CHAPTER 4
EXISTING SECTOR INSTITUTIONS AND ARRANGEMENTS

4. EXISTING SECTOR INSTITUTIONS AND ARRANGEMENTS

4.1 General

The existing sector institutional arrangements in the ARMM is determined largely by two laws: the Act Providing for the ARMM (RA No. 6734), which has been subsequently amended by the Act to Strengthen and Expand the Organic Act for the Autonomous Region in Muslim Mindanao (RA 9054) and the Local Government Code of ARMM, Mindanao Muslim Autonomy # 25 Book III. These laws have resulted in substantially different inter-agency relationships than those currently existing between the national government and the regions other than the ARMM.

4.2 Policies and Development Plan on ARMM

4.2.1 National Government Policies and Plan on ARMM

1) National Government Policies on ARMM

RA 9054 defines the national government policies on the ARMM as follows:

- ARMM remains an integral and inseparable part of the national territory as defined by the Constitution and existing laws;
- Policy of settlement of conflicts by peaceful means;
- Guaranteed recognition and protection of the beliefs, customs and traditions of the people in the ARMM and the free exercise of their religions;
- Perpetuation of Filipino and Islamic values and ideals;
- Improved status of the marginalized; and
- Enhancement of the quality of life, protection of women and children and preferential rights of the inhabitants.

2) National Government Plan on ARMM

The Medium Term Philippine Development Plan 2001-2004, while defining the development aspirations for the country as a whole, puts special attention and focus on securing peace and

development in Mindanao. With reference to Mindanao, the Plan states the policy framework towards national government's approach to its development, to wit – aim at securing peace while accelerating development in conflict and non-conflict areas to attain political and socio-economic stability as well as cultural harmony, in conformity with the rule of law and in accordance with constitutional processes.

The development strategies for Mindanao include the following:

- Peace building efforts through confidence building measures to create a favorable environment for resuming peace talks with the MILF and rehabilitation of communities damaged by the armed conflict with the MILF and return of affected population to their communities; and

- Socio-economic upliftment through the provision of basic services such as food and nutrition, health, *water and sanitation,* basic education/literacy and employment/livelihood opportunities.

Thus, water and sanitation is considered as a priority development sector in Mindanao in general. Among the identified projects directed towards the sector is the ADB-funded Mindanao Basic Urban Services Sector Project (MBUSSP) intended to provide basic infrastructure such as water supply for urban centers and urbanized municipalities in Mindanao.

3) Water Supply and Sanitation Sector Reforms - National

The national government has endorsed the major recommendations of the Water Supply Sector Reform Study and the National Urban Sewerage and Sanitation Strategy Study as evidenced by NEDA Board Resolution Nos. 4, 5 and 6. These resolutions have been enforced in the sector for more than five years with the transition process still ongoing particularly at the provincial level where the community-based demand-driven approach is being handed over to the LGUs.

The following are the aforementioned NEDA Board resolutions that provide the operating and regulatory policies for the sector as a whole and have been followed by the recently completed ADB-funded RW3SP (Rural Water Supply and Sanitation Sector Project) implemented by DILG jointly with the DOH and LGUs of the 20 poorest provinces covered by the Social Reform Agenda of the 1990s.

(a) NEDA Resolution Nos. 4 (series of 1994)

In the context of the national and ARMM Local Government Codes, LGUs in general, now play the lead role in basic services delivery. The resolution allows the LGUs to implement all levels of water supply projects and redefines the roles of other sector agencies.

With the purpose of ensuring common interpretation of clause (g) of this resolution, its Implementing Rules and Regulations (IRR) was prepared by the DILG and approved by the NEDA Board in 1998. It delineates the responsibilities of government agencies involved in the sector and defines the role of LGUs in the provision of water supply and sanitation services, including operation and maintenance (O&M) of the facilities.

(b) NEDA Resolution No. 5 (series of 1994)

This resolution designates the LGUs as primary implementers of the sanitation/ sewerage programs and mandates the establishment of a Central Project Support Office (CPSO) at LWUA to assist LGUs in the formulation, preparation and implementation of sewerage/sanitation projects.

(c) NEDA Resolution No.6 (series of 1996)

This resolution defines the extent of national government assistance to LGUs in the implementation of devolved infrastructure activities/facilities under the LGC in support of national priority programs in order to ensure efficiency, effectivity and more focused implementation. It affirms DILG's responsibilities for overseeing and administrating national government assistance to LGUs including institutional capability building of the LGUs.

4.2.2 ARMM Plans

The Development Framework Plan 2002-2004 (or the Regional Executive Agenda for Peace and Development) sets the policy guidelines and development directions in the ARMM for the indicated period. In general, these include the following:

- Support to the peace process through (i) completion of the 1996 GRP-MNLF Peace Agreement; (ii) sustained efforts to further peace building and stability; and (iii) national

reconciliation including peaceful reconciliation/reconstruction and rehabilitation of the communities affected by the armed conflict;

- Social reforms through (i) delivery of basic services including *potable water supply and sanitation,* health care and nutrition; (ii) focus on education and manpower skills training; and (iii) development of comprehensive social protection package which includes safety nets and conflict prevention components;

- Economic reforms through (i) fast tracking the implementation of livelihood projects complemented with resources of microfinance to enable the marginalized communities to undertake economic activities; (ii) refocus strategic intervention from Agriculture and Fisheries Modernization Act (AFMA) to modernize agriculture and fisheries; (iii) formulation of comprehensive economic plan focusing on providing strategic infrastructures; and (iv) improving the business policy environment and building the capacity of the private sector for small-medium enterprises (SMEs);

- Political reforms by (i) establishing strong partnerships between the legislative and administrative departments; and (ii) establishing mechanisms for greater collaboration between the regional and local governments; and

- Institutional reforms through (i) the formulation of a code of ethical conduct for all public servants in ARMM; (ii) restructuring and reorganization of the ARMM bureaucracy; and (iii) acceleration and improvement in the use of ODA-funded projects.

Access to potable water is one of the key strategic issues viewed as a major stumbling block in attaining sustainable peace and development in ARMM. As a result, one of the more significant objectives for infrastructure development was the development of water resources both for agricultural development and water supply and for social development was the improved delivery of basic services. To achieve these objectives, the sectoral strategies include (i) intensification of massive Information/Education Campaign (IEC) and capability building among stakeholders to ensure the effective and efficient delivery of basic services [social development]; and (ii) building the capacity of LGUs to implement projects and involving the private sector in infrastructure planning, implementation, monitoring and evaluation [infrastructure development].

However, as a priority economic agenda, water and sanitation facilities and services seems to lag compared to other strategic infrastructure facilities.

4.2.3 Provincial Plans and Programs

For the infrastructure sector, the Provincial Physical Framework Plan targets the efficient provision of and access to infrastructure and community services. The strategy involves the improvement of existing basic infrastructure facilities; provision of farm-to-market roads and other basic infrastructure facilities; and provision of potable water system and water facilities to Level III.

Based on the plan, the water supply projects of the province for the 1994-2002 period are quite limited and include the following:

Project Type	Description	Location
Level III Water Supply Sources (e.g. Reservoir)	Province to provide water supply reservoir in some selected municipalities	Sultan Kudarat, Parang, Dinaig, Upi, Buluan, Maganoy, Datu Piang, Ampatuan, Sultan sa Barongis and Pagalungan

Source: Provincial Physical Framework Plan 1994-2002

4.2.4 ARMM Institutions Involved in Water Supply and Sanitation

1) The ARMM Government

The creation of the Autonomous Region evolved through a series of steps taken by the national leadership to resolve what was commonly shown as the *"Mindanao Problem"*, a simmering unrest caused by decades of neglect and discrimination, which resulted in the period of fratricidal conflict.

President Corazon C. Aquino signed the first Organic Act for the Autonomous Region in Muslim Mindanao into law as Republic Act 6754 on August 1, 1989. This was then amended by RA 9054 " An Act to Strengthen and Expand the Organic Act for ARMM, passed in February 7, 2001 and became a law on March 31, 2001 in accordance with Article VI, Section 27 (i) of the Philippine Constitution.

Republic Act 6734 as amended by RA 9054 provides for the establishment of the Executive Department (Article VII) and the Legislative Department (Article VI) in the ARMM Regional Government. These enactments also provide for the administration of Justice (Article VIII). The over-all organizational structure and the relationship with each other are shown in Figure 4-1.

The Regional Government exercises its powers and functions necessary for or incidental to the proper governance and development of all the constituent units within the autonomous region. Specifically mentioned in the Organic Act are:

- Creation of its own sources of revenues and to levy taxes, fees and charges, subject to the provisions of the Constitution and the Republic Act (Article IX);
- Protection of the ancestral domain, ancestral lands and agrarian reform (Article X);
- Promotion of urban and rural planning and development (Article XI);
- Promotion of regional economy and patrimony consistent with the Constitution and existing laws (Article XII);
- Maintenance and preservation of law and order (Article XIII);
- Establish, maintain and support education, science and technology, arts and sports (Article XIV); and
- Promotion of social justice, services, institutions and other concerns (Article XV).

The Executive and Legislative Departments carry out these powers and functions with the administration of justice provided by the Regular Trial and Shari'a courts, directly supervised by the Supreme Court of the Philippines. The President of the Republic of the Philippines provides general supervision over the Autonomous Regional Government (ARG) through the Regional Governor.

The Regional Legislative and Executive Development Advisory Committee (RLEDAC) was recently created to provide the venue for both Departments to inter-act on development matters affecting the ARG.

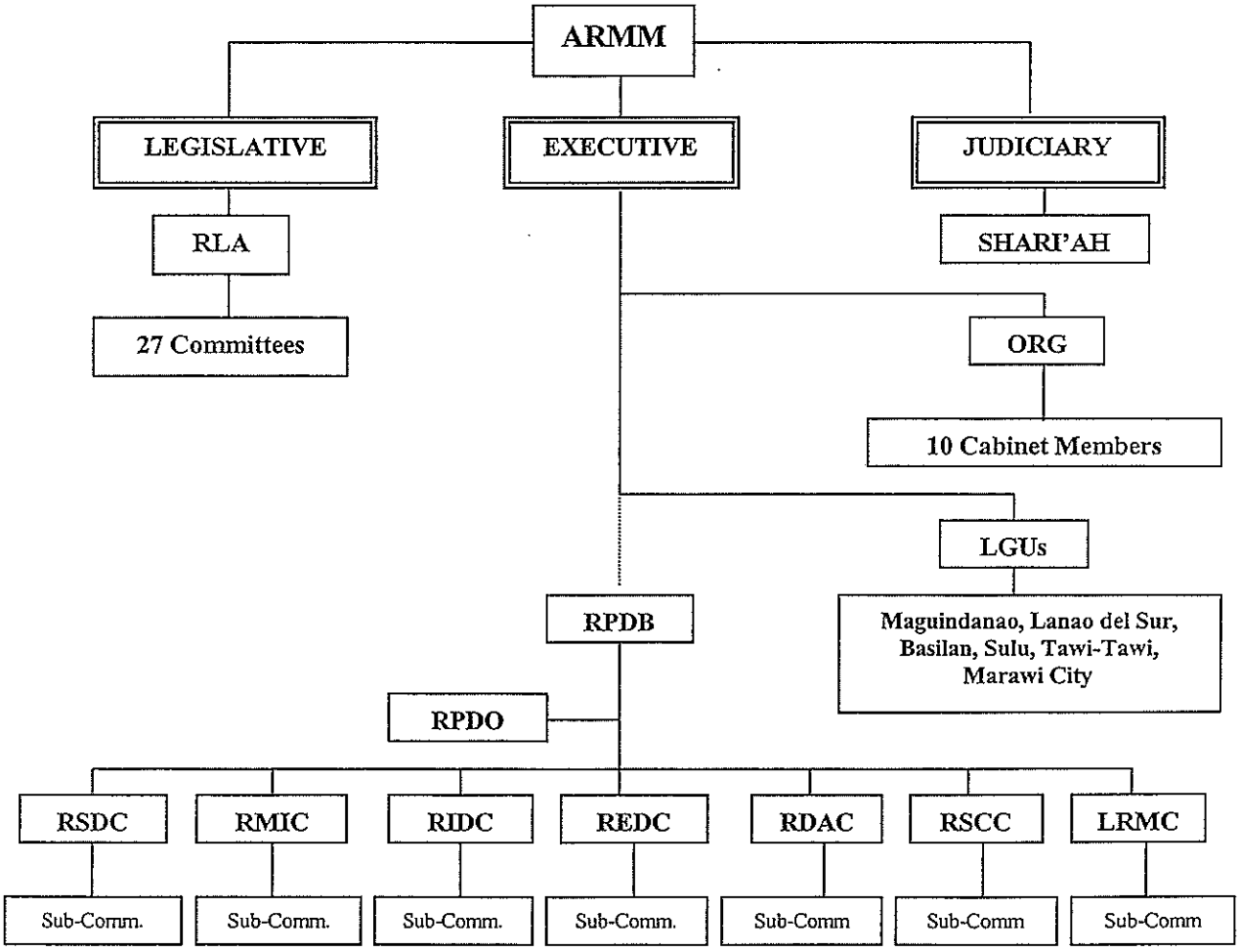
2) The Executive Department

The Executive power in ARMM is vested in the Regional Governor, who is elected by the qualified voters of the Autonomous Region (Article VII, Section 1).

Composition of the Executive Department

The Regional Governor, the Vice Governor, the three Deputy Regional Governors, the Cabinet Secretaries and the Local Chief Executives of the Provinces, City and Municipalities covered by the ARMM Region represent the Executive Department.

Figure 4-1 ARMM Organizational Structure[1]



Source: Regional Planning and Development Office (RPDO)-ARMM

[1] RLA-Regional Legislative Assembly; ORG-Office of the Regional Governor; RPDB-Regional Planning and Development Board; RPDO-Regional Planning and Development Office; RSDC-Regional Social Development Committee; RMIC-Regional Macro-Intersectoral Committee; Regional Infrastructure Development Committee; REDC-Regional Economic Development Committee; RDAC-Regional Development Administration Committee; RSCC-Regional Statistical Coordination Committee; LRMC-LGUs Regional Management Committee

Table 4-1 Composition of the ARMM Executive Department (As of October 2003)

Provisions of RA 9054 with respect to composition of the Executive Department	Status of Implementation
1. The Regional Governor is the Chief Executive of the ARMM Regional Government (Article VII, Section 2) The term of office of the Regional Governor is for a period of three (3) years, which will begin at noon on the 30th day of September next following the day of the election and will end at noon of the same date three (3) years thereafter. (Article VII, Section 7)	1.1 The incumbent Regional Governor assumed office after the first elections for the expanded autonomous region under RA 9054 in 2002. He is also the concurrent Regional Secretary of Department of Public Works and Highways (DPWH)-ARMM. 1.2 He heads the Office of the Regional Governor (ORG) with an Executive Secretary and with 4 support services.
2. The Regional Vice Governor takes over the position of the Regional Governor in case of permanent vacancy (Article VII, Section 11) and temporary vacancy (Article VII, Section 12). The Regional Vice-Governor may be appointed by the Regional Governor as a member of the Regional Cabinet without need of confirmation by the Regional Legislative Assembly (RLA). The term of office of the Vice Regional Governor is for a period of three (3) years, which will begin at noon on the 30th day of September next following the day of the election and will end at noon of the same date three (3) years thereafter. (Article VII, Section 7)	2.1 The incumbent Regional Vice-Governor also assumed office together with the Regional Governor in 2002. He is also the Department of Education (DepED)-ARMM Regional Secretary in a concurrent capacity. 2.2 He heads the Office of the Regional Vice-Governor (ORVG).
3. Deputy Regional Governors: Executive Council This Council shall advise the Regional Governor on matters of governance of the Autonomous Region; The 3 Deputy Governors shall be Ex-Officio members of the Regional Cabinet with or without portfolio (Article VII, Section 6).	3.1 Three (3) Deputy Regional Governors representing the Christians, the Indigenous Cultural Communities and the Muslims in the Region were appointed. These officials are: ▪ Honorable Gumbalia Gunsi representing the Lumads or the Indigenous Cultural Communities ▪ Honorable Abdul Sahrin, an MNLF member representing the Muslims ▪ Honorable Luis Olano representing the Christians

Provisions of RA 9054 with respect to composition of the Executive Department	Status of Implementation
	3.2 The ARMM Regional Government is requesting for the budgetary requirements of the 3 positions, their staff and operating budget from the Department of Budget and Management (DBM).
4. Cabinet Members The Regional Governor shall be assisted by a Cabinet not exceeding ten (10) members (Article VII, Section 2)	4.1 There are twenty (20) Cabinet Secretaries /Directors representing the Devolved Agencies under the direct supervision of the Regional Governor. The List of Cabinet Officials of these agencies is shown in Annex 2-2. 4.2 In addition to the Cabinet Secretaries of the Devolved Agencies, its own locally created offices also assist the Regional Governor. These offices are represented by the following officials: ▪ The Executive Secretary under the Office of the Regional Governor ▪ The Acting Executive Director of the Bureau of Cultural Heritage (BCH-ARMM) ▪ The Executive Director of the Regional Planning and Development Office (RPDO-ARMM) ▪ The Regional Manager of the Regional Ports and Management Authority (RPMA) 4.3 National Government with field offices in ARMM are also tapped by the Regional Governor to participate in Cabinet meetings. These agencies are represented by the following officials: ▪ The Director of the National Police Commission (NAPOLCOM) ▪ The Executive Director of the National Statistics Office (NSO) ▪ The Director of the Civil Service Commission (CSC) ▪ The Regional Manager of the Philippine Coconut Authority (PCA)

Provisions of RA 9054 with respect to composition of the Executive Department	Status of Implementation
	▪ The Administrator of the Southern Philippines Development Authority (SPDA)
4. Local Chief Executives of the Provinces, City, Municipalities and Barangays The term limits in Republic Act No. 7160, the Local Government Code of 1991, will apply to the Governors of Provinces and Mayors of Cities, Municipalities and Punong Barangay in the Autonomous Region.	4.1 There are five (5) provinces, one (1) city, 98 municipalities and 4,445 barangays in the Autonomous Region. The five provinces are: Basilan, Lanao del Sur, Maguindanao, Sulu and Tawi-Tawi. The lone city is Marawi.

Sources: RA 9054 and various documents obtained from the Regional Planning and Development Office (RPDO)-ARMM

The Office of the Regional Governor (ORG) and Locally Created Offices

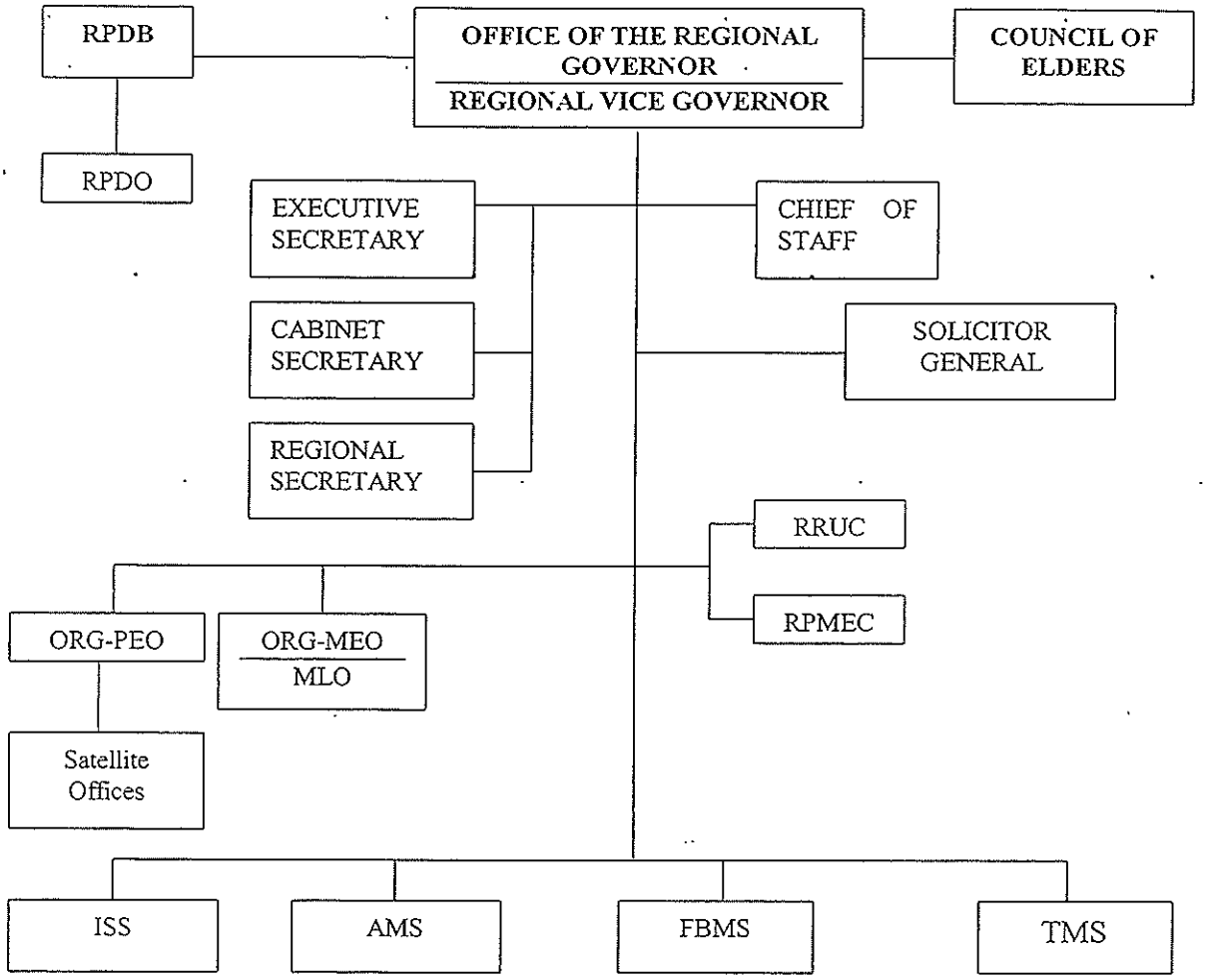
As mentioned, Offices of the Regional and Vice Governor were established, together with other locally created officers.

The Organizational Structure of the Office of the Regional Governor is shown in Figure 4-2 below:

The Office of the Regional Governor is tasked to pursue programs and projects geared towards the proper governance and total development of all constituents within the 5 provinces and 1 city. This office provides for the supervision, implementation and execution of the Regional Development Plans, Policies and Programs.

In addition to its support services, there are three (3) Councils, Boards and Committees within the ORG, namely:

Figure 4-2 Office of the Regional Governor Organizational Structure



LEGEND:

RPDB	*- Regional Planning and Development Board*
RPDO	*- Regional Planning and Development Office*
ORG-PEO	*- ORG Provincial Extension Office*
ORG-MEO	*- ORG Manila Extension Office*
RRUC	*- Regional Reconciliation and Unification Council*
RPMEC	*- Regional Project Monitoring and Evaluation Committee*
ISS	*- Intelligence and Security Service*
AMS	*- Administrative Management Service*
FBMS	*- Finance and Budget Management Service*
TMS	*- Technical and Management Service*

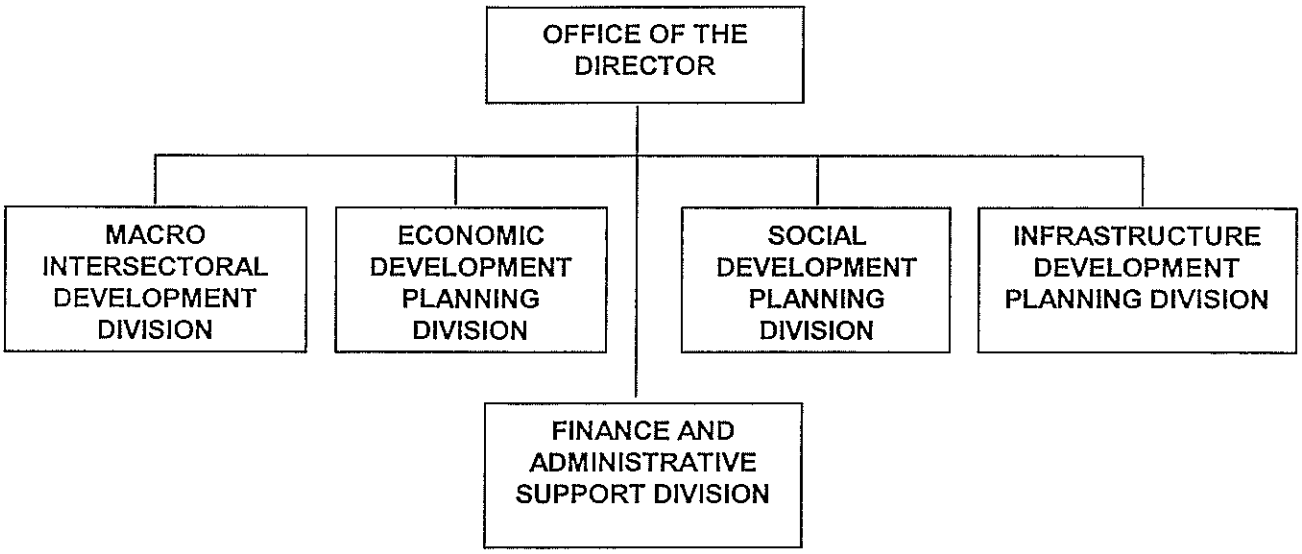
- Regional Economic Development and Planning Board (REDPB)

Providing secretariat support to the REDPB, the highest planning body of the Region is the Regional Planning and Development Office (RPDO). Five (5) Divisions support the RPDO, as shown in Figure 2-3.

Functions of the RPDO are similar to the National Economic and Development Authority Regional Offices (NROs) in the other Administrative Regions. These functions are:

- Evaluate and review proposed programs and projects for consideration by the regional planning and development board;
- Monitor and assess the programs and projects' implementation in the ARMM;
- Serve as the technical staff of the regional planning and development board in the ARMM;
- Provide technical assistance to implementing agencies in the autonomous region in identifying and developing regional programs and projects;
- Coordinate with the regional offices, other departments and agencies, and assist the local government units in the ARMM in the performance of their assigned tasks;
- Coordinate the implementation of foreign-assisted projects in the new autonomous region;
- Coordinate both foreign and local scholarship grants in the region; and
- With the creation of the Official Development Assistance (ODA) unit, the RPDO will need to work closely with said unit in the coordination of foreign-assisted projects.

Figure 4-3 Regional Planning and Development Office (RPDO) Organizational Structure



Source: Regional Planning and Development Office (RPDO)-ARMM

- Regional Reconciliation and Unification Council (RRUC)
- Regional Project Monitoring and Evaluation Committee (RPMEC)

The Manila Extension Office plays an active role as a liaison office in dealing with the National Government, Congress and ODA donors.

Other Locally Created Offices

Of the locally created offices in ARMM, the Office of the Regional Treasurer would be relevant to the sector since its main function is to evolve a system of sound and efficient management of ARMM financial resources and to ensure that said resources are generated and managed in accordance with the Regional Law and applicable existing national policies.

The Devolved Agencies

Article XVIII, Section 4 of the transitory provision of RA 9054 specifies that line agencies and offices of the National Government dealing with local government, social services, science and technology, labor, natural resources, and tourism, including their personnel, equipment, properties and budgets, are placed under the control and supervision of the Regional Governor.

While devolution continues from the National Government to the ARMM, the provision of RA 9054 Section 3 provides that the Regional Government shall adopt a policy on local autonomy whereby regional powers shall also be devolved to local government units particularly in areas of education, health, human resources, science and technology and people empowerment. This has not taken into effect as of this time.

One of the guiding principles and policies embodied in RA 9054 is the provision, maintenance and assurance of the delivery of, among other things, basic and responsive health programs, quality education, appropriate services, livelihood opportunities, affordable and progressive housing projects and water resource development (Article III, Section 11). In view of this provision, the different devolved agencies were created to implement the basic services required of the law.

There are 20 devolved agencies in ARMM, of which for water supply/sanitation, the Department of Public Works and Highways (DPWH-ARMM), the Department of Health (DOH-ARMM) and the Department of Interior and Local Government (DILG-ARMM) are the relevant agencies. The general functions and roles of these agencies involved in the water supply and sanitation (WATSAN) sector are shown in Table 4-2.

Table 4-2 Functions and Roles of Devolved Agencies Involved in WATSAN

Devolved Agencies	Functions and Roles
Department of Interior and Local Government (DILG-ARMM)	Assist the Regional Governor in the exercise of general supervision over the LGUs; develop and strengthen local government capability to promote local autonomy, decentralization, community empowerment through technical assistance and capability-building programs.
Department of Public Works and Highways (DPWH-ARMM)	Lead role in the provision and maintenance of highways, flood control and water resource development systems, and other public works within the ARMM.
Department of Health (DOH-ARMM)	Lead role in the provision and maintenance of health, nutrition and sanitation services to the people.
Department of Environment and Natural Resources (DENR-ARMM)	Lead role in the conservation, protection and rehabilitation of the natural resources of the Region (forests, lands, environment, and other related services)

4.3 National Government Agencies with Field Offices in ARMM

Article XVIII, Section 4 of RA 9054 provides for the transfer of agencies and offices to the ARMM except for the following: Foreign Affairs, National Defense and Security, Postal Services, Coinage/Fiscal/Monitoring Policies, Administration of Justice except Shari'a, Customs and Tariff, Citizenship, Naturalization, Immigration and Deportation, General Auditing, National Elections, Maritime, Land and Air Transportation and Communication, Patents, Trademarks, Trade Names and Copyrights and Foreign Trade (Article IV, Section 3), national government offices and agencies in the ARMM are placed under the control and supervision of the Regional Governor pursuant to a prescribed schedule or within six (6) years from the re-organization of the Regional Government.

Agencies without physical presence in ARMM are represented by other Administrative Regions such as Regions IX and XII. These include: Department of Budget and Management (DBM) and Department of Finance (DOF).

4.3.1 Functions and Roles of National Government with Field Offices in ARMM

The functions and roles of non-devolved national government offices in the ARMM are the same as those of the other regions. These agencies coordinate with the Regional Governor when asked to participate in development planning activities of the REDPB and its Sub-committees, in Cabinet Meetings and in reporting major and significant accomplishments affecting ARMM. There are loose arrangements anchored on maintaining harmonious relationships between NGAs and ARMM.

4.4 Key Players in the Sector in ARMM

The key players in the water/sanitation sector and their nature of involvement are shown in Tables 4-3 and 4-4.

Table 4-3 Key Players Involved in the Water Supply and Sanitation Sector at the National Level and ARMM Government

Level	Offices/Agencies	Nature of Involvement
National Government	Department of Finance (DOF)/ Investment Coordination Committee (ICC)/ Municipal Development Fund Office (MDFO)	• Development planning, implementation, monitoring and evaluation of WATSAN projects, approval of cost sharing arrangements and policies at the national level
	Local Water Utilities Administration (LWUA)	• Technical and financial assistance to WDs
ARMM Government	Regional Economic Planning & Development Board (REPDB)/ Regional Planning & Development Office (RPDO)	• Policy formulation, monitoring and evaluation, regional development planning
	Department of Interior and Local Government (DILG) - ARMM	• Institutional Strengthening of LGUs (same as DILG National Office)
	Department of Health (DOH) - ARMM	• Water quality monitoring and sanitation (Same as DOH National Office)

Table 4-4 Offices/Agencies Involved in the Water Supply and Sanitation Sector at the Local Level

Offices/Agencies	Nature of Involvement
Provincial Planning & Development Office	• Development planning, implementation, monitoring and evaluation of WATSAN projects.
Provincial Engineering Office	• Oversees and may undertake construction, operation and maintenance of the WATSAN facilities in the province including municipalities and barangays.
Provincial Health Office	• Conducts water quality examination (thru Municipal Health Office) • Provide toilet facilities
Barangay/Municipal governments (thru MPDO)	• Identifies projects • Provides counterpart support
Water Service Providers, BWSAs	• Provides water supply coverage in urban areas • Provides water supply coverage in rural areas
Provincial General Services Office	• Responsible for the procurement of materials

Offices/Agencies	Nature of Involvement
Provincial Accounting, Budget, Treasury Offices	• Undertakes administrative works in budgeting and funds releasing
Sangguniang Panlalawigan	• Approves project implementation and appropriates funds (Provincial level)
Provincial Development Council	• Initiates a comprehensive multi-sectoral plan of the province
NGOs, CBOs, POs	• Provides consultancy services especially in CO/CD works
DILG-ARMM Provincial Director's and Municipal Local Government Office	• Conducts/assists training especially on topics related to human resource development

4.4.1 Department of Public Works and Highways – ARMM (DPWH-ARMM)

The capability of the DPWH-ARMM and its implementing arm, the various District Engineers' Offices in the provinces' congressional districts, in planning and implementing water supply projects is quite limited. Its primary focus has been on roads and bridges and has essentially left the different local government units (LGUs) to plan and undertake their own water supply projects. In addition, the District Engineers' Offices have minimal construction equipment in their inventory, all of which are for the repair/maintenance of roads and bridges. However, given its previous experiences in water supply projects in terms of planning and implementation supervision, the District Engineers' Offices do assist the different LGUs in the aforementioned areas upon request.

For its Maguindanao Engineering District and Area Equipment Services, DPWH-ARMM has a total of 71 technical field personnel, while for DPWH-ARMM Regional Office, there are 44 technical personnel. However, as previously stated, their activities seem to be primarily concentrated in roads and bridges.

The budget of DPWH-ARMM for the implementation of projects is quite limited, as most of its budgetary appropriations are consumed by personnel services and maintenance, operating and other expenses. Actually, even the Department's MOOE are actually mostly spent for personal services. Table 4-5 gives the DPWH-ARMM actual budget from 1996-2003, while Table 4-6 gives the budget breakdown by major expenditure items from 2001-2003.

Table 4-5 Actual Budget of DPWH-ARMM (1996-2003

Year	Actual Budget	% change
1996	190.85	
1997	192.26	0.74
1998	189.34	-1.52
1999	716.64	278.49
2000	171.80	-76.03
2001	177.38	3.25
2002	277.90	56.67
2003	281.90	1.44

Source: Regional Planning and Development Office, ARMM

Table 4-6 Breakdown of DPWH-ARMM Budget by Major Expenditure Items (2001-2003)

Expenditure Item	2001	% of Total	2002	% of Total	2003	% of Total
Personal Services	91.36	0.52	89.34	0.32	92.72	0.22
Automatic Appropriation	8.29	0.05	8.09	0.03	8.58	0.02
MOOE	77.73	0.44	180.48	0.65	180.61	0.43
Capital Outlay					136.54	0.33
Total	**177.38**	**1.00**	**277.91**	**1.00**	**418.45**	**1.00**

Source: Office of the Regional Governor, ARMM

The ARMM Public Investment Program for water supply in Maguindanao, which is implemented by DPWH-ARMM and is funded out of ARMM lump sum appropriations for the period 2004-2006 is given in Table 4-7. It shows the minimal amount that is allocated by the ARMM government to water supply for Maguindanao.

Table 4-7 ARMM Public Investment Program for Water Supply – Maguindanao (2004-2006)

Project	2004	2005	2006	Total
Construction of Water Supply System Level III in 8 barangays (Elevated Water Tank)	-	24.0	-	24.0
Construction and Installation of Potable Water Supply and Distribution System in 22 areas	19.5	6.0	7.5	33.0
Total Water Supply	19.5	30.0	7.5	57.0
Total Infrastructure	458.86	3,200.04	2,838.95	6.497.85
% water supply	4.25	0.94	0.26	0.88

Source: Regional Planning and Development Office, ARMM

The organizational charts of DPWH-ARMM and its District Engineers' Office in Maguindanao are given in Figures 4-4 and 4-5.

Figure 4-4 Organizational Chart – Department of Public Works and Highways ARMM

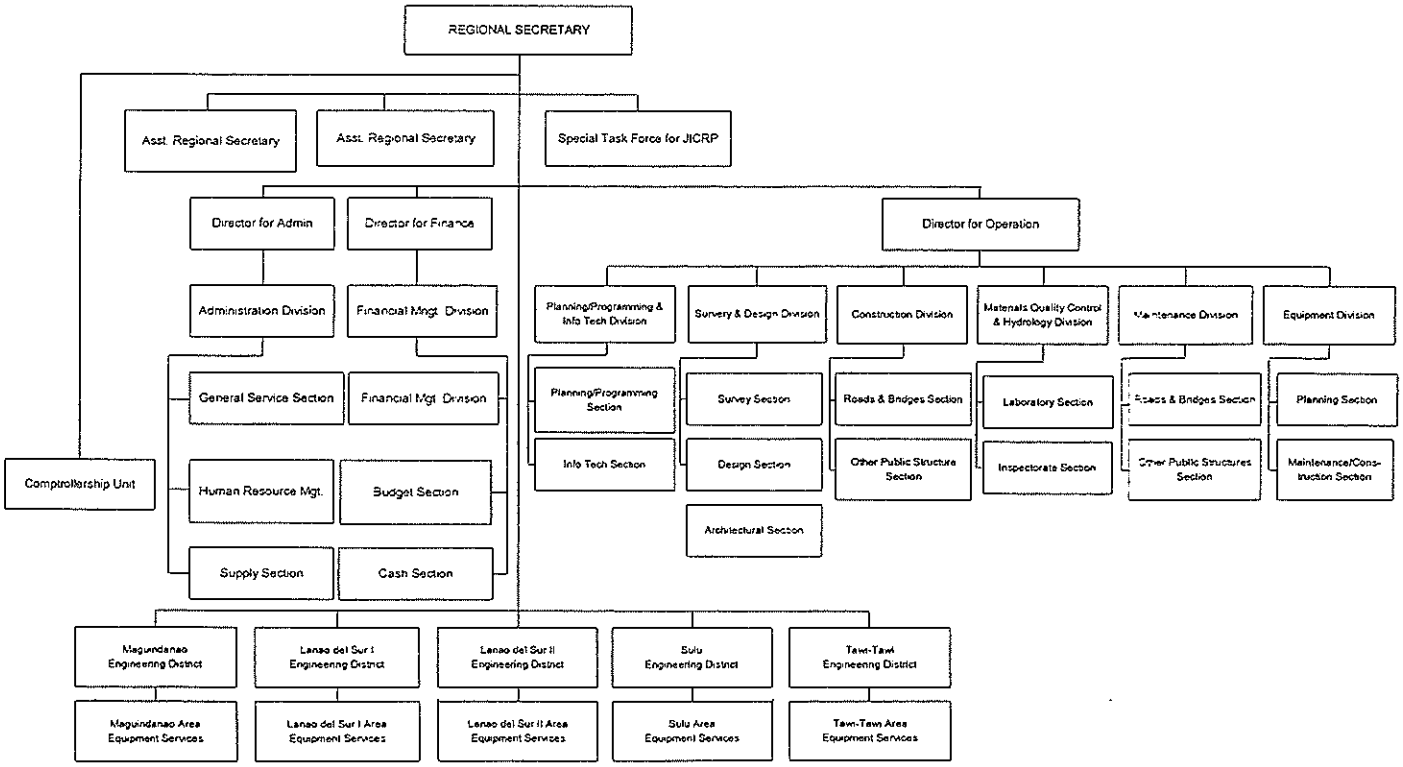
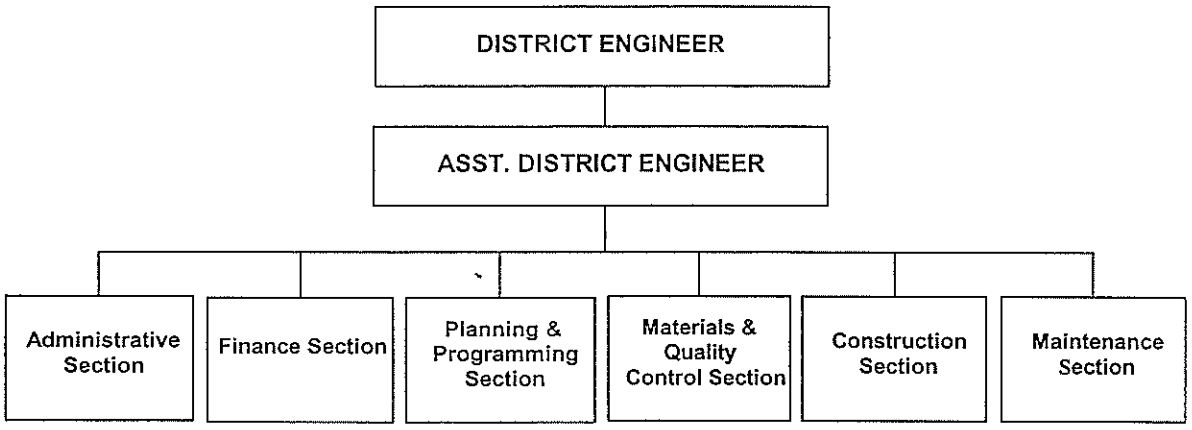


Figure 4-5 Organizational Chart – DPWH District Engineers' Office, Maguindanao



4.4.2 Department of the Interior and Local Government – ARMM (DILG-ARMM)

The activities of DILG-ARMM, compared to its national counterpart, has been severely hampered by budgetary constraints. While it is one of the few ARMM-devolved agencies that has substantial geographical coverage in all ARMM LGUs, it has been unable to extend any significant assistance to LGUs in water/sanitation activities/projects, in such areas as project development and institution/capability-building. The organizational chart of DILG-ARMM is given in Figure 4-6.

As with DPWH-ARMM, its budget goes mostly to personal expenditures and MOOE. Table 4-8 gives the agency's budget from 1996-2003 and the budget breakdown by expenditure items is shown in Table 4-9.

Figure 4-6 Organizational Chart – Department of Interior and Local Government-ARMM

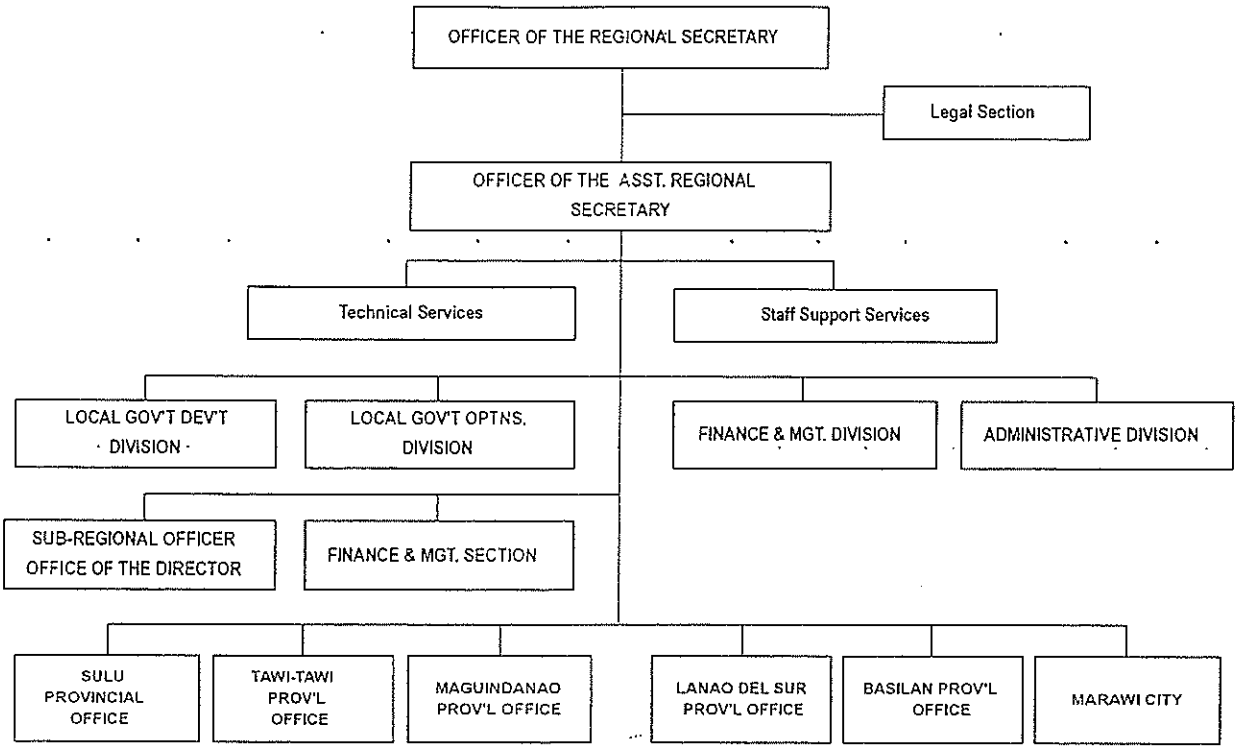


Table 4-8 Actual Budget of DILG-ARMM (1996-2003)

Year	Actual Budget	% change
1996	38.24	-
1997	44.34	15.95
1998	61.09	37.78
1999	67.45	10.41
2000	64.12	-4.94
2001	72.93	13.74
2002	68.02	-6.73
2003	71.27	4.78

Source: Regional Planning and Development Office, ARMM

Table 4-9 **Breakdown of DILG-ARMM Budget by Major Expenditure Items (2001-2003)**

Expenditure Item	2001	% of Total	2002	% of Total	2003	% of Total
Personal Services	59.40	0.81	58.04	0.84	59.87	0.84
Automatic Appropriation	5.59	0.08	5.45	0.08	5.72	0.08
MOOE	7.95	0.11	5.53	0.08	5.68	0.08
Capital Outlay						
Total	**72.94**	**1.00**	**69.02**	**1.00**	**71.27**	**1.00**

Source: Regional Planning and Development Office, ARMM

4.4.3 Department of Health – ARMM (DOH-ARMM)

The DOH-ARMM continues to provide health services up to the LGU level, since it is one of the agencies which functions were not devolved in the ARMM Local Government Code. However, given current financial constraints of ARMM, its LGUs are participating in the financing and delivery of health services to its constituents. The organizational structure of DOH-ARMM is shown in Figure 4-7.

As with the other two previous departments, DOH-ARMM's budget has declined as shown in Table 4-10 and may have already affected its delivery of health services. Furthermore, most of its budget goes to personal services and MOOE, as shown in Table 4-11.

Figure 4-7 Organizational Chart – Department of Health-ARMM

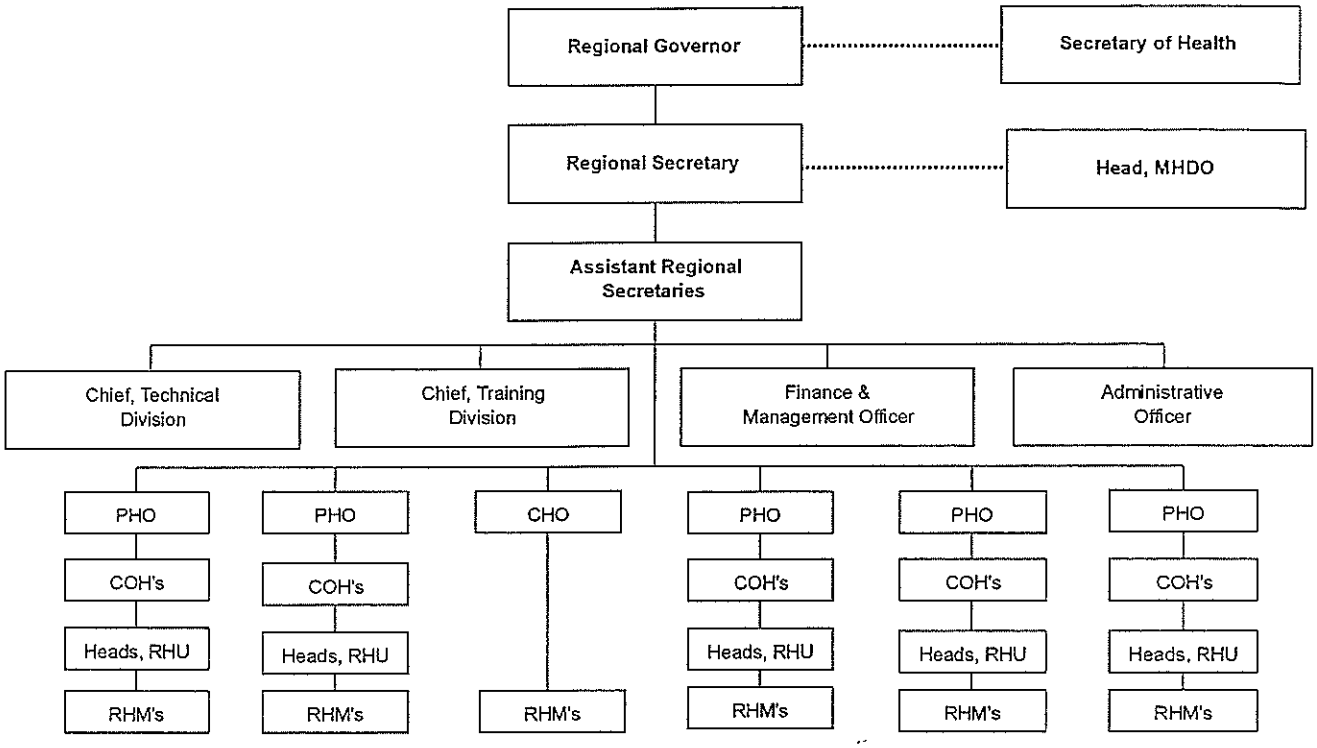


Table 4-10 Actual Budget of DOH-ARMM (1996-2003)

Year	Actual Budget	% change
1996	230.34	-
1997	253.45	10.03
1998	331.18	30.67
1999	420.09	26.85
2000	394.76	-6.03
2001	410.91	4.09
2002	408.93	-0.48
2003	432.40	5.74

Source: Regional Planning and Development Office, ARMM

Table 10 Breakdown of DOH-ARMM Budget by Major Expenditure Items (2001-2003)

Expenditure Item	2001	% of Total	2002	% of Total	2003	% of Total
Personal Services	292.07	0.71	292.69	0.72	318.25	0.74
Automatic Appropriation	24.77	0.06	24.21	0.06	25.96	0.06
MOOE	84.07	0.20	84.33	0.21	86.68	0.20
Capital Outlay	10.00	0.02	7.70	0.02	1.50	0.00
Total	**410.91**	**1.00**	**408.93**	**1.00**	**432.39**	**1.00**

Source: Regional Planning and Development Office, ARMM

4.5 Water Service Providers in Maguindanao

There are no Water Districts in Maguindanao. Most of the BWSAs, which were formerly operating/maintaining Level I systems, are no longer functioning. Only two RWSAs operating/maintaining Level II systems continue to function.

4.6 Institutional/Technical Capacity of WATSAN Agencies in ARMM

4.6.1 ARMM Government

Previously, the Project Management Office – Rural Water Supply at DPWH national in coordination with DOH national handled all WATSAN projects in Maguindanao through the District Engineers' Office (DEO). Trainings provided through the national projects were filtered down through the DEOs. As a result of NEDA Board Resolution No. 4, DILG national was given greater involvement in the sector.

With respect the ARMM Government, capacity building in WATSAN has not yet been undertaken for the ARMM agencies involved in the sector.

4.6.2 The Province

In Maguindanao and in view of the devolution brought about by the ARMM Local Government Code, major WATSAN projects have not reached the province, except for the ADB-funded Mindanao Basic Urban Services Sector. WATSAN is just a component of the project and not a major objective, hence, capacity building for the sector has not yet materialized.

Since municipalities and barangays generally do not have any capacity to undertake WATSAN projects, it is the Maguindanao Provincial Engineers Office (PEO) that has been assisting these lower LGUs. While the equipment of the PEO seems to be primarily for road/bridge maintenance and construction (see Table 4-11), it has the complement of experienced engineers that assists the municipalities/barangays in implementing their WATSAN projects.

Table 4-11 Equipment Inventory of the Provincial Engineers Office (PEO-Maguindanao)

Equipment Type	Brand	No. of Units
Dumptruck	ISUZU FVR	15
Prime Mover with Trailer	ISUZU	1
Wheel Loader	Caterpillar	3
Vibratory Compactor	Caterpillar	2
Motor Grader	Caterpillar	2
Excavator	Caterpillar	3
Backhoe Loader	Caterpillar	1
Track Type Tractor	Caterpillar	2
Crane	NISSAN-TADANO	1
Motor Grader	KOMATSU	3
Motor Loader	KOMATSU	1
Track Type Excavator	KOMATSU	1
Tire Type Excavator	KOMATSU	1
Service Vehicle	KIA	1

Source: Provincial Engineers Office, Maguindanao

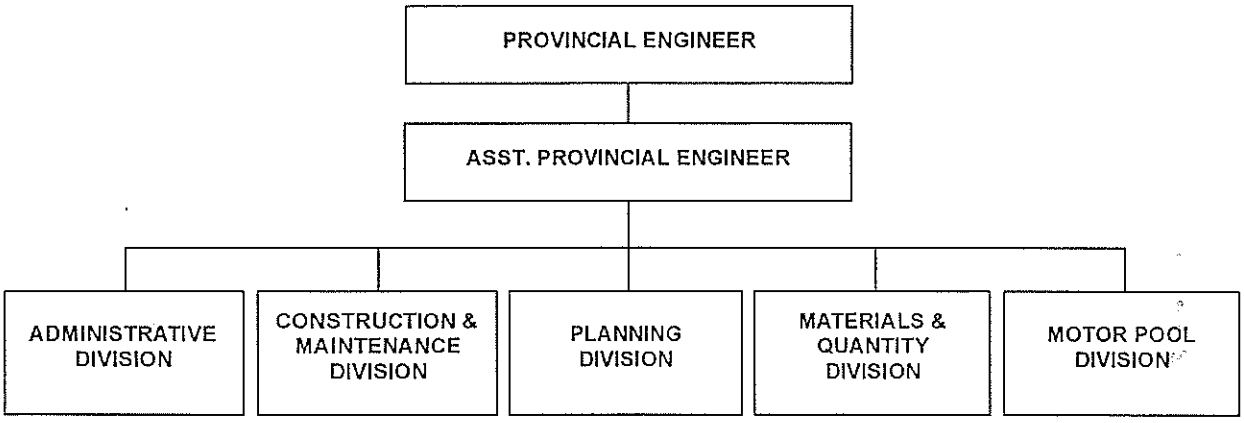
Pursuant to the ARMM Local Government Code, the functions of the PEO with reference to WATSAN are given below:

- Initiate, review and recommend changes in policies and objectives, plans and programs, techniques, procedures and practices in infrastructure development and public works in general;
- Administer, coordinate, supervise and control the construction, maintenance, improvement, and repair of roads, bridges, and other engineering and public works projects of the LGU;

- Provide engineering services to the LGU including investigation and survey, engineering designs, feasibility studies and project management; and
- Exercise technical supervision over all engineering offices of the component cities and municipalities.

The organizational structure of the Maguindanao PEO is given in Figure 4-8.

Figure 4-8 Organizational Structure of the Maguindanao Provincial Engineers Office



4.6.3 Community-Based Organizations or Associations

Community organizing in Maguindanao has to take into account religious and cultural norms, which are particular to the people and communities of this province. The practice of the family (clan) head as the decision-maker is practiced in most rural water supply organizations, e.g., RWSAs/BWSAs. There are no elections of officers as required of an association. The operations and maintenance of the system falls on the shoulder of the family. A clan is composed of many families in the same tribe and could comprise the population of a small barangay. The leaders in the community are chosen on the basis of their being the head of the clan or family.

4.6.4 External Support Agencies Active in the Sector

Maguindanao is currently one of the recipients of the Mindanao Basic Urban Services Sector Project (MBUSSP), but WATSAN is only one of the components. The executing agency of the Project is DILG national through the MBUSS Project Management Office.

MBUSSP covers about 40 urban LGUs throughout Mindanao and is intended for the provision or upgrading of existing/new urban infrastructures and services. The loan of $35 million is provided to the national government through the DILG national. The Project aims to improve the institutional capacity of the LGUs through training, human resource development, and institutional strengthening under the co-financing from Nordic Development Fund.

Further. the Project aims to improve the quality of life of urban residents by enabling the provision. upgrading and rehabilitation of basic municipal infrastructure and services covering water supply, sanitation and sewerage, drainage and flood control, solid waste management, urban roads and bridges, public market and other public facilities. The LGUs capacity to plan, provide, manage and maintain municipal investments and services will be strengthened through training programs. assistance in the preparation of the comprehensive land use plans and implementation of the financial resource mobilization program. The Project will also improve poor communities access to affordable basic infrastructure and services in the Project area and contribute to balanced regional economic development and improvement to the urban environment.

Aside from the MBUSSP, the Growth and Equity in Mindanao (GEM) Project of the United States Agency for International Development (USAID) has provided significant grant assistance to Maguindanao and other ARMM provinces, among other provinces in Mindanao. However, assistance to water supply projects seems to be few and far between.

CHAPTER 5
PAST FINANCIAL PERFORMANCE

5. PAST FINANCIAL PERFORMANCE

5.1 General

One of the major problems usually encountered in ARMM in general and, more specifically, in the different local government units (LGUs) that compose the ARMM, is compliance to the financial reporting system of the national government. Thus, historical records of revenues and expenditures of the various ARMM LGUs are difficult to collect and, when available, the veracity of the information contained is usually questioned. Even the regular audit of these LGUs are often not undertaken due to security concerns for the Commission on Audit (COA) teams that would normally undertake the audits.

In addition, the procedural aspects of the LGU planning, programming, budgeting and expenditure process are seldom followed as required under the ARMM Local Government Code (ARMM-LGC). Thus, the reliability, consistency and truthfulness of the financial information of these LGUs should be considered seriously.

5.2 Financial Performance of the LGU

The provincial and municipals governments' financial performance for the period 1999 to 2001, which are the only available information, was generated from the Bureau of Local Government Finance database together with that of the Department of Budget and Management. At the LGU level, the results of the financial operations could not be released by the LGU Accountants unless clearance from the local chief executive (LCE) is given. In most instances, such clearance for the release of the financial information was not given and the Study Team had to find alternative sources to collect the needed information. could be looked into.

Data on the Internal Revenue Allotment (IRA) for the LGUs were readily available from the DBM, but this only provided information on financial resource availability, not use or allocation.

5.2.1 Sources and Uses of Funds

(a) Revenue Sources

The sources of income are the Internal Revenue Allotment (IRA), local tax revenues, non-tax revenues such as grants, aids and subsidies. At present, the IRA is the major funding source of the province and municipalities therein.

As mandated in Article IX Section 9 of RA 9054, the sharing of Internal Revenue, Natural Resources, Taxes, Fees and Charges are as follows:

(a) Thirty-five percent (35%) to the province or city:

i. The share of the province is apportioned as follows: 45% to the province, 35% to the municipality; and 20% to the barangays;

ii. The share of the city is distributed as follows: 50% to the city and 50% to the barangays.

(b) Thirty-five percent (35%) to the regional government; and

(c) Thirty percent (30%) to the central/national government.

Except for national aid, there are no grants and subsidies reported by the province. However, there are national projects being contracted by the province, such as road repair/maintenance and construction with DPWH-ARMM.

Other income usually comes from economic enterprises, but the LGU receives minimal income from various fees and charges on certain services.

Table 5-1 presents the actual income and expenditures of the Province for the 1999-2001 period. Local revenues, which was less than 4% of the total revenues of the province, consisted of its share of real property tax, business taxes and licenses, and miscellaneous taxes. IRA's annual average share to total income was at least 96%, which indicates that the province has historically been dependent on IRA, given with its low tax and non-tax revenue collections.

The results of the financial operations of the various municipalities in Maguindanao are given in Appendix 5-1.

(b) Uses of Funds of the Province

Actual expenditures of the provincial government for general government services were 35% in 1999 but subsequently decreased to 21.3% of total expenditures. Expenditures on economic development activities has increased from 19.2% in 1999 to 59.03% by 2001. Other charges, such as interest payments on loans has already decreased from 36.7% in 1999 to 19.7% by 2001. While the province enjoys some revenue surplus, this is quite marginal. However, compared to provinces outside of the ARMM, ARMM provinces have less responsibilities as some services have not been devolved such as social services, agriculture, education, etc.

Table 5-1 Actual Results of the Financial Operations of the Province (1999-2001)

ITEMS	1999	2000	2001
INCOME			
LOCAL SOURCES	4,859,898	2,740,908	2,740,907
REVENUE FROM TAXATION	4,165,663	2,371,139	2,371,138
Real Property Tax	3,755,805	1,689,808	1,689,807
Local Taxes	409,858	681,331	643,214
Other Taxes			38,118
NON-TAX REVENUES	694,235	369,769	369,769
Receipt from Eco. Ent.	161,375	0	0
Fees/Charges	10,050	329,671	329,671
Loans and Borrowings		0	0
Other Receipts	522,810	40,098	40,098
AIDS AND ALLOTMENTS	295,029,428	360,298,668	360,298,668
BIR Allotments	295,029,428	346,354,380	346,354,380
National Aids	-	0	13,944,288
National Wealth	-	13,944,288	
TOTAL INCOME	299,889,326	363,039,577	363,039,576
EXPENDITURES			
CURRENT EXPENDITURES	298,560,016	360,081,241	216,821,242
General Government	116,760,571	130,519,898	141,751,597
Public Welfare & Int. Safety	14,719,545	16,442,931	3,707,024
Economic Development	57,409,132	69,037,183	69,858,412
Operation of Econ. Ent.	-	0	0
Other Charges	109,670,768	144,081,228	1,504,209
CAPITAL OUTLAY	493,602	821,229	144,081,228
TOTAL EXPENDITURES	299,053,618	360,902,470	360,902,470
EXCESS (DEFICIT) OF INCOME OVER EXPENDITURES	835,708	2,137,107	2,137,106

Source: Bureau of Local Government Finance

5.2.2 Availability of Funds

As previously noted, the IRA comprises 96% of total income of the province, which is used to finance most of its expenditures including capital outlays. The amount of IRA that will be received by the province is known in advance before the end of the preceding year. Thus, for budgeting purposes, the province just uses the actual amount of IRA it received in the preceding year as its estimate of IRA for the budget year. In the case where the IRA received is larger than that of the preceding year, the province prepares a supplemental budget.

For 2000, the 20% Development Fund (20% of IRA) amounted to about P67.59 million. By 2003, the estimated share of the Development Fund from the IRA is now P81.27 million. These are usually spent for development/infrastructure projects contained in the Annual Investment Plan of the province (AIP).

5.3 Annual Investment Plans

The LGU uses its 20% DF for expenditures on economic and social services, including water supply projects.

5.3.1 Budgetary Allocation to the Sector

The Budget Office of the province consolidates the budget proposal submitted by all offices of the Provincial Government. While, the DBM issues a Local Budget Memorandum every October of the preceding budget year to guide the provinces in their budget preparation, the sector allotment usually comes from the 20% DF, depending on the priorities set and approved by the Provincial Development Council (PDC) and the Governor.

The Governor endorses the AIP to the Sanggunian Panlalawigan for approval and appropriation. Unfortunately, the Governor can change the budget allocation in the AIP, based on his own priorities, with the approval of the PDC.

5.4 Cost Sharing Arrangements/ Counterpart Funding

A new cost-sharing scheme was authorized in 2003 in accordance with the policy on national government grants. Cost sharing arrangements for levels I, II and III systems are shown as follows:

Table 5-2 PGB-Approved Cost Sharing (% share)

Level and Type of Service	Income Class								
	1st/ 2nd			3rd/ 4th			5th/ 6th		
	NG[1]	LGU[2]		NG[1]	LGU[2]		NG[1]	LGU[2]	
		Equity[1]	Loan[1]		Equity[1]	Loan[1]		Equity[1]	Loan[1]
Level I/II WS	30	20	50	40	15	45	50	10	40
Level III WS	0	0	0	20	10	70	50	10	40
Sanitation	20	20	60	40	15	45	50	10	40

For any central government grants that are provided for the development of Level I water supply systems and sanitation facilities to the limited classes of municipalities, the LGUs and beneficiaries concerned shall share the capital cost required. No subsidies from the central government will be provided for the construction of Level II and III water supply systems.

Any grants from the national government that are provided for the development of Level I water supply systems and sanitation facilities are based on the income classification of the municipalities. The LGUs and beneficiaries concerned shall share the capital cost required.

5.5 LGU Financing Options

LGUs have the following financing options :IRA, ODA, private sector financing and debt (both public and private sector debts). The LGU can also avail of funds through conduits, e.g., MDFO, GFIs, and through foreign lending agencies and private sector financing institutions.

5.5.1 Municipal Development Fund Office (MDFO)

The MDF is a revolving fund created under Presidential Decree No. 1914 to provide LGUs access to foreign loans, assistance or grants, but. Operations of the MDF, as well as the

[1] NG – National Government grant for the respective level and type of service and respective income class of the LGU.
Equity – refers to the minimum cash equity contribution to be put up by the LGU.
Loan – refers to the portion of the project cost that the LGU must finance either through loan from MDFO or other Government Financing Institutions (GFIs), e.g., Land Bank, DBP, etc.

[2] If the LGU can raise the equity portion more than the minimum required amount, then the portion of the project cost it needs to raise through loan would be lower. Loan terms of MDFO: Interest Rate - currently at 14% per annum fixed until maturity of the sub-loan; Repayment Period - payable in 15 years inclusive of a 3-year grace period.

CHAPTER 6
WATER SOURCE DEVELOPMENT

6. WATER SOURCE DEVELOPMENT

6.1 General

This chapter discusses the potential water sources and their development for domestic water supply for the province of Maguindanao. More emphasis is given to the available groundwater because of its better quality and economical use as this can require minimal treatment or none at all. The potential of major rivers as possible water source were also considered.

A Groundwater Availability Map (also referred to as Hydrogeologic Map) for the province was prepared to identify areas or geologic formations with available groundwater. This was done through the correlation and evaluation of pump well and ground geology data to determine the groundwater potential of the different geologic units.

In its Rapid Assessment of Water Supply Sources, the National Water Resources Board (NWRB) classifies groundwater as shallow well, deep well, or difficult areas. Instead of using this classification, this study categorized groundwater availability in terms of the potentials and hydrogeologic properties of geologic units underlying the province.

Most of the data and information used in this study were obtained from the following sources:

- Mines and Geosciences Bureau (MGB),
- National Mapping and resources Information Administration (NAMRIA),
- National Water Resources Board (NWRB),
- Local Waterworks Utilities Administration (LWUA),
- Local Government Units (LGUs),
- Provincial Planning and Development Office (PPDO), and
- Department of Public Works and Highways (DPWH).

Majority of the geologic reports and maps and some hydrogeologic reports were obtained from the MGB. Some water resources investigation reports and well data were gathered from the NWRB. These gathered data and information were supplemented by those gathered from field investigations and through questionnaires provided to the local government offices.

The Groundwater Availability Map may be used for provincial or even municipal level master plans and feasibility studies. However, certain investigations may have to be conducted prior to detailed design and implementation of the water supply work.

6.2 Geology

6.2.1 General Statement

The uplifted igneous and sedimentary rocks in Maguindanao were formed during pre-Cretaceous to recent. They are the result of magmatic and tectonic action generated by westward and northeast crustal dipping plates that were subducted during the course of the province evolution. The subduction zones south of Cotabato, along the Agusan-Davao Trough and east of Surigao are considered most significant in the geologic development of Maguindanao and its adjoining provinces.

The sedimentary rocks which were intercalated with the igneous rocks were formed during the Cretaceous to Pleistocene. The oldest known rocks are the partly metamorphosed Cretaceous to Paleogene dense, relatively impervious tuffaceous mudstone and greywacke which are intercalated with lava flows. These are mostly transformed sedimentary deposits derived from basic oceanic crust. Final uplift of younger deposits above sea level occurred during the Pleistocene to Recent time.

In general, none of the igneous and well-cemented, compacted sedimentary rocks can be considered as dependable sources of pumpable groundwater. Only the Pleistocene to Recent deposits can be considered as potential sources of significant quantity of pumpable groundwater.

6.2.2 Groundwater in the Geologic Units

The crystalline igneous and metamorphic rocks and the hard, indurated, well-cemented sedimentary rocks do not contain pumpable groundwater unless they are sufficiently fractured and/or weathered.

None of the fair to excellent sources of pumpable groundwater is homogeneous. In the study area, these sources are the Pliocene to Pleistocene siltstone, sandstone and conglomerate (N_3S), Quaternary pyroclastic deposits (QVP) and the Recent unconsolidated deposits (R).

In the limestone areas, wells may show only small yields. They however, may be dependable sources of spring water.

Several springs may also emanate from the Quaternary volcanic and pyroclastic rocks. They may also exist in some of the metamorphic and older sedimentary rocks.

The following geologic units that are present in the study area are classified as sedimentary or igneous and metamorphic. Their capabilities to contain groundwater are also discussed.

Sedimentary Rocks

Cretaceous to Paleogene (Kpg). This rock unit, which is intercalated with the Cretaceous to Paleogene lava flows, consists of dense, relatively impervious tuffaceous mudstone and greywacke that have been partly metamorphosed. The soil cover is reported to be thin.

Pumpable groundwater, if any, occurs in the fractured and/or weathered zones.

Early to Middle Miocene Rocks (N_1S). The bulk of the formation includes massive layers of hard, well cemented, coarse sandstone. Light brown silty shale and pale greenish-gray siltstone are intercalated with the sandstone. These rocks are partly folded and faulted but dense and impervious when fresh. They occur in rugged ridges, are partly covered with primary and secondary forest growth, and are partly cultivated.

This formation is generally not considered a good water-bearing formation. Groundwater may occur in the fractured and/or weathered zones and in the leached sandstone and conglomerate.

Some reported wells with the sandstone and/or conglomerate as the water-bearing zones have discharge rates of 0.315 lps (5gpm) to 0.56 lps (9 gpm) with specific capacities of 0.04 to 1.86 lps per meter of drawdown.

Early to Middle Miocene Limestone (N_1L). This light colored and fossiliferous limestone overlies the other Early to Middle Miocene sedimentary rocks. This also includes reef limestone and calcarenite.

Groundwater is possible in the bedding openings, solution-enlarged fractures and at contacts with the underlying rocks. There are no reported pumpwells in this formation.

Late Miocene Rocks (N_2S). This unit consists of interbedded conglomerate, sandstone, fossiliferous siltstone, mudstone and light-colored reefal limestone. The clastic rocks are porous and moderately indurated with calcareous clay as cementing material. The basal conglomerate and sandstone were derived from basaltic rocks.

Groundwater occurs mainly within the sandstone and conglomerate. Some low-yielding wells were reported.

Late Miocene to Pliocene Limestone (N_2L). This limestone is generally massive, crystalline and partly coralline. The limestone's basal tuffaceous marl grades into the underlying clastic member.

Groundwater is possible along the secondary permeable fractured zones and in the solution channels that are likely to occur in the coralline limestone portions of the unit. Groundwater generally discharges into the surface drainage.

There are no reported wells in this rock unit.

Pliocene to Pleistocene Clastic Rocks (N_3S). This unit consists of thin bedded soil, fossiliferous mudstone, locally topped by siltstone, sandstone and conglomerate interbeds, rarely intercalated with impure limestone.

Portions of the municipalities of Ampatuan, Shariff Aguak, Talayan, Sultan Kudarat, Parang and Barira are underlain by this rock formation. Generally wells drilled in this formation are low-yielding though the possibility of drilling fairly good yielding wells is not being discarded.

The limited NWRB well records show depths from 10 m to 40 m. It may be deeper in some localities. Water level ranged from about 0.5 to about 2.40 mbgs, however, this is expected to be deeper in several localities. Reported specific capacities ranged from 0.05 to more than 3.0 lps per meter of drawdown.

Pliocene to Pleistocene Limestone (N_3L). This consists of coralline, megafossiliferous, cavernous limestone, interbedded with sandstone, marl, local volcanic sandstone and conglomerate.

Springs are generally common in the limestone formation. Groundwater may be present within the sandstone and conglomerate beds and within the fractured zones and solution cavities.

Quaternary Sediments (Q_1S). This unit is made up of loosely consolidated calcareous siltstone, sandstone and local conglomerate lenses.

Groundwater generally occurs within the interstices of sandstone and conglomerate beds.

Recent Alluvium (R). This unit consists of outwash, valley fill, river and coastal deposits of clay, silt, sand, gravel, organic remains such as coral reefs and shells. It covers most of the Maguindanao lowlands, such as coastal lowlands, flood plains and banks of lower Pulangui River.

These unconsolidated deposits are from less than a meter to over tens of meter thick. Though generally considered as shallow well areas, these can also be considered as shallow to deep well areas in some localities.

Available well records in Cotabato City and the municipalities of Nuling, Pagalungan and Buluan show well depths of less than 10 m to as deep as 63 m. Deeper wells are possible in some localities. Recorded static water levels ranged from about 0.3 m to 26.5 m. Reported actual capacities ranged from 0.32 to less than 4.0 lps. Specific capacities ranged from 0.05 to 6.0 lps per meter of drawdown. Properly designed and constructed wells may show higher actual and specific capacities.

The reported well depths indicate that the recent deposits can be considered as both shallow and deep well areas.

Water-bearing zones in this unit can be classified as fair to very good.

Igneous Rocks

Quaternary Volcanics (QV). The volcanic cone central areas are reported to consist of Pliocene to Pleistocene hornblende andesite which is generally gray, massive and hard. The dacitic phases occur as lava flows. Agglomerates and ash flows also occur.

Pumpable groundwater, if any, is likely to be surficial and in some instances may render partly not potable by sulfuric solutions derived from sulfur deposits.

There are reported wells in this formation.

Pliocene to Recent Pyroclastics (QVP). This formation, consisting predominantly of tuffaceous sandstone, siltstone, shale, agglomerates and tuff, practically covers major portions of the study area. Bombs, scoriaceous and pumiceous materials are also present. The pyroclastic rocks are partly cemented to loosely compacted and in some places, partly faulted.

The aquifers occur as lenses and pods; of larger area when reworked. Groundwater occurs under water table (unconfined) and artesian (confined) conditions.

The northern and some southern portions of the province are underlain by this rock formation. Productive wells can be drilled in this formation especially at the northern part, which is the continuity of this deposit in Lanao del Sur. Some of the municipalities in the north underlain by this formation are Barira, Buldon, Matanog and Parang. On the other hand, the municipalities at the south are North Upi, South Upi and Talayan and some portions of nearby municipalities. Wells to be drilled in this rock unit at the southern part of the province are expected to be less productive.

The 11 wells considered in Parang indicate well depths of about 22 to 93 m with static water level of 0.30 to 0.61 mbgs. Reported specific capacities are from 0.27 to 2.07 lps per meter of drawdown.

The 5 wells considered in Upi indicate well depths of more than 9 m to about 46 m with static water level of 1.5 to 26.5 mbgs. Reported specific capacities ranged from 0.03 to 0.507 lps per meter of drawdown.

The low capacities of these wells can attributed to improper well design and construction. In addition most of these wells are made of small diameter pipes. Properly designed and constructed wells will therefore be expected to give higher capacities and may reflect the actual hydrogeologic properties of the water-bearing zones.

Springs with significant discharges may also emanate from this formation.

6.3 Groundwater Availability in the Province

The Groundwater Availability Map of the province is presented in Figure 6-1. Majority of the data used in the preparation of the map were obtained from the MGB and NWRB. Some of the well data are presented in Table 6-1 and location of these wells is presented in Figure 6-2. Details of located walls are shown in Appendix 6-1.

On the map, each geologic unit is described separately in terms of its lithologic composition and groundwater holding capability. The hydrogeologic properties are likewise included in the explanation.

WITH GROUNDWATER POTENTIAL

R — **Recent Alluvium** Consists of outwash, valley fill, river and coastal deposits of clay, silt, sand, gravel, cobbles, boulders, corals and other marine carbonates. Covers most of the lowlands, such as coastal lowlands, floodplains and banks of lower Pulangui River. Water-bearing zones in this unit can be classified as fair to very good.

Pliocene to Recent Pyroclastics Consists predominantly of tuffaceous sandstone, siltstone, shale, agglomerates and tuff. Bombs, scoriaceous and pumiceous materials are also present.

The aquifers occur as lenses and pods; possibly of larger area when reworked. Can be considered as good to very good water-bearing formation. Springs with significant discharges may also emanate from this formation.

Q_1S — **Quaternary Sediments** Loosely consolidated calcareous siltstone, sandstone and local conglomerate lenses. Groundwater occurs within the interstices of sandstone and conglomerate beds.

N_3S — **Pliocene to Pleistocene Clastic Rocks** Sequence of fossiliferous mudstone, marl, impure limestone, sandstone, conglomerate with a younger poorly consolidated sequence of ferruginous sandstone, calcareous siltstone and conglomerate. Generally wells drilled in this formation are low-yielding though the possibility of drilling fairly good yielding wells is not being discarded.

WITH LIMITED OR NO SIGNIFICANT GROUNDWATER POTENTIAL

N_3L — **Pliocene to Pleistocene Limestone** Consists of coralline, megafossiliferrous, cavernous limestone, interbedded with sandstone, marl, local volcanic sandstone and conglomerate. Groundwater may be present within the sandstone and conglomerate beds and within the fractured zones and solution cavities of limestone. Springs are generally common in the limestone formation.

N_2S — **Late Miocene to Pliocene Clastic Rocks** Consists of tuffaceous shale, sandstone and conglomerate. The clastic rocks are porous and moderately indurated with calcareous clay as cementing material. Limited groundwater occurs mainly within the sandstone and conglomerate. Some wells were reported.

N_2L — **Late Miocene to Pliocene Limestone** This limestone is generally massive, crystalline and partly coralline. The limestone's basal tuffaceous marl grades into the underlying clastic member. Groundwater is possible along the secondarily permeable fractured zones and in the solution channels that are likely to occur in the coralline limestone portions of the unit. Groundwater generally discharges into the surface drainage. There are no reported wells in this rock unit.

N_1S — **Early to Middle Miocene Rocks** Includes greywacke, conglomerate, sandstone, siltstone and mudstone with thin bedded limestone, coal and basalt lava, reef limestone and some pyroclastics. These rocks are partly folded and faulted but dense and impervious when fresh. Groundwater generally occurs in the fractured and/or weathered zones and in the leached sandstone and conglomerate.

N_1L — **Early to Middle Miocene Limestone** Light colored and fossiliferous limestone which conformably overlies the other Early to Middle Miocene sedimentary rocks. Include reef limestone and calcarenite. Groundwater is possible in the bedding openings, solution-enlarged fractures and at contacts with the underlying rocks. There are no reported pumpwells in this formation.

QV — **Quaternary Volcanics** Composed of Pliocene to Pleistocene hornblende andesite which is generally gray, massive and hard. The dacitic phases occur as lava flows. Agglomerates and ash flows also occur. Pumpable groundwater, if any, is likely to be surficial and may be rendered partly not potable by sulfuric solutions derived from sulfur deposits. There are no reported wells in this formation.

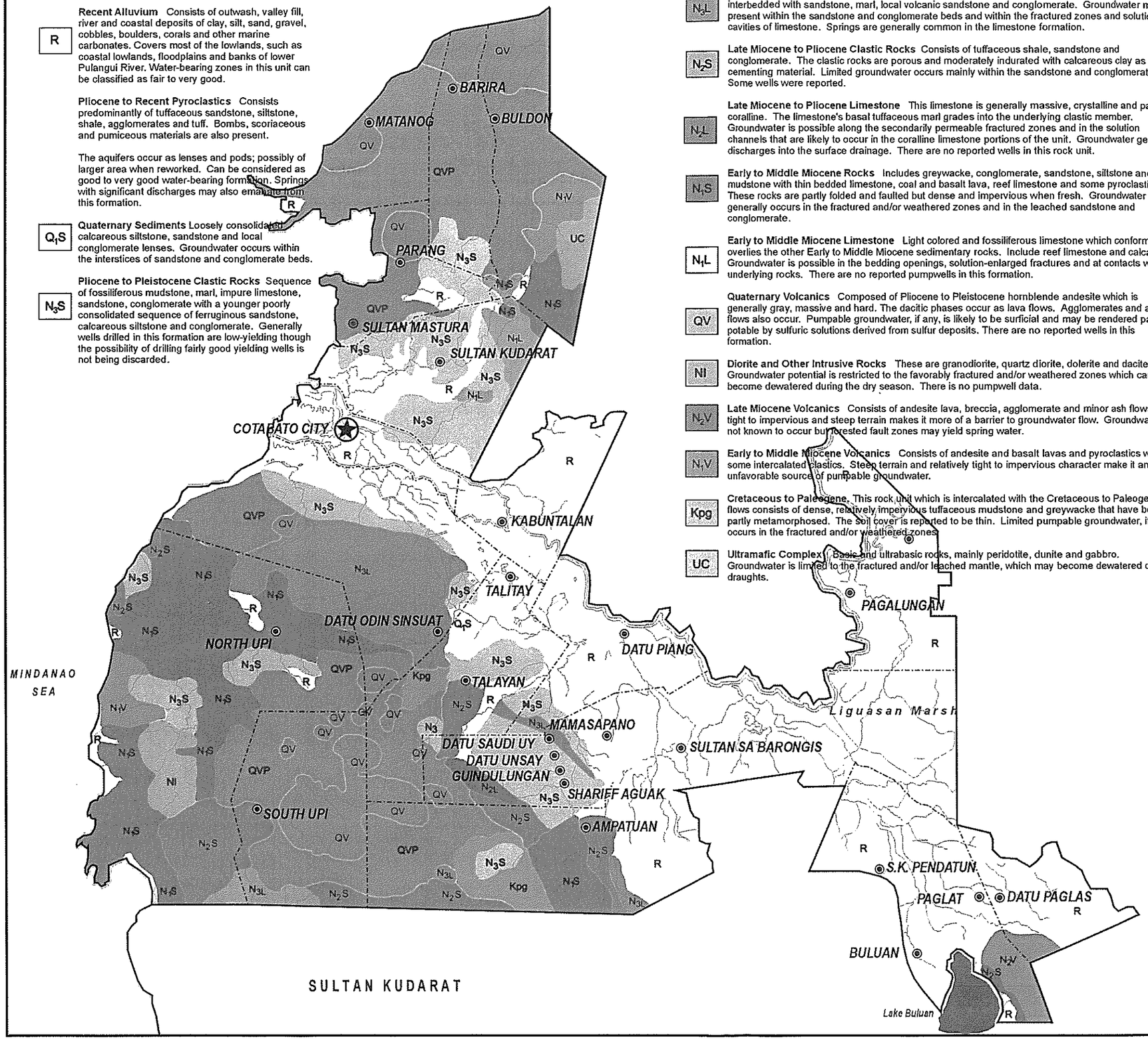
NI — **Diorite and Other Intrusive Rocks** These are granodiorite, quartz diorite, dolerite and dacite. Groundwater potential is restricted to the favorably fractured and/or weathered zones which can become dewatered during the dry season. There is no pumpwell data.

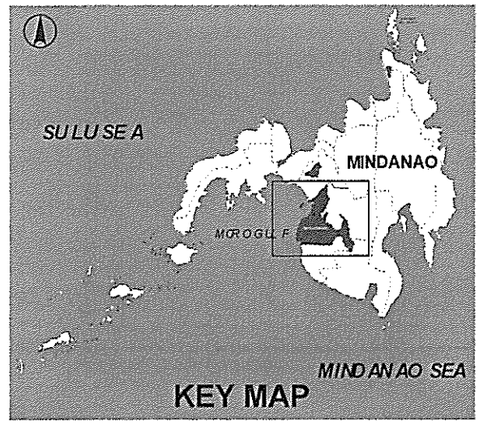
N_2V — **Late Miocene Volcanics** Consists of andesite lava, breccia, agglomerate and minor ash flows. Its tight to impervious and steep terrain makes it more of a barrier to groundwater flow. Groundwater is not known to occur but forested fault zones may yield spring water.

N_1V — **Early to Middle Miocene Volcanics** Consists of andesite and basalt lavas and pyroclastics with some intercalated clastics. Steep terrain and relatively tight to impervious character make it an unfavorable source of pumpable groundwater.

Kpg — **Cretaceous to Paleogene.** This rock unit which is intercalated with the Cretaceous to Paleogene lava flows consists of dense, relatively impervious tuffaceous mudstone and greywacke that have been partly metamorphosed. The soil cover is reported to be thin. Limited pumpable groundwater, if any, occurs in the fractured and/or weathered zones.

UC — **Ultramafic Complex** Basic and ultrabasic rocks, mainly peridotite, dunite and gabbro. Groundwater is limited to the fractured and/or leached mantle, which may become dewatered during draughts.





LEGEND:

- Provincial Boundary
- Municipal Boundary
- River
- City Center
- Town Center

Figure 6-1

GROUNDWATER AVAILABILITY MAP OF MAGUINDANAO

Table 6.1 Water Well Data Summary, Maguindanao Province

No.	Town	No. of Wells Based onStatic Water Level			No. of Wells Considered	Specific Capacity (lps/m)		Well Depth (m)		Static Water Level (mbgs)	
		1-3mbgs	3.1-6 mbgs	>6mbgs		Average	Range	Average	Range	Average	Range
1	Ampatuan	1	-	-	-	0.42	-	28.05	20.43 - 33.84	1.5	-
2	Barira	-	-	-	-	-	-	-	-	-	-
3	Buldon	-	-	-	-	-	-	-	-	-	-
4	Buluan	6	1	-	9	0.89	0.15 -2.03	29.91	14.02 - 53.66	1.44	0.305 - 4.27
5	Datu Odin Sinsuat	-	-	-	-	-	-	-	-	-	-
6	Datu Paglas	-	-	-	-	-	-	-	-	-	-
7	Datu Piang	-	-	-	-	-	-	-	-	-	-
8	Kabuntalan	-	-	-	-	-	-	-	-	-	-
9	Mamasapano	-	-	-	-	-	-	-	-	-	-
10	Matanog	-	-	-	-	-	-	-	-	-	-
11	Pagagawan	-	-	-	-	-	-	-	-	-	-
12	Paglat	-	-	-	-	-	-	-	-	-	-
13	Pangalungan	4	2	-	11	0.5	0.15 - 1.13	40.79	11.28 - 63.11	2.38	0.305 -4.27
14	Parang	3	-	-	11	0.72	0.27 - 2.07	51.25	21.95 - 92.99	0.51	0.305 - 0.61
15	Salipada K. Pendatun	-	-	-	-	-	-	-	-	-	-
16	Sharif Aguak / Maganoy	-	-	-	-	-	-	-	-	-	-
17	South Upi	-	-	-	-	-	-	-	-	-	-
18	Sultan Kudarat	18	1	2	26	0.26	0.05-3.10	27	8.23 - 39.02	2.38	0.305 - 13.11
19	Sultan Sa Barongis	-	-	-	-	-	-	-	-	-	-
20	Talayan	-	-	-	-	-	-	-	-	-	-
21	Talitay	-	-	-	-	-	-	-	-	-	-
22	Upi	1	1	1	5	0.27	0.03 - 0.507	27.44	9.15 - 45.73	14.01	1.5 - 26.52

mbgs - meter below ground surface
SWL - static water level
lps - liters per second
m - meter

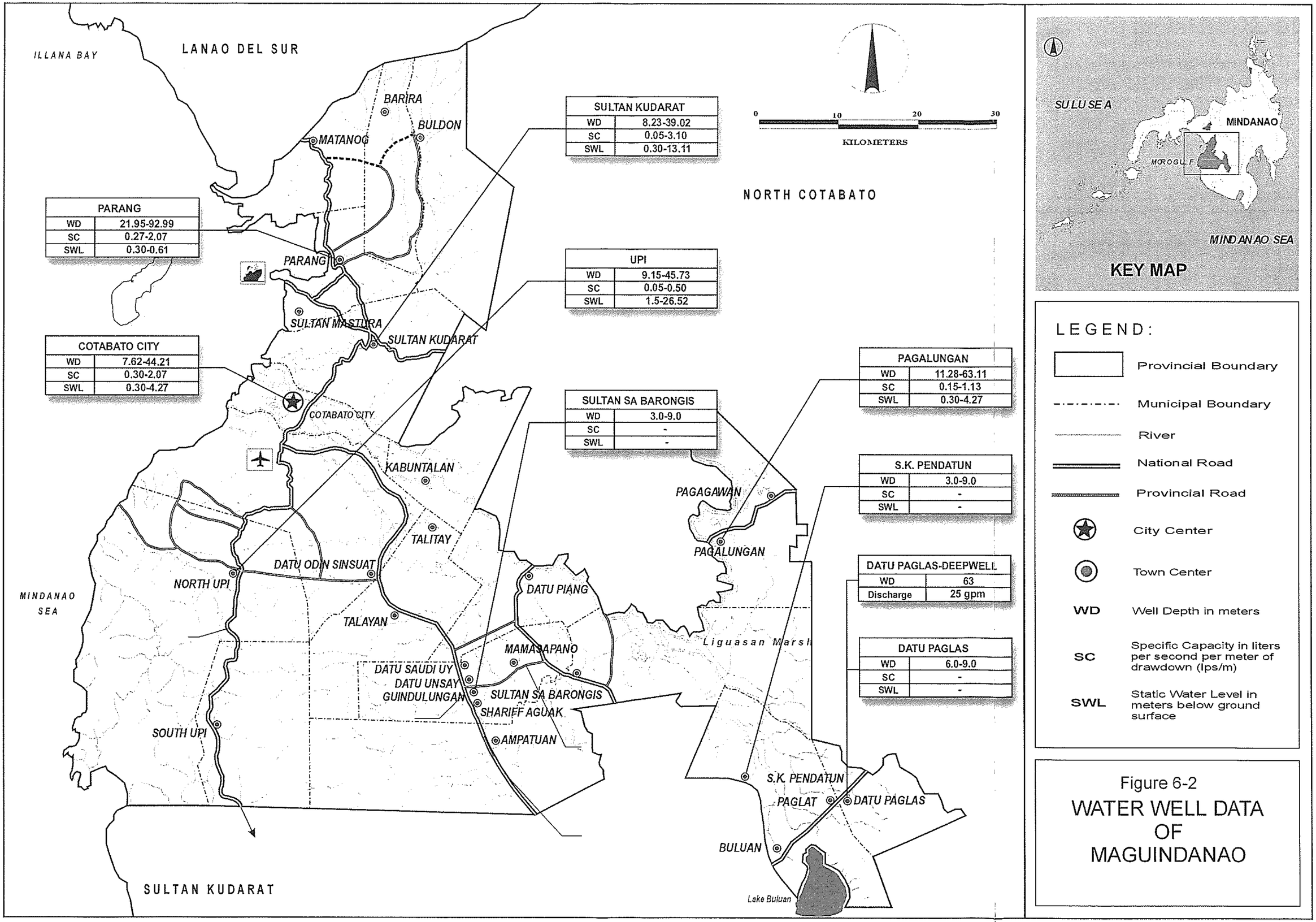


Figure 6-2
WATER WELL DATA OF MAGUINDANAO

In general, none of the igneous, metamorphic and well-cemented, compacted sedimentary rocks can be considered as dependable sources of pumpable groundwater. The Quaternary Pyroclastics (QVP) which underlie the northern and part of the southern portions of the province and the Recent deposits (R) can be considered as potential sources of pumpable groundwater. The Quaternary Pyroclastics can be considered as both shallow and deep well area though most of the wells drilled in this formation are relatively deep. The Recent deposits are generally classified as shallow well areas but can also be considered as deep well areas in places where pervious deposits are relatively thick.

The Pliocene to Pleistocene clastic rocks (N_3S) may also contain groundwater but not as significant as those of the QVP and R, especially those at higher elevations.

Springs may emanate from the limestone deposits, volcanic rocks, and the Quaternary Pyroclastics and other hard and indurated metamorphic and sedimentary rocks. It has been reported that domestic water supply in the province especially in the rural areas are generally supplemented by springs.

For planning purpose, the different rock units in the province can be classified into the following in terms of groundwater availability. It should be noted that there are rock units wherein groundwater occurs both in unconfined and confined conditions and can be classified as both shallow and deep well areas like those underlain by the Recent Alluvium (R) and Pliocene to Recent Pyroclstics (QVP).

- *Shallow well areas.* By definition these are areas having water-bearing formations where water can be withdrawn up to depths of not more than 20 m from the ground surface. These are the areas underlain mostly by Recent Alluvium and Pliocene to Recent Pyroclastics (QVP). Though generally classified as deep well areas, in some cases shallow groundwater also occur within the Pliocene to Pleistocene Clastic Rocks (N_3S) and Late Miocene to Pliocene Clastic Rocks (N_2S).

- *Deep well areas.* In deep well areas, the aquifers exist to depths of more than 20 m from the ground surface. These can be found in areas underlain by R, QVP, N_3S and N_2S wherein the first two are more productive. Where sandstone and conglomerate are present, low-yielding wells can also be drilled in the N_1S. High yielding deep wells are common in the QVP.

CHAPTER 7

FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

7. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION

7.1 General

The future needs in water supply and sanitation facilities for each municipality were basically assessed base on existing condition as presented in Chapter 3 of this report. Other considerations in determining the future requirements were based on the Program of Works (POW) submitted to us by the respective LGU's, taking into account the water sources availability, and service area population and our engineering judgment during the site visit. For the municipalities which were not reached during the investigation. the Poblacion and other urban areas of the municipality were considered to a certain water service level basing it from the general information gathered from the PPDO .

7.2 Targets of Provincial Sector Plan

The master plan aims to provide a ten-year design period for water and sanitation project in the Province of Maguindanao. It was foreseen that the project would be done in two phases. Phase I will cover the need of the province from year 2005 to 2010, and the second Phase from 2010 to 2015. As discussed in Chapter 3 mostly of the water service in the province of Maguindanao is level I. This is being looked into providing a water level service in the municipality, which is technically viable. The targets of development plan for each town were evaluated based on the factors stated in Clause 7.1. Target assumptions were established to be used in projecting the future requirements for each sub sector. Since setting targets for each municipality seems to vary depending on the final evaluation and judgment of the area, a logical percentage for each town was used in projecting the future requirements. The percentages set for Phase Phase II and I are 50% and 60% of the barangay population, respectively for each water service level. For the sanitation facilities, the percentages used for Phase I ranges from 30% to 80% while for Phase II ranges from 50% to 85% of the barangays population. The sample percentage application for each water level service and household toilets as target design year is shown below. Table 7-1 summarizes the provincial targets for the water and sanitation projects.

Phase	Barangay Population (a)	Water Service Level: Level 3 (b)	Level 2 (c)	Level (d)	Household Toilets
Phase I (2005-2010)	1,000	50% x (a)	50% x (a)	* [(a)-(b)] x 50% ** [(a)-(c)] x 50% *** (a) x 50%	(a) x (30% to 80%)
Phase II (2010-2015)	1,500	60% x (a)	60% x (a)	* [(a)-(b)] x 60% ** [(a)-(c)] x 60% *** (a) x 60%	(a) x (50% to 85%)

Notes: * *For level III system barangay* ** *For level II system barangay*
*** *For level I system barangay*

Table 7-1 Provincial Sector Targets

FACILITIES	Existing (2003)		Phase I (2005-2010)		Phase II (2010-2015)	
WATER SUPPLY	*Population Served*	*Population Coverage*	*Additional Population to be Served*	*Population Coverage*	*Additional Population to be Served*	*Population Coverage*
Urban	75,848	9%	59,931	13%	20,604	16%
Rural	296,504	35%	148,949	45%	127,271	59%
Total	372,352	44%	208,880	58%	147,875	75%
SANITATION - HOUSEHOLD TOILETS	*Household Served*	*Additional Household to be Served*	*Additional Household to be Served*	*Household Coverage*	*Additional Household to be Served*	*Household Coverage*
Urban	83,144	10%	3,722	11%	4,458	12%
Rural	324,633	38%	17,824	44%	25,089	54%
Total	407,777	48%	21,546	55%	29,547	66%
SANITATION - SCHOOL TOILETS	*Schools Served*	*Coverage*	*Additional Schools to be Served*	*Coverage*	*Additional Schools to be Served*	*Coverage*
	368	79%	159	100%	49	100%
SANITATION - PUBLIC TOILETS	*Public Utilities Served*	*Coverage*	*Additional No. of Public Toilet*	*Coverage*	*Additional No. of Public Toilet*	*Coverage*
	32	97%	26	100%	26	100%

7.3 Projection of Frame Values

7.3.1 Population Projection

The population for each municipality was projected using the past censal years of 1980, 1990, 1995 and 2000 NSO Municipal Population. The NSO has municipal population projection with based year 1995 up to year 2010. The 1995 NSO municipal population projection growth rates from year 2000 to 2010 were used in projecting the actual 2000 municipal population up to year 2010 municipal population. Since the 1995 NSO municipal population projection was only up to year 2010, the growth rate used in projecting the 2005 to 2010 municipal population was used in projecting the municipal population from 2010 to 2015. Using the growth rates mentioned above, the municipal population was computed based on the formula shown below. For the barangay population projection, the ratio method was applied to project the barangay population with respect to its municipal population. The population projections for the 26 towns broken down into urban and rural are shown in Table 7-2.

$$P_1 = P_0 \times (1+r)^n$$

where:

P_1 = population after n years

P_0 = population in base year

r = growth rate

n = no. of years

Table 7-2 Population Projection, Province of Maguindanao

Municipality		2000			2003			2005			2010			2015		
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1	Ampatuan	5,547	27,360	32,907	5,882	29,000	34,882	6,117	30,153	36,270	6,630	32,690	39,320	7,183	35,442	42,626
2	Barira	4,710	13,586	18,296	5,015	14,345	19,360	5,230	14,874	20,104	5,704	16,029	21,733	6,210	17,283	23,493
3	Buldon	4,957	21,946	26,903	5,287	23,802	29,089	5,523	25,143	30,666	5,619	28,255	33,874	6,672	31,725	38,397
4	Buluan	13,145	37,953	51,098	13,255	38,276	51,531	13,328	38,493	51,821	13,357	38,583	51,939	13,385	38,672	52,057
5	Datu Odin Sinsuat	11,996	59,573	71,569	12,902	64,589	77,491	13,543	67,773	81,317	14,995	75,719	90,713	16,596	84,600	101,195
6	Datu Paglas	2,307	17,707	20,014	2,472	18,980	21,451	2,588	19,878	22,467	2,853	21,925	24,778	3,145	24,183	27,328
7	Datu Piang	10,276	29,518	39,794	10,613	30,448	41,060	10,843	31,084	41,927	11,280	32,283	43,562	11,741	33,559	45,299
8	Datu Saudi	0	27,509	27,509	0	28,692	28,692	0	29,520	29,520	0	31,197	31,197	0	32,925	32,925
9	Datu Unsay	0	13,055	13,055	0	13,486	13,486	0	13,782	13,782	0	14,351	14,351	0	14,955	14,955
10	Gen. S. K. Pendatun	5,858	22,516	28,374	6,188	23,783	29,971	6,418	24,668	31,086	6,918	26,589	33,507	7,456	28,660	36,116
11	Guindulungan	0	14,894	14,894	0	16,902	16,902	0	18,392	18,392	0	22,175	22,175	0	26,696	26,696
12	Kabuntalan	3,811	19,326	23,137	4,166	20,838	25,004	4,421	21,929	26,350	5,007	24,453	29,460	5,650	27,288	32,938
13	Mamasapano	839	19,220	20,059	872	19,919	20,791	894	20,400	21,295	939	21,344	22,284	985	22,333	23,318
14	Matanog	2,722	16,284	19,006	2,889	17,354	20,243	3,006	18,114	21,120	3,261	19,811	23,072	3,539	21,666	25,204
15	Pagagawan	0	27,010	27,010	0	29,689	29,689	0	31,652	31,652	0	36,355	36,355	0	41,756	41,756
16	Pagalungan	6,236	19,672	25,908	6,816	21,677	28,494	7,234	23,127	30,361	8,235	26,636	34,871	9,390	30,662	40,052
17	Paglat	0	5,832	5,832	0	6,183	6,183	0	6,428	6,428	0	6,969	6,969	0	7,554	7,554
18	Parang	34,317	26,618	60,935	34,782	27,998	62,780	36,295	28,964	65,259	37,849	31,005	68,854	40,615	34,037	74,652
19	Shariff Aguak	8,671	27,805	36,476	8,979	28,872	37,851	9,190	29,610	38,800	9,599	31,074	40,673	10,027	32,597	42,624
20	South Upi	6,591	21,595	28,186	7,170	23,248	30,418	7,585	24,440	32,024	8,533	27,191	35,724	9,305	29,427	38,732
21	Sultan Kudarat	7,658	71,397	79,055	8,153	76,072	84,225	8,501	79,359	87,860	9,275	86,688	95,964	10,120	94,680	104,800
22	Sultan Mastura	0	15,806	15,806	0	16,826	16,826	0	17,550	17,550	0	19,186	19,186	0	20,989	20,989
23	Sultan Sa Barongis	6,255	28,454	34,709	6,320	29,677	35,997	6,363	30,904	37,267	6,109	33,307	39,416	5,674	36,015	41,689
24	Talayan	3,101	15,134	18,235	3,478	16,973	20,451	3,754	18,321	22,075	4,449	21,711	26,159	5,278	25,758	31,035
25	Talitay	0	17,026	17,026	0	19,198	19,198	0	20,797	20,797	0	24,841	24,841	0	29,670	29,670
26	Upi	5,369	45,772	51,141	5,594	47,886	53,480	5,749	49,368	55,117	6,060	52,440	58,500	6,391	55,700	62,090
Provincial Total		144,366	662,568	806,934	150,833	704,711	855,544	156,583	734,725	891,307	166,671	802,804	969,475	179,361	878,830	1,058,191

7.3.2 Public Schools and Public Utilities

The number of public schools was projected by applying the current ratio of student population to the total municipal population and the ratio of the number of schools to the number of students. The ratio values were then applied to the projected municipal population.

Generally, in the province of Maguindanao, there is only one place for the markets and bus/jeepney terminals for each town. The number of sanitation facilities for the public utilities were estimated to have one additional sanitation facility for every phase of the project implementation. Table 7-3 shows the projected facilities.

Table 7-3 Projected Schools and Public Utilities by Municipality

Municipality	Public Schools			Public Utilities		
	2003	2010	2015	2003	2010	2015
1 Ampatuan	21	25	27	2	3	4
2 Barira	19	23	24	1	2	3
3 Buldon	24	30	34	1	2	3
4 Buluan	17	17	17	1	2	3
5 Datu Odin Sinsuat	40	51	57	4	5	6
6 Datu Paglas	16	20	22	3	4	5
7 Datu Piang	13	14	15	2	2	3
8 Datu Saudi	12	13	14	1	2	3
9 Datu Unsay	3	3	3	1	2	3
10 Gen. S. K. Pendatun	15	18	19	1	2	3
11 Guindulungan	5	7	9	1	2	3
12 Kabuntalan	20	25	28	1	2	3
13 Mamasapano	9	10	10	1	2	3
14 Matanog	21	24	26	1	2	3
15 Pagagawan	13	17	20	1	2	3
16 Pagalungan	12	16	19	1	2	3
17 Paglat	0	1	1	1	2	3
18 Parang	31	35	38	1	2	3
19 Shariff Aguak	13	14	15	1	2	3
20 South Upi	32	6	7	1	2	3
21 Sultan Kudarat	31	38	41	1	2	3
22 Sultan Mastura	9	11	12	1	2	3
23 Sultan Sa Barongis	20	23	24	1	2	3
24 Talayan	5	7	9	1	2	3
25 Talitay	11	16	19	1	2	3
26 Upi	53	61	64	1	2	3
Provincial Total	**465**	**527**	**576**	**33**	**58**	**84**

7.4 Types of Facilities and Implementation Criteria

7.4.1 Water Supply

A. Urban Water Supply

Service Level. The levels of water service for each municipality were determined based on the different considerations as mentioned in Clause 7.1. Generally, a Level III water system is appropriate for urban areas but Levels I and II facilities can also be implemented in urban areas in the future.

Utilization of Existing Facilities. The existing Level I and II facilities are considered to be utilized during Phase I period. However, the population served by these facilities is assumed to be absorbed by Level III service in Phase II.

Water Source. Most of the existing Level III systems use deep wells. In this context, a deep well source would be used as the primary source in the project development plan, wherever applicable.

Number of System. Generally, there is one Level III system considered for each municipality. Whenever a Level III system exists in the municipality, the future requirements are considered as an expansion of the existing system, otherwise a new system was considered.

Rehabilitation. Rehabilitation of existing and future facilities is assumed to be undertaken by the operating organization or individual.

B. Rural Water Supply

Service Level. The Level I systems are generally planned for rural areas where houses are scattered. Service level standards are set at 15 households per source for Level I and 5 households per communal faucet for Level II. Application of Level III in rural areas may be considered on a case basis during implementation.

Utilization of Existing Facilities. The usable existing facilities of all water system levels will be use and integrated in the future development plan.

Water Source. Generally, shallow/deep wells are recommended for Level I and deep well for Level II wherever applicable, in view of safety against possible contamination and stable water

supply. Conventional construction method (driven well) may be employed under the favorable substrata or hydrogeological conditions. Spring development is also considered in Levels I and II, specifically for municipalities where shallow/deep wells are not possible. Standard specification of shallow and deep wells is summarized below.

Table 7-4 Standard Specifications of Level I Wells

Specification	Shallow Well	Deep Well
Construction Method	Open-hole drilling and gravel pack	
Casing Diameter	50 mm	100 mm
Borehole Diameter	150 mm	200 mm
Ranges of well Depth	20 m	<20 m

Number of Systems and Facilities. Generally, there is one Level III water system in the municipality except for other towns where other urban barangays are distantly located from the Poblacion and where satellite system is recommended. The same case is applied to Level II system when potential Level II barangays are located far from each other, separate systems are applied. The number of Level I wells and the number stand faucets for Level II were estimated using the service level standard set.

7.4.2 Sanitation

The type of toilet facilities is dependent on the service level of water supply in the community. In the province of Maguindanao, a flush type toilet was allocated to be used in areas where Level III water system is existing and proposed and pour flush type is considered for Level I and II water systems.

7.5 Service Coverage by Target Year

7.5.1 Water Supply

The sector service coverage percentage target was set for each town based on the existing facilities. Applying the percentages shown in the table of Clause 7.2 , the average targets for Level III are 11 % and 16% of the municipal population for Phase I and Phase II, respectively. For Level II, average targets are 6% and 7% of the municipal population for Phase I and Phase II, respectively. And for Level I, the average targets are 42% and 52 % of the municipal population for Phase I and Phase II, respectively.

Table 7-5 shows service area population and served population for the water supply system. Figures 7-1 and 7-2 show the proposed water supply facilities coverage for Phases I and II.

7.5.2 Sanitation

The service area coverage target of sanitation facilities was carried out based on the existing sanitary condition of the municipality. Applying the percentages as shown in the table of Clause 7.2, the computed target percentage for Phase I and Phase II are 55% and 66 %, respectively. For the public school toilets and public utility toilets, it is projected that all facilities will be served. Table 7-6 shows projected service area population and served population for the sanitation facilities. Figures 7-3 and 7-4 show the proposed sanitation facilities coverage for Phases I and II.

7.6 Facilities, Equipment and Rehabilitation to Meet the Target Services

7.6.1 Water Supply

The required facilities for each water level were determined based on the parameters discussed in the preceding sections. The required number of systems and service connections were determines based on future service area(s) and service area population. The number of water systems, and service connections for Level III; the number of water systems and public faucets for Level II; and the number of shallow and deep wells Level I, are presented in Table 7-7. Sets of equipment are needed in the implementation of the water supply projects. The list of equipment needed is shown below.

- Truck-mounted rotary drilling machine
- Truck-mounted percussion drilling machine
- Well rehabilitation equipment
- Service truck with crane
- Support vehicle (Pick-up with winch)

7.6.2 Sanitation

The required sanitation facilities were also estimated based on above conditions. The future requirements for the household toilets, school toilets, and public toilets for each target year of implementation are presented in Table 7-8.

Table 7-5 Population to be Served by Target Year (Water Supply)

Municipality	Type	Phase I (2005-2010)								Phase II (2010-2015)							
		Total Population	Service Coverage				Additional Population to be Served				Total Population	Service Coverage				Additional Population to be Served			
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total		Level III	Level II	Level I	Total	Level III	Level II	Level I	Total
1 Ampatuan	Urban	6,630	0	3,315	1,658	4,973	0	3,315	0	3,315	7,183	0	4,310	1,724	6,034	0	995	66	1,061
	Rural	32,690	0	3,762	14,464	18,226	0	3,762	3,653	7,415	35,442	3,429	5,166	16,108	24,703	3,429	4,042	3,067	10,537
	Total	39,320	0	7,077	16,121	23,198	0	7,077	3,653	10,730	42,626	3,429	9,477	17,832	30,738	3,429	5,037	3,133	11,599
2 Barira	Urban	5,704	0	2,852	1,426	4,278	0	2,852	0	2,852	6,210	0	3,726	1,490	5,216	0	607	0	607
	Rural	16,029	0	732	7,648	8,381	0	732	2,065	2,798	17,283	0	951	9,799	10,750	0	218	2,137	2,355
	Total	21,733	0	3,584	9,074	12,658	0	3,584	2,065	5,649	23,493	0	4,677	11,290	15,966	0	825	2,137	2,962
3 Buldon	Urban	5,619	0	2,809	1,405	4,214	0	2,809	0	2,809	6,672	0	4,003	1,601	5,604	0	1,194	197	1,390
	Rural	28,255	0	2,653	12,801	15,454	0	2,653	3,704	6,357	31,725	3,610	0	16,869	20,479	3,610	0	4,068	7,678
	Total	33,874	0	5,462	14,206	19,668	0	5,462	3,704	9,166	38,397	3,610	4,003	18,471	26,083	3,610	1,194	4,265	9,068
4 Buluan	Urban	13,357	6,678	0	3,339	10,017	6,678	0	0	6,678	13,385	8,031	0	3,212	11,243	1,353	0	0	1,353
	Rural	38,583	6,116	0	16,233	22,350	6,116	0	2,720	8,837	38,672	7,355	0	18,790	26,145	1,239	0	2,673	3,912
	Total	51,939	12,795	0	19,572	32,367	12,795	0	2,720	15,515	52,057	15,386	0	22,003	37,389	2,592	0	2,673	5,265
5 Datu Odin Sinsuat	Urban	14,995	5,527	1,971	3,749	11,246	0	1,971	861	2,832	16,596	12,234	2,617	1,047	15,898	0	647	62	708
	Rural	75,719	11,781	7,070	28,434	47,285	0	7,070	9,046	16,117	84,600	26,093	9,390	29,470	64,953	0	2,320	6,926	9,246
	Total	90,713	17,307	9,041	32,182	58,531	0	9,041	9,908	18,949	101,195	38,327	12,008	30,516	80,851	0	2,967	6,988	9,954
6 Datu Paglas	Urban	2,853	0	1,426	713	2,140	0	1,426	0	1,426	3,145	0	1,887	755	2,642	0	461	42	502
	Rural	21,925	0	640	10,643	11,282	0	640	3,285	3,925	24,183	0	853	13,998	14,851	0	214	3,355	3,568
	Total	24,778	0	2,066	11,356	13,422	0	2,066	3,285	5,351	27,328	0	2,740	14,753	17,493	0	674	3,397	4,071
7 Datu Piang	Urban	11,280	5,640	0	2,820	8,460	5,640	0	0	5,640	11,741	7,045	0	2,818	9,862	1,405	0	0	1,405
	Rural	32,283	0	0	16,141	16,141	0	0	3,962	3,962	33,559	0	0	20,135	20,135	0	0	3,994	3,994
	Total	43,562	5,640	0	18,961	24,601	5,640	0	3,962	9,602	45,299	7,045	0	22,953	29,997	1,405	0	3,994	5,399
8 Datu Saudi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	31,197	0	1,516	14,840	16,356	0	1,516	3,730	5,246	32,925	0	1,910	18,609	20,519	0	394	3,769	4,163
	Total	31,197	0	1,516	14,840	16,356	0	1,516	3,730	5,246	32,925	0	1,910	18,609	20,519	0	394	3,769	4,163
9 Datu Unsay	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	14,351	0	1,387	6,482	7,869	0	1,387	1,432	2,819	14,955	0	1,739	7,930	9,668	0	352	1,448	1,799
	Total	14,351	0	1,387	6,482	7,869	0	1,387	1,432	2,819	14,955	0	1,739	7,930	9,668	0	352	1,448	1,799
10 Gen. S. K. Pendatun	Urban	6,918	0	2,040	2,439	4,479	0	2,040	404	2,444	7,456	0	2,639	2,891	5,529	0	599	452	1,050
	Rural	26,589	0	4,319	11,135	15,454	0	4,319	2,553	6,872	28,660	0	5,587	13,844	19,431	0	1,267	2,709	3,976
	Total	33,507	0	6,359	13,574	19,933	0	6,359	2,956	9,315	36,116	0	8,225	16,735	24,960	0	1,866	3,161	5,027
11 Guindulungan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	22,175	0	0	11,088	11,088	0	0	4,327	4,327	26,696	0	0	16,018	16,018	0	0	4,930	4,930
	Total	22,175	0	0	11,088	11,088	0	0	4,327	4,327	26,696	0	0	16,018	16,018	0	0	4,930	4,930
12 Kabuntalan	Urban	5,007	0	2,240	1,384	3,624	0	2,240	88	2,328	5,650	0	3,033	1,570	4,603	0	793	186	979
	Rural	24,453	0	0	12,226	12,226	0	0	3,891	3,891	27,288	0	0	16,373	16,373	0	0	4,146	4,146
	Total	29,460	0	2,240	13,610	15,850	0	2,240	3,979	6,219	32,938	0	3,033	17,943	20,976	0	793	4,333	5,126
13 Mamasapano	Urban	939	0	0	470	470	0	0	121	121	985	0	0	591	591	0	0	122	122
	Rural	21,344	0	2,383	9,480	11,864	0	2,383	2,091	4,474	22,333	0	3,001	11,599	14,600	0	617	2,119	2,736
	Total	22,284	0	2,383	9,950	12,333	0	2,383	2,212	4,595	23,318	0	3,001	12,190	15,191	0	617	2,240	2,858
14 Matanog	Urban	3,261	0	0	1,631	1,631	0	0	0	0	3,539	0	0	2,123	2,123	0	0	492	492
	Rural	19,811	0	3,994	7,908	11,902	0	3,994	1,107	5,101	21,666	0	5,314	9,811	15,125	0	1,320	1,903	3,223
	Total	23,072	0	3,994	9,539	13,533	0	3,994	1,107	5,101	25,204	0	5,314	11,934	17,248	0	1,320	2,395	3,715

Table 7-5 Population to be Served by Target Year (Water Supply) - (cont.)

Municipality	Type	Phase I (2005-2010)									Phase II (2010-2015)								
		Total Population	Service Coverage				Additional Population to be Served				Total Population	Service Coverage				Additional Population to be Served			
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total		Level III	Level II	Level I	Total	Level III	Level II	Level I	Total
15 Pagagawan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	36,355	5,193	0	15,581	20,774	5,193	0	4,455	9,648	41,756	7,194	0	20,737	27,931	2,001	0	5,156	7,157
	Total	36,355	5,193	0	15,581	20,774	5,193	0	4,455	9,648	41,756	7,194	0	20,737	27,931	2,001	0	5,156	7,157
16 Pagalungan	Urban	8,235	3,441	0	2,397	5,838	3,441	0	199	3,640	9,390	4,742	0	2,789	7,531	1,301	0	391	1,693
	Rural	26,636	0	0	13,318	13,318	0	0	4,647	4,647	30,662	0	0	18,397	18,397	0	0	5,079	5,079
	Total	34,871	3,441	0	15,715	19,156	3,441	0	4,847	8,288	40,052	4,742	0	21,186	25,928	1,301	0	5,471	6,772
17 Paglat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	6,969	0	0	3,484	3,484	0	0	1,011	1,011	7,554	0	0	4,533	4,533	0	0	1,048	1,048
	Total	6,969	0	0	3,484	3,484	0	0	1,011	1,011	7,554	0	0	4,533	4,533	0	0	1,048	1,048
18 Parang	Urban	37,849	15,943	1,529	10,189	27,660	4,493	1,529	2,714	8,736	40,615	20,526	1,989	10,860	33,375	1,964	460	701	3,125
	Rural	31,005	4,068	0	13,469	17,537	0	0	4,158	4,158	34,037	5,292	0	17,247	22,539	0	0	3,778	3,778
	Total	68,854	20,011	1,529	23,657	45,197	4,493	1,529	6,872	12,895	74,652	25,818	1,989	28,107	55,914	1,964	460	4,479	6,903
19 Shariff Aguak	Urban	9,599	4,800	0	2,400	7,199	4,800	0	0	4,800	10,027	6,016	0	2,406	8,422	1,216	0	7	1,223
	Rural	31,074	3,499	1,941	12,817	18,257	3,499	1,941	2,619	8,058	32,597	4,386	2,432	15,468	22,286	887	492	2,650	4,029
	Total	40,673	8,298	1,941	15,217	25,456	8,298	1,941	2,619	12,858	42,624	10,402	2,432	17,874	30,708	2,103	492	2,657	5,252
20 South Upi	Urban	11,769	4,267	0	3,751	8,018	4,267	0	530	4,797	12,833	5,583	0	4,350	9,933	1,316	0	599	1,915
	Rural	23,955	0	0	11,978	11,978	0	0	3,766	3,766	25,899	0	0	15,539	15,539	0	0	3,562	3,562
	Total	35,724	4,267	0	15,729	19,995	4,267	0	4,296	8,563	38,732	5,583	0	19,889	25,472	1,316	0	4,161	5,477
21 Sultan Kudarat	Urban	9,275	4,638	0	2,319	6,957	0	0	74	74	10,120	6,072	0	2,429	8,501	0	0	110	110
	Rural	86,688	17,481	811	34,198	52,490	1,766	811	7,675	10,252	94,680	19,847	1,119	44,228	65,194	753	308	10,030	11,092
	Total	95,964	22,119	811	36,517	59,447	1,766	811	7,749	10,326	104,800	25,919	1,119	46,657	73,695	753	308	10,140	11,202
22 Sultan Mastura	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	19,186	0	1,693	8,746	10,439	0	1,693	2,360	4,052	20,989	0	2,217	11,263	13,480	0	524	2,516	3,041
	Total	19,186	0	1,693	8,746	10,439	0	1,693	2,360	4,052	20,989	0	2,217	11,263	13,480	0	524	2,516	3,041
23 Sultan Sa Barongis (Lambayong)	Urban	6,109	0	2,419	1,845	4,264	0	2,419	110	2,529	5,674	0	3,404	1,362	4,766	0	985	0	985
	Rural	33,307	0	0	16,654	16,654	0	0	4,846	4,846	36,015	0	0	21,609	21,609	0	0	4,984	4,984
	Total	39,416	0	2,419	18,498	20,917	0	2,419	4,956	7,375	41,689	0	3,404	22,971	26,375	0	985	4,984	5,969
24 Talayan	Urban	4,449	0	1,673	1,388	3,061	0	1,673	206	1,880	5,278	0	2,382	1,737	4,120	0	709	350	1,059
	Rural	21,711	0	793	10,459	11,252	0	793	3,769	4,562	25,758	0	1,129	14,777	15,906	0	336	4,318	4,654
	Total	26,159	0	2,467	11,846	14,313	0	2,467	3,975	6,442	31,035	0	3,512	16,514	20,026	0	1,045	4,668	5,713
25 Talitay	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	24,841	0	0	12,420	12,420	0	0	4,741	4,741	29,670	0	0	17,802	17,802	0	0	5,382	5,382
	Total	24,841	0	0	12,420	12,420	0	0	4,741	4,741	29,670	0	0	17,802	17,802	0	0	5,382	5,382
26 Upi	Urban	6,060	3,030	0	1,515	4,545	3,030	0	0	3,030	6,391	3,834	0	1,534	5,368	804	0	19	823
	Rural	52,440	0	0	26,220	26,220	0	0	7,065	7,065	55,700	0	0	33,420	33,420	0	0	7,200	7,200
	Total	58,500	3,030	0	27,735	30,765	3,030	0	7,065	10,095	62,090	3,834	0	34,953	38,788	804	0	7,219	8,023
Total	Urban	169,907	53,962	22,275	46,835	123,072	32,349	22,275	5,307	59,931	182,889	74,083	29,991	47,289	151,363	9,360	7,449	3,795	20,604
	Rural	799,568	48,138	33,695	358,868	440,700	16,574	33,695	98,681	148,949	875,302	77,207	40,809	454,372	572,387	11,919	12,405	102,947	127,271
	Total	969,475	102,100	55,970	405,703	563,772	48,923	55,970	103,988	208,880	1,058,191	151,289	70,800	501,661	723,750	21,279	19,853	106,743	147,875
	Urban		6%	2%	5%	13%						8%	3%	5%	16%				
	Rural		5%	3%	37%	45%						8%	4%	47%	59%				
	Total		11%	6%	42%	58%						16%	7%	52%	75%				

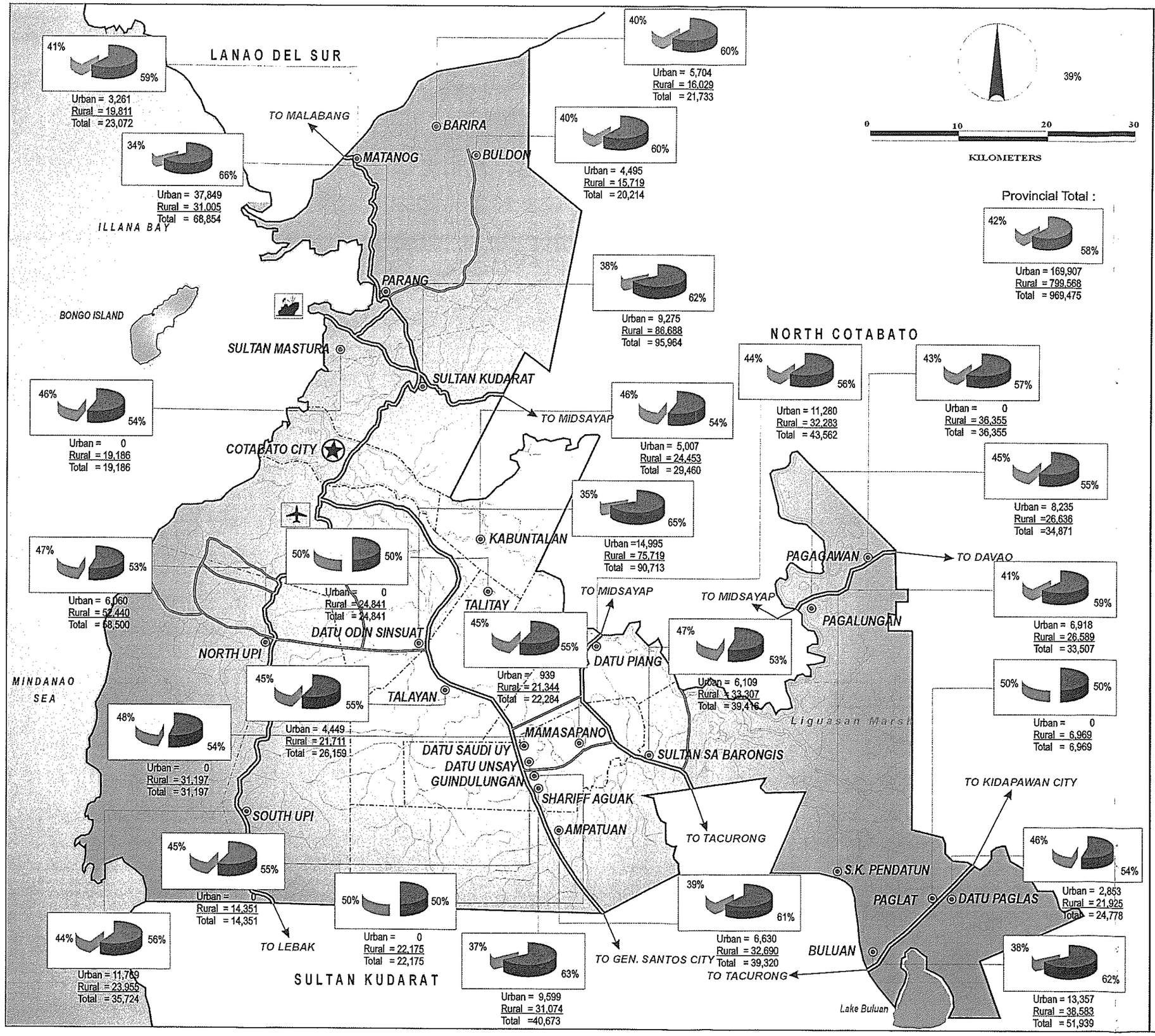


Figure 7-1
WATER SUPPLY FACILITIES
FUTURE REQUIREMENT
PHASE I (2005-2010)
MAGUINDANAO

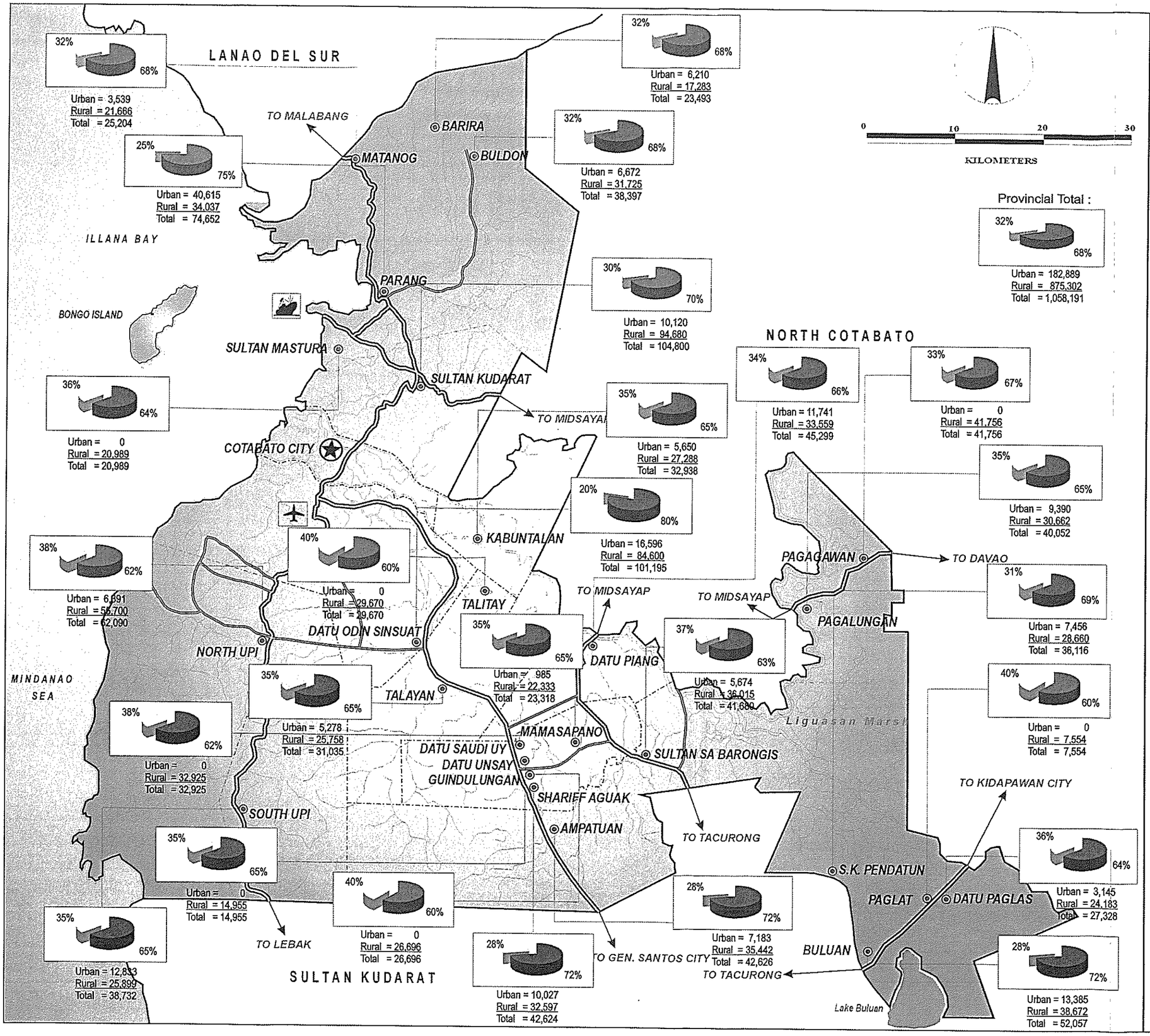


Figure 7-2
WATER SUPPLY FACILITIES
FUTURE REQUIREMENT
PHASE II (2010-2015)
MAGUINDANAO

Table 7-6 Population to be Served by Target Year (HH Toilet)

Municipality	Type	Phase I (2050-2010)								Phase II (2010-2015)							
		Population	Total HH	Total HH to be served			Additional HH to be served			Population	Total HH	Total HH to be served			Additional HH to be served		
				Flush	Pour	Total	Flush	Pour	Total			Flush	Pour	Total	Flush	Pour	Total
1 Ampatuan	Urban	6,630	1,300	0	1,040	1,040	0	196	196	7,183	1,409	0	1,197	1,197	0	157	157
	Rural	32,690	6,410	0	5,128	5,128	0	949	949	35,442	6,950	953	4,955	5,908	125	654	779
	Total	39,320	7,711	0	6,168	6,168	0	1,145	1,145	42,626	8,359	953	6,152	7,105	125	811	937
2 Barira	Urban	5,704	1,037	0	518	518	0	80	80	6,210	1,129	0	677	677	0	159	159
	Rural	16,029	2,914	0	1,457	1,457	0	203	203	17,283	3,142	0	1,885	1,885	0	428	428
	Total	21,733	3,951	0	1,975	1,975	0	283	283	23,493	4,271	0	2,562	2,562	0	587	587
3 Buldon	Urban	5,619	1,003	0	501	501	0	48	48	6,672	1,191	0	714	714	0	213	213
	Rural	28,255	5,043	0	2,522	2,522	0	485	485	31,725	5,663	0	3,398	3,398	0	876	876
	Total	33,874	6,046	0	3,023	3,023	0	533	533	38,397	6,854	0	4,112	4,112	0	1,089	1,089
4 Buluan	Urban	13,357	2,483	1,242	0	1,242	56	0	56	13,385	2,489	1,493	0	1,493	252	0	252
	Rural	38,583	7,174	0	3,587	3,587	0	164	164	38,672	7,191	0	4,314	4,314	0	727	727
	Total	51,939	9,657	1,242	3,587	4,829	56	164	220	52,057	9,679	1,493	4,314	5,808	252	727	979
5 Datu Odin Sinsuat	Urban	14,995	2,780	1,537	548	2,085	303	108	411	16,596	3,077	1,815	647	2,462	278	99	376
	Rural	75,719	14,039	3,276	7,253	10,530	637	1,519	2,156	84,600	15,686	3,870	8,678	12,549	594	1,425	2,019
	Total	90,713	16,820	4,814	7,801	12,615	940	1,627	2,566	101,195	18,763	5,685	9,325	15,011	872	1,524	2,396
6 Datu Paglas	Urban	2,853	524	0	262	262	0	44	44	3,145	577	0	346	346	0	85	85
	Rural	21,925	4,024	0	2,012	2,012	0	337	337	24,183	4,438	0	2,663	2,663	0	651	651
	Total	24,778	4,547	0	2,274	2,274	0	380	380	27,328	5,015	0	3,009	3,009	0	735	735
7 Datu Piang	Urban	11,280	1,809	1,266	0	1,266	92	0	92	11,741	1,883	1,318	0	1,318	52	0	52
	Rural	32,283	5,177	0	3,624	3,624	0	255	255	33,559	5,382	0	3,767	3,767	0	143	143
	Total	43,562	6,986	1,266	3,624	4,890	92	255	347	45,299	7,264	1,318	3,767	5,085	52	143	195
8 Datu Saudi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	31,197	5,003	0	3,502	3,502	0	324	324	32,925	5,280	0	3,696	3,696	0	203	203
	Total	31,197	5,003	0	3,502	3,502	0	324	324	32,925	5,280	0	3,696	3,696	0	203	203
9 Datu Unsay	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	14,351	2,339	0	936	936	0	452	452	14,955	2,437	0	1,462	1,462	0	527	527
	Total	14,351	2,339	0	936	936	0	452	452	14,955	2,437	0	1,462	1,462	0	527	527
10 Gen. S. K. Pendatun	Urban	6,918	1,101	0	440	440	0	184	184	7,456	1,187	0	712	712	0	272	272
	Rural	26,589	4,231	0	1,692	1,692	0	708	708	28,660	4,561	0	2,736	2,736	0	1,044	1,044
	Total	33,507	5,332	0	2,133	2,133	0	893	893	36,116	5,747	0	3,448	3,448	0	1,316	1,316
11 Guindulungan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	22,175	2,892	0	1,446	1,446	0	359	359	26,696	3,431	0	2,059	2,059	0	613	613
	Total	22,175	2,892	0	1,446	1,446	0	359	359	26,696	3,431	0	2,059	2,059	0	613	613
12 Kabuntalan	Urban	5,007	914	0	457	457	0	91	91	5,650	1,031	0	619	619	0	162	162
	Rural	24,453	4,463	0	2,232	2,232	0	402	402	27,288	4,981	0	2,988	2,988	0	757	757
	Total	29,460	5,377	0	2,689	2,689	0	493	493	32,938	6,012	0	3,607	3,607	0	919	919
13 Mamasapano	Urban	939	139	0	69	69	0	7	7	985	146	0	87	87	0	18	18
	Rural	21,344	3,154	0	1,577	1,577	0	161	161	22,333	3,300	0	1,980	1,980	0	403	403
	Total	22,284	3,293	0	1,646	1,646	0	169	169	23,318	3,446	0	2,067	2,067	0	421	421
14 Matanog	Urban	3,261	536	0	268	268	0	40	40	3,539	582	0	349	349	0	81	81
	Rural	19,811	3,257	0	1,629	1,629	0	256	256	21,666	3,562	0	2,137	2,137	0	509	509
	Total	23,072	3,794	0	1,897	1,897	0	296	296	25,204	4,144	0	2,486	2,486	0	590	590

Municipality	Type	Phase I (2050-2010)								Phase II (2010-2015)							
		Population	Total HH	Total HH to be served			Additional HH to be served			Population	Total HH	Total HH to be served			Additional HH to be served		
				Flush	Pour Flush	Total	Flush	Pour Flush	Total			Flush	Pour Flush	Total	Flush	Pour Flush	Total
15 Pagagawan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	36,355	7,357	478	3,201	3,679	108	686	795	41,756	8,450	662	4,409	5,070	184	1,207	1,392
	Total	36,355	7,357	478	3,201	3,679	108	686	795	41,756	8,450	662	4,409	5,070	184	1,207	1,392
16 Pagalungan	Urban	8,235	1,499	501	98	599	399	77	475	9,390	1,709	863	162	1,025	362	64	426
	Rural	26,636	4,848	0	1,939	1,939	0	1,545	1,545	30,662	5,580	0	3,348	3,348	0	1,409	1,409
	Total	34,871	6,346	501	2,038	2,539	399	1,621	2,020	40,052	7,289	863	3,510	4,373	362	1,473	1,835
17 Paglat	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	6,969	1,200	0	600	600	0	88	88	7,554	1,301	0	780	780	0	180	180
	Total	6,969	1,200	0	600	600	0	88	88	7,554	1,301	0	780	780	0	180	180
18 Parang	Urban	37,849	7,082	5,370	1,004	6,374	437	252	689	40,615	7,600	5,761	1,079	6,840	391	74	466
	Rural	31,005	5,802	1,370	3,851	5,221	135	476	611	34,037	6,369	1,398	4,334	5,732	115	395	511
	Total	68,854	12,884	6,740	4,856	11,595	572	728	1,300	74,652	13,969	7,159	5,413	12,571	507	470	976
19 Shariff Aguak (Maganoy)	Urban	9,599	1,565	626	0	626	304	0	304	10,027	1,634	981	0	981	355	0	355
	Rural	31,074	5,065	709	1,317	2,026	344	646	991	32,597	5,313	1,111	2,077	3,188	402	760	1,162
	Total	40,673	6,629	1,335	1,317	2,652	648	646	1,294	42,624	6,947	2,092	2,077	4,168	757	760	1,517
20 South Upi	Urban	11,769	2,310	838	318	1,155	246	93	340	12,833	2,519	1,096	416	1,511	258	98	356
	Rural	23,955	4,702	0	2,351	2,351	0	659	659	25,899	5,084	0	3,050	3,050	0	699	699
	Total	35,724	7,013	838	2,669	3,506	246	752	998	38,732	7,603	1,096	3,466	4,562	258	797	1,056
21 Sultan Kudarat (Nuling)	Urban	9,275	1,662	665	0	665	227	0	227	10,120	1,813	1,088	0	1,088	423	0	423
	Rural	86,688	15,532	2,506	3,707	6,213	854	1,270	2,124	94,680	16,964	4,101	6,077	10,178	1,595	2,370	3,965
	Total	95,964	17,194	3,170	3,707	6,877	1,080	1,270	2,350	104,800	18,777	5,189	6,077	11,266	2,018	2,370	4,389
22 Sultan Mastura	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	19,186	3,437	1,375	0	1,375	0	471	471	20,989	3,760	0	2,256	2,256	0	881	881
	Total	19,186	3,437	1,375	0	1,375	0	471	471	20,989	3,760	0	2,256	2,256	0	881	881
23 Sultan Sa Barongis	Urban	6,109	1,131	0	339	339	0	281	281	5,674	1,050	0	630	630	0	291	291
	Rural	33,307	6,166	0	1,850	1,850	0	1,575	1,575	36,015	6,668	0	4,001	4,001	0	2,151	2,151
	Total	39,416	7,297	0	2,189	2,189	0	1,856	1,856	41,689	7,718	0	4,631	4,631	0	2,442	2,442
24 Talayan	Urban	4,449	748	0	374	374	0	93	93	5,278	888	0	533	533	0	159	159
	Rural	21,711	3,652	0	1,826	1,826	0	453	453	25,758	4,333	0	2,600	2,600	0	774	774
	Total	26,159	4,401	0	2,200	2,200	0	546	546	31,035	5,221	0	3,132	3,132	0	932	932
25 Talitay	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	24,841	4,069	0	2,035	2,035	0	682	682	29,670	4,860	0	2,916	2,916	0	882	882
	Total	24,841	4,069	0	2,035	2,035	0	682	682	29,670	4,860	0	2,916	2,916	0	882	882
26 Upi	Urban	6,060	1,182	591	0	591	0	66	66	6,391	1,247	748	0	748	157	0	157
	Rural	52,440	10,228	0	5,114	5,114	0	622	622	55,700	10,864	0	6,518	6,518	0	1,404	1,404
	Total	58,500	11,410	591	5,114	5,705	0	688	688	62,090	12,111	748	6,518	7,266	157	1,404	1,561
Total	Urban	169,907	30,805	12,635	6,239	18,873	2,063	1,659	3,722	182,889	33,159	15,162	8,169	23,331	2,528	1,931	4,458
	Rural	799,568	142,179	9,714	66,387	76,101	2,078	15,746	17,824	875,302	155,549	12,094	89,086	101,180	3,016	22,074	25,089
	Total	969,475	172,984	22,349	72,625	94,974	4,142	17,405	21,546	1,058,191	188,708	27,257	97,255	124,512	5,543	24,004	29,547
	Urban					11%								12%			
	Rural					44%								54%			
	Total					55%								66%			

LANAO DEL SUR

50% 50%
Urban = 3,261
Rural = 19,811
Total = 23,072

10% 90%
Urban = 37,849
Rural = 31,005
Total = 68,854

50% 50%
Urban = 5,704
Rural = 16,029
Total = 21,733

50% 50%
Urban = 5,619
Rural = 28,255
Total = 33,874

60% 40%
Urban = 9,275
Rural = 86,688
Total = 95,964

TO MALABANG

BARIRA

MATANOG

BULDON

ILLANA BAY

PARANG

BONGO ISLAND

SULTAN MASTURA

SULTAN KUDARAT

TO MIDSAYA

60% 40%
Urban = 0
Rural = 19,186
Total = 19,186

50% 50%
Urban = 5,007
Rural = 24,453
Total = 29,460

COTABATO CITY

25% 75%
Urban = 14,995
Rural = 75,719
Total = 90,713

KABUNTALAN

50% 50%
Urban = 6,060
Rural = 52,440
Total = 58,500

50% 50%
Urban = 0
Rural = 24,841
Total = 24,841

TALITAY

TO MIDSAYAP

TO MIDSAYAP

50% 50%
Urban = 939
Rural = 21,344
Total = 22,284

70% 30%
Urban = 6,109
Rural = 33,307
Total = 39,416

DATU ODIN SINSUAT

NORTH UPI

DATU PIANG

PAGAGAWAN

TO DAVAO

PAGALUNGAN

MINDANAO SEA

50% 50%
Urban = 4,449
Rural = 21,711
Total = 26,159

TALAYAN

30% 70%
Urban = 0
Rural = 31,197
Total = 31,197

MAMASAPANO

DATU SAUDI UY

DATU UNSAY

GUINDULUNGAN

SULTAN SA BARONGIS

SHARIFF AGUAK

AMPATUAN

SOUTH UPI

TO TACURONG

60% 40%
Urban = 0
Rural = 14,351
Total = 14,351

61% 39%
Urban = 0
Rural = 22,175
Total = 22,175

20% 80%
Urban = 6,630
Rural = 32,690
Total = 39,320

TO GEN. SANTOS CITY

TO TACURONG

60% 40%
Urban = 9,599
Rural = 31,074
Total = 40,673

50% 50%
Urban = 11,769
Rural = 23,955
Total = 35,724

SULTAN KUDARAT

TO LEBAK

NORTH COTABATO

30% 70%
Urban = 11,280
Rural = 32,283
Total = 43,562

50% 50%
Urban = 0
Rural = 36,355
Total = 36,355

60% 40%
Urban = 8,235
Rural = 26,636
Total = 34,871

60% 40%
Urban = 6,918
Rural = 26,589
Total = 33,507

50% 50%
Urban = 0
Rural = 6,969
Total = 6,969

Liguasan Marsh

TO KIDAPAWAN CITY

S.K. PENDATUN

PAGLAT

DATU PAGLAS

50% 50%
Urban = 2,853
Rural = 21,925
Total = 24,778

BULUAN

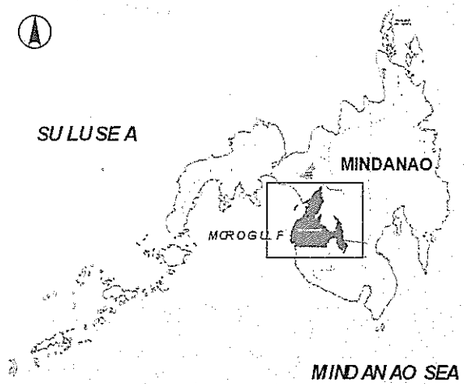
50% 50%
Urban = 13,357
Rural = 38,583
Total = 51,939

Lake Buluan

Provincial Total :

45% 55%
Urban = 184,528
Rural = 799,568
Total = 962,041

0 10 20 30
KILOMETERS



KEY MAP

LEGEND:

- Provincial Boundary
- Municipal Boundary
- River
- National Road
- Provincial Road
- City Center
- Town Center
- Population served by sanitation facilities (%)
- Population un-served by sanitation facilities (%)

Source: PPDO & ACTUAL FIELD VERIFICATION

Figure 7-3

SANITATION FACILITIES
FUTURE REQUIREMENT
PHASE I (2005-2010)
MAGUINDANAO

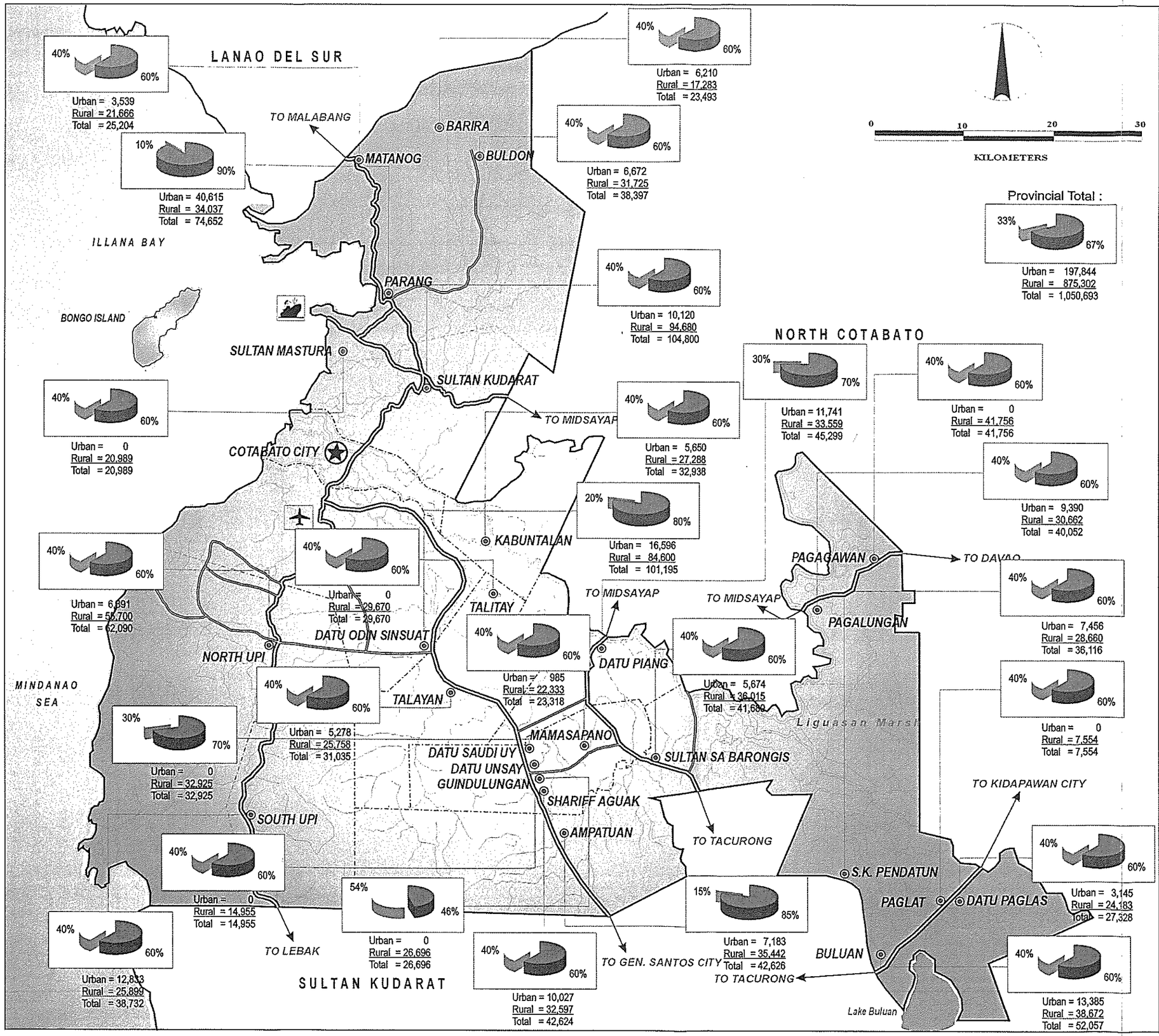


Figure 7-4

SANITATION FACILITIES
FUTURE REQUIREMENT
PHASE II (2010-2015)
MAGUINDANAO

Table 7-7 Water Supply Facilities Required by Target Year

Municipality	Phase I (2005-2010) Requirement							Phase II (2010-2015) Requirement		
	Level III			Level II			Level I	Level III	Level II	Level I
	Mode of Project	No. of Systems	No. of Connections	Mode of Project	No. of Systems	No. of stand faucets	Total No. of wells	No. of Connections	No. of stand faucets	No. of add'l wells
1 Ampatuan	0	0	0	New	1	278	48	672	198	41
2 Barira	0	0	0	New	3	130	25	0	30	26
3 Buldon	0	0	0	New	1	195	44	644	43	51
4 Buluan	New	1	2,379	0	0	0	34	482	0	33
5 Datu Odin Sinsuat	0	0	0	New	10	335	122	0	110	86
6 Datu Paglas	0	0	0	New	1	76	40	0	124	42
7 Datu Piang	New	1	904	0	0	0	42	225	0	43
8 Datu Saudi	0	0	0	New	1	49	40	0	63	604
9 Datu Unsay	0	0	0	New	1	45	16	0	11	16
10 Gen. S. K. Pendatun	0	0	0	New	5	202	31	0	59	34
11 Guindulungan	0	0	0	0	0	0	49	0	0	55
12 Kabuntalan	0	0	0	New	1	82	48	0	29	53
13 Mamasapano	0	0	0	New	1	70	22	0	18	22
14 Matanog	0	0	0	New	1	131	12	0	43	26
15 Pagagawan	New	1	1,051	0	0	0	60	405	0	70
16 Pagalungan	New	1	626	0	0	0	59	237	0	66
17 Paglat	0	0	0	New	0	0	12	0	0	12
18 Parang	Improvement	1	841	New	1	57	86	367	17	56
19 Shariff Aguak	New	1	1,353	New	1	63	28	343	16	29
20 South Upi	Ugrade from Level II	1	838	0	0	0	56	258	0	54
21 Sultan Kudarat	Rehab/ Improvement	1	316	New	1	29	93	135	11	121
22 Sultan Mastura	0	0	0	New	1	61	28	0	19	30
23 Sultan Sa Barongis	0	0	0	New	1	90	60	0	36	62
24 Talayan	0	0	0	New	1	83	45	0	35	52
25 Talitay	0	0	0	New		0	52	0	0	59
26 Upi	Upgrade from Level II	1	591	0	0	0	92	157	0	94
Provincial Total		**9**	**8,899**		**32**	**1,977**	**1,244**	**3,926**	**863**	**1,836**

Table 7-8 Sanitation Facilities Required by Target Year

Municipality	Phase I (2005-2010) Requirement			Phase II (2010-2015) Requirement		
	No. of Household Toilet	No. of Public School Toilet	No. of Public Toilet	No. of Household Toilet	No. of Public School Toilet	No. of Public Toilet
1 Ampatuan	1,145	4	1	937	2	1
2 Barira	283	22	1	587	2	1
3 Buldon	533	6	1	1,089	4	1
4 Buluan	220	14	1	979	0	1
5 Datu Odin Sinsuat	2,566	11	1	2,396	6	1
6 Datu Paglas	380	4	1	735	2	1
7 Datu Piang	347	1	1	195	1	1
8 Datu Saudi	324	1	1	203	1	1
9 Datu Unsay	452	0	1	527	0	1
10 Gen. S. K. Pendatun	893	3	1	1,316	1	1
11 Guindulungan	359	5	1	613	2	1
12 Kabuntalan	493	11	1	919	3	1
13 Mamasapano	169	3	1	421	0	1
14 Matanog	296	13	1	590	2	1
15 Pagagawan	795	4	1	1,392	3	1
16 Pagalungan	2,020	4	1	1,835	2	1
17 Paglat	88	1	1	180	0	1
18 Parang	1,300	4	1	976	3	1
19 Shariff Aguak	1,294	1	1	1,517	1	1
20 South Upi	998	1	1	1,056	1	1
21 Sultan Kudarat	2,350	7	1	4,389	3	1
22 Sultan Mastura	471	2	1	881	1	1
23 Sultan Sa Barongis	1,856	8	1	2,442	1	1
24 Talayan	546	4	1	932	1	1
25 Talitay	682	15	1	882	3	1
26 Upi	688	8	1	1,561	4	1
Total	**21,546**	**159**	**26**	**29,547**	**49**	**26**