,773.04 | 3,746,098.98 | 3,685,365.00 | 6,546,948.66 | 7,383,463.00 |
| Capital Outlay (CO) | 695,213.03 | 1,557,691.79 | 1,403,190.73 | 2,045,280.23 | 879,885.00 |
| Others | 318,984.55 | 301,177.00 | 1,66,584.50 | 336,345.01 | 2,576,793.00 |
| | | 332,395.00 | - | - | - |
| 10. Gen. Luna | | | | | |
| Income | | | | | |
| Local Revenues | 6,462,334.46 | 8,470,839.76 | 12,043,622.99 | 8,568,536.80 | 14,748,429.00 |
| IRA | 1,031,454.25 | 1,099,627.76 | 578,764.12 | 464,408.80 | 3,182,002.00 |
| Grants and Aids | 5,235,428.48 | 5,871,212.00 | 6,414,335.00 | 8,080,851.00 | 9,223,402.00 |
| Borrowings | 195,451.73 | 1,500,000.00 | 5,050,523.87 | 23,277.00 | 2,200,000.00 |
| Expenditures | | | | | |
| Personal Services (P.S.) | n.a. | n.a. | 6,773,891.31 | 8,143,082.14 | 143,025.00 |
| Maint. & Other Oper. Exp. (MOOE) | | | 3,866,274.24 | 5,884,679.60 | 10,439,344.24 |
| Capital Outlay (CO) | | | 1,195,728.77 | 950,269.82 | 5,388,234.24 |
| Others | | | 1,411,888.30 | 1,308,132.72 | 1,906,430.00 |
| | | | 300,000.00 | - | 3,144,680.00 |
| 11. Gigaquit | | | | | |
| Income | | | | | |
| Local Revenues | 8,157,094.55 | 8,506,070.84 | 8,349,195.00 | 11,022,575.66 | 11,925,181.00 |
| IRA | 981,706.15 | 828,869.84 | - | 366,575.14 | - |
| Grants and Aids | 7,042,388.40 | 7,677,201.00 | 8,349,195.00 | 10,496,625.00 | 11,925,181.00 |
| Borrowings | 133,000.00 | - | - | 159,375.52 | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 7,697,686.01 | 6,038,547.53 | 6,679,896.86 | 11,010,899.40 | 12,688,508.97 |
| Maint. & Other Oper. Exp. (MOOE) | 5,236,362.22 | 4,708,942.93 | 5,235,982.76 | 6,174,711.04 | 7,260,083.68 |
| Capital Outlay (CO) | 2,128,323.79 | 1,144,604.60 | 1,258,914.10 | 1,903,112.00 | 2,191,130.04 |
| Others | 333,000.00 | 185,000.00 | 185,000.00 | 132,900.00 | 243,000.00 |
| | | | - | 2,800,176.36 | 2,994,295.25 |
| 12. Libjo | | | | | |
| Income | | | | | |
| Local Revenues | 9,837,785.36 | 11,261,726.80 | 9,459,084.00 | 12,309,818.41 | 13,196,698.00 |
| IRA | 1,592,155.86 | 2,541,837.80 | - | 709,631.96 | - |
| Grants and Aids | 8,008,629.50 | 8,719,889.00 | 9,459,084.00 | 11,600,186.45 | 13,196,698.00 |
| Borrowings | 237,000.00 | - | - | - | - |

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|----------------|----------------|----------------|-----------------|-----------------|
| Expenditures | | | | | |
| Personal Services (P.S.) | 8,273,163.88 | 9,539,489.88 | 8,237,257.62 | 11,882,727.74 | 15,404,783.00 |
| Maint. & Other Oper. Exp. (MOOE) | 5,124,200.87 | 5,562,492.00 | 6,074,275.29 | 6,744,385.21 | 9,137,596.00 |
| Capital Outlay (CO) | 3,140,963.01 | 1,736,394.88 | 1,979,321.09 | 2,628,230.53 | 2,837,977.00 |
| Others | 8,000.00 | - | - | 16,000.00 | - |
| Total | 14,536,327.76 | 17,038,376.76 | 16,290,853.99 | 21,291,343.48 | 27,380,356.00 |
| 13. Loreto | | | | | |
| Income | | | | | |
| Local Revenues | 8,307,468.94 | 8,617,830.96 | 9,921,700.00 | 11,853,201.79 | 12,287,268.00 |
| IRA | 1,578,107.44 | 2,226,438.96 | - | 1,066,546.09 | - |
| Grants and Aids | 6,053,249.00 | 6,391,392.00 | 9,921,700.00 | 10,786,655.70 | 12,287,268.00 |
| Borrowings | 676,112.50 | - | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 7,624,415.48 | 8,593,619.65 | 7,758,237.85 | 13,088,083.09 | 15,913,752.20 |
| Maint. & Other Oper. Exp. (MOOE) | 4,794,397.24 | 5,012,074.11 | 5,405,280.64 | 8,181,759.15 | 11,179,512.85 |
| Capital Outlay (CO) | 1,661,121.91 | 2,316,545.54 | 765,507.21 | 3,202,825.21 | 1,332,134.90 |
| Others | 1,168,896.33 | - | 1,587,450.00 | 1,703,498.73 | 138,500.00 |
| Total | 14,248,830.96 | 15,922,239.30 | 15,516,475.60 | 24,176,166.18 | 28,563,800.00 |
| Total | 2,287,496.78 | 1,116,137.46 | 4,405,228.40 | (12,322,964.39) | (6,276,444.00) |
| 14. Mainit | | | | | |
| Income | | | | | |
| Local Revenues | 11,187,240.91 | 19,355,542.78 | 15,421,076.46 | 12,930,081.25 | 16,015,399.10 |
| IRA | 1,809,166.41 | 2,280,597.78 | 1,558,208.46 | 1,737,432.10 | 1,737,432.10 |
| Grants and Aids | 8,378,174.50 | 9,274,945.00 | 10,107,868.00 | 9,362,417.15 | 12,447,735.00 |
| Borrowings | 1,000,000.00 | - | 255,000.00 | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 9,670,078.49 | 7,800,000.00 | 3,500,000.00 | 14,991,137.99 | 14,991,137.99 |
| Maint. & Other Oper. Exp. (MOOE) | 5,444,636.50 | 6,827,564.17 | 6,946,369.38 | 8,233,575.99 | 8,233,575.99 |
| Capital Outlay (CO) | 1,900,011.41 | 2,916,978.40 | 1,300,280.33 | 4,493,066.94 | 4,493,066.94 |
| Others | 2,325,430.58 | 8,893,738.18 | 3,975,651.18 | 1,147,048.77 | 1,147,048.77 |
| Total | 19,340,156.98 | 26,438,280.75 | 19,722,289.81 | 24,870,833.75 | 29,065,829.60 |
| Total | (8,152,916.07) | (7,082,737.97) | (4,301,213.35) | (11,939,752.50) | (13,050,430.50) |
| 15. Mallmono | | | | | |
| Income | | | | | |
| Local Revenues | 7,393,702.95 | 9,897,861.97 | 8,472,372.00 | 9,984,399.51 | 10,722,063.00 |
| IRA | 287,733.95 | 1,527,321.97 | - | 621,982.36 | - |
| Grants and Aids | 7,005,969.00 | 7,770,540.00 | 8,472,372.00 | 9,362,417.15 | 10,722,063.00 |
| Borrowings | 100,000.00 | 600,000.00 | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 7,312,391.39 | 8,041,363.52 | 7,117,586.87 | 9,948,875.34 | 11,527,262.23 |
| Maint. & Other Oper. Exp. (MOOE) | 4,871,233.70 | 5,358,356.07 | 5,459,223.97 | 6,747,980.59 | 7,795,522.48 |
| Capital Outlay (CO) | 2,418,497.69 | 2,660,347.45 | 1,321,392.90 | 1,002,482.15 | 914,782.15 |
| Others | 22,660.00 | 22,660.00 | - | - | 43,545.00 |
| Total | 14,624,782.78 | 16,082,707.04 | 13,908,283.74 | 17,700,338.08 | 20,281,112.60 |
| Total | (7,231,079.83) | (6,184,845.07) | (5,435,911.74) | (7,715,938.57) | (9,559,049.60) |
| 16. Pilar | | | | | |
| Income | | | | | |
| Local Revenues | 6,061,604.45 | 7,925,592.24 | 7,040,976.35 | 8,212,956.68 | 8,212,956.68 |
| IRA | 385,298.70 | 1,126,239.24 | 746,926.35 | 238,379.02 | 238,379.02 |
| Grants and Aids | 5,543,305.75 | 5,799,353.00 | 6,294,050.00 | 7,974,577.66 | 7,974,577.66 |
| Borrowings | 133,000.00 | 1,000,000.00 | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | - | - | - | - | - |
| Maint. & Other Oper. Exp. (MOOE) | - | - | - | - | - |
| Capital Outlay (CO) | - | - | - | - | - |
| Others | - | - | - | - | - |
| Total | 12,123,208.90 | 14,851,184.48 | 14,071,952.70 | 16,426,413.36 | 16,426,413.36 |

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|---------------|---------------|---------------|---------------|---------------|
| Expenditures | | | | | |
| Personal Services (P.S.) | 5,866,466.62 | 6,995,064.00 | 6,492,766.15 | 7,591,276.03 | 7,591,276.03 |
| Maint. & Other Oper. Exp. (MOOE) | 4,283,335.21 | 4,382,823.00 | 4,092,305.96 | 5,586,684.07 | 5,586,684.07 |
| Capital Outlay (CO) | 1,371,326.21 | 1,856,083.00 | 772,093.70 | 2,004,591.96 | 2,004,591.96 |
| Others | 211,805.20 | 756,158.00 | 1,006,888.46 | - | - |
| | | | 621,478.03 | - | - |
| 17. Placer | | | | | |
| Income | 11,965,047.04 | 27,226,476.13 | 8,602,820.00 | 17,470,039.07 | 11,988,336.00 |
| Local Revenues | 2,967,143.36 | 17,795,571.13 | - | 5,387,349.06 | - |
| IRA | 7,151,701.00 | 7,930,905.00 | 8,602,820.00 | 10,582,690.01 | 11,988,336.00 |
| Grants and Aids | 1,396,202.68 | 1,500,000.00 | - | 1,500,000.00 | - |
| Borrowings | 450,000.00 | - | - | - | - |
| Expenditures | 11,291,339.40 | 12,370,604.79 | 20,841,377.71 | 21,093,001.18 | 30,584,556.90 |
| Personal Services (P.S.) | 7,335,583.14 | 8,069,141.45 | 8,882,532.83 | 11,166,388.57 | 15,526,019.00 |
| Maint. & Other Oper. Exp. (MOOE) | 3,457,070.76 | 3,802,777.84 | 6,165,556.46 | 5,650,674.49 | 9,679,170.70 |
| Capital Outlay (CO) | 498,685.50 | 498,685.50 | 5,793,288.42 | 4,275,938.12 | 5,379,367.20 |
| Others | - | - | - | - | - |
| 18. Benito | | | | | |
| Income | 4,237,808.71 | 4,828,748.94 | 5,033,196.00 | 6,521,043.52 | 7,177,933.00 |
| Local Revenues | 4,102,992.40 | 193,995.94 | - | 184,718.00 | - |
| IRA | 134,816.31 | 4,634,753.00 | 5,033,196.00 | 6,336,325.52 | 7,177,933.00 |
| Grants and Aids | - | - | - | - | - |
| Borrowings | - | - | - | - | - |
| Expenditures | 4,058,154.02 | 5,497,884.00 | 4,242,509.13 | 6,000,605.50 | 9,323,381.00 |
| Personal Services (P.S.) | 2,931,487.76 | 4,135,934.00 | 3,893,142.26 | 4,737,490.87 | 5,840,688.00 |
| Maint. & Other Oper. Exp. (MOOE) | 782,766.44 | 405,000.00 | 245,367.12 | 523,983.46 | 1,251,300.00 |
| Capital Outlay (CO) | 343,899.82 | 30,000.00 | - | 150,000.00 | 188,000.00 |
| Others | - | 926,950.00 | 103,999.75 | 589,131.17 | 2,043,393.00 |
| 19. San Francisco | | | | | |
| Income | 5,776,737.70 | 6,318,127.47 | 6,157,387.00 | 9,275,888.00 | 8,873,107.00 |
| Local Revenues | 550,397.70 | 661,164.47 | - | 1,296,159.00 | - |
| IRA | 5,121,340.00 | 5,656,963.00 | 6,157,387.00 | 7,979,729.00 | 8,873,107.00 |
| Grants and Aids | 105,000.00 | - | - | - | - |
| Borrowings | - | - | - | - | - |
| Expenditures | 5,560,853.43 | 5,733,841.00 | 5,377,839.98 | 9,117,263.73 | 10,598,386.65 |
| Personal Services (P.S.) | 3,566,050.55 | 3,776,220.07 | 4,638,777.19 | 6,183,976.63 | 7,501,720.00 |
| Maint. & Other Oper. Exp. (MOOE) | 1,968,622.68 | 1,670,523.93 | 564,149.84 | 678,252.83 | 676,084.90 |
| Capital Outlay (CO) | 26,180.20 | 287,097.00 | 162,462.95 | 524,593.40 | - |
| Others | - | - | 12,450.00 | 1,730,440.87 | 2,420,581.75 |

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|---------------|---------------|--------------|---------------|---------------|
| 20. San Isidro | | | | | |
| Income | 4,810,315.52 | 5,158,658.69 | 5,798,356.60 | 7,139,428.73 | 8,498,948.00 |
| Local Revenues | 102,310.52 | 169,717.69 | 386,839.60 | 161,255.46 | 659,323.00 |
| IRA | 4,514,848.00 | 4,988,941.00 | 5,411,517.00 | 6,941,671.33 | 7,839,615.00 |
| Grants and Aids | 193,157.00 | - | - | 36,501.94 | - |
| Borrowings | - | - | - | - | - |
| Expenditures: | 5,393,597.83 | 4,436,956.00 | 3,796,929.03 | 6,115,815.07 | 8,418,201.00 |
| Personal Services (P.S.) | 3,912,325.00 | 3,704,491.00 | 2,952,322.77 | 4,554,423.10 | 5,884,331.00 |
| Maint. & Other Oper. Exp. (MOOE) | 1,481,272.83 | 732,465.00 | 733,573.95 | 834,462.70 | 529,000.00 |
| Capital Outlay (CO) | - | - | 81,079.50 | 280,028.62 | - |
| Others | - | - | 29,952.83 | 446,900.65 | 2,004,870.00 |
| 21. San Jose | | | | | |
| Income | 11,206,479.62 | 11,512,403.98 | 9,664,549.00 | 11,482,435.53 | 12,364,448.00 |
| Local Revenues | 2,443,276.62 | 2,778,233.98 | - | 655,534.53 | - |
| IRA | 7,818,716.00 | 8,734,170.00 | 9,664,549.00 | 10,826,901.00 | 12,364,448.00 |
| Grants and Aids | 944,487.00 | - | - | - | - |
| Borrowings | - | - | - | - | - |
| Expenditures | 6,814,324.48 | 7,337,494.44 | 8,108,315.49 | 10,721,796.09 | 13,278,397.23 |
| Personal Services (P.S.) | 5,097,438.64 | 4,662,259.62 | 5,706,071.53 | 6,914,912.08 | 8,689,450.31 |
| Maint. & Other Oper. Exp. (MOOE) | 1,530,175.54 | 1,268,939.69 | 1,413,883.44 | 2,540,255.83 | 1,445,334.92 |
| Capital Outlay (CO) | 186,710.30 | 1,294,114.02 | 902,397.27 | - | 8,000.00 |
| Others | - | 112,181.11 | 85,963.25 | 1,266,628.18 | 3,135,612.00 |
| 22. Sta. Monica | | | | | |
| Income | 5,507,096.41 | 6,158,249.35 | 5,246,544.00 | 7,293,993.41 | 7,520,572.00 |
| Local Revenues | 823,921.62 | 1,341,127.35 | - | 452,866.41 | - |
| IRA | 4,502,847.79 | 4,817,122.00 | 5,246,544.00 | 6,841,127.00 | 7,520,572.00 |
| Grants and Aids | 180,327.00 | - | - | - | - |
| Borrowings | - | - | - | - | - |
| Expenditures | 4,619,588.46 | 4,918,708.81 | 5,679,305.33 | 6,988,674.55 | 7,264,972.40 |
| Personal Services (P.S.) | 3,375,815.96 | 3,304,058.61 | 3,896,743.31 | 5,189,078.67 | 6,038,172.40 |
| Maint. & Other Oper. Exp. (MOOE) | 580,111.50 | 578,743.68 | 1,257,025.76 | 1,638,717.80 | 1,089,800.00 |
| Capital Outlay (CO) | 663,661.00 | 1,035,906.52 | 525,536.26 | 160,878.08 | 137,000.00 |
| Others | - | - | - | - | - |

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------------------|--------------|--------------|--------------|---------------|---------------|
| 23. Sison | | | | | |
| Income | | | | | |
| Local Revenues | 6,304,725.20 | 6,285,658.12 | 6,885,112.64 | 8,923,848.90 | 9,677,361.38 |
| IRA | 792,449.20 | 572,933.12 | 685,036.64 | 688,019.23 | 652,410.38 |
| Grants and Aids | 5,187,276.00 | 5,712,725.00 | 6,200,076.00 | 8,034,829.67 | 9,024,951.00 |
| Borrowings | 325,000.00 | - | - | 201,000.00 | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 6,148,851.16 | 7,849,736.09 | 5,434,697.64 | 8,452,521.26 | 9,677,361.38 |
| Maint. & Other Oper. Exp. (MOOE) | 4,029,634.60 | 4,513,264.50 | 4,842,392.45 | 5,538,594.70 | 6,962,610.35 |
| Capital Outlay (CO) | 1,581,126.43 | 1,660,182.75 | 261,032.19 | 877,433.59 | 410,892.76 |
| Others | 538,090.13 | 1,280,396.39 | - | 66,000.00 | 3,000.00 |
| | | 395,892.45 | 331,273.00 | 1,950,492.97 | 2,300,858.27 |
| 24. Socorro | | | | | |
| Income | | | | | |
| Local Revenues | 9,574,950.03 | 8,012,951.06 | 8,366,534.00 | 10,920,944.60 | 11,831,188.40 |
| IRA | 1,419,259.69 | 222,812.06 | - | 498,916.09 | - |
| Grants and Aids | 6,934,886.00 | 7,690,139.00 | 8,366,534.00 | 10,422,028.51 | 11,831,188.40 |
| Borrowings | 100,000.00 | 100,000.00 | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 1,120,304.34 | 8,214,566.86 | 7,691,287.44 | 10,149,469.80 | 14,282,149.42 |
| Maint. & Other Oper. Exp. (MOOE) | 8,514,060.11 | 4,487,315.41 | 4,865,129.87 | 6,235,608.83 | 8,528,560.00 |
| Capital Outlay (CO) | 4,066,619.09 | 2,826,017.84 | 2,006,335.58 | 1,497,432.67 | 2,391,132.00 |
| Others | 1,197,842.31 | 901,233.61 | 819,821.99 | 1,050,885.71 | 1,232,000.00 |
| | 3,249,598.71 | - | - | 1,365,542.59 | 2,130,457.42 |
| 25. Tagana-an | | | | | |
| Income | | | | | |
| Local Revenues | 8,196,092.12 | 8,460,617.34 | 7,085,160.00 | 9,825,863.02 | 9,115,744.00 |
| IRA | 2,305,470.12 | 1,947,789.34 | - | 825,677.02 | - |
| Grants and Aids | 5,890,622.00 | 6,512,828.00 | 7,085,160.00 | 9,000,186.00 | 9,115,744.00 |
| Borrowings | - | - | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | n.a. | n.a. | 6,113,565.07 | 8,045,111.08 | 9,981,738.00 |
| Maint. & Other Oper. Exp. (MOOE) | - | - | 4,025,852.62 | 5,342,858.38 | 6,124,192.00 |
| Capital Outlay (CO) | - | - | 983,938.90 | 2,037,552.82 | 3,778,546.00 |
| Others | - | - | 1,103,773.55 | 664,699.38 | 79,000.00 |
| 26. Tubajon | | | | | |
| Income | | | | | |
| Local Revenues | 5,473,034.00 | 5,812,562.17 | 5,840,511.00 | 7,826,532.88 | 8,379,939.00 |
| IRA | 246,115.00 | 371,874.17 | - | 149,051.98 | - |
| Grants and Aids | 4,995,419.00 | 5,440,688.00 | 5,840,511.00 | 7,385,240.90 | 8,379,939.00 |
| Borrowings | 231,500.00 | - | - | 292,240.00 | - |

Table 6.2.1 Income and Expenditures of Surigao del Norte, 1994-1998

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|----------------|----------------|----------------|----------------|----------------|
| 27. Tubod | | | | | |
| Expenditures | | | | | |
| Personal Services (P.S.) | 5,398,183.97 | 6,216,786.00 | 6,421,362.25 | 7,417,127.41 | 8,585,009.50 |
| Maint. & Other Oper. Exp. (MOOE) | 3,422,637.52 | 3,756,703.00 | 4,031,411.63 | 5,047,650.00 | 5,754,326.50 |
| Capital Outlay (CO) | 1,541,055.45 | 634,312.00 | 968,990.72 | 884,223.21 | 716,443.00 |
| Others | 434,491.00 | 443,369.00 | 1,420,959.90 | 100,000.00 | - |
| Income | | | | | |
| Local Revenues | 6,697,837.00 | 8,356,035.08 | 6,682,566.00 | 9,920,180.87 | 9,264,492.00 |
| IRA | 935,327.07 | 2,198,949.08 | - | 448,797.20 | - |
| Grants and Aids | 5,277,509.93 | 6,157,086.00 | 6,682,566.00 | 8,241,291.67 | 9,264,492.00 |
| Borrowings | 485,000.00 | - | - | 1,230,092.00 | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | 6,008,711.43 | n.a. | 6,250,810.25 | 8,306,610.56 | 11,352,039.55 |
| Maint. & Other Oper. Exp. (MOOE) | 3,873,895.11 | - | 5,208,547.41 | 6,403,908.78 | 8,001,669.81 |
| Capital Outlay (CO) | 2,074,816.32 | - | 1,007,594.74 | 787,672.91 | 857,184.06 |
| Others | 60,000.00 | - | 33,168.20 | 711,530.88 | 30,000.00 |
| Income | | | | | |
| Local Revenues | - | - | 131,963,737.56 | 334,715,253.00 | 399,058,719.00 |
| IRA | - | - | 131,963,737.56 | 186,004,495.00 | 200,389,495.00 |
| Grants and Aids | - | - | - | 148,710,758.00 | 198,669,224.00 |
| Borrowings | - | - | - | - | - |
| Expenditures | | | | | |
| Personal Services (P.S.) | - | - | - | 213,553,000.00 | 235,186,000.00 |
| Maint. & Other Oper. Exp. (MOOE) | - | - | - | 79,579,000.00 | 87,537,000.00 |
| Capital Outlay (CO) | - | - | - | 22,941,000.00 | 22,535,000.00 |
| Others | - | - | - | 48,813,000.00 | 53,694,000.00 |
| Total Income of Surigao Municipalities and City ^{1/} | 200,560,192.28 | 253,735,663.77 | 347,467,166.78 | 610,880,668.12 | 692,516,426.56 |
| Total Expenditures of Surigao Municipalities and City | 152,135,922.90 | 171,084,193.64 | 205,631,230.73 | 482,358,439.77 | 565,989,279.80 |

Source: Municipalities and PPDO.
1/ Includes Surigao-City starting 1996 to 1998.

Table 6.2.2 Past Internal Revenue Allotment to Municipalities from Central Government

| | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. IRA to all municipalities (National total) | 16,325,288,074 | 18,788,952,000 | 19,607,715,553 | 24,849,000,000 | 28,245,815,434 |
| 2. IRA to municipalities in Surigao del Norte | | | | | |
| <i>Total</i> | 87,782,723 | 100,610,570 | 109,376,669 | 136,679,000 | 157,836,480 |
| Alegria | 5,114,591 | 5,654,103 | 6,159,233 | 8,518,385 | 9,627,528 |
| Bacuag | 5,362,771 | 5,931,839 | 6,436,356 | 9,222,869 | 10,437,789 |
| Basilisa (Rizal) | 7,807,616 | 8,671,172 | 9,478,069 | 12,125,138 | 13,784,535 |
| Burgos | 3,321,815 | 3,755,322 | 4,080,497 | 5,700,678 | 6,432,058 |
| Cagdianao | 6,702,485 | 8,512,157 | 9,211,678 | 10,761,889 | 13,049,724 |
| Claver | 7,126,897 | 10,365,211 | 11,185,689 | 13,732,444 | 14,419,066 |
| Dapa | 6,961,244 | 7,722,020 | 8,433,272 | 10,069,464 | 11,415,155 |
| Del Carmen | 6,180,012 | 7,097,463 | 7,713,914 | 7,274,713 | 9,434,000 |
| Dinagat | 4,487,422 | 4,966,644 | 5,425,779 | 8,946,684 | 10,156,341 |
| General Luna | 5,235,428 | 5,871,212 | 6,414,335 | 8,080,851 | 9,223,402 |
| Gigaquit | 7,042,388 | 7,677,201 | 8,349,195 | 10,496,625 | 11,925,181 |
| Libjo (Albor) | 8,008,630 | 8,719,889 | 9,459,084 | 11,600,186 | 13,196,698 |
| Loreto | 6,053,249 | 6,391,392 | 6,921,700 | 10,786,656 | 12,287,268 |
| Mainit | 8,378,175 | 9,274,945 | 10,107,868 | 9,362,417 | 12,447,735 |
| Malimono | 7,005,969 | 7,770,540 | 8,472,372 | 9,362,417 | 10,722,063 |
| Pilar | 5,543,306 | 5,799,353 | 6,294,050 | 7,974,578 | 7,974,578 |
| Placer | 7,151,701 | 7,930,905 | 8,602,820 | 10,582,690 | 11,988,336 |
| San Benito | 4,102,992 | 4,634,753 | 5,033,196 | 6,336,326 | 7,177,933 |
| San Francisco (Anao-Aon) | 5,121,340 | 5,656,936 | 6,157,307 | 7,979,729 | 8,873,107 |
| San Isidro | 4,514,848 | 4,988,941 | 5,411,517 | 6,941,671 | 7,839,615 |
| San Jose | 7,818,716 | 8,734,170 | 9,664,549 | 10,826,901 | 12,364,448 |
| Santa Monica (Sapao) | 4,502,848 | 4,817,122 | 5,246,544 | 6,841,127 | 7,520,572 |
| Sison | 5,187,276 | 5,715,725 | 6,200,076 | 8,034,830 | 9,024,951 |
| Socorro | 6,934,886 | 7,690,139 | 8,366,534 | 10,422,029 | 11,831,188 |
| Surigao City (Capital) | 116,224,599 | 123,208,277 | 131,963,738 | 148,710,758 | 198,669,224 |
| Tagana-An | 5,890,622 | 6,512,828 | 7,085,160 | 9,000,186 | 9,115,744 |
| Tubajon | 4,995,419 | 5,440,688 | 5,840,511 | 7,385,241 | 8,379,939 |
| Tubod | 5,288,510 | 6,157,086 | 6,682,566 | 8,241,292 | 9,264,492 |
| 3. Share (%) in national total by municipality | | | | | |
| <i>Total</i> | 1.7033 | 1.6286 | 1.6850 | 1.5909 | 1.6943 |
| Alegria | 0.0313 | 0.0301 | 0.0314 | 0.0343 | 0.0341 |
| Bacuag | 0.0328 | 0.0316 | 0.0328 | 0.0371 | 0.0370 |
| Basilisa (Rizal) | 0.0478 | 0.0462 | 0.0483 | 0.0488 | 0.0488 |
| Burgos | 0.0203 | 0.0200 | 0.0208 | 0.0229 | 0.0228 |
| Cagdianao | 0.0411 | 0.0454 | 0.0470 | 0.0433 | 0.0462 |
| Claver | 0.0437 | 0.0552 | 0.0570 | 0.0553 | 0.0510 |
| Dapa | 0.0426 | 0.0411 | 0.0430 | 0.0405 | 0.0404 |
| Del Carmen | 0.0379 | 0.0378 | 0.0393 | 0.0293 | 0.0334 |
| Dinagat | 0.0275 | 0.0265 | 0.0277 | 0.0360 | 0.0360 |
| General Luna | 0.0321 | 0.0313 | 0.0327 | 0.0325 | 0.0327 |
| Gigaquit | 0.0431 | 0.0409 | 0.0426 | 0.0422 | 0.0422 |
| Libjo (Albor) | 0.0491 | 0.0465 | 0.0482 | 0.0467 | 0.0467 |
| Loreto | 0.0371 | 0.0341 | 0.0353 | 0.0434 | 0.0435 |
| Mainit | 0.0513 | 0.0494 | 0.0516 | 0.0377 | 0.0441 |
| Malimono | 0.0429 | 0.0414 | 0.0432 | 0.0377 | 0.0380 |
| Pilar | 0.0340 | 0.0309 | 0.0321 | 0.0321 | 0.0282 |
| Placer | 0.0438 | 0.0423 | 0.0439 | 0.0426 | 0.0424 |
| San Benito | 0.0251 | 0.0247 | 0.0257 | 0.0255 | 0.0254 |
| San Francisco (Anao-Aon) | 0.0314 | 0.0301 | 0.0314 | 0.0321 | 0.0314 |
| San Isidro | 0.0277 | 0.0266 | 0.0276 | 0.0279 | 0.0278 |
| San Jose | 0.0479 | 0.0465 | 0.0493 | 0.0436 | 0.0438 |
| Santa Monica (Sapao) | 0.0276 | 0.0257 | 0.0268 | 0.0275 | 0.0266 |
| Sison | 0.0318 | 0.0305 | 0.0316 | 0.0323 | 0.0320 |
| Socorro | 0.0425 | 0.0410 | 0.0427 | 0.0419 | 0.0419 |
| Surigao City (Capital) | 0.7119 | 0.6564 | 0.6730 | 0.5985 | 0.7034 |
| Tagana-An | 0.0361 | 0.0347 | 0.0361 | 0.0362 | 0.0323 |
| Tubajon | 0.0306 | 0.0290 | 0.0298 | 0.0297 | 0.0297 |
| Tubod | 0.0324 | 0.0328 | 0.0341 | 0.0332 | 0.0328 |

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



7. WATER SOURCE DEVELOPMENT

7.3 Groundwater Sources

7.3.2 Groundwater Availability in the Province

(1) Major Information and References

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

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

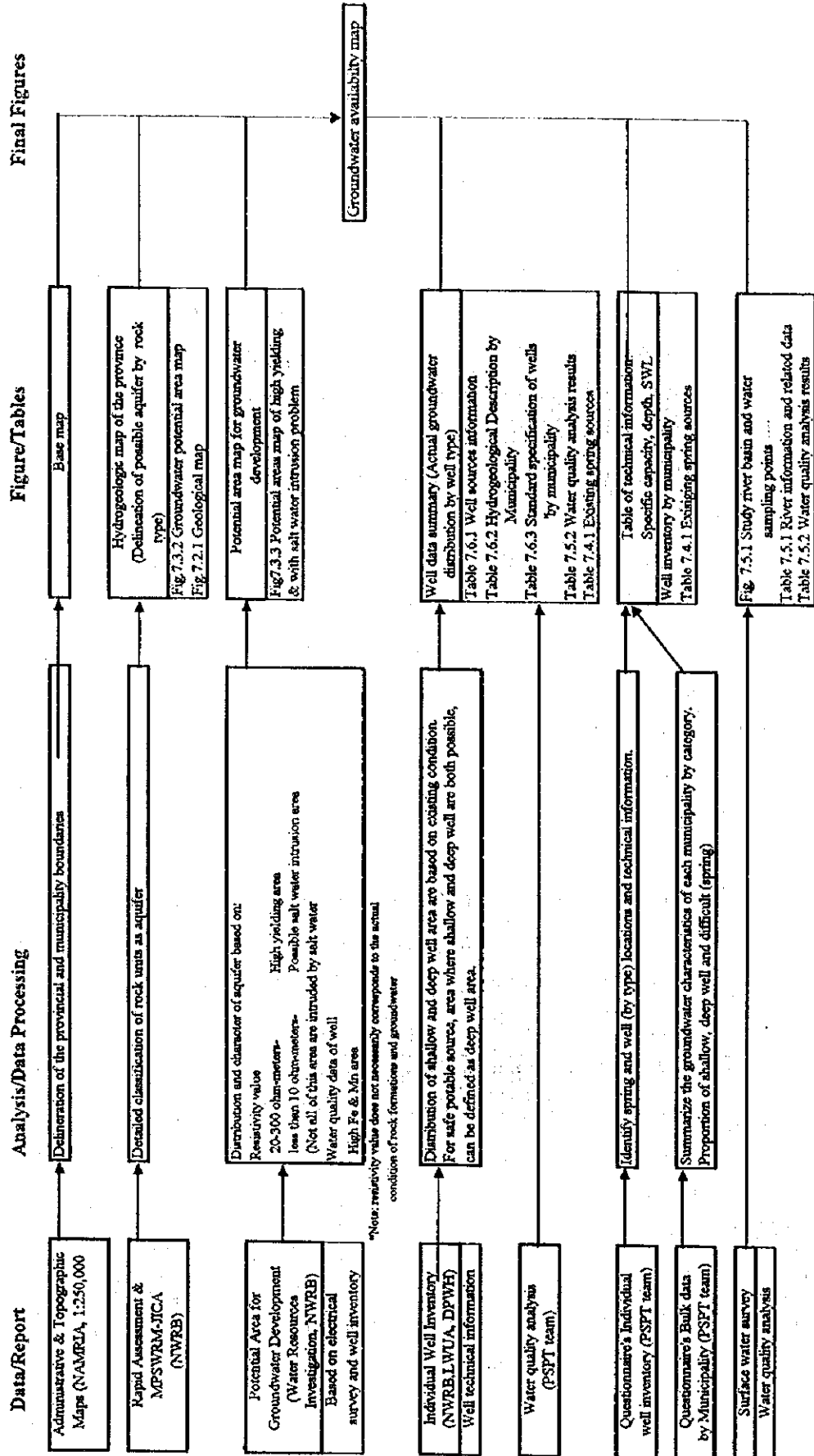
(2) Approach and Methodology

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

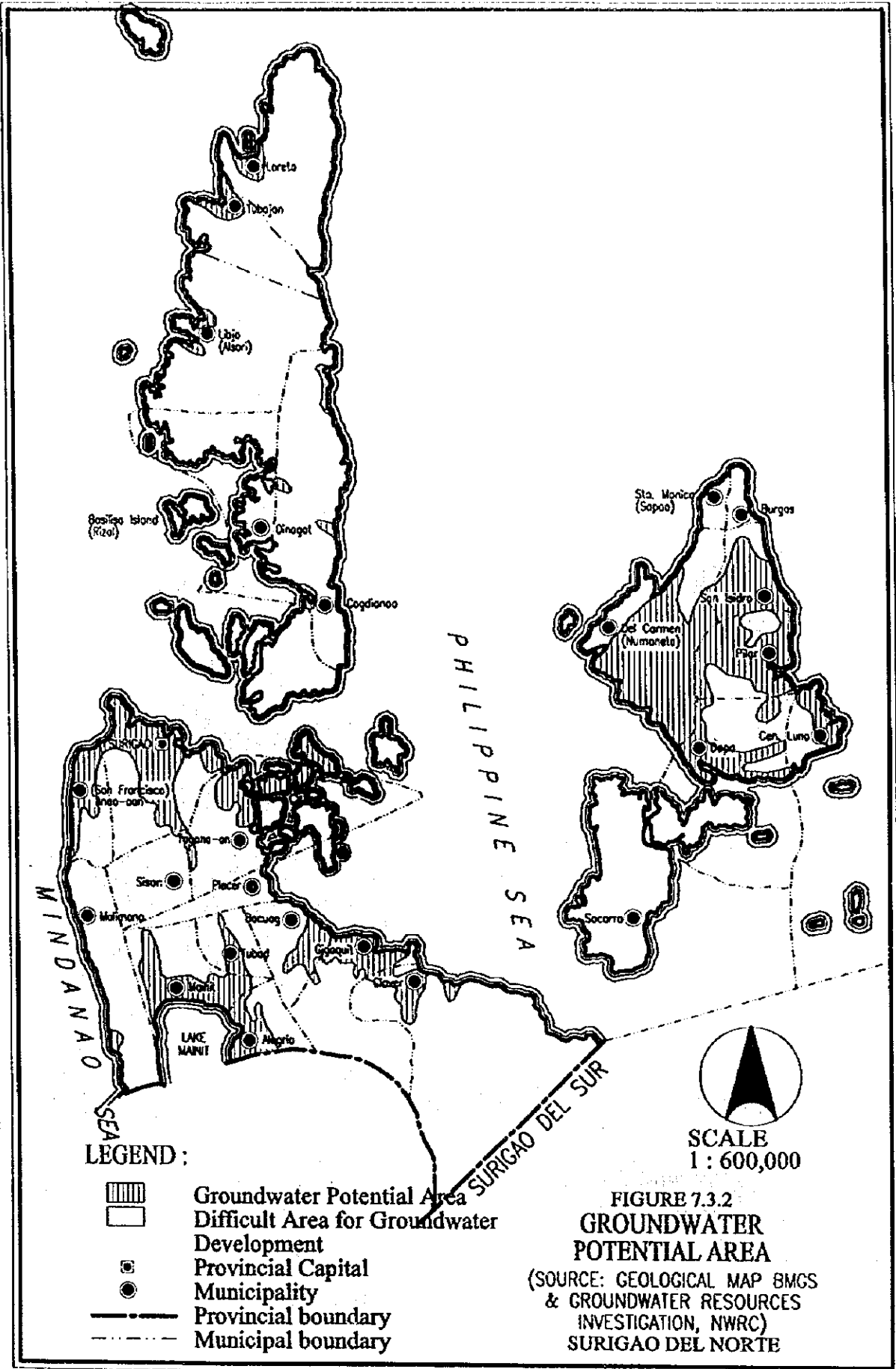
- 1) Prepare a base map with a scale of 1:250,000. The topographical map of NAMRIA (1:250,000) was used as a reference map. Basic information including rivers and provincial and municipal boundaries are indicated in the prepared base map.
- 2) The groundwater potential areas, based on the geology of the province, are delineated on the base map. The Recent alluvial and/or beach deposits, Pliocene-Quaternary sedimentary formation (clay, silt, sand and gravel) and Pliocene-Quaternary volcanic rock units (pyroclastics, debris flow, and tuff) are regarded as possible aquifers considering their high porosity and permeability.

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

Figure 7.3.1 WORK FLOW OF GROUNDWATER AVAILABILITY MAP



DISK NAME : SURIGAO-DELNORTE(DISK1)
 FILENAME : SURIGAO-DELNORTE(GPA)

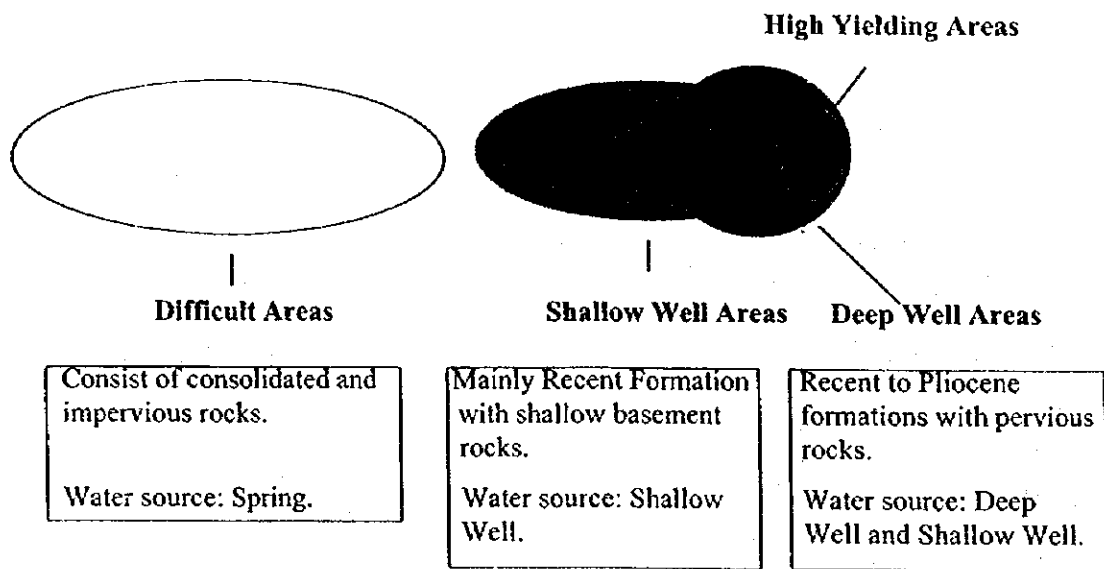


- 3) Areas with potential high yielding aquifer in the Water Resources Investigation of NWRB, are reflected in the defined groundwater potential areas.

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

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

Figure 7.3.4 Area Category by Groundwater Utilization



Shallow well areas are defined on the following basis:

- (a) Predominance of serviceable shallow wells and presence of deep wells with water quality problem and/or low yielding aquifers.
 - (b) Occurrence of impervious rocks beneath the Recent formation at shallow depth.
- 5) Based on the information provided by NWRB's well inventory and the data obtained through the questionnaires, well specifications for each municipality are established

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

(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 the information obtained through the questionnaires and Table 7.1.1 Water Source Information, Data Report.

Table 7.4.1 Existing Spring Sources

| Municipality | Developed Spring | | Untapped Spring | | |
|----------------------------|------------------|-------------------|-----------------|-------------------|-------------|
| | Number | Discharge (l/sec) | Number | Discharge (l/sec) | |
| | | | | Ave. | Range |
| Loreto (Dinagat Is.) | 14 | <2.8 | | | |
| | 1 | >2.8 | | | |
| Tubajon (Dinagat Is.) | 1 | <2.8 | | | |
| Libjo (Dinagat Is.) | 7 | <2.8 | | | |
| Basilisa (Dinagat Is.) | 36 | <2.8 | | | |
| Dinagat (Dinagat Is.) | 7 | <2.8 | 9 | 0.19 | 0.03 - 0.67 |
| Cagdianao (Dinagat Is.) | 5 | <2.8 | | | |
| | 1 | >2.8 | | | |
| San Josefa (Dinagat Is.) | 31 | >2.8 | | | |
| Santa Monica (Siargao Is.) | 3 | <2.8 | | | |
| | 5 | >2.8 | | | |
| Burgos (Siargao Is.) | 3 | <2.8 | | | |
| San Isidoro (Siargao Is.) | 7 | <2.8 | 6 | 1.11 | 1.11 |
| San Benito (Siargao Is.) | 1 | <2.8 | | | |

| Municipality | Developed Spring | | Untapped Spring | | |
|----------------------------|------------------|-------------------|-----------------|-------------------|-------------|
| | Number | Discharge (l/sec) | Number | Discharge (l/sec) | |
| | | | | Avc. | Range |
| Pilar (Siargao Is.) | 9 | < 2.8 | | | |
| | 1 | > 2.8 | | | |
| Del Carmen (Siargao Is.) | 16 | < 2.8 | 1 | N.A. | N.A. |
| General Luna (Siargao Is.) | | | 1 | 27.6 | 27.6 |
| Dapa (Siargao Is.) | 11 | < 2.8 | | | |
| | 1 | > 2.8 | | | |
| Socorro (Socorro Is.) | 10 | < 2.8 | | | |
| Surigao City | 2 | > 2.8 | | | |
| San Francisco (Anao-aon) | 8 | > 2.8 | 2 | 30.0 | 20.0 - 40.0 |
| Malimono | 2 | < 2.8 | 1 | 1.19 | 1.19 |
| Tagana-an | 2 | < 2.8 | | | |
| Sison | 11 | < 2.8 | | | |
| | 1 | > 2.8 | | | |
| Placer | 9 | < 2.8 | | | |
| | 7 | > 2.8 | | | |
| Bacuag | 1 | > 2.8 | 6 | 3.0 | 1.67 - 4.17 |
| Tubod | 3 | < 2.8 | | | |
| | 1 | > 2.8 | | | |
| Mainit | 23 | < 2.8 | | | |
| | 6 | > 2.8 | | | |
| Alegria | 1 | < 2.8 | 8 | > 1.16 | > 1.16 |
| | 7 | > 2.8 | | | |
| Gigaquit | 3 | > 2.8 | | | |
| Claver | 2 | < 2.8 | | | |
| Total | 233 | | 34 | 10.52 | |

Note: N.A. Data not available

7.5 Surface Water Sources

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

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

Based on the above criteria, the selected major rivers were the Surigao River, the Valencia River, the Mayac River, the Bacuag River and the Gigaquit River as shown in Table 7.5.1.

The Bacuag and Gigaquit Rivers originate from Agusan del Norte.

The gauging stations in the province are located at the Surigao River, the Mayac River and the Bacuag River, which are shown in Figure 7.5.1. The runoff records are obtained from the "Philippine Water Resources Summary Data" established by the NWRC in 1980. The information on the gauging stations including the present uses (water rights) of the major rivers in respective municipalities are summarized in Table 7.5.1.

(1) Surface Water Utilization/Water Rights

As seen in Table 7.5.1, the present water uses in the watershed of the major rivers total 1.98 cu.m/sec. Of this total, the water rights of 1.96 cu.m/sec are registered in the province. Therefore, 0.02 cu.m/sec from the Bacuag and Gigaquit Rivers are used in the adjoining province. Additionally, the water rights of 3.23 cu.m/sec from other rivers are also utilized in the province. The ratio of surface water use for domestic water supply purposes in the major river basins is only 5.0% (about 8,560 cum/day), including the utilization by the Metro Surigao WD.

(2) River Flow Analysis

The flow duration curves, derived from the available runoff records, are shown in Figure 7.5.2. The stream flow, maintenance flow, diversion flow and return flow are usually used to estimate the exploitable surface water potential. In this study, the stream flow was considered as flow potential for domestic use and the diversion flow value was treated as the equivalent to the discharge of water rights registration in surface water use.

Detailed study on the return flow has not been performed due to the difficulties investigating relative hydrological parameters within whole 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 high (10-year or longer return-period) of the whole hydrologic period.

In determining the river maintenance flow, such factors as runoff characteristics,

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

| Major River | River Basin | | Information from Gauging Station | | | | | Surface Water Use (Water Rights) in Watershed | | | | |
|--------------|-----------------------|-----------------------------|----------------------------------|---------|---------|----------|-------------|---|------------------|--------------------|--------------------|-----------------------------|
| | Stream & Main Systems | Drainage: sq. km. | Location No. in Figure 7.5.1 | Peak Qp | Max. Qm | Mini. Qm | Data Period | Municipality in watershed | Domestic cum/Sec | Industrial cum/Sec | Irrigation cum/Sec | Others ³ cum/Sec |
| Valencia | | No Existing Gauging Station | | | | | | Dinagat | NR ⁴ | NR ⁴ | NR ⁴ | NR ⁴ |
| Sungao | Stream-A | No Existing Gauging Station | | | | | | Libjo | 0.00 | 0.00 | 0.01 | 0.00 |
| | Sungao Main | | | | | | | Tagana-an | 0.00 | 0.00 | 0.00 | 0.00 |
| Mayac Sonkoy | | | | | | | | Sungao City | 0.00 | 0.00 | 0.02 | 0.00 |
| | | | | | | | | Maint | 0.00 | 0.00 | 0.05 | 0.00 |
| | | | 101.0 (1): near Sungao City | 356.65 | 160.72 | 2.67 | 1957-169 | Placer | 0.00 | 0.00 | 0.01 | 0.00 |
| | | | 41.0 (2): near Maimit | 110.73 | 54.20 | 1.59 | 1952-'70 | Sison | 0.00 | 0.00 | 0.00 | 0.00 |
| Bacug | | No Existing Gauging Station | | | | | | Sungao City | 0.03 | 0.01 | 0.28 | 0.00 |
| | | | | | | | | Maimit | 0.00 | 0.00 | 0.41 | 0.00 |
| Bacug | Stream-B | No Existing Gauging Station | | | | | | Tubod | 0.00 | 0.00 | 0.15 | 0.00 |
| | | | | | | | | Maimit | 0.00 | 0.00 | 0.35 | 0.00 |
| Gigaquit | | | | | | | | Alegria | 0.00 | 0.00 | 0.04 | 0.00 |
| | | | | | | | | (Agusan del Norte) ⁵ | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | Alegria | 0.00 | 0.00 | 0.02 | 0.00 |
| | | | | | | | | Bacug | 0.00 | 0.00 | 0.18 | 0.00 |
| | | | | | | | | (Agusan del Norte) ⁵ | 0.00 | 0.00 | 0.01 | 0.00 |
| | | | | | | | | Gigaquit | 0.00 | 0.00 | 0.04 | 0.01 |
| | | | | | | | | Bacug | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | (Agusan del Norte) ⁵ | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | Calver | 0.00 | 0.00 | 0.11 | 0.00 |
| | | | | | | | | Ginagaquit-A | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | Calver | 0.00 | 0.00 | 0.12 | 0.00 |
| | | | | | | | | (Agusan del Norte) ⁵ | 0.00 | 0.00 | 0.01 | 0.00 |
| | | | | | | | | Ginagaquit-A | 0.00 | 0.00 | 0.02 | 0.01 |
| | | | | | | | | Calver | 0.00 | 0.00 | 0.05 | 0.00 |
| | | | | | | | | Ginagaquit-B | 0.00 | 0.00 | 0.00 | 0.00 |

Source: Philippine Water Resources Summary Data, established January 1980 by NWRRC

- Notes: Drainage¹ : Watershed Area at Gauging Station
 NA² : Record is lacking.
 Qp : Peak Discharge of Daily Maximum Discharge
 Qm : Maximum Daily Discharge of Weighted Daily Discharge
 Qm : Minimum Daily Discharge of Weighted Daily Discharge
 Others³ : Including Livestock, Recreation & Fisheries
 NR⁴ : Surface water utilization was not registered in NWRB Database, as of March 1997.
 (Province)⁵ : Out of Applicable Area

DISK NAME : SURIGAO DEL NORTE(DISK1)
 FILENAME : SURIGAO-DELNORTE(A4)

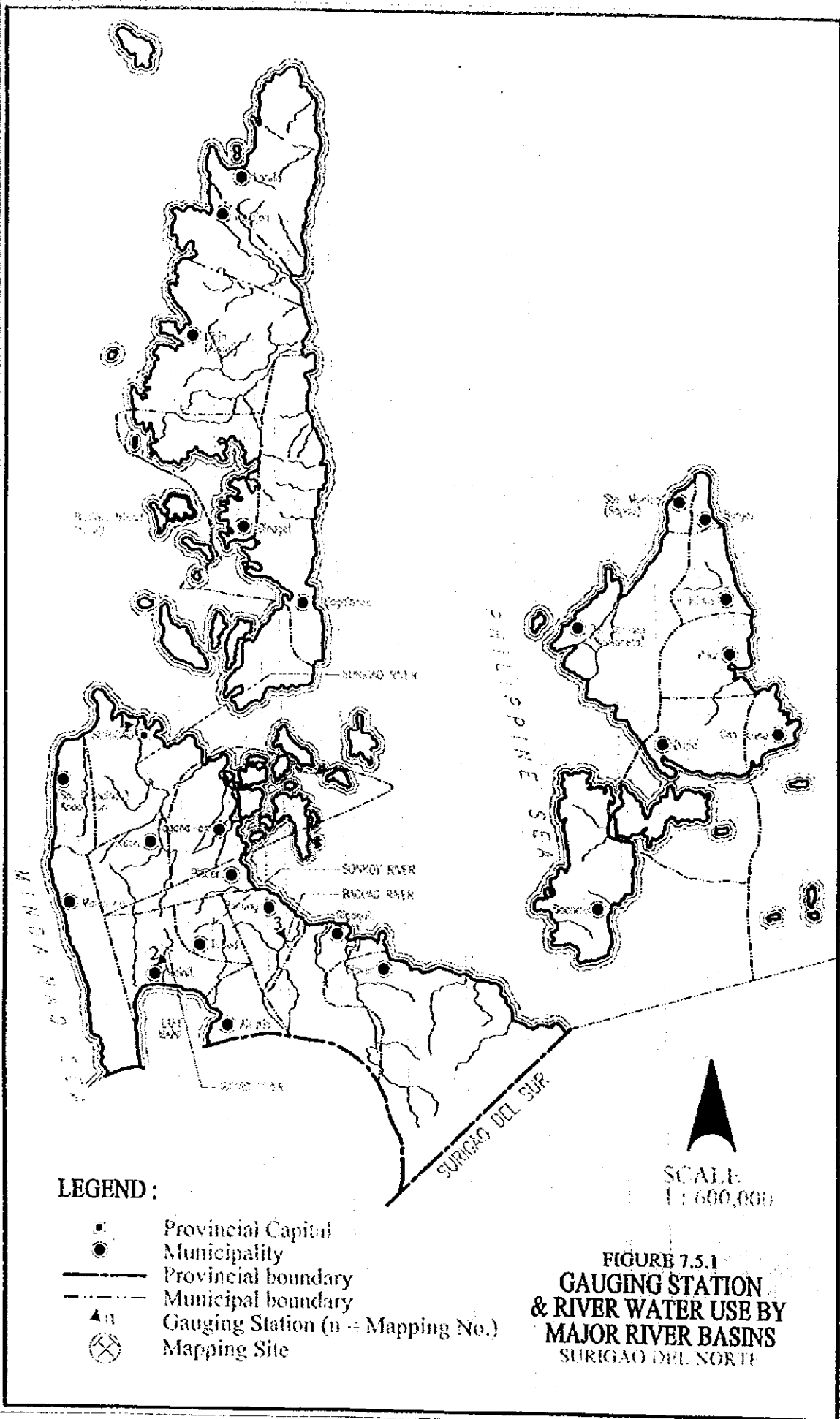


FIGURE 7.5.1
GAUGING STATION
& RIVER WATER USE BY
MAJOR RIVER BASINS
SURIGAO DEL NORTE

| Percent of Time (%) <small>(See in Figure 7.5.1)</small> | Specific Discharge (cum/sec/100sq km) | | |
|---|---------------------------------------|------------|-------------|
| | Surigao 1 | Mayac 2 | Bacuag 3 |
| 10% | 24.21 | 21.70 | 31.87 |
| 20% | 19.21 | 14.83 | 19.10 |
| 30% | 12.80 | 10.71 | 11.55 |
| 40% | 9.44 | 9.46 | 6.35 |
| 50% | 7.12 | 7.61 | 4.70 |
| 60% | 5.56 | 6.72 | 3.24 |
| 70% | 3.65 | 5.98 | 2.06 |
| 80% | 2.97 | 5.18 | 1.46 |
| 90% | 2.29 | 3.76 | 1.08 |
| 100% | 1.40 | 2.54 | 0.58 |
| Period of Data Used | 1958-'69 | 1957-'70 | 1952-'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

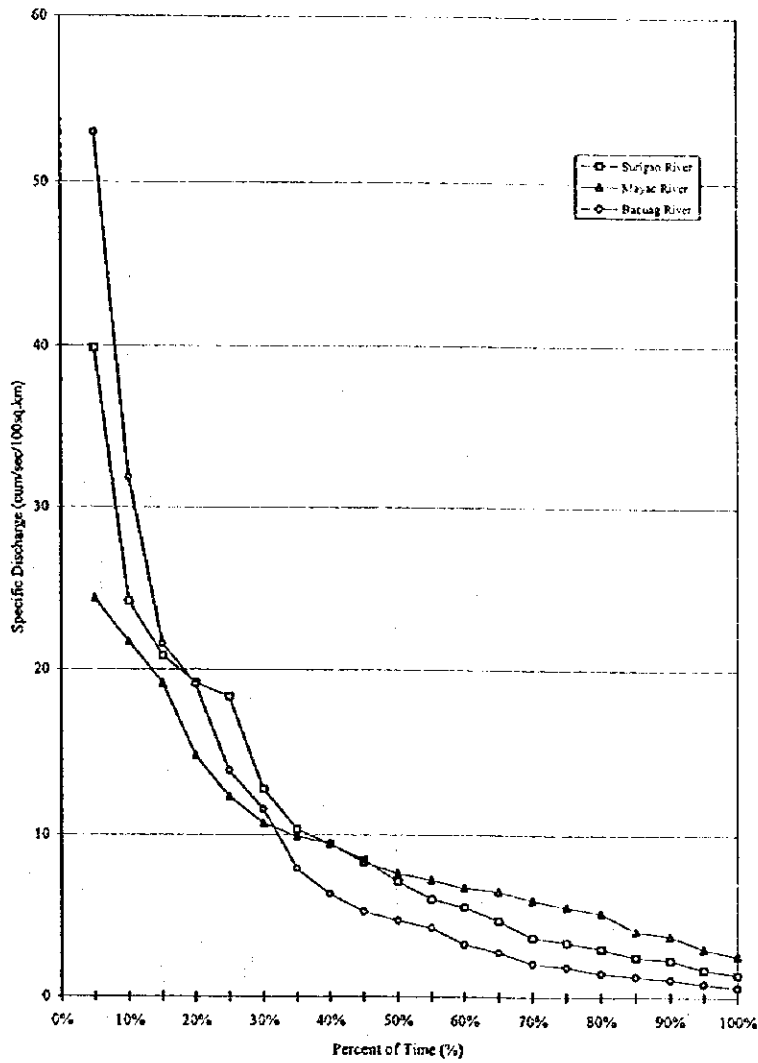


Figure 7.5.2 River Flow Duration Curve

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

Finally, the exploitable potential of surface water in the province was studied in case of inflow to and outflow from the respective municipalities. The results are summarized in Table 7.5.2.

(3) Surface Water Quality

Mining sites exist upstream of the Surigao River which is flowing through the Surigao City. The location of the mining sites is shown in Figure 7.5.1. According to the investigation results on soil and sediments, as shown in Table 7.5.3, done by the Surigao City in 1996, heavy metals have polluted the watershed of the Surigao River.

Table 7.5.3 Element Concentrations (ppm) in the Soils & Stream Sediments of the Surigao River Watershed

| Elements | Stream Sediments | | | Soils | | |
|----------|------------------|------|---------|---------|------|---------|
| | Minimum | Mean | Maximum | Minimum | Mean | Maximum |
| Cu | 10 | 80 | 500 | 5 | 80 | 700 |
| Pb | 6 | 45 | 2,000 | 7 | 40 | 140 |
| Zn | 8 | 100 | 1,000 | 4 | 80 | 600 |
| Ni | 5 | 50 | 900 | 4 | 50 | 5,000 |
| Co | 5 | 40 | 90 | 5 | 40 | 450 |
| Mo | 1 | 6 | 40 | 1 | 8 | 40 |
| W | 1 | 5 | 10 | 5 | 7 | 35 |
| As | 0.7 | 10 | 500 | 0.8 | 9 | 800 |
| Sb | 0.07 | 0.5 | 7 | 0.07 | 0.5 | 4 |
| Bi | 0.07 | 0.2 | 0.4 | 0.07 | 0.4 | 3 |
| Tl | 0.07 | 0.2 | 0.4 | 0.07 | 0.3 | 0.6 |
| Te | 0.07 | 0.6 | 5 | 0.07 | 0.6 | 5 |
| Cd | 0.07 | 0.3 | 6 | 0.07 | 0.4 | 3 |
| Au | 0.01 | 0.2 | 10 | 0.01 | 0.08 | 8 |
| Ag | 0.07 | 0.3 | 11 | 0.07 | 0.1 | 1 |
| Hg | 0.03 | 0.07 | 0.9 | 0.04 | 0.09 | 4 |

Source, the Investigation of the Surigao City (1996)

The results of water quality survey are summarized in Table 7.5.1, Data Report. The sampling locations were selected basically at the upstream boundary of the respective

Table 7.5.2 Probability of Surface Water

| Surface Water Sources | | Related Data | | | | Probability of Surface Water (10-year return-period) | | | | | | | | | |
|-----------------------|-----------------------|--|-------------------------------------|-------------------|-----------------|--|---------------|---|---|------------------------------------|--|---|--|---------------------------------------|---|
| Major Surface Water | Stream & Main Systems | Location Municipality & Other Province | River Connection outlet or inlet | Watershed Area in | | Sp. D (return-period) | | Inflow to Municipality | | | Outflow from Municipality | | | | |
| | | | | Location (1) | Upstream (2) | 10-year (3) | 5-year (4) | S/Flow (5) (2)X(4) ^{1.00} cu.m/sec | M/Flow (6) (2)X(4) ^{0.5000} cu.m/sec | Use (7) (5)-(6)-(7) cu.m/sec | Potential (8) (5)-(6)-(7) cu.m/sec | S/Flow (9) (5)-(10)(3) ^{1.00} cu.m/sec | M/Flow (10) (6)-(10)(3) ^{0.5000} cu.m/sec | Use (11) (9)-(10)-(11) cu.m/sec | Potential (12) (9)-(10)-(11) cu.m/sec |
| Valencia | | Dinagat | | 12.07 | 0.00 | 2.29 | 2.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.04 | 0.00 | 0.24 |
| | | Libjo | | 122.43 | | 2.29 | 2.97 | 0.28 | 0.04 | 0.00 | 0.24 | 3.08 | 0.40 | 0.01 | 2.66 |
| Surigao | Stream-A | Tagana-an | | 14.21 | 0.00 | 2.29 | 2.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.04 | 0.00 | 0.28 |
| | | Surigao City | to Surigao Main | 4.91 | | 2.29 | 2.97 | 0.33 | 0.04 | 0.00 | 0.28 | 0.44 | 0.06 | 0.02 | 0.36 |
| | | Maint | | 5.28 | 0.00 | 2.29 | 2.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.02 | 0.05 | 0.05 |
| | | Placer | | 9.89 | | 2.29 | 2.97 | 0.12 | 0.02 | 0.05 | 0.05 | 0.35 | 0.05 | 0.02 | 0.28 |
| | | Sison | | 20.79 | | 2.29 | 2.97 | 0.35 | 0.05 | 0.02 | 0.28 | 0.82 | 0.11 | 0.00 | 0.71 |
| | | Surigao City | from Stream-A | 71.14 | | 2.29 | 2.97 | 0.82 | 0.11 | 0.00 | 0.71 | 2.89 | 0.37 | 0.32 | 2.19 |
| Mayac | | Maint | | 42.21 | 0.00 | 3.76 | 5.18 | 0.00 | 0.00 | 0.00 | 0.00 | 1.59 | 0.22 | 0.41 | 0.96 |
| Sonkoy | | Tubod | | 13.01 | | 2.29 | 2.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.04 | 0.15 | 0.11 |
| | | Maint | | 35.61 | | 2.29 | 2.97 | 0.30 | 0.04 | 0.15 | 0.11 | 1.11 | 0.14 | 0.35 | 0.62 |
| | | Alegria | | 4.68 | | 2.29 | 2.97 | 1.11 | 0.14 | 0.35 | 0.62 | 1.22 | 0.16 | 0.04 | 1.02 |
| Bacuang | Stream-B | Agusan del Norte | | 15.93 | 0.00 | 1.08 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.17 | 0.02 | 0.00 | 0.14 |
| | | Alegria | | 2.98 | | 1.08 | 1.46 | 0.17 | 0.02 | 0.00 | 0.14 | 0.20 | 0.03 | 0.02 | 0.15 |
| | | Bacuang | to Bacuang Main | 27.33 | | 1.08 | 1.46 | 0.20 | 0.03 | 0.02 | 0.15 | 0.50 | 0.07 | 0.18 | 0.25 |
| | | Agusan del Norte | | 23.89 | 0.00 | 1.08 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.03 | 0.01 | 0.22 |
| | | Gigaquit | | 33.38 | | 1.08 | 1.46 | 0.26 | 0.03 | 0.01 | 0.22 | 0.62 | 0.08 | 0.05 | 0.48 |
| | | Bacuang | from Stream-B | 0.45 | | 1.08 | 1.46 | 0.62 | 0.08 | 0.05 | 0.48 | 1.12 | 0.15 | 0.00 | 0.97 |
| Gigaquit | Stream-C | Agusan del Norte | | 17.92 | 0.00 | 1.08 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 | 0.03 | 0.00 | 0.16 |
| | | Calver | | 29.19 | | 1.08 | 1.46 | 0.19 | 0.03 | 0.00 | 0.16 | 0.51 | 0.07 | 0.11 | 0.33 |
| | | Ginagaquit-A | to Gigaquit Main | 2.78 | | 1.08 | 1.46 | 0.51 | 0.07 | 0.11 | 0.33 | 0.54 | 0.07 | 0.00 | 0.46 |
| | | Calver | to Gigaquit Main | 31.43 | 0.00 | 1.08 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.34 | 0.05 | 0.12 | 0.17 |
| | | Agusan del Norte | | 41.81 | 0.00 | 1.08 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 0.06 | 0.01 | 0.38 |
| | | Ginagaquit-A | from Stream-C | 15.30 | | 1.08 | 1.46 | 0.45 | 0.06 | 0.01 | 0.38 | 1.15 | 0.16 | 0.03 | 0.97 |
| | | Calver | from Stream-D | 13.47 | | 1.08 | 1.46 | 1.15 | 0.16 | 0.03 | 0.97 | 1.64 | 0.22 | 0.05 | 1.36 |
| | | Ginagaquit-B | | 4.17 | | 1.08 | 1.46 | 1.64 | 0.22 | 0.05 | 1.36 | 1.68 | 0.23 | 0.01 | 1.45 |

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.

municipalities. In the said table, Class AA and Class A of the "DENR Water Quality Criteria for Fresh Water" are shown as a reference for the raw water evaluation. The PNSDW-1994 is also referred 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.

7.6 Future Development Potential of Water Sources

7.6.2 Groundwater

A well inventory covering all the municipalities show that there are 1,225 existing wells in the province, while 88 wells are recorded in the inventory made by NWRB (See Table 7.1.1 and 7.3.1, Data Report). Despite the smaller number of wells included in NWRB data, they were used in the analysis since they provided technical information. Of the total 88 wells, 55 have complete information: depth, static water level and specific capacity. Data are summarized in Table 7.6.1 Existing Well Sources.

Considering the well information, the most productive wells are those having depth ranging from 4 m to 19 m and from 20 m to 77 m. The good yielding wells have static water level varying from about 1 m to 8 mbgl and specific capacity of about 0.5 l/sec/m to 2.6 l/sec/m drawdown.

Based on the hydraulic characteristics and distribution of wells in Surigao del Norte, aquifers occur in the recent sediments that are distributed in the periphery areas of Surigao City and San Francisco (Anao-aon), in the northern area of Mainit Lake, and in Bacuag and Gigaquit areas, and in about half of the Siargao Island. However, groundwater development by means of deep wells in alluvial plain formed by the Surigao River is not appropriate because the formation thickness of the alluvium ranges from 10 m to 25 m. Moreover, shallow groundwater has no possibility for groundwater development due to mercury contamination caused by the development of many gold mines upstream of the Surigao River. Therefore, the development of spring sources may be recommended after a confirmation of the absence of mercury pollution. The Miocene and older rock units are distributed in most areas of Dinagat Island and Socorro Island, in few areas in Siargao Island, and in the western, eastern and the northeastern parts of the main Mindanao Island, and are therefore classified as difficult area for groundwater development. These areas have a mountainous topography.

Table 7.6.1 Existing Well Sources

| Municipality | Type | Number | Depth (m) | | SWL (m) | | Sp. Cap. (l/sec/m) | |
|--------------------------------|-------|--------|-----------|-------------|---------|------------|--------------------|------------|
| | | | Ave. | Range | Ave. | Range | Ave. | Range |
| Alegria | SW | 4 | 14.55 | 10.97-18.29 | 3.86 | 3.05-4.88 | 0.79 | 0.52-1.02 |
| | DW | 1 | 37.20 | 37.20-37.20 | 3.66 | 3.66-3.66 | - | - |
| | Total | 5 | 19.08 | | 3.82 | | 0.79 | |
| (San Francisco) Anao-Dan (ADN) | SW | 2 | 11.58 | 10.21-12.95 | 8.07 | 6.09-10.06 | 0.62 | 0.52-0.71 |
| | DW | 1 | 34.76 | 34.76-34.76 | 0.91 | 0.91-0.91 | 0.61 | 0.61-0.61 |
| | Total | 3 | 19.31 | | 5.68 | | 0.62 | |
| Bacuaug | SW | 6 | 8.41 | 3.81-12.20 | 3.2 | 1.83-4.57 | - | - |
| | DW | 2 | 46.19 | 45.73-46.65 | 2.89 | 2.13-3.66 | 0.83 | 0.62-1.04 |
| | Total | 8 | 17.86 | | 3.12 | | 0.83 | |
| Burgos | SW | - | | | | | | |
| | DW | - | | | | | | |
| | Total | | | | | | | |
| Cagdianao | SW | - | | | | | | |
| | DW | - | | | | | | |
| | Total | | | | | | | |
| Claver | SW | 3 | 13.82 | 10.37-18.60 | 3.45 | 1.20-4.57 | 1.45 | 1.45-1.45 |
| | DW | - | | | | | | |
| | Total | 3 | 13.82 | | 3.45 | | 1.45 | |
| Dapa | SW | 4 | 6.43 | 4.27-8.23 | 2.82 | 1.83-4.27 | 0.55 | 0.15-1.04 |
| | DW | - | | | | | | |
| | Total | 4 | 6.43 | | 2.82 | | 0.55 | |
| Del Carmen | SW | 10 | 8.71 | 5.06-12.50 | 3.11 | 1.83-5.18 | 0.61 | 0.10-1.45 |
| | DW | - | | | | | | |
| | Total | 10 | 8.71 | | 3.11 | | 0.61 | |
| Dinagat | SW | 2 | 8.38 | 8.23-8.54 | 1.39 | 1.27-1.52 | 2.01 | 2.01-2.01 |
| | DW | - | | | | | | |
| | Total | 2 | 8.38 | | 1.39 | | 2.01 | |
| Gen. Luna | SW | 9 | 8.23 | 4.87-11.28 | 2.23 | 0.91-5.79 | 0.72 | 0.52-1.24 |
| | DW | - | | | | | | |
| | Total | 9 | 8.23 | | 2.23 | | 0.72 | |
| Gigaguit | SW | 14 | 10.60 | 7.01-18.29 | 2.11 | 0.61-3.65 | 0.63 | 0.06-1.47 |
| | DW | 1 | 59.45 | 59.45-59.45 | 1.83 | 1.83-1.83 | 0.16 | 0.16-0.16 |
| | Total | 15 | 13.86 | | 2.09 | | 0.60 | |
| Libjo | SW | 1 | 11.28 | 11.28-11.28 | 0.91 | 0.91-0.91 | 1.38 | 1.38-1.38 |
| | DW | - | | | | | | |
| | Total | 1 | 11.28 | | 0.91 | | 1.38 | |
| Loreto | SW | 2 | 8.23 | 8.23-8.23 | 1.98 | 1.52-2.44 | 0.69 | 0.69-0.69 |
| | DW | - | | | | | | |
| | Total | 2 | 8.23 | | 1.98 | | 0.69 | |
| Mainit | SW | 4 | 9.69 | 7.92-11.89 | 4.11 | 3.04-5.48 | 0.73 | 0.12-1.034 |
| | DW | 3 | 65.04 | 42.68-76.22 | 3.05 | 1.83-3.66 | - | - |
| | Total | 7 | 33.41 | | 3.66 | | 0.73 | |
| Malimono | SW | 4 | 7.47 | 6.10-8.54 | 3.66 | 1.83-5.49 | 2.62 | 1.45-4.36 |
| | DW | 1 | 76.81 | 76.81-76.81 | - | - | - | - |
| | Total | 5 | 21.34 | | 3.66 | | 2.62 | |
| Pilar | SW | 4 | 12.27 | 8.54-13.72 | 3.35 | 2.13-6.10 | 0.24 | 0.18-0.29 |
| | DW | - | | | | | | |
| | Total | 4 | 12.27 | | 3.35 | | 0.24 | |
| Placer | SW | 2 | 8.54 | 6.70-10.37 | 0.92 | 0.61-1.22 | 0.99 | 0.76-1.23 |
| | DW | - | | | | | | |
| | Total | 2 | 8.54 | | 0.92 | | 0.99 | |
| San Isidro | SW | - | | | | | | |
| | DW | - | | | | | | |
| | Total | | | | | | | |
| Sta. Monica | SW | 5 | 11.10 | 8.84-15.24 | 2.26 | 1.22-3.66 | 0.67 | 0.32-1.42 |
| | DW | - | | | | | | |
| | Total | 5 | 11.10 | | 2.26 | | 0.67 | |

Source: NWRB Well Inventory Database

Notes:

- Based on the data from Feasibility Study of WDs, LWUA and DPWH (Questionable data were disregarded)
- Estimated figures from hydrogeological continuity of the aquifer.
- No related technical information available.

Legend: SWL = Static Water Level SP. Cap = Specific Capacity Ave. = Average
 SW = Shallow Well DW = Deep Well

As indicated in Figure 7.3.2 Main Report, the alluvial plain formed by the Surigao River has salt water intrusion in the shallow aquifers. In addition, the results of electric resistivity survey revealed that salt water intrusion occurred in the small alluvium areas of Dinagat and Siargao Islands. Shallow groundwater in the alluvial plain along north line of Mainit Lake has high iron content. However, water from deep well with depth of 27 m is potable. In Tagana-an municipality, water from deep wells with depth of 36 m also has high iron content.

As alternative water sources, the untapped springs can be developed for future use. These are the most reliable sources of water supply in the areas considered as difficult for well development (mostly occupied by mountains). The untapped springs are distributed in the mountainous areas of Dinagat municipality in Dinagat Island; in the low mountains of San Isidro, Del Carmen, and General Luna in Siargao Island; in the high mountainous areas of San Francisco, Malimono, Bacuag, and Alegria in main Mindanao Island.

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

Table 7.6.2 Hydrogeological Description by Municipality

| MUNICIPALITY | TOPOGRAPHY | EXISTING CONDITIONS | | | | | | | | | | | DATA INTERPRETATION | | | | | | |
|--------------------------|---------------|---------------------|----|----|------------------|-----|-----------|-------|---------|------|------|------|-------------------------------|------|--------------------|--------------------------------------|----------------------------|---|--|
| | | GEOLOGIC UNITS (%) | | | WELL INFORMATION | | | | SPRINGS | | | | GROUND WATER AVAILABILITY (%) | | AQUIFER FOR-MATION | ESTIMATED AQUIFER DEPTH RANGE (mbgl) | OTHERS | | |
| | | R | N3 | N2 | N1 | O | DEPTH (m) | SW | DW | SW | DW | SW | DW | DF | | | | | |
| | | 60 | 0 | 20 | 10 | 10 | 11-18 | 37-37 | 3.86 | 3.66 | 0.79 | 8 | >1.16 | 0 | 50 | 50 | Alluvium/ Plio-Pleistocene | Potential aquifer expected in the alluvial deposits. Alluvium overlies in a hard/dense formation. | |
| San Francisco (Anao-son) | flat to hilly | 20 | 0 | 0 | 0 | 80 | 10-13 | 35-35 | 8.07 | 0.9 | 0.62 | 3 | >2.8 | 30.0 | 0 | 60 | 40 | Alluvium deposits | Potential aquifer lies along the coast of the town with only a thin alluvial deposits on top of a dense formation. Abstraction of water should be monitored to prevent the encroachment of salt water. |
| Bacuag | flat to hilly | 15 | 0 | 10 | 0 | 75 | 4-12 | 45-46 | 3.20 | 2.89 | 0.83 | 6 | <2.8 | 3.0 | 0 | 30 | 70 | Alluvium/ Plio-Pleistocene sediments | Potential aquifer expected in the shallow well areas. Location of groundwater sources should be away from the shoreline. Pumping of saltwater is probable near the shoreline. |
| Burgos | flat | 0 | 0 | 0 | 0 | 100 | | | | | | 1 | <2.8 | | 0 | 0 | 100 | Miocene and older rocks | Largely spring areas. |
| Claver | flat | 5 | 0 | 5 | 10 | 80 | 10-18 | 3.45 | 3.45 | 1.45 | | | | | 0 | 20 | 80 | Alluvium/ Plio-Pleistocene | Potential aquifer expected in the alluvial deposits and low relief hills. Pumping of freshwater shall be controlled to prevent salt water intrusion. |
| Cagdianao | flat to hilly | 0 | 0 | 0 | 0 | 100 | 10-18 | 3.45 | 3.45 | 1.45 | 26 | >2.8 | | | 5 | 0 | 95 | Miocene and older rocks | Area is not suitable for groundwater development. Spring is the best source of water supply. |
| Dapa | flat | 30 | 0 | 0 | 0 | 70 | 4-8 | 2.82 | 2.82 | 0.55 | 4 | <2.8 | | | 0 | 20 | 80 | Alluvium/ Plio-Pleistocene rocks | Freshwater may be expected in the deep well areas. Spring development is recommended. Spring sources are recommended. |
| Del Carmen | flat | 70 | 0 | 0 | 0 | 30 | 5-12 | 3.11 | 3.11 | 0.61 | 14 | <2.8 | | | 0 | 80 | 20 | Alluvium/ Plio-Pleistocene rocks | Aquifer expected in the deep well area. Abstraction of saltwater is probable. |

| MUNICIPALITY | TOPOGRAPHY | EXISTING CONDITIONS | | | | | | | | | | | | DATA INTERPRETATION | | | | | | | |
|--------------|---------------------|---------------------|----|----|------------------|-----|-----------|------|---------|------------|----|---------------------------|----------|---------------------|--------------------|-------------------------------------|--------|----|---------------------------------|------|---|
| | | GEOLOGIC UNITS (%) | | | WELL INFORMATION | | | | SPRINGS | | | GROUND WATER AVAILABILITY | | | AQUIFER FOR-MATION | ESTIMATED AQUIFER DEPTH RANGE (mbs) | OTHERS | | | | |
| | | R | N3 | N2 | N1 | 0 | DEPTH (m) | AVE | | MAX. (AVE) | | TAPPED | UNTAPPED | AVAILABILITY (%) | | | | | | | |
| | | | | | | | SW | DW | SW | DW | SW | DW | NO. | AVE. Q (l/s) | NO. | AVE. Q (l/s) | SW | DW | DF | | |
| Dinagat | flat to hilly | 0 | 0 | 0 | 0 | 100 | 8-8.5 | 1.39 | 2.01 | | | 14 | <2.8 | 9 | 0.19 | 0 | 5 | 95 | Miocene and older rocks | 3-80 | Largely spring areas. |
| Gen. Luna | flat | 25 | 60 | 0 | 0 | 15 | 5-11 | 2.2 | 0.72 | | | 1 | 27.6 | | | 0 | 50 | 50 | Alluvium/Plio-Pleistocene rocks | 2-60 | Potential aquifer expected in the alluvial deposits. |
| Gigauit | flat | 40 | 0 | 15 | 30 | 15 | 7-18 | 2.11 | 0.63 | 0.16 | | 6 | >2.8 | | | 0 | 30 | 70 | Alluvium/Plio-Pleistocene rocks | 2-60 | Potential aquifer expected in the alluvial deposits and low relief hills. Confining clay exist from near surface to about 30 meters. |
| Libjo | flat to hilly | 5 | 0 | 0 | 0 | 95 | 11-18 | 0.91 | 1.38 | | | 20 | <2.8 | | | 0 | 5 | 95 | Miocene and older rocks | - | Largely spring areas. |
| Loreto | flat to mountainous | 5 | 0 | 15 | 0 | 85 | 8-23 | 1.98 | 0.69 | | | 15 | >2.8 | | | 0 | 10 | 90 | Miocene and older rocks | - | Largely spring areas. |
| Mainit | flat to hilly | 40 | 60 | 0 | 0 | 10 | 8-12 | 4.11 | 0.73 | | | | | | | 0 | 60 | 40 | Alluvium/Plio-Pleistocene rocks | 3-40 | Expectable aquifer in the alluvial deposits. |
| Malirmono | flat to mountainous | 0 | 0 | 0 | 0 | 100 | 6-8 | 3.66 | 2.62 | | | 2 | <2.8 | 1 | 1.19 | 0 | 10 | 90 | Miocene and older rocks | 3-80 | Potential aquifer expected in the alluvial deposits and fractured, weathered formation. |
| Pilar | flat | 70 | 0 | 0 | 0 | 30 | 8-13 | 3.35 | 0.24 | | | 10 | <2.8 | | | 0 | 80 | 20 | Alluvium/Plio-Pleistocene rocks | 3-80 | Potential aquifer expected in the alluvial deposits and fractured limestone and elastic rocks. |
| Placer | flat to hilly | 5 | 65 | 0 | 0 | 30 | 6-10 | 0.92 | 0.99 | | | 17 | <2.8 | | | 5 | 0 | 95 | Miocene and older rocks | 3-60 | Aquifer may be expected in the alluvial deposit along the shore. Groundwater pumping should be monitored to prevent salt water intrusion. |

| MUNICIPALITY | TOPOGRAPHY | EXISTING CONDITIONS | | | | | | | | | | | | DATA INTERPRETATION | | | | | | | | | |
|------------------|---------------|---------------------|----|----|------------------|-----|-----------|-----------------|-------------|-----------------------------|-------------------------------|--------------|--------------|---------------------|--------------------------------------|--------|--------------|----|----|-----|----------------------------------|------|---|
| | | GEOLOGIC UNITS (%) | | | WELL INFORMATION | | | | SPRINGS | | GROUND WATER AVAILABILITY (%) | | | AQUIFER FORMATION | ESTIMATED AQUIFER DEPTH RANGE (mbsl) | OTHERS | | | | | | | |
| | | R | N1 | N2 | N3 | O | DEPTH (m) | AVE. SWL (mbsl) | AVE. (mbsl) | MAX. (AVE.) SP. CAP. (1/5m) | TAPPED NO. | AVE. Q (l/s) | UNTAPPED NO. | | | | AVE. Q (l/s) | SW | DW | DF | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | |
| San Isidro | flat to hilly | 60 | 0 | 0 | 0 | 0 | 40 | | | | | | | 7 | <2.8 | 6 | 1.11 | 0 | 15 | 85 | Alluvium/ Plio-Pleistocene rocks | 3-80 | Potential aquifer expected in the alluvial deposits and in fractured limestone and elastic rocks. |
| Sta. Monica | flat | 0 | 0 | 0 | 0 | 100 | 0 | 2.26 | 0.67 | | | | | 8 | >2.8 | | | 5 | 0 | 95 | Miocene and older rocks | - | Largely spring areas. |
| Sison | flat to hilly | 10 | 70 | 0 | 0 | 20 | 0 | 3.86 | 4.27 | 0.46 | | | | 14 | <2.8 | | | 0 | 5 | 95 | Miocene and older rocks | - | Largely spring areas. |
| Socorro | flat to hilly | 0 | 0 | 0 | 0 | 100 | 0 | | | | | | | 10 | <2.8 | | | | | | Miocene and older rocks | - | Spring area. Aquifer can be expected at fractured hard formation. |
| Sungao City | flat to hilly | 30 | 20 | 20 | 0 | 25 | 0 | 4.25 | 1.83 | 0.78 | | | | 37 | >2.8 | | | 0 | 60 | 40 | Alluvium/ Plio-Pleistocene rocks | 3-80 | Potential aquifer expected in the alluvial deposits. Salt water intrusion is likely if overpumping of fresh water is not prevented. |
| Tagana-an | | 20 | 5 | 30 | 0 | 45 | 0 | 2.74 | 7.62 | 0.34 | | | | 14 | >2.8 | | | 0 | 20 | 80 | Alluvium/ Plio-Pleistocene rocks | 2-20 | Potential aquifer expected in the alluvial plains. |
| Tubajon | | 10 | 0 | 5 | 0 | 85 | 0 | | | | | | | | | | | 0 | 0 | 100 | Miocene and older rocks | - | Largely spring areas. |
| Tubod | | 20 | 35 | 30 | 0 | 25 | 0 | 5.48 | 2.94 | 2.07 | | | | 12 | >2.8 | | | 0 | 30 | 70 | Alluvium/ Plio-Pleistocene rocks | 2-15 | Potential aquifer expected in the alluvial deposits. |
| (Basitisa) Rizal | | 0 | 0 | 0 | 100 | 0 | 0 | 2.44 | 1.03 | | | | | | | | | 5 | 0 | 95 | Miocene and older rocks | - | Largely spring areas. |

7.6.2 Springs

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

Table 7.6.3 Untapped Spring Source Identification

| Municipality | Barangay Name | Untapped Spring | | | | |
|--------------------------|------------------|-----------------|---------|--------------------------------|-------------|--------------------------|
| | | Number | Owner | Discharge (m ³ /hr) | T.L.L. (km) | Elevation Difference (m) |
| Dinagat | Magsaysay | 1 | N.A. | 0.6 | 0.1 | 15 |
| | Justiniana Edura | 1 | N.A. | 0.3 | 0.4 | 50 |
| | Gomez | 1 | Public | 0.1 | 0.1 | 10 |
| | Wadas | 1 | Private | 0.9 | 0.1 | 25 |
| | New Mabuhay | 1 | N.A. | 0.3 | 0.02 | 30 |
| | | 1 | N.A. | 2.4 | 0.05 | 20 |
| | Cayetano | 1 | Private | 0.3 | 0.1 | 25 |
| | Bagumbayan | 1 | N.A. | 0.6 | 0.1 | 35 |
| | White Beach | 1 | N.A. | 0.6 | 0.3 | 5 |
| San Isidoro | Pob. Del Carmen | 1 | Gov. | 4.0 | 9.0 | 15 |
| | | 1 | N.A. | N.A. | 3.0 | N.A. |
| | Sto. Paz | 1 | N.A. | N.A. | N.A. | N.A. |
| | | 1 | N.A. | N.A. | 4.5 | N.A. |
| | | 1 | N.A. | N.A. | 4.0 | N.A. |
| | | 1 | N.A. | N.A. | 3.2 | N.A. |
| Del Carmen | Bacacay | 1 | Private | N.A. | 8.0 | 26 |
| Gen. Luna | Catangnan | 1 | Private | 99.3 | 2.0 | 6.75 |
| San Francisco (Anao-aon) | Didz | 1 | Gov. | 72.0 | 2.0 | N.A. |
| | Jubgan | 1 | Gov. | 144.0 | 3.0 | N.A. |

Note: T.L.L. Transmission line length

N.A. Data not available

| Municipality | Barangay Name | Untapped Spring | | | | |
|--------------|---------------|-----------------|---------|--------------------------------|-------------|--------------------------|
| | | Number | Owner | Discharge (m ³ /hr) | T.L.L. (km) | Elevation Difference (m) |
| Malimono | Tinago | 1 | Private | 4.3 | 2.0 | N.A. |
| Bacuag | Cambuayon | 1 | Private | 9.0 | 0.7 | N.A. |
| | Pongtud | 1 | Private | 12.0 | 0.8 | N.A. |
| | Sto. Rosario | 1 | Private | 10.8 | 2.1 | N.A. |
| | Poblacion | 1 | Private | 12.0 | 1.5 | N.A. |
| | Campo | 1 | Private | 6.0 | 1.4 | N.A. |
| | Payapag | 1 | Private | 15.0 | 2.1 | N.A. |
| Alegria | Alipao | 1 | LGU | > 4.17 | 1.5 | 300 |
| | Ferlda | 1 | Public | > 4.17 | 1.7 | N.A. |
| | Camp Eduard | 1 | Public | > 4.17 | 0.5 | N.A. |
| | Budlingin | 1 | Public | > 4.17 | 1.0 | N.A. |
| | Ombong | 1 | Public | > 4.17 | 3.0 | N.A. |
| | Ouano | 1 | Public | > 4.17 | 4.0 | N.A. |
| | San Juan | 1 | Public | > 4.17 | 5.0 | N.A. |
| | Pongtud | 1 | Public | > 4.17 | 4.8 | N.A. |

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

7.7 Water Source Development for Medium-Term Development Plan

7.7.1 Spacing Allocation for Level II and III Wells

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

(1) Specific Capacity

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

(2) Pumping Rate

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

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

Table 7.7.1 Spacing Arrangements for Planned Wells

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