CHAPTER 3

PRESENT AGRICULTURE AND FISHERIES SECTOR SITUATION IN THE REGION

3. PRESENT AGRICULTURE AND FISHERIES SECTOR SITUATION IN THE REGION

3.1 Available Resources for Agriculture and Fisheries

3.1.1 Land, its Present Classification, Use and Capability

The land classification in the region as of 31 December 2000 is shown below.

Table 3-1 Land Classification by Province (as of 31 December 2000)

(Unit: ha)

CLASSIFICATION	Maguin-danao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM
1. Alienable and Disposable	**306,622**	**133,135**	**85,574**	**47,687**	**55,383**	**628,401**
2. Total Forest Land	**198,138**	**254,154**	**47,149**	**112,353**	**53,357**	**665,151**
2.1Unclassified Forest Land	3,525	0	5,953	66,284	24,864	100,626
2.2 Total Classified Public Forest						
- Forest Reserves	12,515	11,844	168	0	0	24,527
- Established Timber Land	152,050	240,628	358,224	44,898	28,108	823,908
- National Park (GRBS/WA)	30,048	1,682	840	213	0	32,783
- Reserved areas	0	0	0	0	0	0
(Sub-total of 2.2)	(194,613)	(254,154)	(41,196)	(46,069)	(25,493)	(561,525)
3. Total Land Area	**504,760**	**387,289**	**132,723**	**160,040**	**108,740**	**1,293,552**
4. Area for Fishpond Development	0	0	3,412	956	385	4,753

SOURCE: Bureau of Census and Statistics, Statistical Yearbook 2002

The land resource is used to satisfy the requirements of the people living thereon. The two basic classification of land use are: forest land and alienable and disposable land. The later are generally made available for private ownership and are put to use to produce commodities or build upon to satisfy people's needs. The forest land is further classified based on the possibility of degradation of the resource and/or the environment.

On the other hand, the provinces of the region have also drafted / finalized their Physical Framework Plan adopting further delineation of available land. The land classification made by the provinces are presented in Annex Tables B-1 to B-5.

3.1.2 Soils and Classification

Data on soils is the Study area were collected from the Bureau of Soils and Water Management (BSWM). The Soil Maps of all the provinces except two (2) island provinces, Tawi-Tawi and Sulu, are presented in Attachment Figures 4-6.

Soil types in Maguindanao and Lanao del Sur are composed of 18 and 11 types of soils, respectively. The texture varies, soils in plain area varies from sandy to clay, while those in

the upland is generally classified into the Mountainous soil group. On the other hand, the soils in Basilan consist of only four (4) types. Of those, two (2) are dominant, which are the Mountain soil and Bulacen Clay Loam. Since there is no data on the distribution of each soil type in the Bureau, the Study team estimated the areas based on the maps. Table 3-2 shows the estimated area distributed to each type of soils for three provinces.

Table 3-2 Area by Soil Type Distributed in the Study Area

(1) Maguindanao

Type of soil	Map Unit	Area (ha)
1. Hydrosol	1	45,019
2. Mountain Soil	45	104,202
3. San Manuel Silty Clay Loam	94	2,855
4. Faraon Clay	132	87,732
5. River Wash	152	549
6. San Manuel Loam	190	10,321
7. Parang Clay Loam	431	67,858
8. Buldun Sandy Loam	432	4,721
9. Balut Clay Loam	434	18,337
10. Tamantaka Clay	435	16,800
11. Banga Sandy Loam	440	24,462
12. Lutayan Sandy Loam	443	9,553
13. San Manuel Gravelly Loam	456	3514
14. New Iloilo Fine Sandy Loam	445	5,380
15. Tinambulan Peat	457	2,196
16. Longkong Sandy	458	42,823
17. Timaga Clay Loam	630	43,921
18. Dalican Clay Loam	639	12,517
Total	**6,314**	**502,760**

(2) Lanao der Sul

Type of soil	Map Unit	Area (ha)
1. Hydrosol	1	4,064
2. Mountain Soil	45	126,204
3. Bolinao Clay Loam	108	2,197
4. Longkong Sandy	458	52,503
5. Adtuyan Clay Loam	573	76,996
6. Ruguan Clay Loam	973	9,336
7. Salaman Loam	975	2,746
8. Ramain Clay Loam	976	4,064
9. Malabang Sandy	1,004	44,265
10. Sinidayan Silt Loam	1,005	51,844
11. Adtuyan La Castellana Complex	1,007	13,071
Total	**7,125**	**387,290**

(3) Basilan

Type of soil	Map Unit	Area (ha)
1. Hydrosol	1	6,424
2. Mountain Soil	45	42,016
3. Bulacen Clay Loam	255	5,571
4. Medellin Clay Loam	276	78,711
Total	577	132,722

Source. Bureau of Soils and Water Management, 1980

3.1.3 Slope

Slope maps for all the provinces were also collected from BSWM at the same time the Study team collected the soil maps. The area is classified into six (6) slope classes, namely, i) level to nearly level (0-3 %), ii) gently sloping to undulating (3-8 %), iii) undulating to rolling (8-18 %), iv) rolling to moderately steep (18-30 %), v) steep (30-50 %), and vi) very steep (more than 50 %). The slope maps of the Study area are shown in Attachment Figure 7-11, and the estimated area of each slope by province are summarized as follows:

Table 3-3 Area by Slope Category by Province, ARMM

Slope type	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
1. Level to nearly level	209,649	27,842	20,884	49,202	72,568
2. Gently sloping to undulating	8,459	22,246	17,755	39,187	9,132
3. Undulating to rolling	147,597	172,724	38,172	45,684	9,415
4. Rolling to moderately steep	46,838	101,109	29,526	27,920	15,993
5. Steep	47,974	47,734	22,337	1,766	1,632
6. Very steep	44,243	15,633	4,049	1,281	0
Total	504,760	387,289	132,723	165,040	108,740

Source: Philippine Land and Soil Management Atlas for Mindanao, BSWM, 1991

3.1.4 Climate (Rainfall and Temperature)

Climate in the region is generally tropical with rainfall relatively evenly distributed throughout the year. The autonomous region is outside the typhoon belt, although occasional gutsy wind occurs. Mean monthly rainfall during the last 10 years taken at the Cotabato City Synoptic Station is summarized in the table below. This data would more or less be representative for all the provinces comprising the region.

Table 3-4 Monthly Rainfall, in Millimeters, Cotabato City Synoptic Station, 1991-2000

Year	Jan.	Feb.	Mar	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1991	42	62.3	34.6	132	557.7	601.4	513.4	183.7	301.2	96.7	112	46.2
1992	30.8	1.8	7.6	103.5	213.3	370.3	156.5	141.3	62.5	359.2	125	62.5
1993	50.9	134	28.1	111.6	243.7	202.8	175.8	198.3	70.4	122.9	182	149.5
1994	130.9	97.9	162.4	136.8	194.3	269.5	204.9	369.3	0	208.7	144.7	34.8
1995	72.3	63.1	189	57.5	215.5	299.4	185.9	195.3	306.6	206.6	223.4	198.2
1996	162.2	201.7	60.4	103.7	177.1	231.7	256	96.1	134.8	497.5	380.2	112
1997	25.9	88.2	91.2	125.3	141.4	213.9	281.2	147.3	119	98.8	181.9	63.2
1998	18.1	18.7	0	48.6	215.6	203.1	192.1	294.7	241.9	357.5	388.9	239.8
1999	170.4	50.8	357.2	251.8	402.5	214.5	185	340.3	239.1	151.8	267.4	131.3
2000	66.5	185.4	217.5	270	275.7	278.4	325	433.1	143.9	236	370.8	111.6
MEAN	77	90.4	114.8	134.1	263.7	288.5	247.6	239.9	161.9	233.6	237.6	114.9

Source: PAGASA

The climate in the different provinces, however, could vary somehow, especially the island provinces. Reports on temperature and rainfall in the provincial profiles of each province are here quoted to gain better appreciation of the local situation.

Province	Brief Description
Maguindanao	Climate: Characterized by more or less even distribution of rainfall throughout the year. Temperature averages 22.9°C with the hottest months being March to June.
Lanao del Sur	Seasons are not very pronounced. Relatively dry during the months of November to April and wet during the rest of the year. Rainfall: Daily average was 8.64 mm in 1996 and 6.35 mm in 1997.
Basilan	Two agro-climatic zones are identified in the province. These are the wet and moist zones. The wet zone is characterized by annual rainfall of 2,500 mm and growing period of 270-330 days. This zone generally occurs in the hilly to highland areas. The moist zone is characterized by annual rainfall ranging from 1,500-2,500 mm and a growing period of 210-270 days. This zone covers most of the present agricultural and expansion areas in lowland, upland and hilly areas. The province is predominantly within the moist agro-climatic zone. This shows a moderate moisture shortage during the relatively dry period. However, it is still capable of sustaining year-round maximum production considering moisture availability. Areas with growing season of 210 days or more are suitable for a sequence of cropping system. Mean Annual Temperature is 26.4°C.
Sulu	Climate: Mean temperature is 26.80°C with minimum of 22.7°C and a maximum of 30.9°C with the coldest months occurring in December to February and the warm months during April to September.
Tawi-Tawi	Climate: Mean temperature in the coastal areas ranges between 27oC to 30°C in the early morning without breeze. In the interior of the island, mean temperature ranges from 30°C to 33°C. Rainfall: August – 6.7 mm; September –2.4 mm; October – 8.9 mm; and in November 8.5 mm.

The distribution of agro-climatic zone of the provinces are presented in Attachment Figures 12-13

3.1.5 Hydrology

There are many small rivers running through the provinces in the main island (Mindanao), while water resources in the island provinces are limited. The following (Table 3-5) give the general description of hydrological situation of each province.

Table 3-5 Brief Description of Hydrological Condition of the Study Area

Province	Brief Description
Maguindanao	The Mindanao River known to be the largest and longest in Mindanao receives discharge form the Pulangui and Gatisan Alah rivers. Several perennial rivers and creeks with significant flows are draining the province. The Nituan, Ambat and Simuay rivers and their tributaries are running through the area from the north to the south. The southwestern which is generally steep to rugged is drained by the west-flowing Mataba and Tabuan rivers and by the southwest-flowing Lawanig River and its tributaries. The southern portion is drained by the

Province	Brief Description
	northeast-flowing Talayan River and its tributaries and several perennial creeks which discharge into Gatisan Alah River. Springs 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. 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. In general, however, none of the igneous, metamorphic and well-cemented, compacted sedimentary rocks can be considered as dependable sources of groundwater that could be extracted by pump. The Quaternary Pyroclastics (QVP) which underlie the northern and part of the southern portions of the province and the Recent deposits (R) could be considered as potential sources of pump-extractable groundwater. This would be both as shallow and deep well area. The Recent deposits are generally classified as shallow well areas but can also be considered as deep well area in places where pervious deposits are relatively thick.
Lanao del Sur	Lake Lanao and Agus Rivers have large storage of water and flow rates. In the municipality of Malabang, the Matling River is the biggest and the Malabang River that stretch about two kilometers and flows coming from several important springs found in the lava and pyroclastic rocks outcropping in the area. The other rivers that flow towards Lake Lanao are the Siguan, Maguin, Gata, Rugun and Malaig Rivers. Major portions of Lanao del Sur are underlain by Pliocene to Recent Pyroclastics (QVP) formation consisting predominantly of tuffaceous sandstone, siltstone, shale, agglomerates and tuff. This is a good source of groundwater and several productive wells for potable water have been drilled in this formation. Available well records in Marawi City, Saguiran, Wao, Malundo, Mandalum, Marantao, Bayabao, Ganassi and Bubong show well depths of less than 10 meters to more than 100 meters. Several springs with significant discharges emanate from this formation.
Basilan	Several short rivers flow through the province. The Gumalarang River that flows south to north is the largest and longest, being more than 19 km long. Its tributaries, which originate from the central highlands, are mostly flowing towards the northwest. The next biggest river is the Gubauan River whose upper stretch drains the northern portion of Tipo-Tipo. Its middle and lower stretches drain most of the sloping and relatively flat areas of Lamitan. The west-east flowing Bojelebung River is the other river draining major portions of Tipo-Tipo. Several small south-flowing rivers and creeks drain the southern portion of Basilan. The biggest is the Mangal River in Sumisip. The northwest-flowing Maluso River and its east-west tributaries drain major portion of the municipality of Maluso. The small south-north-flowing Aguado River drains some portion of the municipality of Isabela. Springs, although have minimal yields are also available in the province. Groundwater resources, however, are being utilized as potable water source. Reports indicate that in some places aquifers could be only three meters from the surface. Although the area has some potential for irrigation development extracting the groundwater, a thorough study on the availability of water (water deposit) and requirement of potable water shall come first.
Sulu	The bodies of fresh surface water in the province are limited to some perennial small rivers and creeks. Ground water resources are likewise limited and what are available may not even suffice to meet the potable water requirements of the growing population. Note that groundwater occur in rock units in the province with unconfined and confined conditions and can be classified as both shallow and deep well areas like those underlain by the pyroclastics (QVP).

Province	Brief Description
Tawi-Tawi	Only two river basins – Malum river and Tarawakan stream are available in the province. Malum river originates from Mt. Balugan, Mt. Bin-Uang and Mt. Datu Sali, It traverses the municipality of Panglima Sugala and has a drainage area of 49.5 km and a main stream length of about 12.2 km. The Tarawakan stream has a watershed area of 7.13 km^2 and a mainstream length of 5.7 km. It originates in Bato-Bato and flows northwards to drain into the Sulu Sea.

3.1.6 Erosion Potential

Attachment Figures 14 to 18 shows the potential for future soil erosion in the provinces. The maps could also give an idea of the potential for agricultural development. For instance, Maguindanao has a vast plain area suitable for palay production, while Lanao del Sur needs to consider upland and perennial crops to be the main crops to be promote.

3.1.7 Present Land Use

An updated land use data could not be collected through the Study. Therefore, the Study team utilized data generated by BSWM in 1991 for information on the present land use in the Study area. In order to further grasp the updated situation, there is a need to investigate the land use by using satellite images or aerial photomaps. Attachment Figures 19-23 show the present land use and vegetation of the Study area. The area of each land use type were also estimated based on the maps by adopting the approach used in the estimation of soil class distribution.

Table 3-6 Land Use by Province

Land Use type	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
1. Agricultural Area	173,226	106,234	97,874	107,830	34,683
2. Grassland/Shrubland areas	134,899	64,245	6,517	21,050	31,303
3. Woodland Areas	99,394	213,746	16,250	4,090	23,504
4. Wetland Areas	80,797	3,064	11,956	25,684	18,713
5. Special / Miscellaneous Areas	16,492	0	66	1,385	539
Total	504,808	387,289	132,663	160,039	108,742

Source: Philippine Land and Soil Management Atlas for Mindanao, BSWM, 1991

3.2 Farm Size and Tenure

The 1991 Census of Agriculture is the only secondary source of data on farm size available in the area. This indicates that the average farm size in the region is about 2.3 hectares as shown in Table 3-7.

Table 3-7 Number of Farms, Area of Farm and Average Area per Farm, by Province, 1991

Province	No. of Farms	Farm Area (Ha)	Ave. Farm Size (Ha)
Maguindanao	98,223	230,371	2.3
Lanao del Sur	56,438	192,772	3.4
Basilan	16,137	75,374	4.7
Sulu	38,769	68,709	1.8
Tawi-Tawi	14,038	29,187	2.1
ARMM	**223,605**	**521,039**	**2.3**

Source: 1991 Census of Agriculture, NCSO

More recent / site-specific information is not available. Hence, a farm household survey has to be undertaken to get the current picture in this regard. However, in order to gain some insights on the possible size of farms in the region that currently exists, information in regard to the Land Acquisition and Distribution under the Comprehensive Agrarian Reform Program (CARP) is herein used. This might indicate what would be the farm tenure situation and the resulting farm size in the region. Table 3-8 shows that the average farm size in the mainland provinces is lower than that of the island provinces. This is mainly caused by an increase in population in the mainland and perhaps a more conscientious implementation and cooperation of landowners in land distribution in the island provinces.

Table 3-8 Estimated Farm Size in CARP Area

Province	No. of Farms	Area of Farms (Ha)	Ave. Size of Farm (Ha)
Maguindanao	50,701	151,892	3.0
Lanao del Sur	56,317	174,789	3.1
Basilan	8,728	27,353	3.0
Sulu	25,389	95,384	3.8
Tawi-Tawi	7,627	31,600	4.4

Source: DAR-ARMM Profile and Provincial Agrarian Reform Office of Basilan

3.3 Agriculture

3.3.1 Area Harvested and Volume of Production by Crop

The major crops cultivated in the different provinces in the region, based on the area harvested, are rice, corn, cassava, camote, coconut and coffee. Rubber is quite important in Basilan and to some extent Maguindanao. Banana, especially the Cavendish variety is also gaining popularly in the area. This could be attributed to the improved access for the commodity to markets in the nearby countries, in addition to the success attained by a

corporate farm in Maguindanao. Area harvested and production of crops in the region for the last five (5) years are presented in Annex Tables 1-12 and summarized as follows:

Table 3-9 Area Harvested and Production by Province

(1) Staple Crops

Province	Crops	Area Harvested (Ha)			Production (Ton)		
		1998	2002	% Change	1998	2002	% Change
Maguindanao	Palay	76,800	103,675	9%	131,464	258,712	23%
	Corn	99,880	111,216	5%	145,709	232,550	18%
	Cassava	938	985	1%	6,837	5,262	-4%
Lanao del Sur	Palay	35,152	63,711	17%	83,598	154,072	20%
	Corn	160,652	163,736	1%	317,855	399,881	7%
	Cassava	34,312	29,026	-3%	648,527	514,337	-5%
Basilan	Palay	1,859	1,487	-4%	3,141	3,455	4%
	Corn	1,774	2,564	20%	1,572	1,856	19%
	Cassava	18,000	18,178	-1%	189,593	206,571	2%
Sulu	Palay	4,011	3,995	0%	5,138	4,485	-9%
	Corn	1,700	1,327	-6%	1,257	835	-3%
	Cassava	27,780	26,102	-2%	140,108	154,996	3%
Tawi-Tawi	Palay	1,602	1,205	-6%	2,406	1,856	-5%
	Corn	696	1,471	25%	501	1,230	33%
	Cassava	17,871	18,920	1%	72,669	89,641	5%
ARMM	**Palay**	**119,424**	**174,073**	**10%**	**225,747**	**422,580**	**19%**
	Corn	**264,702**	**280,314**	**2%**	**466,894**	**636,352**	**10%**
	Cassava	**98,901**	**92,296**	**-1%**	**1,057,734**	**970,257**	**-2%**

(2) Vegetables and Upland Crops

Province	Crops	Area Harvested (Ha)			Production (Ton)		
		1998	2002	% Change	1998	2002	% Change
Maguindanao	Mongo	3,687	4,398	5%	3,825	3,901	1%
	Cabbage	215	263	5%	820	815	0%
	Others	352	369	1%	925	997	2%
Lanao del Sur	Eggplant	351	470	8%	249	151	-11%
	Peanut	34	29	-3%	188	144	-6%
	Others	87	92	1%	386	332	-3%
Basilan	Gourd	40	44	3%	60	82	9%
	Eggplant	15	19	7%	43	72	16%
	Others	48	57	5%	91	121	8%
Sulu	Peanut	255	223	-3%	161	174	2%
	Mongo	108	100	-2%	59	102	19%
	Others	76	82	2%	99	106	2%
Tawi-Tawi	Peanut	124	103	-5%	108	77	-8%
	Eggplant	9	12	8%	20	25	6%
	Others	19	21	3%	41	43	2%

(3) Fruits and Industrial Crops

Province	Crops	Area Harvested (Ha)			Production (Ton)		
		1998	2002	% Change	1998	2002	% Change
Maguindanao	Banana	10,424	13,180	3%	104,018	206,707	20%
	Durian	121	182	12%	1,247	674	-11%
	Lanzones	25	15	-10%	149	39	-9%
	Coconut	59,920	95,219	15%	391,279	407,206	1%
	Coffee	4,430	4,407	0%	3,811	3,303	-3%

Province	Crops	Area Harvested (Ha)			Production (Ton)		
		1998	2002	% Change	1998	2002	% Change
Lanao del Sur	Banana	4,115	4,958	6%	97,421	113,285	4%
	Durian	81	110	1%	509	50	-33%
	Lanzones	214	216	9%	292	85	-23%
	Coconut	47,895	62,667	8%	14,213	170,938	249%
	Coffee	2,271	2,353	1%	318	253	-5%
Basilan	Banana	7,097	7,094	5%	20,846	22,407	2%
	Durian	3	27	200%	28	n.a.	-
	Lanzones	25	30	5%	156	268	-
	Coconut	47,464	67,853	11%	191,050	174,939	-1%
	Coffee	3,227	3,296	1%	3,471	4,492	8%
Sulu	Banana	2,530	2,500	0%	15,129	17,493	4%
	Durian	720	720	0%	16,510	14,040	-4%
	Lanzones	4,421	5,000	3%	46,211	35,230	-6%
	Coconut	76,950	66,901	-3%	223,575	210,838	-1%
	Coffee	3,345	3,347	0%	8,857	8,552	-1%
Tawi-Tawi	Banana	650	678	1%	8,330	8,907	2%
	Durian	56	54	-1%	29	113	145%
	Lanzones	48	48	0%	-	-	-
	Coconut	2,271	2,353	1%	146,114	150,295	1%
	Coffee	1,288	1,438	3%	166	149	-2%

Source: Bureau of Agricultural Statistics, ARMM

Palay (Rough Rice) – During the last five years, the average increment in area harvested and production are about 10 % and 19 %, respectively. Total area harvested in 2001 is about 174,000 ha and total produce from this area is about 422,600 tons for the whole region. The province where the area devoted to the production of rice is largest is Maguindanao, both in irrigated and rain-fed conditions, followed by Lanao del Sur. Farmers in the island provinces devote one to two thousand hectares to the cultivation of the crop, but primarily under rain-fed condition.

In terms of total production, Maguindanao lead with an average of 893,306 metric tons during the last five years compared to only 453,162 metric tons in Lanao del Sur. This basically reflects the area devoted to its cultivation.

Corn – In the region, this commodity is harvested in a larger area than rice. This is indicative of its importance. This is because it is produced both as staple cereal – the white flint varieties and as feed grain (the yellow varieties). The area devoted to the production of white flint is 75% more than that devoted to the feed grain varieties or the yellow corn. It is noted that only the white flint varieties are cultivated in the island provinces. In terms of the yellow corn, the major user being the feed and oil millers, its cultivation in the mainland provinces

have been influenced by the demand by processors, in the other regions in Mindanao. (see Attachment Figure 31).

Vegetables and Upland Crops – On the basis of area cultivated to vegetables, it appears that these are generally raised in gardens directed primarily for farm family consumption. Excess production would find its way to the local market. Major vegetables and upland crops found in the area are mongo and cabbage (Maguindanao), eggplant (Lanao del Sur and Taw-Tawi), peanut (Sulu and Tawi-Tawi), and gourd in Basilan.

Roots and Tubers – Root crops are very important in terms of area cultivated, in Lanao del Sur and the island provinces. In the latter, the area devoted to both sweet potato (camote) and cassava in proportion to the total agricultural area is relatively high. The main reason for this is the fact that these are staple food crops in the island provinces. Production of cassava is highest in Lanao del Sur followed by Basilan and Sulu.

Fruits – Banana (both local variety of the table type and the cooking type) is the major fruit grown in all the provinces except Sulu. In Sulu, the area produces several types of fruits, of which, lanzones and durian are dominant. However, the fruit trees in Sulu as well as other island provinces are considered "wild" (not cultivated as orchard farm and under the "extensive management") rather than plantation (under the "intensive management").

Other fruit of some importance include avocado, Jackfruit, and marang. These are generally planted near the farm household. Output in excess of the farm household consumption requirements are sold to local buyers/assemblers.

Commercial / Industrial Crops – Commercial / Industrial crops of importance in terms of area harvested are coconut and coffee in all the provinces of the region. Next to these crops is abaca which is second in importance in terms of area harvested in Sulu, followed by Maguindanao and Lanao del Sur. In Basilan, rubber is quite important and it is also harvested from some 425 hectares in Maguindanao.

3.3.2 Number of Livestock

In terms of livestock, data available are relatively scanty. This could be related to the fact that there are no commercial growers of livestock and poultry in the region. In general, farm household raise a head or two of livestock. Chickens are usually raised free range, more often

scavenging for food. Annex Table 13-16 shows the estimated number of livestock in the Study area. The following give the situation in 2001 in the Study area

Table 3-10 Number Heads of Livestock and Poultry, by Province, ARMM 2002

(Unit: Heads)

	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM
Carabao	90,019	44,159	7,753	524	213	142,668
Cattle	24,076	44,094	2,221	20,202	3,638	94,231
Goat	81,172	67,210	13,893	15,540	11,135	188,950
Swine	33,110	1,240	14,140	850	70	49,410
Chicken	729,873	595,768	139,071	310,800	79,029	1,854,541
Duck	324,475	35,631	4,452	18,000	6,414	388,972

Source: Bureau of Agricultural Statistics, Website

3.3.3 Productivity of Major Crops

The productivities of major crops planted in the area are estimated based on the area harvested and production. The yields of crops in the area in 2001 are summarized in the following table, while Annex Tables 17-21 shows more detailed information on the productivities of crops harvested in the Study area.

Table 3-11 Yields of Major Crops by Province, ARMM, 2002

(Ton per Hectare)

Crops	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM
1. Palay						
- Irrigated	3.4	3.0	3.1	-	-	3.2
- Rainfed	2.0	2.2	2.0	1.1	1.5	2.0
2. Corn						
- Yellow	2.9	4.5	-	-	-	3.7
- White	1.7	1.9	0.7	0.6	0.8	1.8
3. Cassava	5.7	17.7	11.8	6.0	4.7	10.5
4. Banana	15.7	22.8	3.2	7.0	13.1	13.0
5. Lanzones	2.6	0.4	8.9	7.0	2.1	6.7

Source: Bureau of Agricultural Statistics, ARMM

Yield of palay is generally higher where irrigation water is available. Region-wide, the palay yield in 2002 are estimated at 3.2 ton/ha under irrigation and 2.0 ton/ha under rainfed. This is estimated on the data of area harvested and production. Both yields are relatively lower than the national average (3.6 ton/ha under irrigation and 2.4 ton/ha under rainfed). In Sulu and Tawi-Tawi, the productivity is quite low (less than 2.0 ton/ha) since they usually plant under rain-fed or upland conditions.

In corn, there is relatively large difference in yield between white flint and the yellow variety. This could be a function of the fact that more research efforts, both in the country and more especially abroad, on increasing the productivity of yellow corn. Productivity of corn farms in Lanao del Sur is higher in both white flint and yellow varieties. Sulu farms, seems to yield much lower than anywhere else in the region. In general, however, corn yield in the region as a whole is relatively comparable to those attained in the other regions of the country.

As for yields of the other crops, Lanao del Sur attain high productivity of cassava and banana. That would tell some of the evidence of the land characteristics / suitability of the area.

In terms of the municipalities where production of the major crops in the five provinces in the region, these are shown in Attachment Table and summarized as follows:

Crop	Province	Municipality
Palay	Sulu	Lowland rice :Indanan, Talipao and Old Panamo. Upland rice: primarily in the municipality of Parang.
	Tawi-Tawi	Only upland: In Bongao, Pnaglima Sugala, Languyan, Tandubas and Mapun.
	Maguindanao	It is cultivated in all municipalities, but large areas are in Datu Panglas,Talayan, Mapatuan, Genneral S. K. Pendatun and Mamasapano.
	Lanao del Sur	In Butig, Lumba Bayabao, Budong, Poona Bayabao, Ditsaan Ramain, Tamparan, Wao, Baudipos Bunton, and Maguing.
Corn	Sulu	In all municipalities, except Jolo, Maimbung and Pnaglima Tahil.
	Tawi-Tawi	In Bongao, Panglima Sugala, Languyan, Tandubas and Mapun.
	Maguindanao	In all municipalities, except Paglat and Talitay. The largest area harvested is in the municipality of Upi.
Roots crops	Lanao del Sur	In all Municipalities with the largest area harvested being in Wao.
	Sulu	In all municipalities, except Luuk, Maimbung, Lugus and Pandami with the largest area harvested found in Old Panamao.
	Tawi-Tawi	In all municipalities, with Panglima Sugala and Languyan having large area for this crop.
Fruits and Industrial Crops	Sulu	Important in the province are coffee in the municipality of Parang, Banana and Durian in Old Panamo.
	Tawi-Tawi	Banana and other fruits are planted in all municipalities.
	Lanao del Sur	Tagoloan has a large area planted to coffee.

Livestock and Poultry - In all the provinces in the region, households would have some livestock and poultry. This would include carabao that is used as draft animal, cattle and goat. Poultry would be in terms of native chicken and duck. Tables showing area harvested, volume of production yield per hectare and livestock and poultry population are provided as Attachment Tables.

3.3.4 Food Security

Based on the volumes of palay and corn produced in the region in 2002, the food security was assessed by using the region's (all barangays) average per capita consumption of rice and corn.

Province	Unit	Maguin-danao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM
1. Population <1	Person	863,143	720,888	358,604	667,658	347,279	2,957,570
2. Per Capita <2							
- Rice	Kg/pa	122.2	122.2	122.2	122.2	122.2	122.2
- Cassava		28.3	28.3	28.3	28.3	28.3	28.3
3. Requirement							
- Rice	Ton/yr	105,476	88,092	43,821	81,588	42,437	361,415
- Cassava		24,461	20,430	10,163	18,921	9,842	83,818
4. Production <3							
- Rice	Ton/yr	155,227	92,443	2,073	2,691	2,914	253,548
- Cassava		5626	514,337	205,657	154,996	89,641	970,254
5. Balance							
- Rice	Ton/yr	49,751	4,351	-41,748	-78,897	-39,524	-107,867
- Cassava		-18,835	493,907	195,494	136,075	79,799	886,436

Source:
<1: 2002 Philippine Statistical Yearbook (adjusted by the annual population increase rate of 3.86% per year
<2: Consumption of Selected Agricultural Food Commodities, Vol. 2.15, BAS, 2001.
<3: Table 3 (Rice production is computed by applying recovery rate of 60% from palay into rice.)

The data mentioned above show that two provinces in the mainland can produce rice enough for sustaining the population in the provinces while the island provinces substitute corn and cassava for palay. There is also a possible of inflow of rice produced in mainland or outside the region (including Malaysia) into the island provinces.

3.3.5 Typical Farming Practices

Farming in the region could be considered primarily in its early stages of modernization. On the other hand, farming is not done in response to market conditions except for a few limited cases.

Farming practices, especially of farmers in the island provinces are basically what have been handed down through generations, with some technological improvements largely in the form of improved seeds and fertilizers distributed free by government. Commercial crops like rubber and coffee that were cultivated as plantation crops by its previous owners who were not native to the place and utilize improved technology. In the provinces in the main island of Mindanao, the inroad of technical improvements is more pronounced even with respect to the staple crops like rice and corn because of the influence of extension workers and more so

the practices of neighboring farmers who are immigrants from the other islands of the country. Since the traditional farming practices are far from the one promoted by DA as the modern farming, renovation of the practices has taken a long time. This is in fact one of the constraints to improvement of production.

Improvement of transport and communication could help a lot in terms of upgrading farming practices in the region. In addition, the perception in regard to the peace and order situation has refrained possible investors, both in production and in trade, into getting in the area. They could greatly influence changes in the farming practices.

3.3.6 Agrarian Reform

The Comprehensive Agrarian Reform Program (CARP) is the latest in the series of attempts by the government to improve the plight of the farming population.

(a) Land Acquisition and Distribution

Land Acquisition and Distribution has been undertaken since before the CARP. However, land that was subject to acquisition was limited to those devoted to the production of rice and corn. With the CARP, all agricultural land is now covered. The status of land acquisition and distribution in the different provinces of the region are presented in Annex Tables 22-26 and summarized in Table 3-12 below.

Table 3-12 CARP Accomplishment, by Province, ARMM, 2002

Province	No. of Municipalities	Land Acquisition and Distribution		Remarks
		Target Area	Accomplishment	
Maguindanao	n.a.	96,920	48,838	Accomplishment: 50 %
Lanao del Sur	n.a.	102,371	72,186	Accomplishment: 71 %
Basilan	7	28,201	27,353	Total No. of ARBs is about 8,700
Sulu	5	10,457	5,908	Accomplishment: 57 %
Tawi-Tawi	7	51,514	16,767	Accomplishment: 32 %

Source: Provincial Agrarian Reform Offices

(b) The Agrarian Reform Communities

In response to the call by former President Fidel V. Ramos under his "Philippines 2000", the operating policies of the Department of Agrarian Reform have been realigned. The implementation strategy for CARP started to focus on the development of Agrarian Reform Communities (ARCs). These are contiguous areas that may correspond to a barangay or a

cluster of barangays. ARCs are identified on the basis of two sets of criteria formulated by the Department, the ***must*** and ***want*** sets.

The ***must*** criteria are:
1. the presence of a high density of agrarian reform beneficiaries;
2. the community is considered economically depressed; and
3. the scope of coverage of the CARP is large.

While the ***want*** criteria are:
1. the presence of Non Government Organization and People's Organization in the community;
2. a clamor for agrarian reform in the area;
3. presence of government sponsored developmental projects and support services; and
4. positive support to the Agrarian Reform Program by the local government unit.

ARCs organized along the above guidelines in the five provinces of the autonomous regions are summarized below.

Table 3-13 Number of ARCs, Municipalities, Beneficiaries and Area

Province	No of ARCs	No. of Municipalities	Scope Area (Ha)	No. of Beneficiaries
Maguindanao	18	24	58,362	11,067
Lanao del Sur	26	39	44,024	16,043
Basilan	14	7	18,676	5,648
Sulu	12	18	6,685	1,671
Tawi-Tawi	8	10	14,303	4,823

Note: There is no information on the scope areas and No. of beneficiaries of four (4) ARCs
Sources: DAR Provincial Offices

More detailed information such as name of ARCs municipal location and its area are shown in Annex Tables 27-31 Exact locations of these Agrarian Reform Communities are provided in Attachment Figures 24-28.

3.3.7 Agricultural Support Services

(a) Agricultural Research and Development

Administrative Order Nos. 6 and 19, series of 1991 issued by the Department of Agriculture Central reorganized its R&D activities and established the "National R&D Center and Regional Integrated Agricultural Research Centers". However, the ARMM was not covered by the Order. Thus, the regional government, through an Executive Order of the Governor defined the structure and management of the R (Research), D (Development) & E (Extension) system in ARMM. This system is anchored on a Central Experiment Station located in the former Bureau of Animal Industry's Breeding Station at Simuay, Sultan

Kudarat, Maguindanao. Satellite Stations, one each in the provinces, are also installed as part of the system.

The Central Station is called upon to perform the following functions:

1. Provide leadership in planning and orchestrate the implementation and evaluation of an integrated research and development program within the context of a farming system approach, in coordination with the Regional Training Center;

2. Undertake mid-stream and down stream applied research on its assigned commodity;

3. Develop and maintain a network of provincial collaborators in undertaking the regional RD&E program on its assigned commodities.

The satellite stations serves as link between the regional and provincial R&D programs are called upon to undertake applied research relevant to the needs of the agriculture sector of the province and their assigned commodities. They are also to demonstrate new appropriate technology and serve as medium for agricultural education and training in the province. The following are the five (5) satellite stations:

a. ARMMIARC for integrated farming is the newly reopened Maridagao Experiment Station at Kilangan, Pagalungan, Maguindanao;

b. ARMMIARC for lowland Irrigated/Rain-fed rice at the MSU Campus in Datu Odin Sinsuat, Maguindanao;

c. ARMMIARC for Hilly Land at MSU Campus, Marawi City and composed of Lumbatan Breeding Station in Lumbatan, Lanao del Sur and Bayang Breeding Station in Bayang, Lanao del Sur;

d. ARMMIARC for Upland Plain at Talipao, Sulu and Lungkiaban Breeding Station in Lungkiaban, Sulu; and

e. ARMMIARC for Marginal Areas/Germplasm Collection and Evaluation Center in Bongao, Tawi-Tawi.

The ARMM Integrated Agricultural Research Center and its satellite stations have at the moment a total complement of 45 regular technical personnel. Five personnel belonging to

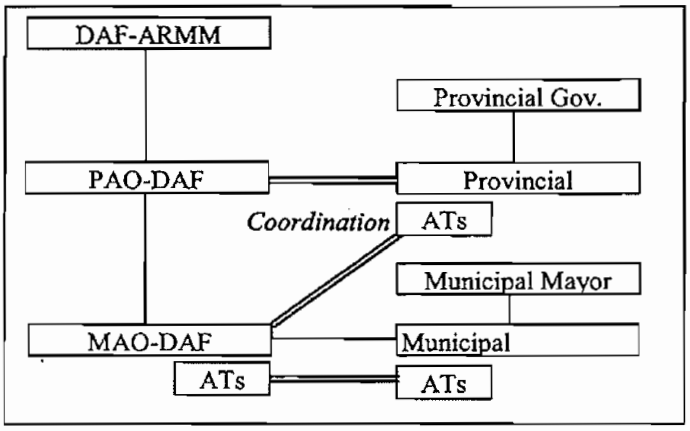
the Central Station are currently on study leave. This is part of the efforts towards strengthening of the system. There are also some physical facilities that DAF have received as assistance from the Bureau of Agricultural Research of DA Central. Attachment Figure 29 shows the Organizational chart of Integrated Research System in the region

Current research program of the ARMMIARC is based on the national research thrusts that are designed to achieve food security, eradication of poverty, people empowerment, increase productivity and farmer's income, sustainable agricultural development and global competitiveness. Except for rice and corn, the other commodities that receive ARMMIARC attention are those that are suitable to the situation in the area. Thus, in livestock, more attention is given to small ruminants, especially goat and to some extent also cattle. For the high value crops, the interests are put on some of the fruits, like durian, Mango, and mangosteen.

(b) Agricultural Extension

The structure of the agricultural extension service in ARMM appear to be a carry-over of the old structure of the said service of the National Department of Agriculture before it was devolved to local government units. Thus, the Department of Agriculture and Fisheries of ARMM has maintained its provincial and municipal agriculture offices (PAOs and MAOs).

DAF assigns and supervises personnel in both provincial and municipal levels. All five provincial governments in the region also have Provincial Agriculturist that are supposed to coordinate with the DAF-PAO. Some municipalities are also able to appoint Agricultural Technicians that should work in the close coordination with the Municipal Agricultural Officer of DAF. But in some cases, the Provincial Agriculturist are political appointees. Therefore, it is often found that they don't function as they are expected or they may even hamper the activities of PAO/MAO-DAF as worst scenario. The following drawing shows the present organizational set-up in the agricultural extension service.



The Provincial Government of Maguindanao has employed a Provincial Agriculturist and 18 Agricultural Technicians (ATs) under the Provincial Agriculturist. But in the case of Maguindanao, the Provincial Agriculturist works in coordination with DAF-PAO. ATs, at the provincial office work as program coordinators under the PAO. The 18 ATs assigned to different municipalities of the 22 municipalities of the province, also work in the field under the supervision of DAF-MAO. Two (2) municipal Government-hired ATs are presently working in the respective Municipalities under the supervision of the MAO DAF.

The Study Team was not able to get the information / data on the equipment of PAO- and MAO–DAF since this is not readily available from secondary data. Based on the interviews to the DAF staff as well as Provincial Agriculturists, the following are the general situation in the Study area.

- One (1) PAO and one (1) MAO each would be assigned per province and municipality, respectively.

- Under MAO-DAF, an ATs would generally be assigned to help in these extension activities. The number would vary, but the total ATs by province as of August 2003 are:

  - Maguindanao - 99
  - Lanao del Sur - 117
  - Basilan - n.d.
  - Sulu - 59
  - Tawi-Tawi - 43

- Municipalities should in general also hire municipal agriculturist at their own cost.

(c) Credit (LANDBANK)

LANDBANK is dominant source of formal credit for agriculture and fishery activities. However, it extends loans through cooperating institutions, cooperatives and rural banks. With respect to cooperatives, they have to first be accredited by the Bank. On the other hand, rural banks use LANDBANK for rediscounting their agricultural and fishery loans.

Any cooperative of farmers or fisher folks can apply for LANDBANK accreditation. The minimum requirements are; i) Registration with the Cooperative Development Authority, ii) Membership of at least 60, iii) Paid-up capital of at least ₱30,000, iv) All members have undergone PMES, v) Updated financial statement, and vi) have a core management team. (Please see Annex "C" for the LANDBANK criteria for accreditation and classification of cooperatives)

As at the end of August 2003, the number of cooperatives in ARMM accredited by LANDBANK was only 232, majority of which are class D (38%) while about 11% are failed coops, meaning they have been in default and considered not able to pay existing loans (Table 3-14).

Table 3-14 Accredited Cooperatives by LANDBANK, Mainland and Island Provinces, ARMM, 2002

Coop Class	Mainland Province		Island Province		Total	
	Number	% of Total	Number	% of Total	Number	% of Total
A	4	2.3	5	8.4	9	3.9
B	24	13.9	9	15.3	33	14.2
C	56	32.4	20	33.9	76	32.8
D	64	37.0	24	40.7	88	37.9
F	25	14.4	1	1.7	26	11.2
TOTAL	173	100.0	59	100.0	232	100.0

Source: Mindanao Branches Group, Land Bank of the Philippines

LANDBANK has ten (10) branch offices in and around the Study area. The activities of these branches are reflected in Table 3-15. Note the relatively low agrarian loan releases and the repayment rate.

Table 3-15 LANDBANK Loan Releases and Past Due, Mainland and Island Provinces, ARMM, August, 2003

Million Pesos

Item	Maguindanao Branches*	Island Province	Total
Total Agrarian Loan			
Releases 2001-03	407.7	50.6	458.3
Loans Past Due			
2001	338.0	26.8	364.8
2002	306.7	33.6	340.3
2003 (August)	266.6	45.7	312.3
Number of Branches	7	3	10

** One Branch, Marawi is actually in the province of Lanao del Sur*
Source: Mindanao Branches Group, Land Band of the Philippines

3.3.8 Existing Cooperatives

The number of cooperatives in the Study area that have been registered by the Cooperatives Development Authority is shown in Table 3-16 below. Note that only 60% are considered active. This is indicative of the problems with cooperatives development that is not unique to the region.

Table 3-16 Number of Registered Cooperatives, by Province, ARMM, 2002

Province*	No. Registered	No. Active	Active as % of Registered
Maguindanao	1,962	1,090	55.6
Lanao del Sur	2,176	1,169	53.7
Sulu	639	428	67.0
Tawi-Tawi	457	351	76.8
TOTAL	**5,234**	**3,038**	**100**

** Data for Basilan is not yet available at the Cooperative Development Authority, ARMM*
Source: Cooperatives Development Authority, ARMM

In terms of cooperatives that are agriculture/fisheries based, the number is summarized in Table 3-17 below.

Table 3-17 Estimated Number of Registered Agri-Fish Based Cooperatives, by Province, ARMM, 2002*

Province	Est. No. Registered	No. Active
Maguindanao	1,742	968
Lanao del Sur	1,932	1,037
Sulu	567	380
Tawi-Tawi	406	312
TOTAL	**4,644**	**2,417**

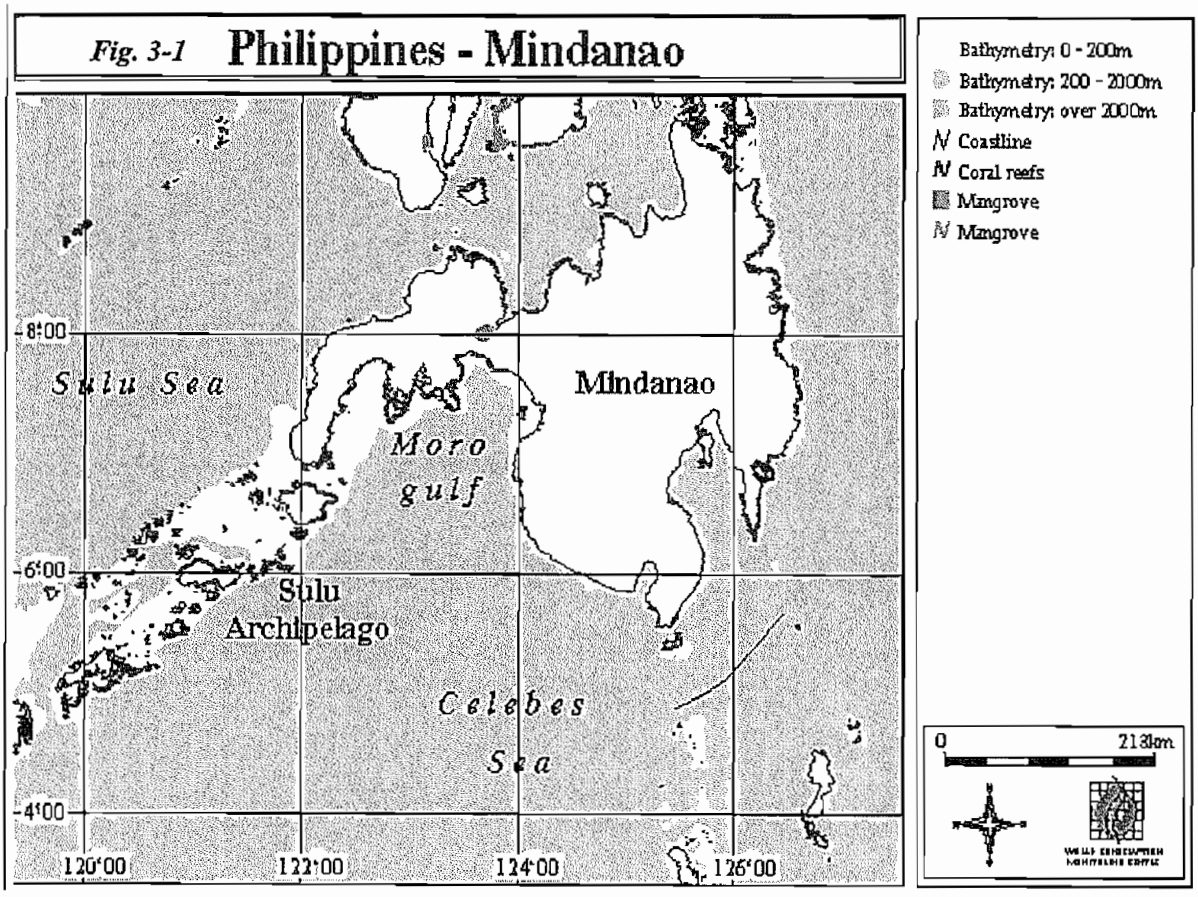
** Estimated on the assumption that producer's coop are agri-fish based*
Source of Basic Data: Cooperative Development Authority, ARMM

Note that although the number of cooperatives that are registered in Tawi-Tawi is lowest, the proportionate number considered active is highest. In addition, a relatively higher proportion of its cooperatives are classified by LANDBANK as Class A (Table 3-14).

3.4 Fisheries

3.4.1 Major Fishing Grounds and Dominant Fish Species

Fishery is a dominant resource in ARMM. This is not surprising when viewed from the perspective of the whole country showing its extensive coral reefs (Figure 3-1). ARMM has a territorial water area of 18,426,613 hectares, a shelf area of 2,811,141.97 hectares, and a coastline of 1,801.07 kilometers (BFAR-ARMM, 2003). Of its five provinces, three are island provinces surrounded by vast marine fishing grounds. These are Basilan, Sulu and Tawi-Tawi. While Maguindanao and Lanao are part of mainland Mindanao, they also have a limited share of marine fishing grounds. Their contribution to fishery comes mostly from their major inland freshwater resources.



Source: Global Information System on Coral Reefs, Reef base Resources Biodiversity Philippines

Based on the 2003 estimate of the National Mapping and Resource Inventory Authority (NAMRIA), ARMM has a total coastline of 3,232.3 kilometers. This is about 18.5% of the country's coastline (17,460 km.) as reported by the Bureau of Agricultural Statistics (BAS) in 2002. The share of the tress island provinces is 88.9% (2,873 km.) with Tawi-Tawi contributing the longest (1,230 km.). The provinces of Lanao del Sur and Maguindanao have the least number of coastal municipalities and thus also have the shortest length of coastline. Note that the length of coastline along lakeshore is not included in the estimate. In fact, the length of coastline of municipal waters (both marine and freshwater lakes) has not been estimated due to the absence of legal basis in regard to the delineation and/or delimitation of municipal waters.

Table 3-18 Coastline of the Autonomous Region in Muslim Mindanao (ARMM)

Province	Length of Coastline (km)	
	Total	%
Maguindanao	193.00	5.97
Lanao del Sur	166.00	5.13
Basilan	536.24	16.59
Sulu	1,107.00	34.25
Tawi – Tawi	1,230.05	38.06
Total	**3,232.29**	**100.00**

Source: National Mapping and Resource Inventory Authority (NAMRIA)

The fishery resource capacity of the ARMM may be further gleaned from an assessment of its 99 local government units (Annex Table 35). Table 3-19 shows that three quarters (75 municipalities) of these LGUs are located in either coastal (43%), lakeshore (23%), or marshland (9%) areas. In terms of the number of barangays located within or near coastal zones and/or freshwater bodies, only 28% (702 barangays) are within or near the region's fishing grounds while almost three quarters (1,772 barangays) are located outside. The proximity of non-coastal, lakeshore or marshland barangays to the region's fishing grounds, however, serve as magnet for livelihood to at least 60% of the populace, most especially those in the three island provinces.

Table 3-19 Classification of ARMM LGUs, 2003

Municipalities/City/ Barangays	Maguindanao		Lanao del Sur		Basilan		Sulu		Tawi-		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Total Municipalities/Cities	26	100	39	100	6	100	18	100	10	100	99	100
- Total Coastal	5	19	4	10	6	100	18	100	10	100	43	43
- Total Lakeshore	1	4	22	56	-	-	-	-	-	-	23	23
- Total Marshland	9	35	-	-	-	-	-	-	-	-	9	9
- Total Non-coastal/ Lakeshore/Marshland	11	42	13	33	-	-	-	-	-	-	24	24

Municipalities/City/ Barangays	Maguindanao		Lanao del Sur		Basilan		Sulu		Tawi-		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Total Barangays	**474**	**100**	**1181**	**100**	**210**	**100**	**411**	**100**	**203**	**100**	**2479**	**100**
- Total Coastal	36	7	35	8	82	39	125	30	198	98	476	19
- Total Lakeshore	9	2	191	16	-	-	-	-	-	-	200	8
- Total Marshland	26	5	-	-	-	-	-	-	-	-	26	1
- Total Non-coastal/ Lakeshore/Marshland	403	85	955	76	128	61	286	70	5	2	1777	72

Sources: Bureau of Fisheries and Aquatic Resources-ARMM, 2003
Survey Questionnaires

The fishing grounds of the ARMM are vast, varied and generally productive. These are highly capable of serving both commercial and municipal fishing. There are two fishing environments, coastal or marine like seas, gulf, bays, channels and straits and freshwater or inland fishing like lakes, marshlands and rivers. Major fishing grounds for commercial fishing operations[1] are the Sulu Sea, Celebes Sea and Moro Gulf (Table 3-20). The rest of the areas are generally located in municipal waters[2]. In addition to these are 67 other municipal fishing grounds in Sulu (Annex Table 35).

Table 3-20 Major Marine/Coastal Fishing Grounds in ARMM and their Dominant Species

Major Fishing Ground	Location	Dominant Fish Species
1. Sulu Sea	Sulu archipelago	Bullet tuna, frigate tuna, eastern little tuna, skipjack tuna, island mackerel, Indian mackerel, short mackerel, mackerel scad, Indian scad, oxeye scad, fring scale sardine, gold stripe sardine, blacktip sardine, Indian oil sardine, snapper fish, siganus canaliculatus, siganus lineatus, siganus punctatus, lieognathus equulus, lieognathus bindus (NSAP, 2003); squid, octopus
2. Celebes Sea	Near the Sulu archipelago	Frigate tuna, eastern like tuna, bullet tuna, yellow fin funt, shark, blue marlin; squid, octopus
3. Moro Gulf	Basilan Maguindanao Lanao del Sur Zamboanga del Sur/Sibugay Maguindanao	Bullet tuna, frigate tuna, eastern little tuna, skipjack tuna, island mackerel, Indian mackerel, short mackerel, mackerel scad, Indian scad, oxeye scad, fring scale sardine, gold stripe sardine, blacktip sardine, Indian oil sardine, snapper fish, siganus canaliculatus, siganus lineatus, siganus punctatus, lieognathus equulus, lieognathus bindus; squid, octopus
4. Illana Bay	Maguindanao Lanao del Sur	Bullet tuna, frigate tuna, eastern little tuna, skipjack tuna, island mackerel, Indian mackerel, short mackerel, mackerel scad, Indian scad, oxeye scad, fring scale sardine, gold stripe sardine, blacktip sardine, Indian oil sardine, snapper fish, siganus canaliculatus, siganus lineatus, siganus punctatus, lieognathus equulus, lieognathus bindus (NSAP, 2003); squid, octopus
5. Tawi-Tawi Bay	Sulu archipelago	Tuna, grouper, snapper, parrotfish, squid, shrimp, octopus, scads, sardines, mackerel, siganid
6. Basilan Strait	Basilan Zamboanga del Sur	Grouper, fusilier, spade fish, snapper, siganids, slipmouth, big-eyed scad, crevale, cavalla, Indian sardines, Spanish mackerel, swordfish, yellowfin tuna, blue marlin, squid, octopus, sea

[1] *Capacity of 3.1 gross tons and over*
[2] *15 kilometers from the coastline of the mainland and offshore and/or fringing islands of the municipality or city (DAO 17, 200)*

Major Fishing Ground	Location	Dominant Fish Species
		crabs, lobsters, anchovy, barracuda, shark, roundscad, eastern little tuna, bullet tuna, frigate tuna, skipjack tuna, caesio, trevally, oceanic bonito, catfish, flatfish, garfish, hardtail, herring, nemipterid, eel, striped mackerel, sting ray, parrot fish
7. Sibutu Passage	Tawi-Tawi	Tuna, grouper, snapper, parrotfish, squid, shrimp, octopus, scads, sardines, mackerel, siganid
8. Tapaan Passage	Tawi-Tawi	Tuna, grouper, snapper, parrotfish, squid, shrimp, octopus, scads, sardines, mackerel, siganid

Sources: *Provincial Fisheries Profile of Sulu (undated)*
Provincial Fisheries Profile of Tawi-Tawi, 2002
Provincial Fisheries Profile of Basilan, 1999, 2000, 2001, 2002
The Basilan Marine/Aquaculture Industry: A Profile, 2000
Fisheries Profile of Illana Bay (undated)

Issues on the management and utilization of these fishing grounds often stem from boundary conflicts between commercial and municipal fishing. Commercial fishing vessels (CFV) from regions 9 and 12 in Mindanao and other regions outside of Mindanao are almost always spotted in municipal waters. Their reported presence, considered as encroachment into municipal waters, constitutes a violation of the Philippine Fisheries Code of 1991 (Republic Act No. 8550) and indicates weak institutional and/or logistical capability of most local governments in the ARMM to enforce coastal laws. On the other hand, the LGUs' mandate to enforce laws on municipal water boundaries is compromised by an unclear national policy on municipal water delineation that would have been enforced had not Department Administrative Order (DAO) No. 17 of the DENR not been revoked in March 2003 by the DENR Secretary.

The major inland sources of fish for the ARMM (Table 3-21) are in Lanao del Sur and Maguindanao covering an area of at least 75,000 hectares. Of these sources, Lake Lanao, which is the second largest lake in the country next to Laguna de Bay. Around the lake are 22 (including Marawi City) of the 39 local government units of Lanao del Sur. Lake Lanao is is the largest (48%) freshwater and inland source followed by the Ligawasan Marsh in Maguindanao with an area of 30,000 hectares. Also considered significant sources of fish are Lake Buluan in Maguindanao and Lake Dapao in Lanao del Sur. Other freshwater bodies include Seit Lake in Sulu (120 ha.), Lake Butig in Lanao del Sur (68 ha), Balut Lake (15 ha) and Lake Darapanan (9 ha.) in Maguindanao. Although not as significant in terms of size of fishing ground, these freshwater bodies nevertheless add to the production of municipal inland fishery. Lakes Lanao, Dapao, Butig and Buluan as well as the Ligawasan Marsh were proclaimed protected areas under certain republic acts, memorandum orders or proclamations due to their biodiversity.

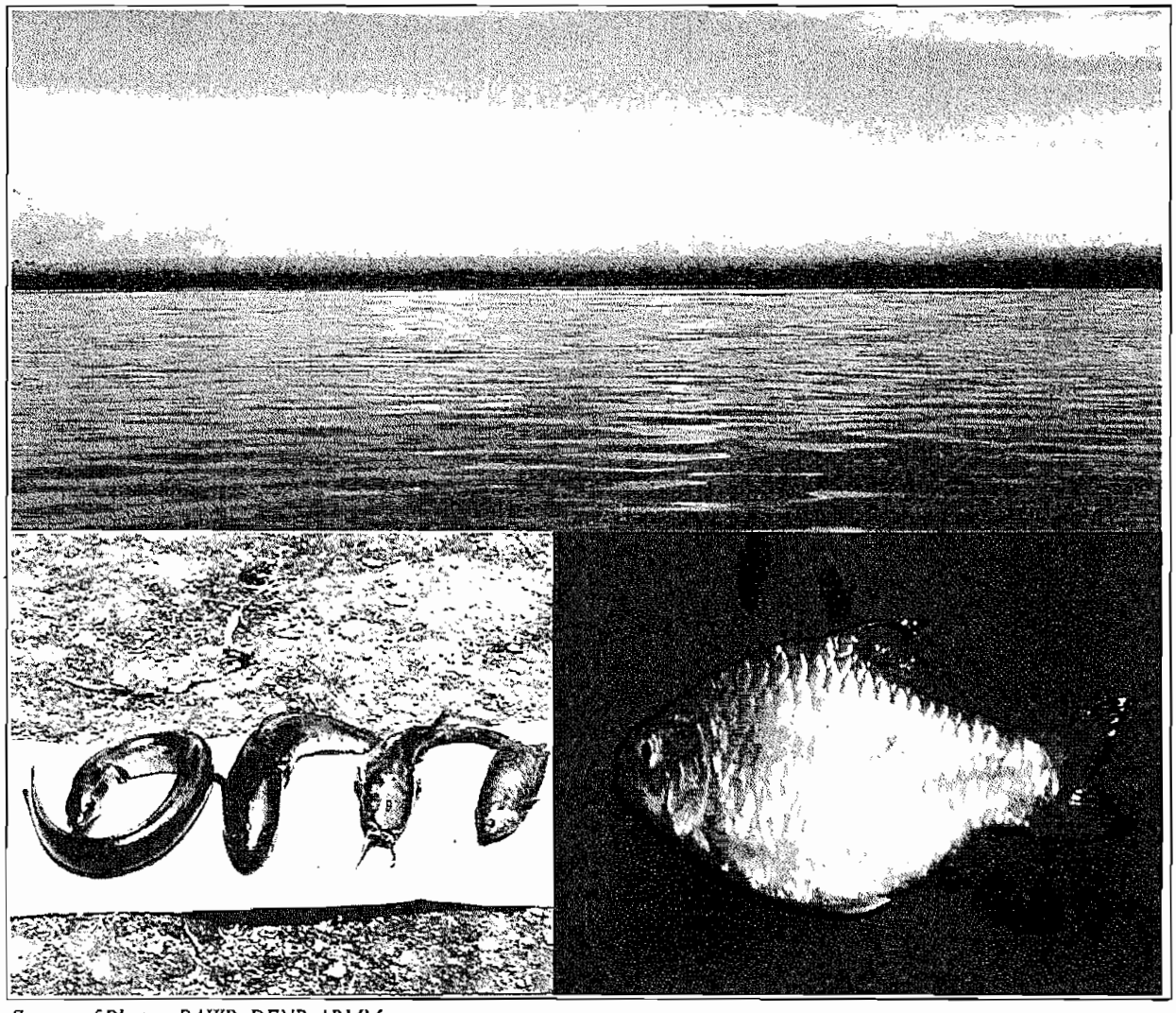
Table 3-21 Major Freshwater/Inland Fishing Grounds in ARMM and their Dominant Species

Major Fishing Ground	Location	Size	Dominant Species
Lake Lanao	Lanao del Sur	36,000 ha	Aruan/mudfish, katipa/catfish, popoyo/ climbing perch, kasili/eel, carp, tilapia, gourami, black bass, white goby, milkfish
Ligawasan Marsh	Maguindanao	30,000 ha	Native hito, catfish, tilapia, gourami, gray eel, janitor fish, red bangus, carp, spotted eel, mudfish
Lake Buluan	Maguindanao	8,000 ha	*Nd*
Lake Dapao	Lanao del Sur	1,000 ha	*Nd*
Rio Grande de Mindanao	Maguindanao		*Nd*
Agus River	Lanao del Sur	1,900 km²	*Nd*

Nd=no data

Source: Bureau of Agricultural Statistics, Department of Agriculture 1997. Philippine Fisheries Profile, 1997, 1998, 2001, 2002
Bureau of Agricultural Statistics, Department of Agriculture 2001. Fisheries Statistic of the Philippines, 1997-2001.
BFAR-ARMM Fisheries Profile, 2002
The Basilan Marine/Aquaculture Industry: A Profile, 2000

Fig. 3-2 The Ligawasan Marsh in the Province of Maguindanao with yellow eel and silver carp as among the identified fish species



Source of Photo: PAWB, DENR-ARMM

3.4.2 Fishing Boats, Fishermen and Gears

Based on the BFAR-ARMM Fisheries Profile, the number of fishermen in the ARMM is estimated to be about 60,990 (2002). Sulu registers the highest number (25,000 persons) followed by Tawi-Tawi (24,363 persons) and Maguindanao (2,936 persons) with the lowest. Over half (57 %) of the municipal fishing bancas they operate are non-motorized while the rest (43 %) are motorized. The most common type of gears used are hook and line and gill net with some variations as shown in Table 3-22 below.

Table 3-22 Municipal Fishing Boats, Fishermen and Gears in ARMM, 2002

Province	Number of Fishing Boats			Municipal Fishermen	Gears Used
	Motorized	Non-motorized	Total		
Maguindanao	523	1,239	1,762	2,936	Multiple hook and line, hook and line, gill net, fish corral, fish trap, cast net, spear gun, ring net
Lanao del Sur	791	2,259	3,050	4,537	Multiple hook and line, hook and line, gill net, beach seine, fish trap, cast net, spear gun
Basilan	5,748	8,053	13,801	4,144[3] (1999)	Danish Seine, ring net, bag net, baby net, tuna long line, fish carrier, light boat, purse seine; hook and line, gillnet
Sulu	9,931	10,053	19,984	25,010	Gill net, hook and line, fish trap, shallow fish corral, spear gun
Tawi-Tawi	1,025	1,909	2,934	24,363	Gill net, shallow fish corral, hook and line, set long line
Total No. (%)	18,018 (43.4%)	23,513 (56.6%)	41,531 (100.0%)	60,990 -	

Source *BFAR-ARMM Fisheries Profile, 2002*
The Basilan Marine/Aquaculture Industry: A Profile, 2000

3.4.3 Fish Catch/Landed by Fishing Ports/Fish Landing

Commercial as well as municipal fish catch in ARMM are usually landed in traditional landing sites. In other regions, fish are landed in either private, Philippine Fisheries Development Authority (PFDA) pr traditional fish landing centers. However, neither privately owned or PFDA fish ports exists in any of the five provinces comprising ARMM.

The fishery production in ARMM (Table 3-23) contributed an annual average of about 16% to the national total or 23,656,329 MT during the period 1995-2002. ARMM is in fact the highest contributor to fishery production in Mindanao (about 48% of total) Of the four fishery sub-sectors in ARMM, aquaculture consistently led, contributing an average of 75% to the

[3] included as an indicative figure in the absence of 2002 data

region's total fishery production during the period under review. Municipal (marine and inland) fishing contributed an average of 15.3 percent. On the other hand, commercial fishing is not far behind with an average contribution of 11.4 percent.

In terms of growth rate, however, commercial fishing exhibited a higher average annual increase of 9.3 percent. On the other hand, aquaculture, with a rate of growth of only 5.4% performed the lowest, although contributing a higher annual average production of 353,726 MT during the last eight years.

Table 3-23 Total Fish Production in ARMM, 1995-2002

Metric Tons

Year	Commercial	Municipal		Aquaculture	Total ARMM	ARMM as % of Phil.	Philippines
		Marine	Inland				
1995	43,588	32,975	12,027	344,677	433,267	15.6%	2,784,316
1996	37,342	35,437	12,746	336,616	422,141	15.1%	2,795,997
1997	40,952	44,106	13,516	357,319	455,893	16.3%	2,793,556
1998	48,147	48,085	10,985	361,573	468,790	16.6%	2,829,520
1999	54,438	52,556	15,613	360,300	482,907	16.5%	2,923,772
2000	54,549	51,589	18,455	329,319	453,912	15.2%	2,993,332
2001	75,224	58,816	17,754	353,302	505,096	16.0%	3,166,530
2002	76,146	57,978	18,263	386,678	539,065	16.0%	3,369,306
Ave. 95-02	53,798	47,693	14,920	353,723	470,134		2,957,041
Ave. Share							
ARMM	**11.4%**	**10.1%**	**3.2%**	**75.2%**	**100%**		
Ave. Share							
Phil	**1.8%**	**1.6%**	**0.5%**	**12.0%**	**15.9%**		

Source: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Mindanao Economic Development Council (MEDCO) at http://www.medco.gov.ph
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000
Bureau of Agricultural Statistics, Department of Agriculture. Philippine Fisheries Profile, 1997, 1998, 2001, 2002.
Bureau of Agricultural Statistics, Department of Agriculture 2001. Fisheries Statistic of the Philippines, 1997-2001.

3.4.4 Commercial Fishing

Very few commercial fishing vessels (CFV) are registered with the Bureau of Fisheries and Aquatic Resources (BFAR) in the ARMM. Based on the Philippine Fisheries Profile of the BFAR (Table 3-22), year 1997 showed the highest number of CFVs at 11 with a gross tonnage of 316.52 tons or an average of 28 tons per CFV. It decreased to seven (7) CFVs in 1998 and remained at the same level up to 2002. The gross tonnage of CFVs decreased accordingly. As Table 3-24 shows, there are inconsistencies in the number of CFVs in ARMM.

Table 3-24 Number and Tonnage of Commercial Fishing Vessels (CFV) in ARMM, 1997-2002

Year	Commercial Fishing Vessels (No.)	Gross Tonnage (Ton)	Average Tonnage/CFV (Ton/Unit)
1997	11	316.52	28.77
1998	7	181.94	25.99
1999	7	181.94	25.99
2000	7	181.94	25.99
2001	7	181.94	25.99
2002	7	181.94	25.99

Source: Philippine Fisheries Profile, 1997, 1998, 2001, 2002

Other sources of data reveal a higher number of commercial fishing vessels (CFV) with Tawi-Tawi having the highest (31 vessels) and Lanao del Sur with the least (2 vassels) as shown in Table 3-25. In terms of fisher folks employed in commercial fishing, the number (755) pale in comparison to the total number of fisher folks engaged in municipal fishing (60,990).

The most common fishing gear used by the CFVs is purse seine which is highly extractive as well as destructive, especially when done in municipal waters. With respect to large-scale CFVs, accessories used would include a fish finder, generator, light, SSB radio, and sonar compass.

Table 3-25 Registered Commercial Fishing Vessels/Operations in ARMM, 2002

Province	No. of Fishing Vessels	No. of Fishermen	Fishing Gear Used	Accessory
Maguindanao	5	125	Purse seine, bagnet	Fish finder, generator, light, SSB radio, sonar, compass, etc.
Lanao del Sur	2	20	Purse seine	- do -
Basilan	19	Nd	Purse seine, Danish seine, bagnet, fish carrier, light boat	- do -
Sulu	13	145	Garnet, ring net, PCN, hook and line, shark commercial gill net, long line, bagnet, bottom gill net, purse seine, fish trap, multiple hook and line, fish coral, fish net	- do -
Tawi-Tawi	31	465	Purse seine, trawler, Danish seine, catcher	- do -
Total	70	755		

Nd=no data
Sources: BFAR-ARMM Fisheries Profile, 2002
The Basilan Marine/Aquaculture Industry: A Profile, 2000

Data on commercial fish production in ARMM (Table 3-26) shows an increasing trend in volume and value, with Sulu on the lead, followed by Basilan. The price of fish from

commercial fishing vessels varied from province to province and was apparently influenced by market situation.

In comparison to the national figure, ARMM contributed only 7.7% to the total production of fish from commercial fishing during the period 1995-2001. Region IX topped the list followed by Region XII or the National Capital Region in terms of production level. Although this may be the case, it must be noted that most commercial fishing vessels registered with the BFAR in regions IX and XII fish in the seas surrounding the island provinces of ARMM, including municipal waters. The fish catch of these vessels are not recorded as caught in ARMM.

The trend in commercial fishery production in ARMM is increasing at an annual average rate of 14% during the period 1997-2002. The highest increase of about 38% was observed between the years 2000 and 2001. During the six-year period 1997-2002, the output of commercial fishery in ARMM contributed an annual average of 6.1% to the total Philippine commercial fisheries production. The province of Sulu registered the highest share of 66.6 percent (Table 3.26). This production level indicates the relatively high productive capacity of the fishing grounds surrounding the said province. Contributing the least share in commercial fisheries is Lanao del Sur with an average of only 3.3 percent. However, there are only four coastal towns in the province. It is followed by Maguindanao, which only has five towns. Tawi-Tawi has no record of commercial fishery production starting year 1992. This is highly doubtful considering the noted productivity of its fishing grounds. This absence of information may be attributable to a weakness in database and monitoring systems. It must be noted that most commercial fishing vessels that are registered with the BFAR in regions IX and XII catch fish in the major fishing grounds of the ARMM particularly near Sulu and Tawi-Tawi. Fish caught by these vessels are not properly recorded and credited to the ARMM.

Although the volume of production from commercial fishery in Sulu maybe highly significant in comparison to the rest, its average annual growth rate (14%) is lower than Maguindanao (30%) that supposedly had one of the lowest production among the ARMM provinces.

The price of fish caught by commercial fishing vessels varied from province to province and was apparently influenced by market situation. The Province of Sulu, which generated the

most volume from commercial fishing, reported lower prices during the 5-years being reviewed, while prices reported in the province of Lanao del Sur was consistently higher than any of the four provinces.

Table 3-26 Production, Value and Price of Commercial Fisheries By Province, ARMM and Philippines, 1997-2001

Year	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM	Philippines
Production (M.T.)							
1997	1,439	1,291	14,235	23,987	-	40,952	884,651
1998	2,249	1,281	13,430	31,187	-	48,147	940,533
1999	2,890	1,753	14,077	35,718	-	54,438	948,754
2000	2,808	2,149	13,963	35,629	-	54,549	946,485
2001	3,075	2,421	14,186	55,542	-	75,224	976,539
2002*						76,146	1,042,193
Ave. Share							
ARMM	**4.6%**	**3.3%**	**25.6%**	**66.6%**		**100%**	
Ave. Share							
Phil.	**0.3%**	**0.2%**	**1.5%**	**3.9%**		**5.8%**	
Value ('000)							
1997	22,808	35,011	201,852	336,538	-	596,209	25,935,331
1998	34,859	40,143	231,441	416,970	-	723,413	29,737,074
1999	49,332	48,768	279,006	594,705	-	971,811	32,242,140
2000	51,834	51,243	293,159	624,872	-	1,021,108	33,878,677
2001	61,500	60,525	312,282	1,043,074	-	1,477,381	36,088,640
Ave. Share							
ARMM	**4.6%**	**4.9%**	**27.5%**	**63.0%**		**100%**	
Ave. Share							
Phil	**0.1%**	**0.1%**	**0.8%**	**1.9%**		**3.0%**	
Price (P/kg)							
1997	15.85	27.12	14.18	14.03	-	14.56	29.32
1998	15.50	31.34	17.23	13.37	-	15.03	31.62
1999	17.07	27.82	19.82	16.65	-	17.85	33.98
2000	18.46	23.85	21.00	17.54	-	18.72	35.79
2001	20.00	25.00	22.01	18.78	-	19.64	36.96

** from the website of MEDCO*

Source: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Mindanao Economic Development Council (MEDCO) at http://www.medco.gov.ph
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000
Bureau of Agricultural Statistics, Department of Agriculture. Philippine Fisheries Profile, 1997, 1998, 2001, 2002.
Bureau of Agricultural Statistics, Department of Agriculture 2001. Fisheries Statistic of the Philippines, 1997-2001.

3.4.5 Marine Municipal Fishing

The marine municipal fishing of ARMM contributed a significant amount to its total fishery production (Annex Table 37) which is lower in comparison to the production level of commercial fishing. Table 3-27 presents the production level of marine municipal fishing as well as value and price of produce from 1995 to 2001.

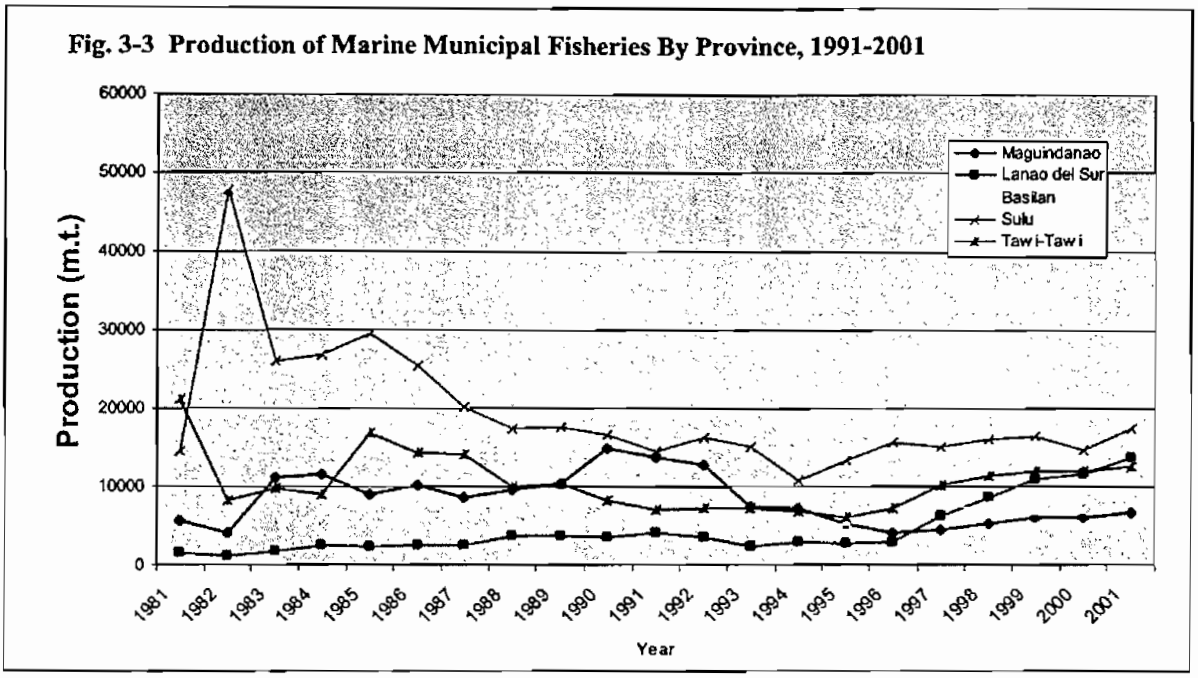
Of the five provinces, Sulu is noted to have contributed the most to marine municipal fishing (Figure 3-3). This may be attributed to the number of its coastal municipalities (18 or 42%), the vastness and productivity of its fishing grounds and number of fishermen (25,010 or 41% of the total fisher folk population in ARMM). This is followed by Tawi-Tawi, which has the next largest number of coastal municipalities (10), the largest number of coastal barangays (198), the second largest number of fisher folks (24,363), not to mention its vast and rich fishing grounds. Lanao del Sur ranks the third, higher than Basilan in terms of municipal marine production despite the small number of coastal municipalities (4) and coastal barangays (35). This may be attributed to the fishery options available to the coastal towns of Lanao del Sur. Further examination indicates that four coastal towns are located in the Illana Bay. Fisher folks in the province are not engaged in seaweed farming. This is a dominant fishery option for the fishing population in Tawi-Tawi and Sulu. Fishing efforts of fisher folks in the coastal towns of Lanao del Sur is thus noted to be high. This is reflected in the relatively high annual average rate of increase in production (34.9%), the highest among the five provinces of the ARMM. Tawi-Tawi and Sulu, although producing higher volumes lag behind in rate of growth rates by a significant margin.

Table 3-27 Production Value and Price of Marine Municipal Fisheries, by Province, ARMM, 1997-2001

Year	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM
Production (M.T.)						
1995	5,224	2,665	5,720	13,325	6,041	32,975
1996	4,201	3,001	5,423	15,654	7,158	35,437
1997	4,607	6,216	8,040	15,045	10,198	44,106
1998	5,365	8,608	6,740	15,992	11,380	48,085
1999	6,099	10,889	7,148	16,426	11,994	52,556
2000	6,002	11,663	7,245	14,709	11,970	51,589
2001	6,701	13,708	8,466	17,446	12,495	58,816
Ave. 95-01	**5,457**	**8,107**	**6,969**	**15,514**	**10,177**	**46,223**
Share (%)	**11.8%**	**17.5%**	**15.1%**	**33.6%**	**22.0%**	**100.0%**
Ave. Annual Increase	**5.0%**	**34.9%**	**8.5%**	**5.1%**	**13.7**	**10.4%**
Value ('000 Pesos)						
1995	75,968	117,704	115,412	269,737	93,583	672,404
1996	61,942	134,389	113,412	321,295	112,399	743,437
1997	99,386	218,312	203,518	290,172	215,041	1,026,429
1998	119,961	313,417	176,858	319,840	248,767	1,178,843
1999	121,812	318,252	184,923	324,774	252,604	1,202,365
2000	142,863	364,140	188,202	318,972	264,484	1,278,661
2001	161,561	411,788	221,979	383,638	285,636	1,464,602
Ave. 95-01	**111,928**	**268,286**	**172,043**	**318,347**	**210,359**	**1,080,963**
Share (%)	**10.4%**	**24.8%**	**15.9%**	**29.4%**	**19.5%**	**100.0%**
Ave. Annual Increase	**15.5%**	**24.9%**	**14.8%**	**6.6%**	**23.6%**	**14.4%**
Price (Pesos/kg)						
1995	14.54	44.17	20.18	20.24	15.49	20.39
1996	14.74	44.78	20.91	20.52	15.71	20.98
1997	21.57	35.12	25.31	19.29	21.09	23.27
1998	22.36	36.41	26.24	20.00	21.86	24.52
1999	19.97	29.23	25.81	19.77	21.06	22.88
2000	23.80	31.22	25.98	21.69	22.1	24.79
2001	24.11	30.04	26.22	21.99	22.86	24.9
Average	**20.16**	**35.85**	**24.38**	**20.50**	**20.02**	**23.10**
Ave. Annual Increase	**10.2%**	**(5.5%)**	**4.7%**	**1.5%**	**7.3%**	**3.6%**

Sources: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Mindanao Economic Development Council (MEDCO) at http://www.medco.gov.ph
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000
Bureau of Agricultural Statistics, Department of Agriculture. Philippine Fisheries Profile, 1997,1998, 2001, 2002
Bureau of Agricultural Statistics, Department of Agriculture 2001. Fisheries Statistic of the Philippines, 1997-2001.

Fig. 3-3 Production of Marine Municipal Fisheries By Province, 1991-2001



In terms of value of production, Lanao del Sur garnered the best market price (average of P35.85/kg.) for their produce from municipal marine fishery. This is attributed to the low volume of supply of marine products from municipal marine fishing the level of local demand. The total value of fishery products in Lanao del Sur ranked second to Sulu, in terms of share in the overall value produced by the region. However, it enjoyed the largest average annual increase in value of production (24.9%) with Tawi-Tawi (23.6%) and the other three provinces trailing behind. Again, this is attributed to the prevailing market price of fishery commodities, which is noted to have been declining at the rate of 5.5 percent. The trend in market price in the Province of Maguindanao is promising as indicated by its average annual increase of 10.2 percent.

3.4.6 Inland Municipal Fishing

Where the Province of Maguindanao performed poorly in terms of marine municipal fishery production, it did well in inland municipal fishery (Table 3-28). This is primarily because of its vast freshwater resources; 30,000 hectares from Ligawasan Marsh, and 8,000 hectares from Lake Buluan. These inland municipal fishing areas produce fish species such as the native hito, catfish, tilapia, gourami, gray eel, janitor fish, red bangus, carp, spotted eel, and mudfish. Following Maguindanao is Lanao del Sur, which generated its production largely from the 36,000 hectares Lake Lanao and the 1,000 hectares Lake Dapao. These lakes contribute fishery products such as aruan/mudfish, katipa/catfish, popoyo/ climbing perch, kasili/eel, carp, tilapia, gourami, black bass, white goby, milkfish. The annual inbound

fishery production and values in Lanao del Sur has increased during the last seven (7) years, while annual national production seems to be decreasing.

Table 3-28 Production, Value and Price of Inland Municipal Fisheries by Province, ARMM, and Philippines

Year	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM	Philippines
Production (M.T.)							
1995	8,347	3,638	42	n.d	n.d	12,027	186,674
1996	8,954	3,752	40	n.d	n.d	12,746	177,940
1997	8,385	5,101	30	n.d	n.d	13,516	159,739
1998	6,523	4,432	30	n.d	n.d	10,985	146,471
1999	9,322	6,282	9	n.d	n.d	15,613	146,519
2000	10,704	7,742	9	n.d	n.d	18,455	152,121
2001	10,189	7,556	9	n.d	n.d	17,754	136,347
Ave. Increase	**5.3%/yr**	**14.8%/yr**	**-16.6%/yr**	**n.d**	**n.d.**	**8.5%/yr**	**-5.0%/yr**
Ave. Share							
ARMM	**61.7%**	**38.1%**	**0.2%**			**100%**	
Ave. Share							
Phil	**5.6%**	**3.5%**	**0.0%**			**9.1%**	
Value ('000)							
1995	195,522	140,526	1,788	n.d	n.d	337,836	
1996	281,681	149,123	1,735	n.d	n.d	432,539	
1997	163,239	198,744	1,140	n.d	n.d	363,123	2,157,353
1998	219,920	197,930	1,228	n.d	n.d	419,078	2,331,846
1999	298,770	212,954	578	n.d	n.d	512,302	2,203,482
2000	292,391	334,462	610	n.d	n.d	627,463	2,619,804
2001	322,051	373,466	639	n.d	n.d	696,156	2,907,550
(share)	-11.10%	-12.80%	0.00%			-23.90%	-
Ave. Increase	**13.4%/yr**	**19.2%/yr**	**-12.0%/yr**	**n.d.**	**n.d**	**13.8%/yr**	**5.4%/yr**
Ave. Share							
ARMM	**52.3%**	**47.4%**	**0.2%**			**100.0%**	
Ave. Share							
Phil	**14.5%**	**13.2%**	**0.1%**			**27.7%**	
Price (P/kg)							
1995	23.42	38.63	42.57	n.d	n.d	n.d	
1996	31.46	39.74	43.38	n.d	n.d	n.d	
1997	19.47	38.96	38	n.d	n.d	n.d	13.51
1998	33.71	44.66	40.93	n.d	n.d	n.d	15.92
1999	32.05	33.9	64.22	n.d	n.d	n.d	15.04
2000	27.32	43.2	67.78	n.d	n.d	n.d	17.22
2001	31.61	49.43	71	n.d	n.d	n.d	21.32

Sources: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Mindanao Economic Development Council (MEDCO) at http://www.medco.gov.ph
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000
Bureau of Agricultural Statistics, Department of Agriculture. Philippine Fisheries Profile, 1997, 1998, 2001, 2002
Bureau of Agricultural Statistics, Department of Agriculture 2001 Fisheries Statistic of the Philippines, 1997-2001.

3.4.7 Aquaculture

(1) Overall Picture

Aquaculture production contributes an important share to the total fishery production in ARMM. In 2001, it produced a total of 353,302 MT with a value of ₱1,515,667 million (Table 3-29). The provinces of Tawi-Tawi and Sulu have proven to be the major producers of aquaculture products, primarily seaweeds.

Table 3-29 Production, Value and Price of Aquaculture by Province, ARMM and Philippines

Year	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM	Philippines
Production (M.T.)							
1998	1,581	19	457	173,223	186,293	361,573	997,841
1999	2,215	27	661	168,205	189,192	360,300	1,048,679
2000	2,689	40	806	157,386	168,398	329,319	1,100,902
2001	7,469	46	4,336	184,868	156,583	353,302	1,220,456
2002 *						386,678	1,338,175
Ave. Share							
ARMM	**1.0%**	**0.0%**	**0.4%**	**48.7%**	**49.9%**	**100%**	
Ave. Share							
Phil	**0.3%**	**0.0%**	**0.1%**	**15.7%**	**16.0%**	**28.4%**	
TOTAL							
Value ('000)							
1998	130,559	1,112	2,780	463,408	458,490	1,056,349	26,429,525
1999	170,776	1,501	19,830	523,046	586,277	1,301,430	29,046,054
2000	165,484	2,085	40,799	539,801	482,044	1,230,213	32,183,390
2001	215,171	2,731	69,810	676,398	551,557	1,515,667	36,883,415
Ave. Share							
ARMM	**13.4%**	**0.1%**	**2.6%**	**43.2%**	**40.7%**	**100%**	
Ave. Share							
Phil	**0.5%**	**0.0%**	**0.1%**	**1.8%**	**1.7%**	**4.1%**	
Price (P/kg)							
1998	82.58	58.53	6.08	2.68	2.46	2.92	26.49
1999	77.1	55.59	30	3.11	3.1	3.61	27.7
2000	61.54	52.13	50.62	3.43	2.86	3.74	29.23
2001	28.81	59.37	16.1	3.66	3.52	4.29	30.22

** from the websit of MEDCO*

Source: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Mindanao Economic Development Council (MEDCO) at http://www.medco.gov.ph
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000
Bureau of Agricultural Statistics, Department of Agriculture 1997. Philippine Fisheries Profile, 1997 to 2002
Bureau of Agricultural Statistics, Department of Agriculture 2001. Fisheries Statistic of the Philippines, 1997-2001.

Although the region accounts for about 29 % of the national aquaculture production, its share in the total value is only 4 percent. This indicates that the majority of the products are seaweeds. On the other hand, three provinces, namely, Maguindanao, Lanao del Sur, and Basilan increased their production of aquaculture during the last seven (7) years, but the volume transacted in 2001 is still far behind those of Sulu or Tawi-Tawi.

(2) Seaweeds Culture

The seaweeds industry has through the years served as a main income-earner to at least 60% of the population of the island provinces in ARMM. The region's geographic placement, which put significant limitations in terms of access to basic services, has turned to its advantage with the emergence of the seaweed industry. This industry has kept the communities afloat during times of economic difficulties. This has gained a niche in the market for the region not only vis-à-vis the other regions of Mindanao (where the ARMM accounts for 74% to the total Mindanao production of 2,886,376 MT) but in the country as a whole where it shared 48% to the total production volume of 4,426,430 MT over a 6-year period (Table 3-30). Worldwide, the Philippines emerged as the top three major seaweeds producer in year 2000 with its share of 7.94% of the total production of 7.8 MT after China (62.68%) and Japan (8.25%) [*DA-AMAS website, as cited by BFAR, 2003*].

Table 3-30 Seaweed Production By Region, Philippines, 1997-2002

Year	Region IX		ARMM		Mindanao		Philippines	
	Production (Ton)	(%) of Philippines	Production (Ton)	(%) of Philippines	Production (Ton)	(%) of Philippines	Production (Ton)	(%) of Philippines
1997	90,283	13.7	355,576	54.1	446,998	68.0	657,292	100.0
1998	118,611	17.3	359,951	52.5	479,547	70.0	685,336	100.0
1999	125,957	18.1	357,765	51.4	497,781	71.5	696,112	100.0
2000	114,354	16.2	326,819	46.2	460,049	65.1	707,039	100.0
2001	100,182	12.7	350,560	44.6	477,381	60.8	785,795	100.0
2002	105,811	11.8	383,608	42.9	524,611	58.6	894,856	100.0

Source: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000
Bureau of Agricultural Statistics, Department of Agriculture 1997-1998, 1999, 2000, 2001, 2002. Philippine Fisheries Profile, 1997-1998, 1999, 2000, 2001 & 2002.
Bureau of Agricultural Statistics, Department of Agriculture 1998. Philippine Fisheries Profile, 1998.
Bureau of Agricultural Statistics, Department of Agriculture 2001. Philippine Fisheries Profile, 2001.
Bureau of Agricultural Statistics, Department of Agriculture 2002. Philippine Fisheries Profile, 2002.
Bureau of Agricultural Statistics, Department of Agriculture 2001. Fisheries Statistic of the Philippines, 1997-2001.

By culture environment (Table 3-31), seaweeds farming emerged as the most dominant aquaculture activity in ARMM, contributing 99% of the total aquaculture production. Of this, Tawi-Tawi and Sulu contributed the most share at 50% and 49%, respectively.

Brackishwater fishponds followed with a contribution of only 0.5 percent. These fishponds are found mostly in the Province of Maguindanao (89%) and Basilan (10%). Aquaculture activities in freshwater fishponds, freshwater fishcages, freshwater fishpens, marine fishcage and marine fishpen did not make significant contributions to total output.

Table 3-31 Production of Aquaculture by Culture Environment, by Province, ARMM, 1995-2001

Production (M.T.)	1995	1996	1997	1998	1999	2000	2001	Ave. 1995-01
MAGUINDANAO	**543**	**975**	**1,708**	**1,581**	**2,215**	**2,689**	**7,469**	**2,454**
Brackishwater fishpond	527	945	1,680	1,555	2,169	2,020	2,104	**1,571**
Freshwater fishpond	-	10	12	11	18	17	15	**12**
Freshwater fishcage	12	15	13	11	23	25	36	**19**
Freshwater fishpen	4	5	3			15	26	**8**
Seaweeds	-	-	-	-	-	612	5,288	**843**
LANAO DEL SUR	**7**	**16**	**11**	**19**	**27**	**40**	**46**	**24**
Brackishwater fishpond	2	7	6	9	13	19	22	**11**
Freshwater fishpond	5	9	4	10	12	19	22	**12**
Freshwater fishcage	-	-	-	-	-	2	2	**1**
Freshwater fishpen	-	-	1	-	2	2	2	**1**
BASILAN	**378**	**565**	**536**	**457**	**661**	**806**	**4,336**	**1,106**
Brackishwater fishpond	29	24	24	22	293	380	509	**183**
Marine fishcage	-	-	-	-	-	-	1	**0**
Marine fishpen	-	-	-	-	-	3	5	**1**
Seaweeds	349	541	512	435	368	423	3,821	**921**
SULU	**178,996**	**156,144**	**173,729**	**173,223**	**168,205**	**157,386**	**184,868**	**170,364**
Seaweeds	178,996	156,144	173,729	173,223	168,205	157,386	184,868	**170,364**
TAWI-TAWI	**164,753**	**178,916**	**181,335**	**186,293**	**189,192**	**168,398**	**156,583**	**175,067**
Seaweeds	164,753	178,916	181,335	186,293	189,192	168,398	156,583	**175,067**
ARMM	**344,677**	**336,616**	**357,319**	**361,573**	**360,300**	**329,321**	**353,304**	**349,016**
Brackishwater fishpond	558	976	1,710	1,586	2,475	2,419	2,635	**1,766**
Freshwater fishpond	5	19	16	21	30	36	37	**23**
Freshwater fishcage	12	15	13	11	23	27	38	**20**
Freshwater fishpen	4	5	4	4	7	17	28	**10**
Marine fishcage	-	-	-	-	-	-	1	**0**
Marine fishpen	-	-	-	-	-	3	5	**1**
Seaweeds	344,098	335,601	355,576	359,951	357,765	326,819	350,560	**347,196**

Sources: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries: Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Bureau of Agricultural Statistics, Department of Agriculture. Philippine Fisheries Profile, 1997, 1998, 2001, 2002
Bureau of Agricultural Statistics, Department of Agriculture 2001. Fisheries Statistic of the Philippines, 1997-2001.

The contribution of seaweeds to the total aquaculture production in ARMM in year 2002 reached almost 100 %. It even accounted for 73 % of the seaweed production of the entire Mindanao. Since some of the products attributed and the other regions may actually be from the study area, the share in the total production may be more than 80 %.

Except for Lanao del Sur, all provinces in ARMM engage in seaweeds production (Table 3-32). Tawi-Tawi remained as top producer (50.4%) besting Sulu (49.1%) by a margin of 1.3% over a 7-year period. Basilan ranked third (.0.3%) while Maguindanao, a newcomer to the industry, ranked last (.24%) though not far behind Basilan. Overall, the trend in annual seaweed production in ARMM does not show much variation.

The following table shows the production of seaweeds by province during the period 1995 to 2001.

Table 3-32 Production of Seaweeds on ARMM, 1995-2001

Year	Production (M.T.)					Total	
	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	ARMM	% Increase (decrease)
1995	n.d	n.d	349	178,996	164,753	344,098	-
1996	n.d	n.d	541	156,144	178,916	335,601	(-2.40%)
1997	n.d	n.d	512	173,729	181,335	355,576	6.00%
1998	n.d	n.d	435	173,223	186,293	359,951	1.20%
1999	n.d	n.d	368	168,205	189,192	357,765	(-0.60%)
2000	612	n.d	423	157,386	168,398	326,819	(-8.60%)
2001	5,288	-	3,821	184,868	156,583	350,560	7.30%
Ave. Share							
ARMM			**0.3%**	**49.1%**	**50.4%**	**100%**	

Sources: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000

Farming methods used for seaweeds are hanging spider net monoline, bottom-stake and multiple raft that yields an average of 24 MT per hectare at six croppings per year.

3.5 Agriculture and Fisheries Infrastructure

The Development Framework Plan (Regional Executive Agenda for Peace and Development) for the Autonomous Region in Muslim Mindanao (ARMM) for 2002 – 2004 identifies inadequate infrastructure facilities as one of the key strategic issues.

Despite the current efforts of the National Government to refocus its infrastructure development outside the urban centers of Luzon, Visayas and Mindanao, ARMM is still in dire need for assistance in order to develop its vital and agricultural support infrastructure facilities.

3.5.1 Irrigation

The irrigation development in the Philippines is under the mandate of the National Irrigation Administration (NIA). The agency has four classifications of irrigable areas defined as follows:

a. Potential Irrigable Area – the total area that could possibly be developed regardless of sufficiency in the supply of irrigation water from identified surface water sources;

b. Design Area – the total area that can be irrigated after discharge analysis of proposed sources have been conducted and dependable flow determined;

c. Service Area – the actual area provided with irrigation and drainage facilities after completion of construction work; and

d. Irrigated Area – the actual area provided with irrigation during the wet and dry seasons. This information is generated based on an annual inventory.

The potential irrigable area in ARMM is recorded at 196,345 hectares (Table 3-33). To date, only 28,485 hectares have been developed for an overall development rate of only 14.51 percent. Table 3-34 shows the distribution of these areas by province for the National and Communal schemes as well as those privately owned and areas irrigated by pumps.

Table 3-33 Potential Irrigable Area and Development Rate, by Province, ARMM

Province	Potential Irrigable Area (Has)	Existing Number and Service Area (Has)						Dev't. Rate (%) (%)
		NIS		CIS		PIS and Private	Total	
		No.	Area (Ha)	No.	Area (Ha)	Area (Ha)	Area (Ha)	
Maguindanao	146,365	5	15,843	32	5,228	1,130	22,201	15.17
Lanao del Sur	40,186	1	3,740	8	1,192	0	4,932	12.27
Basilan	996	none	none	5	280	27	307	30.82
Sulu	2,710	none	none	9	666	33	699	25.79
Tawi-Tawi	6,049	none	none	9	322	24	346	5.72
Total	**196,345**	**6**	**19,583**	**63**	**7,688**	**1,214**	**28,485**	**14.51**

Source: NIA – PIO data as of April 2003

The list of the existing national irrigation systems are as follows:

Table 3-34 Existing National Irrigation Systems (NIS) by Province, ARMM

Province / Name of System	Covered Municipalities	Service Area (Has)	Actual Irrigated Area CY 2003 (Has)		Remarks
			Wet	Dry	
Lanao Sur					
1. Rugnan RIS	Molondo, Tarake, Poona and Lumba Bayabao	3,740	0	0	Non operational; programmed for rehab under SPISP and GAA funds
Sub-total		**3,740**	**0**	**0**	
Maguindanao					
1. Kabulnan RIS	D. Piang, Kabuntalan, S. Aguak	11,000	8,000	4,571	See reason cited below
2. Alip RIS	Datu Paglas	3,000	3,000	2,538	Includes banana area of 986 has
3. Pagalungan RIS	Pagalungan	400	600	100	Wet includes rainfed area
4. Talayan RIS	Talayan	700	628	300	See reason cited below
5. Libungan RIS	Gayunga	743	743	743	Area reflected is for Maguindanao only
Sub-total		**15,843**	**12,971**	**8,252**	
Basilan	*none*	*None*	*none*	*none*	
Sulu	*none*	*None*	*none*	*none*	
Tawi Tawi	*none*	*None*	*none*	*none*	
Total		**19,583**	**12,971**	**8,252**	

Source: NIA – PIO data as of April 2003

It will be noted that the total service area is not provided with irrigation water even during the wet season. The reason is that farmer beneficiaries were unable to plant during the period due to lack of capital. Some farmers have also changed crops from palay to others crops that do not need irrigation, like high value cash crops during the wet season.

3.5.2 Barangay and Farm to Market (local) Roads and Bridges

While the paved ratio of the local road network (barangay and farm to market roads) in Mindanao is considered the lowest at 3.8% (DPWH 1998 data) among the three (3) island groups of the Philippines, the situation of these roads in ARMM is even worse. Table 3-35 below shows the paved ratio of the local roads by province. Overall, paved ratio in ARMM stands at only 1.5%, which is much lower than the 3.8% for Mindanao as a whole.

Table 3-35 Existing Barangay and Farm to Market (local) Roads in ARMM

Province	Paved (kms)	Unpaved (kms)	Total (kms)	Paved Ratio (%)
Maguindanao	35.00	1,015.00	1,050.00	3.3
Lanao del Sur	16.00	3,693.44	3,709.44	0.6
Basilan	10.44	201.90	212.34	4.9
Sulu	18.00	637.00	655.00	2.8
Tawi-Tawi	9.51	328.46	337.97	2.8
Total	**88.95**	**5,875.80**	**5,964.75**	**1 5**

Source: DAR-ARMM *and DAR ARMM Project Documents*

Data on the inventory and status of local bridges in the provinces are not available. Only bridges along national highways and provincial roads are covered by available provincial profile and other documents. Hence, there is a need to identify and conduct an inventory of these facilities on a per municipality basis in a further study.

3.5.3 Fishing Ports, Wharves and Fish Landing Facilities

The major means of transportation in the island provinces of Basilan, Sulu and Tawi Tawi are various types of seacrafts. These sea transports are not only vital for passengers but also of more importance in the movement of cargo, particularly marine products. These seaport facilities is the major factor supporting the socio-economic activities in the region.

The Port of Polloc in the province of Maguindanao is the main port facility for cargoes to and from the mainland provinces of Lanao Sur and Maguindanao and the city of Marawi. The port of Jolo accounts for the bigger share of coastwise trade particularly seaweeds. Table 3-36 shows the distribution of existing ports by province.

Table 3-36 Existing Ports by Category, by Province, ARMM, 2002

Province	Type and Number of Ports					
	Port of Entry	Sub-Port of Entry	Municipal Port	Municipal Commercial Port	Municipal Fishing Port	Commercial Fishing Port
Maguindanao	1	1	3	4	3	none
Lanao del Sur	none	none	33	33	6	none
Basilan	none	1	none	none	42	7
Sulu	none	2	18	42	3	none
Tawi-Tawi	none	2	10	10	10	none
Total	**1**	**6**	**64**	**89**	**64**	**7**

Source: ARMM Socio Economic Profile 2000; BAS, Isabela City, Basilan; List of PHF established in ARMM (1997-2001), BFAR-ARMM

It will be noted that eight (8) of the municipal fishing ports and one (1) sub-port of entry in Basilan are located in Isabela City while the sub-port of entry in Maguindanao is in the city of Cotabato. Both cities are not part of ARMM. This means that the operation, management and regulation of these ports are outside the jurisdiction of the ARMM Regional Ports Management Authority (RPMA) but rather under the coverage of the Philippine Ports Authority (PPA) at the National Level. Considering that majority of the users of these ports are ARMM constituents, there is a need to clearly define the roles and responsibilities of the Ports Authority of ARMM and the PPA to ensure proper accountability and sustain the facilities, specially if further improvements are necessary.

Although most of these facilities are reported to be insufficient in capacity and need further improvement and rehabilitation, the physical status of these ports could not be determined unless actual inspection is done. In addition, it is not clear whether the data for Lanao del Sur is inclusive of Marawi City which has a share of the area of Lake Lanao along its southern boundary.

Aside from these ports, a number of timber ports were also provided by the IBRD and OPEC funded Special Zone of Peace and Development (SZOPAD) Project to different ARMM provinces. As of October 2003, it has completed the following sub-projects in ARMM:

Table 3-37 Completed SZOPAD Social Fund Timber Ports, by Province, ARMM

Province	No. of Timber Ports	Total Cost (mPhP)
Maguindanao	1	1.55
Lanao del Sur	0	0.00
Basilan	8	7.48
Sulu	5	4.45
Tawi-Tawi	10	8.49
Total	**23**	**21.96**

Source: SZOPAD Social Fund Updates as of October 2003 (now ARMM Social Fund)

These timber ports are usually provided with pedestrian timber walk bridge leading towards timber pier heads at the end and deeper section of the coast. The main purpose of these ports are for fish landing by small-scale fisher folks.

3.5.4 Other Agriculture and Fisheries Facilities *(Post Harvest Facilities)*

The region is endowed with vast agricultural and fisheries resources, hence basically an agri-fish based economy. An inventory obtained from DAF-ARMM show the following Post Harvest Facilities (PHF).

Table 3-38 Existing Agri-Fisheries Post Harvest Facilities by Province, ARMM, 2002

Province	Warehouse	Drying Pavement	Stilt Drier	Mech'l Drier	Cold Storage
Maguindanao	1	n.a	12	1	2
Lanao del Sur	n.a.	n.a	n.a	none	3
Basilan	n.a.	38	n.a	none	?
Sulu	11	21	22	none	11
Tawi-Tawi	1	-	37	none	3
Total	**13**	**59**	**71**	**1**	**19**

Source: DA summary list of program implementation for Sulu; BFAR list of PHF 1997-2001; DA Region IX PHF data for Basilan

The lone mechanical drier in the province of Maguindanao is reported not operational while the present status of the rest of the facilities are not available. Data on cold storage facilities

include those owned and operated by private individuals. It should be noted that the inventory by DAF ARMM of the above facilities does not include those that have been provided by SZOPAD Social Fund to wit:

Table 3-39 Completed SZOPAD Social Fund Warehouses and Solar Dryers in ARMM

Province	No. of Facilities	Total Cost (mPhP)
Maguindanao	37	21.72
Lanao del Sur	19	9.67
Basilan	0	0.00
Sulu	2	1.98
Tawi-Tawi	2	3.22
Total	**60**	**36.58**

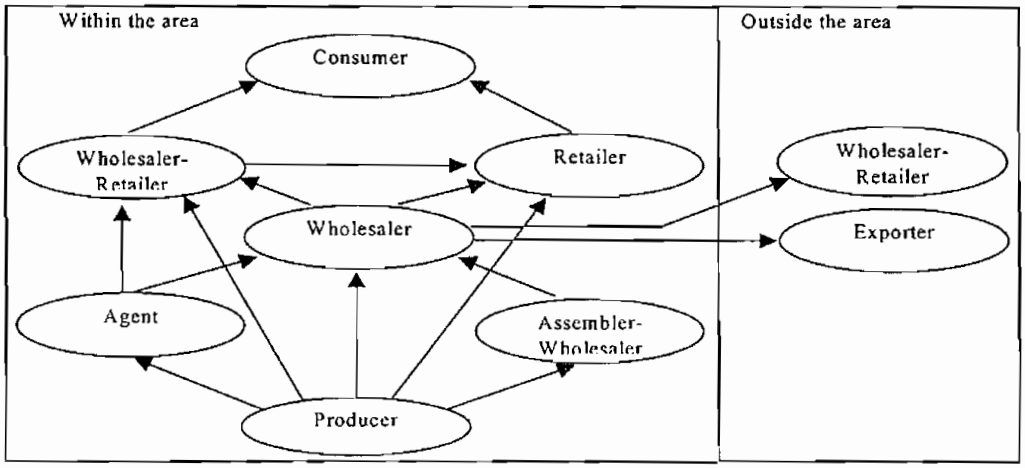
Source: SZOPAD Social Fund Updates as of October 2003 (non ARMM Social Fund)

Access to data on fishing ports and post harvest facilities conducted under either GEM or LEAP of US/AID was not possible and thus not included in this report.

3.6 Markets and Marketing

As a general rule, the marketing system for agricultural commodities is under a relatively free atmosphere. The government do not exercise any control in the determination of commodity prices. The marketing channel is characterized by multiplicity of intermediaries. Farm produce would be sold by farmers to local assemblers then to a local wholesaler who in turns sell it to a bigger wholesaler operating in the provincial trading center. The commodity would eventually find its way to a wholesaler-retailer within and without the region and retailers within the region. The following schematic diagram shows the present generalized flow of agricultural commodities produced in the region.

Fig. 3-4 Schematic Flow of Farm Products



3.6.1 Markets of Major Agricultural and Fisheries Products

(1) Agricultural Commodities

There are a number of agricultural commodities produced in the region that could be sold to the market outside of the province where it is produced. These commodities are coconut, cassava, corn, coffee, banana and rubber in farm products and seaweeds and a variety of fish in fisheries products. Few information and document written about marketing of agriculture and fishery commodities produced in ARMM were found during the study. Therefore, the marketing situation were generally grasped through interviews of staff concerned. The following give general marketing situation of major commodities in the area.

Coconut: Coconut is usually processed into copra before they are sold off farm. The buyers would either be local assembler/wholesaler who in turns sell to other wholesalers for the export market or for sale to local processors. Local processing facilities, however, are all located outside ARMM.

Rubber: This is produced in Basilan and to some extent in Maguindanao, follows the same pattern as in the trade of copra. However, the rubber producers in Basilan based on cooperatives at ARC level, (beneficiaries of former plantations) have associated with other organizations including Zamboanga City-based to improve also their market paower. Although, the association is not yet close net, it is trying to gain for members higher price for their output as well as help improve the technology, especially in tapping and on-farm processing (smoking, etc.)

Cassava: Its primary end-users in the region are those who use it as their staple crop. This is especially true in the island provinces. Although there is a market for cassava as an industrial crop, the local processors, especially the alcoholic beverage producers, secure these from contract growers or cooperatives. Specific standard in regard to the dried cassava chip has to be adhered to. Some producers in the provinces of Lanao del Sur and Maguindanao also have contract with the local processors.

Coffee: Coffee would have a market in the area where they are produced and within the region. Excess of local requirements would find its way to the nearest buying station that is maintained by Nestlé Philippines (if within Nestle quality standard) or wholesaler outside the region.

Banana: Banana has its own market. With the success of the Cavendish banana project in other places in Mindanao, a plantation with foreign investment has been established in Maguindanao and recently started exporting the commodity. This has raised interest on the variety in the other provinces of the region.

Rice and White Corn: Rice and white corn are staple cereals. These are primarily consumed in the region. Any excess production, especially in the mainland provinces, would be sold to local markets.

Market flows of some commodities (i.e., corn, banana, coffee and rubber) in Mindanao region are presented in Attachment Figures 30-34.

(2) Fishery Commodities

The fishery commodities of the ARMM under various culture environments include seaweeds, milkfish, tilapia, tiger prawn, mudcrab and many others. These commodities are shown in Annex Table 38.

Seaweed: Seaweed is the most important aquaculture commodity of ARMM. Two varieties of seaweeds cultivated are *Eucheuma cottonnii* (*Kappaphycus alverezzi*) and *Eucheuma spinosum*. The *E.cottonnii* is the major variety, which is produced on a commercial scale constituting 99.97% (Table 3-40) of the total seaweeds production in ARMM. This variety is used mostly for industrial purposes such as food additive; manufacture of pharmaceutical products and consumer products like shampoos, toothpastes and creams; curing of leather products, sizing materials for textiles, growing medium for bacteria, etc. The *E. spinosum* is otherwise known as the table seaweed for home consumption.

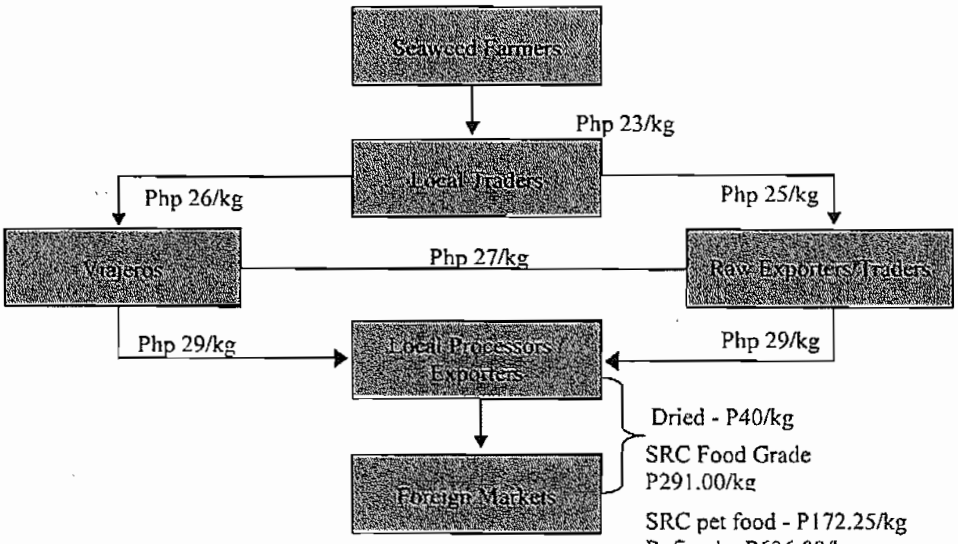
Table 3-40 Production of Seaweeds in the ARMM by Type, 1995-2001

Year	*E. cottonnii*		*E. spinosum*		TOTAL	
	Metric Tons	Percent	Metric Tons	Percent	Metric Tons	Percent
1995	344,059	99.99%	39	0.01%	344,098	100
1996	335,542	99.98%	59	0.02%	335,601	100
1997	355,527	99.99%	49	0.01%	355,576	100
1998	359,912	99.99%	39	0.01%	359,951	100
1999	357,759	100.00%	6	0.00%	357,765	100
2000	326,819	100.00%	-		326,819	100
2001	350,061	99.86%	499	0.1%	350,560	100
Ave '95-01	**347,097**	**99.97%**	**691**	**0.03%**	**2,430,370**	**100**

Sources: Bureau of Agricultural Statistics, Fisheries Statistics Division, Department of Agriculture 2002. Fisheries Database Autonomous Region of Muslim Mindanao (ARMM), 1995-2001
Bureau of Agricultural Statistics, Autonomous Region of Muslim Mindanao. Table on Fisheries Production by Sector and by Province, ARMM, Philippines, 1981-2000

Harvested seaweeds reach local markets and top export destinations such as the U.S.A., France, China, Korea, and Hongkong following is the marketing flow shown below.

Fig. 3-5 Marketing Flow of Dried Seaweeds

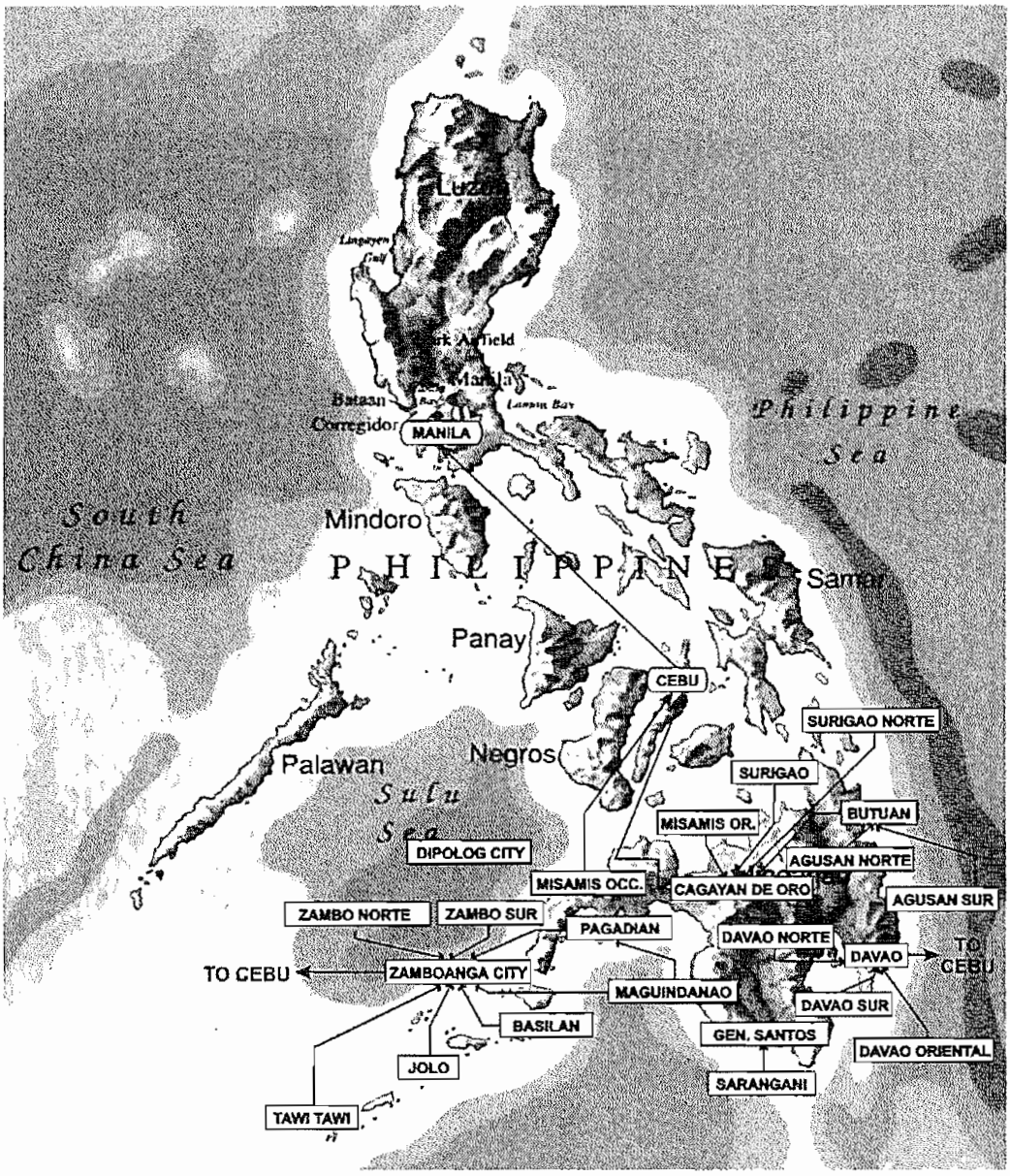


Source: SIAP SIAP

Note: 7 kgs. of fresh seaweeds = 1 kg. dried

On the other hand, the commodity flow in the country is shown as follows:

Fig. 3-6 Distribution Channels for Seaweeds



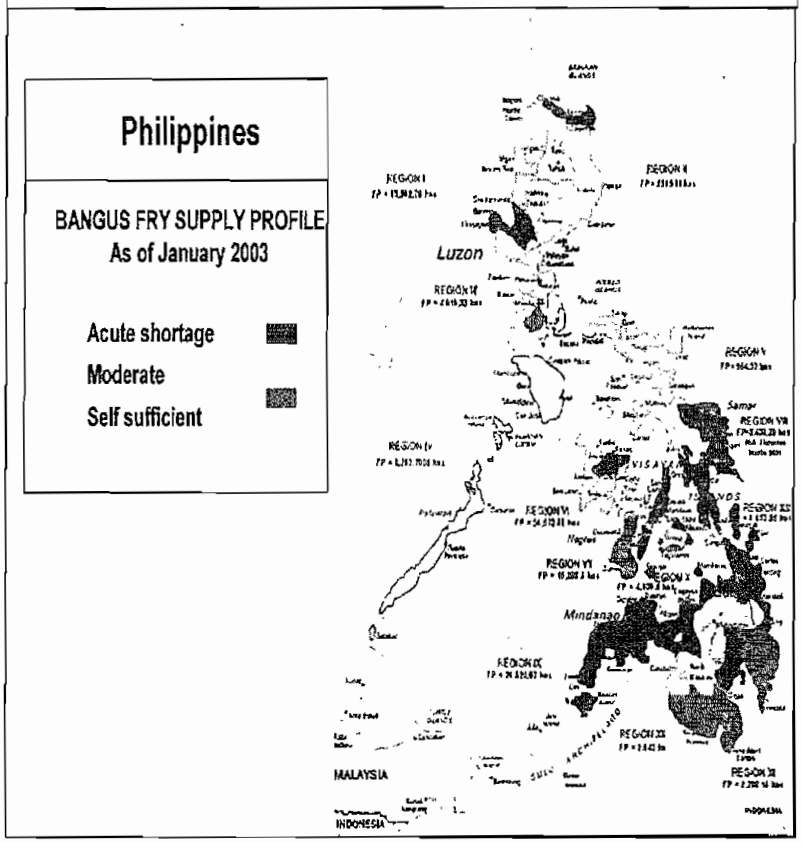
Source: Department of Agriculture (DA), 2003

Milkfish, Tilapia and Tiger Prawn. Aside from seaweeds, the other fishery products in ARMM are milkfish (9,309 MT) tilapia (1,791 MT) and tiger prawn (1,207 MT). Like Regions 10, 11 and CARAGA, ARMM also experienced a supply gap of 4,755 MT in year 2002. It posted a milkfish supply of 2,144 MT which was inadequate to provide for its annual requirement of 6,899 MT. According to the DA, this shortage in milkfish or bangus supply (Figure 3-7) as well as tilapia is due to the following:

- Degeneration of quality of fingerling stocks due to inbreeding

- Insufficient supply of quality bangus and tilapia fry/fingerlings
- High cost of farm inputs
- Lack of manpower to effect technology transfer to the municipal level
- Multiple marketing layers which stands between producers and consumers
- Lost opportunities to participate in global market for value-added product.

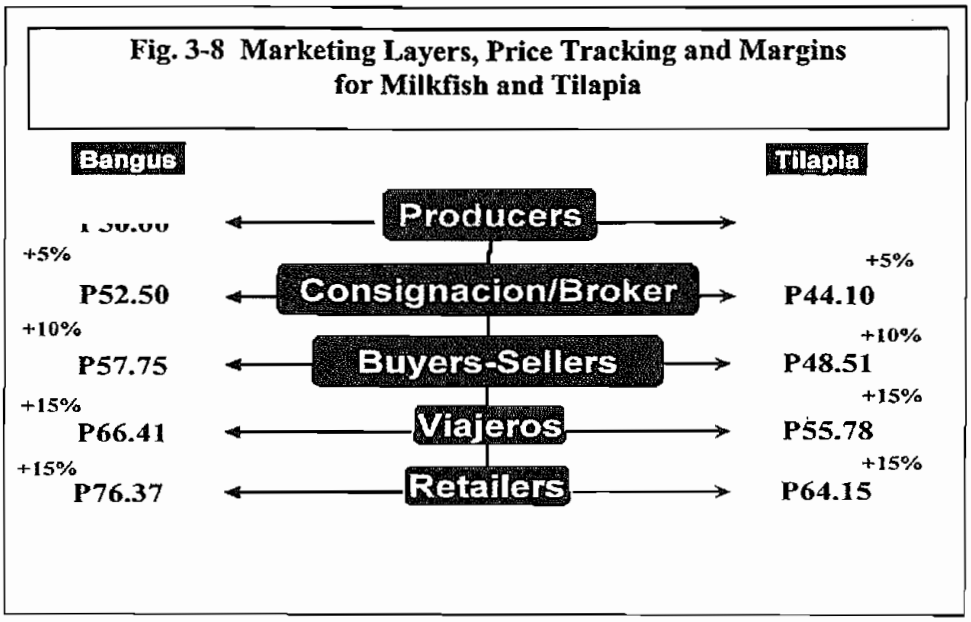
Fig. 3-7 Bangus Fry Requirement per Region, 2002



Source: Department of Agriculture, 2003

The marketing layers, price tracking and margins for milkfish and tilapia culture are shown in Figure 3-8.

Fig. 3-8 Marketing Layers, Price Tracking and Margins for Milkfish and Tilapia



Source: Department of Agriculture, 2003

3.7 Problems and Constraints in the Agriculture and Fisheries Sector

3.7.1 General

Based on the assessment of present condition, the main problems that keep farmers and fisher folks in the area being at the subsistence level converged into three (3) points.

a. Low productivity and poor quality in Agriculture and Aquacultur products

b. Limited opportunities to improve the livelihood of farmers / fisher folks

c. Inefficient utilization of the resources available in the area

These main problems were further analyzed and the following were identified as the crucial causes.

Main Constraints	Related Causes
1. Low productivity (Agriculture and Aquaculture)	Lack of irrigation systems Limited knowledge / information on modern/integrated farming Inefficient support service Lack of capital, Lack of access to improved farm inputs
2. Limited opportunity (Marketing, Post-harvest, Quality improvement, etc.)	Poor accessibility and lack of transportation facilities Lack of credit scheme Poor quality of product Lack of information on market prospects and price
3. Inefficient utilization of the resources in the area (New area development, organizational setting, Possible development, etc.)	Peace and order situation Inefficient management capability (government & coops) Lack of information Lack of capital Policy conflict

The following sections give the existing issues, problems and constraints in each sub-sector.

3.7.2 Agricultural Production and Extension

The problems and constraints in agriculture are classified into three (3) namely; i) production activity, ii) support service, and iii) marketing activity.

(1) Production Activity

Peace and Order: One major constraint to production is the peace and order situation. This is especially true in areas where armed conflict between government forces and different lawless elements or rebel groups. The conflict force farmers to abandon their farm lands and hamper activities of agricultural and fisheries extension workers.

Farming Practice: Lack of capital and poor accessibility to improved farm input as well as extension and/or support services are also major causes keeping farmers in doing the traditional farming practice. On the other hand, it is also true that the practices shown in demonstration farm is sometimes far beyond what farmers are doing in their farm. Therefore, a practical / low cost farming practice should be emphasized rather than introducing the modern farming practice adopted in other areas.

Seeds: ARMM government has not been able to supply all the certified seeds required in the region. The provision of certified seeds of palay as well as corn is very limited.

Irrigation Schemes: In the implementation of the GMA Rice program, the lack of irrigation facilities has been a bottleneck to the attainment of production and productivity goals. Rice farmers usually go on with the traditional farming practices under rain-fed condition.

Upland farming: Farmers in the upland areas like those in the island provinces and Lanao del Sur have limited opportunities to improve their livelihood. Those in the island provinces have preference to sweet and white flint corn variety rather than yellow corn. White flint corn is generally planted in upland area under a traditional method neither is improve hybrid seeds available. It is also the same story with cassava. Although these are suitable in the upland and cultivated as mono crop. Diversification or integration would be promoted to improve the condition. In addition, soil conservation should also be taken into account.

(2) Supporting Service

Extension: In terms of organizational structure, research and extension services are in place. However, the personnel complement for research work is limited and thus output of adaptive research is limited. This in turn impinge on the work of the extension workers, although the number of workers in both Regional and local government units is relatively satisfactory as compared with those in other regions. Training of these workers also needs to be done to strengthen and upgrade their knowledge, especially in terms of technology that would be adaptable to the local environment.

At present, ARMMIARC has just been established and the R, D & E has yet to be fully functional. In particular, there is no training facility in the ARMMIARC as well as other branches under DAF-ARMM. This would be one of the constraints on strengthening the capability of extension workers (agricultural technicians and MAOs) as well as farmers in the region.

At the field level, ATs and MAOs have often faced difficulties in extension works due to insufficient budget allocation supporting their activities and lack of transportation facilities combined with poor road condition.

Credit: Another constraint is with respect to the delivery of credit to support farmers' production activities. As described in the Chapter 3, the formal credit institutions for serving the agriculture-fishery sector is limited and most branch offices of these institutions are located in the center of province / town. It would be very difficult for the farmers who reside in the remote area to make use of these institutions. In addition, there is also a belief among farmers that the criteria set by the institution for access are difficult and the interest rate on loans high.

Activity of Private Sector: One of the constraints caused by the peace and order problem is the limited activity of private sector (including NGOs). In other regions that are safer for them, the private sector plays vital role in providing useful information, supporting farmers and strengthening farmer's capability.

(3) Marketing

The problem in marketing is quite similar to those that exist in the other areas of the country and that is the low price offered by buyers during peak harvest season. This of course is highly related to available infrastructure, both in terms transport and communication. Poor

accessibility has made the buying price of buyers lower and available market outlets limited. The remoteness has put farmers limited access of market information (price, quality, possible buyers, trend, etc.)

The small farmer has generally less power to negotiate for better price. The need is for a group to be formed so that as such they could be in a better negotiating position. They could do this with a larger volume of produce. It is noted that in the case of the rubber in Basilan, an association have provided information on prevailing prices to its members so that members could negotiate a better price. The association also aims to enter into collective selling in the future.

3.7.3 Fishery

Despite the vastness and richness of the fishery resources of the ARMM as well as the powers[4] vested in the local government units as prime managers of their municipal waters, there are issues and constraints that inhibit the maximum fishery development in the region. These issues and/or constraints relate to coastal or fishery resource management practices, production; institutional, financial and technical capability; biophysical condition of natural resources, socio-economic condition of communities, and political factors. The details of these issues and constraints are shown in Table 3-41.

Table 3-41 Issues and Constraints in the Fisheries Sub-Sector in the ARMM

Issues and Constraints	Maguin-danao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	DA-BFAR[5]
Coastal/Fisheries Management Practices	•	•	•	•	•	•
• Encroachment of commercial fishing vessels	•	•	•	•	•	•
• Laxity in the implementation of ordinances and resolutions resulting to illegal fishing, use of extractive and harmful fishing practices and gears.	•	•			•	•
• Poor coastal/fisheries resource management inclusive of quarrying and proper waste management.	•		•	•		

[4] Local Government Code of 1991 (Republic Act No. 7160), the Philippine Fisheries Code of 1998 (Republic Act No. 8550), and Muslim Mindanao Act No. 86

[5] Issues and constraints as seen by the DA-BFAR based on documents gathered

Issues and Constraints	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	DA-BFAR[6]
Institutional Capability	•	•	•	•	•	•
• *Law enforcement.* Lack of competencies, logistics and equipment in law enforcement			•	•	•	•
• *Policy/law enforcement.* Absence/lack of updated municipal fisheries ordinances (MFO)	•	•	•			•
• Inadequate *research, development, and extension* services for seaweeds			•		•	•
• *Capability-building program.* Lack of capability-building programs for poor fishermen/seaweeds farmers					•	
• *Physical.* Limited capacity of commercial fishing vessels for high sea/offshore fishing			•			
Production			•	•	•	•
• Insufficient/lack of post-harvest facilities (PHF)*			•	•	•	•
• High cost of inputs			•	•	•	•
• Seaweeds diseases				•	•	•
• Poor quality of seaweeds				•	•	
• Insufficient supply of bangus and tilapia fry/fingerling			•			•
Financial Capability			•	•	•	•
• Lack of funds for expansion/upgrading to produce quality seaweeds, improve farming practices and livelihood activities			•	•	•	•
• High cost of transportation/handling of product from point of origin to destination						•
Biophysical Condition	•	•			•	•
• Destruction of coral reef and low fish productivity	•	•				•
• Affected biodiversity (with the introduced cyprinid predator fish in Lake Lanao)		•				
• Forest denudation resulting to siltation	•					
Political	•	•		•		•
• Unstable peace and order condition and loose firearms	•	•		•		•
• Political intervention						•
• Less participation and support by LGUs on fishery/coastal resource management and non-passage of a national policy on municipal water delineation						•

[6] Issues and constraints as seen by the DA-BFAR based on documents gathered

Issues and Constraints	Maguin-danao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	DA-BFAR[7]
Technical Capability			•	•		•
• Limited market information				•		•
• Use of traditional farming method due to lack of infusion of contemporary technology esp. seaweeds and fishpond production.			•	•		
• Strong reliance on middlemen in the marketing of fishery products			•			
Socio-economic Condition of Community					•	
• Low income of fisher folks/farmers					•	
• Lack of livelihood assistance and alternative fishery livelihood					•	
Market Conditions						•
• Increasing competition at the international market (with Malaysia, Indonesia, Africa)						•
• Multiplicity of middlemen						•

NOTE: Blank cell means information not available and does not necessarily mean that the issue/constraint do not exist in the province.

** solar dryer for seaweeds, fishports, wet market, cold storage facilities*

Sources: Provincial Fisheries Profile of Basilan, 2002, 2001, 2000
Provincial Fisheries Profile of Tawi-Tawi, 2002
Fisheries Profile for Illana Bay (undated)
Comprehensive Development Plan of Tawi-Tawi
The Basilan Marine/Aquaculture Industry
Fisheries Survey Questionnaire
The Fisheries Profile of Illana Bay (draft report)
Interviews

3.7.4 Agricultural Infrastructure and Related Facilities

The development problems and constraints in Infrastructure and related facilities for the Agriculture - Fishery sector are basically similar to all other sectors. However, the negative impact of the infrastructure constraints is for greater in agriculture-fishery as these are closely related to production. Besides, the improvement of facilities requires huge financing and takes time to accomplish.

(1) Present Capacity of Rural Infrastructure

Most of the existing facilities provided by DAF ARMM and other supporting agencies were based on the actual needs of the locality as community based project identification is

[7] Issues and constraints as seen by the DA-BFAR based on documents gathered

generally practiced by implementing agencies and to some extent, the LGUs. However, assistance provided for these facilities is not enough since the potential of the region is huge and funding provided even under the foreign assisted projects are limited. As Section 3.5 indicated, there would still be a need to develop irrigation systems in the area. The number and capacity of available agricultural and fisheries facilities pales in comparison with requirements. Improvement and provision of additional facilities would be needed to ensure the development of the agriculture-fishery based economy of ARMM.

(2) Issues and Constraints in Implementation

In terms of implementation, the common problems, and constraints encountered by the LGUs and implementing agencies are summarized as follows:

a. the prevailing unstable peace and order situation in some municipalities of ARMM affects the implementation of funded projects in support of agriculture-fishery sector;

b. funding constraints in the implementation of vital agriculture-fishery sector support projects in ARMM;

c. even if foreign financing is available, implementation of projects are commonly delayed by the limited availability of GOP counterpart funds;

d. difficulty of the LGUs to provide equity contribution for nationally funded projects as required by NEDA;

e. inadequate and untimely release of funds for project implementation; and

f. difficulty and high cost of transport of construction materials to island provinces

(3) Maintenance of facilities

The sustainability of existing infrastructure facilities, especially farm to market roads is a bigger issue as these are increasingly deteriorating due to the absence or minimal maintenance funds from the LGUs. Although this is common to LGUs nationwide, it is more pronounced in the ARMM. Majority of these ARMM LGUs are classified under the 5th to 6th class municipalities and their internal revenue allocation (IRA) are usually enough only to pay for personal services i.e. salaries and wages, with almost nothing left for development purposes. Budget provided to ARMM Line Agencies by the National Government are likewise deficient and could not finance development projects.

Irrigation facilities are operated and maintained by the Irrigators' Service Associations (ISA) and some PHF, by proponent farmers organizations. Although some facilities are well maintained, there is need to enhance the capability of these organizations in terms of instilling a sense of ownership and capacity building in the O and M of agri-fishery infrastructure support facilities. Hence, any development project implemented in ARMM should always include a package of institutional and community organizing work.

(4) Organizational Aspects

In terms of its current organizational structure, the NIA provincial offices (PIO) in Lanao del Sur and Maguindanao have the necessary manpower, equipment and technical capability in implementing communal irrigation schemes. In contrast, the island provinces of Basilan, Sulu and Tawi Tawi have no PIOs since the islands' existing and potential irrigable areas are too small to support the establishment of a regular provincial irrigation office. Hence, implementation of irrigation schemes in the island provinces are done through a Memorandum of Agreement between the NIA Regional Office IX and the provincial LGUs. This kind of indirect implementation has often jacked up the project cost and cause delays in project implementation.

The municipal LGUs are supposed to be the main body for farm-to-market road development. However, the municipal LGUs generally lack the capability to implement projects due to non-availability of technical manpower and competencies, equipment and financing. Therefore, the provincial LGUs often provide assistance in the implementation of farm to market roads and even other agriculture and fishery infrastructure support facilities. In some cases, the DPWH ARMM also provide support when requested by the LGUs.

3.7.5 Agrarian Reform

The following problems / constraints found with regard to the implementation of CARP.

1) Lack of clear-cut direction from DAR-ARMM on land acquisition and distribution;

2) There is constant delay in releasing funds from DAR Central office;

3) Capacity building / strengthening the capability of field staff is not sufficient because of lack of budget;

4) Lack of budget also hampers the development of ARCs and sustained implementation of LTI activities.

CHAPTER 4

CURRENT DEVELOPMENT PLANS OF AGRICULTURE AND FISHERIES AGENCIES

4. CURRENT DEVELOPMENT PLANS OF AGRICULTURE AND FISHERIES AGENCIES

4.1 Current Development Plans

4.1.1 Medium-Term Development Plan (2003-2006) of ARMM

As indicated earlier, the agricultural development thrusts closely follow the national as well as regional thrusts, which adopt the strategy of sustainable agriculture and fisheries development. In the region, the Medium-Term Development Plan, 2003-2006 of DAF-ARMM is the development framework plan to support the attainment of the national development framework of AFMP. The specific objectives of the MTDP are:

1. Initiation of farm mechanization through the provision of modern farm equipment for production, preservation and marketing;

2. Improvement of rural accessibility through rehabilitation/construction of farm-to-market road and irrigation facilities;

3. Enhancement of livelihood of rural communities by establishment of strategic market centers so as to support market flow efficiency; and

5. Ensuring the protection and preservation of the environment and equity for small farmers and fisher folks by adopting social and economic adjustment measures.

One of the strategies to be adopted in the MTDP is to take the characteristics of the area into consideration as a basis for the development. Therefore, a strategy of convergence zone development. Under this concept, Maguindanao and Lanao del Sur, with the presence of Cotabato River and the Buluan and Lanao lakes would serve as the potential area for both fisheries and agriculture, notably rice, corn, livestock and plantation commercial crops. Basilan, Sulu and Tawi-Tawi, on the other hand, would be the zone for fisheries and trade. In fact, the municipality of Bongao (Tawi-Tawi) has been the traditional trading center since it has a natural harbor free from wave action. On the other hand, Jolo has traditionally been a trading center as it is strategically located as a market center where transportation services are available to and from Zamboanga City.

Other important strategies recommended in MTDP are as follows:

1. Development of farm-to-market roads, irrigation system, post harvest facilities and other production support to be made available to help the sustainable economic development of the area;

2. Maintenance of peace and order in the region to be carried out effectively and efficiently so as not to impede the development efforts in the growth areas;

3. Leadership of the LGUS in the region to take active role in providing the conducive atmosphere for business and industries through meaningful ordinances and rational taxation;

4. Improvement in the communication system to enhance market linkage and exchange of market information;

5. Rural electrification to be promoted to encourage efficient preservation and processing of agro fishery products while addressing market requirements for quality products; and

6. Watershed areas would be rehabilitated to help ensure efficient functioning of irrigation systems as well as potable water supply.

4.1.2 Development Plans of BFAR

The BFAR-ARMM aims to achieve nine (9) key objectives in year 2003, to wit:

1. To attain increased fish production from sustainable aquaculture and sustained yield of inland fishery within the limits of acceptable environment use;

2. To enhance the quality of life of the marginal users of aquatic resources;

3. To promote long-term sustainability and enhancement of fishery resources;

4. To achieve equitable access to fishery resources for the socio-economic upliftment of subsistence fisher folks;

5. To enforce existing laws;

6. To provide adequate infrastructure and support services;

7. To improve the capabilities of extension workers as well as that of their clientele for smooth satisfactory and cost-effective execution of training/extension program; and

8. To ensure the sustainability of appropriate fishery technologies for adoption by fisher folks, fishery industry and other constituents.

These objectives are to be achieved through five program areas and specific projects as follows:

1. Sustainable Aquaculture and Inland Fishery through the establishment demonstration farms for rice shrimp culture, rice-fish culture and mudcrab culture and fish cage farming project. Rehabilitation/maintenance in inland bodies of water, freshwater seed production and stocking of fingerlings inland bodies of water.

2. Fishery Resources Management through the conduct of coastal resources inventory/assessment, monitoring of fish sanctuaries and artificial reefs/fish refuge, law enforcement, monitoring control and surveillance, establishment of demonstration project on friendly fishing gears and deputation of fish wardens.

3. Fishery Post-Harvesting, Marketing and Infrastructure, e.g., establishment of seaweeds stilt dryers, promotion of value-added products and monitoring and inspection of processing plants.

4. Fishery Training and Extension Services in aquaculture, coastal resource management, post-harvest, law enforcement, other aspects of fisheries. Provision of technical assistance and advisory services on aquaculture, municipal fishing, commercial fishing, post-harvest, other aspects of fisheries.

5. Research and Development on proper monitoring and evaluation and on National Stock Assessment.

Details of the action plan of BFAR-ARMM are shown in Annex D.

4.2 On-going Development Programs / Projects under DAF

The existing programs and projects of DAF ARMM are basically those that are implemented by DA Central and thus assistance from DA Central also obtained. These are: the Agricultural Fisheries Modernization, the Ginintuang Masaganang Ani (GMA) Programs and the foreign assisted Mindanao Rural Development Program (MRDP).

4.2.1 Strategic Agriculture and Fishery Development Zone (SAFDZ)

One of the crucial achievements under the Agricultural and Fisheries Modernization is the classification of the area into different land-use categories so that all lands suitable for the economic and commercial development of agriculture and fishery industry are set aside and protected from unwarranted future conversion from other competing uses. The classification is made based on the natural condition, such as soils, agro-climate, slope, elevation, hydrological situation and present land use. This classification scheme is called Strategic Agriculture and Fishery Development Zone (SAFDZ) and shown on the map. The SAFDZ map would provide the physical basis for the proper planning of sustainable agriculture and fishery development and the identification of suitable crops, livestock and fish that can be economically grown and commercially developed without creating irreversible environmental damage as well as human health problems.

Identification and delineation of SAFDZ was primarily done by the LGU as the AFMA mandates that these be incorporated in their Physical Framework Development Plan. However, DA provided technical assistance to the concerned LGU.

The estimated area of each SAFDZ is based on LGU data rather than calculated from the land capability class map prepared by BSWM. The total SAFDZ area is more often larger than the official estimate of alienable and disposable land reported by the National Census and Statistics Office. The discrepancy lies in the fact that alienable and disposable land in LGU records often exceeds that issued by the Lands Management Bureau of the Department of Environment and Natural Resources. In addition, there would be double counting of area since there are overlapping of municipal boundaries. These remain to be settled and some are in the courts for adjudication.

The SAFDZ maps of the provinces are presented in Attachment Figures 35-39. The land categories and the area distributed to land categories are shown in Annex Table 38 and summarized as follows:

Table 4-1 Area Distribution by SAFDZ Categories

Category <1	Maguin-danao	Lanao Del Sur	Basilan	Sulu	Tawi-Tawi-	ARMM
202,190		95,347	63,496	93,310	33,939	488,282
1,300		0	0	0	0	1,300
41,162		2,529	2,758	19,630	245	66,324
9,766		620	0	0	0	10,387
0		0	0	0	0	0
0		339	0	0	0	339
287		0	0	0	0	287
254,704		98,836	66,254	112,940	34,184	566,918
74,835		102,188	5,404	17,205	23,345	222,977
175,220		186,265	61,065	29,895	51,211	503,656
504,760		387,289	132,723	160,040	108,740	1,293,552

Source: *Bureau of Soils & Water Management (BSWM), DA*
Remark: The areas distributed to each class were adjusted based on the total land area officially registered.
Note: <1 SAFDZ 1: Area to be developed as "Strategic Crop Development Zone"
SAFDZ 2: Area to be developed as "Strategic Livestock Development Zone"
SAFDZ 3: Area to be developed as "Strategic Fishery Development Zone"
SAFDZ 4: Area to be developed as "Strategic Crop/Livestock Development Zone"
SAFDZ 5: Area to be developed as "Strategic Crop/Fishery Development Zone"
SAFDZ 6: Area to be developed as "Strategic Crop/Livestock/Fishery Development Zone"
SAFDZ 7: Area to be developed as "Strategic Fishery/Livestock Development Zone"

Data in the above table indicates that about 60% of the land in Sulu are suitable for crop development while Lanao del Sur has only about 25% or 95,000 ha of the total land suitable for crop development. It will also be noted that about 41,000 ha or 8% of the total land are good for fishery development.

4.2.2 Mindanao Rural Development Program (MRDP)

The MRDP is currently implementing its Adaptable Program Lending I (APL-I) which will terminate by year 2004. It has three (3) more APLs to complete the whole program from year 2005 and beyond. Under APL-I, only the province of Maguindanao in ARMM is covered and the status of implementation is as follows:

Table 4-2 Status of MRDP implementation in Maguindanao Province, APL I

Sub-Project Type	Completed		On-going		Total	
	Physical Target	Cost (mPhP)	Physical Target	Cost (mPhP)	Physical Target	Cost (mPhP)
FMR	13.8 kms	11.1	77.54 kms	73.2	91.34 kms	84.3
Irrigation	498 has	15.2	138 has	4.2	636 has	19.4
Bridge	None	0.0	None	0.0	none	0.0
Total		**26.3**		**77.4**		**103.7**

Source: MRDP Progress Report as of September 2003

An eight (8) km Sarakan – Tangkal FMR rehabilitation in the municipality of Matanog, Maguindanao has been bidded out but not yet awarded.

4.3 On-going Development Programs / Projects under NIA

To date, the National Irrigation Administration (NIA) has one (1) on-going national irrigation project within ARMM. This is being implemented by the 52nd Engineering Battalion of the Philippine Army. This project is the Malaig RIP located in the municipality of Butig of the province of Lanao Sur. (Table 4-3)

There are a few communal irrigation schemes undergoing construction covering about 960 ha of rehabilitation work and 171 ha of new construction. The distribution of these on-going projects by province are in Table 4-4.

Table 4-3 On-Going NIP (only in Lanao Sur)

Name of Project	Province	Category	Municipality	Area	No. of FBs	Status of Implementation
1. Malaig RIP	Lanao Sur	New	Butig	2,750	3,000	Phase I of 450 has still to be implemented by the AFP Eng'g. Battalion
Total	-	-	-	**2,750**	**3,000**	

Source: NIA PIO data as of April 2003

Table 4-4 On-Going CIS Rehabilitation and CIP

Province	CIS Rehabilitation			CIP Construction			Total		
	No.	Area (Has)	Cost (mPhP)	No.	Area (Has)	Cost (mPhP)	No.	Area (Has)	Cost (mPhP)
Maguindanao	3	700.5	11.2	2	15.0	0.6	5	715.5	11.8
Lanao del Sur	1	50.0	nda	3	126.0	Nda	4	176.0	nda
Basilan	1	30.0	1.0	none	0.0	0.0	1	30.0	1.0
Sulu	2	100.0	1.5	1	30.0	1.2	3	130.0	2.7
Tawi-Tawi	2	80.0	7.0	none	0.0	0	2	80.0	7.0
Total	9	960.5	20.7	6	171.0	1.8	15	1,131.5	22.4

Source: NIA PIO data as of April 2003

The Tambu CISs rehabilitation in Maguindanao, is funded by the on-going foreign assisted Mindanao Rural Development Program (MRDP), while the rest are funded under NIA's program on Balikatan Sagip Patubig Program (BSPP) and NIA CARP-IC.

The NIA has no project in the pipeline except for its proposed Five (5) Year Irrigation Development Program from 2003 to 2007.

4.4 On-going Development Programs / Projects under DAR

The Department of Agrarian Reform (DAR) in ARMM has established about 78 ARCs distributed in the five (5) provinces and Marawi City. To support the development of these ARCs, three (3) Foreign Assisted Projects (FAPs) at DAR national level is currently covering about 34 ARCs in ARMM. These three (3) FAPs are the ADB funded Agrarian Reform Communities Project (ARCP), the EU funded Support to Agrarian Reform in Central Mindanao (STARCM) and the Belgian Integrated Agrarian Reform Support Project (BIARSP). However, it should be noted that assistance to these ARCs in terms of rural infrastructure is minimal, while BIARSP only covers rural water supply, agricultural and non-agricultural materials, trainings and a few education related assistance such as books and minor school building repairs. The number of ARCs covered with on-going DAR FAPs are shown in Table 4-5.

Table 4-5 Number of ARC in ARMM Covered with On-going DAR Foreign Assisted Projects

Province		Number of ARC with Foreign Assisted Projects				
	No. of ARC	ARCP	STARCM	BIARSP	Total	% Covered
Maguindanao	18	6	0	0	6	33.3
Lanao del Sur	26	7	7	0	12	44.4
Basilan	14	0	0	9	9	69.2
Sulu	12	2	0	0	2	16.7
Tawi-Tawi	8	5	0	0	5	62.5
Total	**78**	**20**	**7**	**9**	**34**	43.6

Remark: <1 Two (2) ARCs are covered both by ARCP and STARCM
Source: DAR ARMM Profile

To date, only ARCP have completed some sub-projects related to agricultural sector covering 21.34 kms of farm-to-market road and 17.20 linear meters of bridge. About ₱ 224.797 million worth of sub-projects are undergoing implementation at various stages for both ARCP and STARCM. Table 4-6 shows the breakdown of these sub-projects by province and by FAP.

Table 4-6 Completed and On-going Sub-Projects of DAR FAPs in ARMM ARCs

Province	ARCP (Completed)				ARCP (On-going)				STARCM (On-going)			
	FMR		Bridge		FMR		Irrigation		Multi-bldg		Solar Drier	
	km	mPhp	lm	mPhp	Km	mPhp	ha	mPhp	unit	mPhp	unit	mPhp
Maguindanao	6.3	29.1	none	0.0	24.6	61.3	0.0	0.0	-	-	-	-
Lanao Sur	8.0	12.6	17.2	3.6	27.8	89.6	0.0	0.0	1	0.7	1	0.3
Basilan	none	0.0	none	0.0	-	-	-	-	-	-	-	-
Sulu	none	0.0	none	0.0	0.0	0.0	0.0	0.0	-	-	-	-
Tawi Tawi	7.0	12.3	0.0	0.0	17.0	64.3	70.0	8.6	-	-	-	-
Total	**21.3**	**54.0**	**17.2**	**3.6**	**69.3**	**215.2**	**70.0**	**8.6**	**1**	**0.7**	1	**0.3**

Source: ARCP Progress report as of August 2003; STARCM Status Report as of October 2003

Five (5) sub-projects under ARCP are on the pipeline for deliberation by the Sub-project Approval Committee (SAC), while STARCM and BIARSP have no firmed-up pipeline sub-projects to date.

Table 4-7 DAR ARCP Sub-projects on the Pipeline under ARMM

Sub-Project Title	Location	Physical Target (kms)	Estimated Cost (PhP)
1. Dirumuyud-Pedtad FMR const.	Maguindanao	4.5	11.3 million
2. Alamap road construction	Maguindanao	3.6	14.7 million
3. Bagid FMR construction	Tawi Tawi	1.8	11.6 million
4. Bongao road construction	Tawi Tawi	4.8	19.0 million
5. Sibutu road construction	Tawi Tawi	1.2	7.0 million
Total		**15.9**	**63.6 million**

Source: ARCP Progress Report as of August 2003

4.5 SZOPAD Social Fund and ARMM Social Fund Projects

The Special Zone of Peace and Development (SZOPAD) Social Fund is a World Bank – IBRD and OPEC funded project under the Office of the President (now subsumed to ARMM Social Fund). The Fund covers the fourteen (14) provinces and ten (10) cities of the SZOPAD areas, of which the five (5) provinces and Marawi City of ARMM are included.

The ARMM Social Fund (ASF) is a successor project of the SZOPAD Social Fund. It initially started its implementation in January of 2003. The ASF project focuses on only the five (5) provinces and one (1) city in ARMM.

The accomplishments and on-going activities of SZOPAD are summarized as follows:

Table 4-8 Completed SZOPAD (now ARMM) Social Fund Sub-Projects in ARMM

Province	Farm to Market Road						Timber Ports				Warehouse / Solar Drier			
	Completed		On-going		Approved<1		Completed		Approved<1		Completed		Approved<1	
	no.	m P	no.	m P	no.	m P	no.	m P	No.	m P	no.	m P	no.	m P
Maguindanao	1	1.4	1	0.9	2	2.2	1	1.5	0	0.0	37	21.7	1	0.7
Lanao Sur	1	0.4	0	0.0	0	0.0	0	0.0	0	0.0	19	9.7	1	0.6
Basilan	3	3.3	0	0.0	0	0.0	8	7.5	3	1.9	0	0.0	1	0.6
Sulu	1	2.8	2	4.3	2	3.0	5	4.5	2	1.7	2	2.0	1	0.6
Tawi Tawi	0	0.0	0	0.0	1	0.5	10	8.5	4	2.3	2	3.2	0	0.0
Total	6	7.8	3	5.3	5	5.6	23	22.0	9	5.8	60	36.6	4	2.5

Note: <1 Pipeline subprojects approved by the SZOPAD Executive Committee
Source: SZOPAD Social Fund Updates as of October 2003

The ASF project has already provided assistance to some twenty-one (21) pilot communities of the 500 target sites in five (5) municipalities in terms of social preparation. However, it has yet to implement its community based infrastructure projects since it still is in the initial stage of implementation. The planned activities to be provided by the Project that would support the agriculture-fishery sector are summarized in Table 4-9 below.

Table 4-9 Community Based Infrastructure Component of ARMM Social Fund Project

Sub-Project Type	Unit	Physical Target	Estimated Cost (PhP)
❑ FMR rehabilitation	Kms	400	400,000,000
❑ Rock Causeway	Lm	360	2,700,000
❑ Timber Port	Lm	1,200	10,200,000
❑ Warehouse (64 sqm)	Unit	105	44,100,000
❑ Solar Driers			
➢ Land Based Crops (500 sqm)	Unit	70	15,750,000
➢ Seaweeds (400 sqm)	Unit	35	49,000,000
Total			**521,750,000**

Source: ARMM Social Fund Project Feasibility Study, May 2002

CHAPTER 5

PROPOSED DEVELOPMENT THRUST

5. PROPOSED DEVELOPMENT THRUST

5.1 Objectives

Account is taken of the environmental, economic and social milieu in ARRM in specifying the following objectives for the agriculture-fishery sector.

a. Sustainable Development

b. Poverty alleviation

c. Improvement of income distribution

5.2 Basic Thrust

The thrust for the sector would still be along the lines of AFMA. Thus, the agricultural and fisheries development for the region is geared to:

- promote suitable land uses considering the natural and socio-economic conditions of the area;

- increase productivity of agricultural and fisheries products through the enhancement of technical as well as institutional capabilities;

- maximize the opportunities for enhancement of livelihood in rural communities through improvements in rural infrastructure, marketing and existing organizational set-up, etc.; and

- promote sound development and achieve a balance between economic development and sustainable environmental and resource management.

The development strategies of each sub-sector are described in the following section.

5.2.1 Agriculture and Supporting Infrastructure

The thrusts for agriculture would be based on the development potential of the area, present agricultural condition, socio economic condition, and the constraints and issues observed in the area. Along this line, the following six (6) strategies, namely; i) food security, ii) diversification, iii) market-oriented production, iv) mobilization of private sector

participation, v) effective R & D and extension, and vi) community organizing/organizational strengthening are formulated.

a. Food Security: As with the aim of the Ginintuang Masaganang Ani (GMA) program, the approach to food security shall be through improving the productivity of staple crops. Difficulties in increasing the productivity and production which farmers are encountering in the area are due i) to lack of irrigation facilities, ii) inefficient R, D & E, iii) lack of capital (or insufficient supporting services in the form of credit), and iv) lack of access to farm inputs. Each of these could be the bottleneck in attaining food security for the area in particular, a) expansion of irrigated area, b) improvement of accessibility to the farm input and c) improvement of farming technology through proper R, D & E are inevitable.

b. Diversification: Agricultural production in ARMM is by and large dominated by a few major crops, such as rice, corn, cassava, banana and coconut. Some are staple crops and the others are cash crops, but all are cultivated under rather extensive management. Although they are the main sources of income for farmers, their contribution to expanding livelihood opportunities is minimal. Therefore, diversification is essential in improving and sustaining the region's farm economy. The strategy is to pursue crop diversification, application of alternative farming system and market development. Crop diversification should be closely linked with the R, D and Extension activities and market prospects. Alternative farming system would promote environmentally sound farming practices as well as promote increased local value added to agricultural output. Remunerative prices for farm output is important for maintaining gains from diversification as well as willingness of farmers to employ the practice continuously. Improvement in the marketing system and marketing facilities is important in this regard. In addition, collection and analysis of market information are essential.

c. Market-oriented Production: Lack of market power to be able to negotiate for better prices with strength and isolation from market information are main reasons that the farm products are bought at a lower price by buyers. As in the case of the rubber association in Basilan shows, cooperative / enterprise development is an appropriate approach to allow local communities capture better market opportunities.

Quality improvement is another dimension that need consideration. Although it is true that farmers are at a disadvantageous position, product quality is also often wanting.

Dissemination of quality standards, the way to their improvement and the provision of needed facilities / equipment would be part of development interventions in the sector.

d. Mobilization of Private Sector Participation: In many cases, private sector and NGOs play an important role in agricultural and rural development. The former could provide updated information and technology on agricultural production and also be a possible marketing outlet and/or a credit supplier at the same time. In addition, they could perform entrepreneurial function and promoters of agri-business activities. On the other hand, the NGOs could be a possible source of technical and/or financial assistance to local communities in enterprise development as well as building their capacity. However, the maintenance of peace and order is a major premise for the active participation of the private sector.

d. Effective R & D and Extension: R&D and extension are key to agricultural development. As stated in Chapter 3, DAF-ARMM has just established its institutions (ARMMIARC and its satellite stations) and it has yet to be functional as expected. Hence, there is a great need to enhance its facilities and reinforce the capability of staff. Reinforcement of the ARMMIARC Central Experiment Station to also be the regional training center for extension worker would be important. (Copy of DAF proposal is predicted as Annex "E").

On the other hand, PhilRice has experience in working in the area of building the capabilities of agricultural technicians (ATs) and rice farmer-leaders. Consequently, linkage with other institutions, such as PhilRice, academic organizations, NGOs, etc., need to be promoted.

e. Community Organizing/Organizational Strengthening: Organizing communities or strengthening the existing organizations could help them attain economic scale in selling their products as well as buying farm inputs. In other words, community organization, which requires great efforts, could put together individual resources and maximize the opportunities that the communities / areas own.

There have been many failures in cooperative development in the country. Proper approach should be taken and continuous support should be provided to organized communities at the field level.

5.2.2 Fisheries and Supporting Infrastructure

The present situation of the fisheries sub-sector including a definition of issues limiting its development points out the need to address the requirements of four actors:

- *First*, the Bureau of Fisheries and Aquatic Resources of the ARMM as technical arm and service provider on fisheries;
- *Second*, the Local Government Units (LGU), most especially the municipalities and cities which have been vested with the mandate to directly manage the LGU's coastal/fishery resources;
- *Third*, the communities that depend primarily on fishery resources for their livelihood and at the same time convert them into economic goods;
- *Fourth*, the natural fishery or coastal environment that ensures the stability and sustainability of fishery resources.

The basic development thrusts for fishery should serve the best interests of the four actors. Based on the present condition, the following thrusts emerge.

a. Quality Improvement and Increased Productivity: Provision of dryers, warehouse and semi processing plant; establishment of nursery for quality seedlings; provision of fish port/fish landing; and technical assistance in fish cage/fish pens production of high value marine products.

b. Management of the Natural Resource Capacity: Rehabilitation and protection and management of mangrove; community organization; conduct of coastal resource inventory; and advocacy for increased community participation in fishery resource management.

c. Improvement of Fishery Resource Management capability of LGUs: Capacity building of LGUs in monitoring, control, surveillance and law enforcement, including deputation of fish wardens, and fishery resource management planning.

d. Improvement of Research, Development and Extension Capability: Staff development, establishment of laboratory to improve its resource assessment

capability; and technical assistance in the transfer of appropriate technology to fisher folks including community organizing and establishment of linkages.

Table 5-1 below define the proposed development thrusts for each province, considering their capability, potentials as well as issues and constraints.

Table 5-1 Proposed Fishery Development Thrusts by Province

Province	Proposed Development Thrust
All the provinces	• Strengthening people's organizations like associations, cooperatives, deputized fish wardens (DFW), Fisheries and Aquatic Resource Management Councils (FARMC), Bantay Dagat • Capacity-building on coastal resource management for the LGUs to exercise their lead role in minimizing destructive, extractive and harmful fishery practices
Lanao del Sur/ Maguindanao	• Brood stocking of fingerlings e.g. milkfish and tilapia in inland bodies of water • Rehabilitation, maintenance and/or establishment of fish farms/demonstration farms • Freshwater fish stock production • Provision of farm-to-market roads
Island provinces	• Provision of post-harvest facilities like warehouses, solar dryers, cold storage facilities, fish landing, etc. • Expansion of seaweed farms • Assistance in the marketing of seaweeds • Marketing of high value fishery resources like lobster, octopus, squid, among others (Only for Basilan)

5.2.3 Agriculture Infrastructure

Based on the present status of agricultural and fisheries infrastructure in the region, its farmers and fisher folks requires a lot of assistance in the form of rehabilitation/construction of agricultural and fisheries related facilities. Indicator of the gap between the development made and the requirement in area are the following:

a. Only about 28,500 ha or 14.5 % of a potential irrigable area of 196,300 ha have been developed.

b. Only 1.5 % of the farm-to-market roads with a total length of about 6,000 km are paved.

c. There are 231 ports in the area of different classifications. Most of these are made of timber with insufficient capacity or need to be rehabilitated.

d. Some post-harvest facilities have been constructed largely through several project assistance, but these facilities are insufficient in number and most need expansion. Further improvement to cater to the region's vast potential in agricultural and fisheries resources is required.

Given the above, it is imperative to focus the assistance to ARMM on addressing the need to develop the support facilities to agriculture and fisheries activities. The thrusts are in fact indicated in the other sections of this report. Focus in this section would be on the general development direction for each type of infrastructure.

(1) Irrigation and Drainage

The provinces in the mainland (Maguindanao and Lanao del Sur) have the biggest potential for irrigation development. Taking advantage of this potential would certainly trigger the acceleration in the growth of agriculture in the region. The following table shows that these two (2) provinces accounts for about 95 % of the potential area for irrigation development.

Table 5-2 Potential for Irrigation Development, by Province, ARMM

Province	Potential Irrigable Area (Hectare)	Existing Service Area (Hectare)	Development Rate	Potential Area For Development (Hectare)
Maguindanao	146,365	22,201	15.2 %	124,164
Lanao Sur	40,186	4,932	12.3 %	35,254
Basilan	996	307	30.8 %	689
Sulu	2,710	699	25.8 %	2,011
Tawi Tawi	6,049	346	5.7 %	5,703
Total	**196,306**	**28,485**	**14.5 %**	**167,821**

Source : Five Year Irrigation Development Plan, NIA Provincial Irrigation Office

(2) Farm-to-Market Road

In all provinces, the importance of an all weather farm to market roads could not be overemphasized. Production would never be sustained and enhanced without the necessary link to the market. Hence, to ensure efficient transshipment of land based crops and marine products and provide mobility to farmers and traders, development of this infrastructure has to be given sufficient attention.

There is no established method of determining the standard requirement for farm to market roads for a given the land area. It would be necessary to conduct detailed and actual road network planning at the municipal level. At present, the possible method available is to make a comparative analysis of the existing road density of each province against the national figures. Hence, this method will be presented as aid to making an approximation of the needed length of road network for future assistance. Table 5-3 below is a comparative status of the barangay and farm to market roads in the provinces of ARMM *vis-à-vis* that of the country as a whole and in Mindanao.

Table 5-3 Comparative Barangay and Farm to Market Road Density and Paved Ratio, by Province, ARMM

Province	Land Area (sq km)	Brgy / FMR Length (kms)	Paved Ratio (%)	Road Density (lm/sq km)	Road Length Gap* (kms)
Maguindanao	5,048	1,050	3.33	208	999
Lanao Sur	3,873	3,709	0.55	958	-
Basilan	1,327	212	4.92	160	327
Sulu	1,600	655	2.75	409	-
Tawi Tawi	1,087	338	2.81	311	104
ARMM Total	***12,936***	***5,965***	***1.49***	***461***	
Mindanao	102,630	44,891	2.30	437	
Philippines	300,000	121,965	6.60	406	

**Road Length Gap was computed using National (Philippines) Local Road Density as reference*
Data Source: DPWH ARMM and DAR ARMM Project Documents

On the basis of the above table, it is apparent that focus must be on road construction in the provinces of Maguindanao, Basilan and Tawi Tawi. In terms of paved ratio, the overall ratio for the region of 1.5 % is way below the national average at 6.6 percent. This indicates that while there is a need to construct additional roads in the three (3) provinces, as mentioned above, upgrading of the existing local roads in all the ARMM provinces is important to ensuring mobility of farm inputs and agricultural products in all kind of weather.

(3) Post-harvest Facilities for Land-based Crops

One of the issues besetting the marketing of agricultural products is the relatively poor quality of produce largely due to the inadequacy of post-harvest measures. This indicates the high possibility that post-harvest facilities installed in the area can hardly cover all the inland barangays. Based on the numbers of inland barangays and existing post-harvest facilities for land-based crops in the area, the Study estimated the numbers of required drying pavements and warehouses in the assumption that each barangay should have one.

Table 5-4 Potential/Need for Development of Post Harvest Facilities for Land Based Products, by Province, ARMM

Province	No. of Inland Barangays	No. of Drying Pavements	No. of Warehouse	Est. No of Barangays That Need Dryers	Est. No. of Barangays That Need Warehouse
Maguindanao	403	149	9	254	394
Lanao Sur	955	173	8	782	947
Basilan	128	38	None	90	128
Sulu	286	21	11	265	275
Tawi Tawi	5	0	1	5	4
Total	**1,777**	381	29	1396	1748

Source : Department of Agriculture & Fisheries, ARMM

(4) Supporting Facilities for Fisheries

Post-harvest facilities for marine products are likewise found insufficient, especially in the island provinces as shown in table 5-5 below.

Table 5-5 Potential/Need for Fisheries Post Harvest Facilities, ARMM

Province	No. of Coastal Barangays	No. of Stilt Dryers (Required)	No. of Stilt Dryers (Existing)	No. of Stilt Dryers (To be Provided)
Maguindanao	36	36	12	24
Lanao Sur	35	35	0	35
Basilan	82	82	6	76
Sulu	125	125	22	103
Tawi Tawi	198	198	37	161
Total	**476**	**476**	**77**	**399**

Source : Bureau of Fisheries and Aquatic Resources, ARMM

The economy of the island provinces of Sulu and Tawi Tawi and to a large extent also that of Basilan, depends more on the fishery industry, especially marine products and/or seaweeds. Therefore, the provision of post-harvest facilities such as seaweed stilt dryers, fish landing ports and processing centers for marine products, should be focused on the island provinces.

On the other hand, port in the lakeshore barangays around Lake Lanao, is also an important facility not only for fishing (as a livelihood activity) but also for transportation. Accordingly, most of them are small and made of wood/bamboo. However, secondary data are not available.

(5) Attention to be Given in Implementation

In the implementation of infrastructure development projects, the following should be given appropriate consideration.

Scale of Project: Large-scale projects might be hampered by limitations of available GOP counterpart funds. It would be more severe in case of the LGUs with their limited Internal Revenue Allotment and weak tax base. Therefore, proposed projects should be of a reasonable size.

Management of Project: Project implementation has often been affected by inadequate and untimely release of funds. It would be worse if the organization for project implementation is not efficiently set up. The Project Management Office (PMO) should be at the field level and sufficiently manned.

Maintenance: Maintenance of constructed infrastructure facilities is essential in ensuring the sustainability of development effects. However, the maintenance by LGU is generally insufficient, which is not peculiar to ARMM. Proposed projects should give important consideration to future maintenance. Organizational strengthening, size or type of project, extent of beneficiary involvement, share of responsibility and accountabilities, etc. should be taken into account.

5.3 Long-list of Recommended Projects

In order to help enable the region attain its development goal as well as the development thrusts proposed by the Study, the following interventions are proposed as long-listed projects. Most of the projects comprising the area of intervention would correspond to those that have been identified in the MTDP and/or the Development Programs of NIA and BFAR.

Table 5-6 Long List of Proposed Projects

(1) Agriculture sub-sector

Project/Intervention	Implementing Agency	Possible Site	Source (proposed by)
1. Capacity Building			
1.1 ATs /Farmers training and demonstration on rice-based farming system	PhilRice	Rice producing municipalities	Proposal of PhilRice-DA
1.2 Training for extension workers on newly generated farming systems of farm diversification technologies	DAF-ARMM	All provinces	Study Team
2. Production			
2.1 Farm diversification in upland areas	DAF-ARMM	Lanao del Sur, Sulu, Basialn	Study Team
2.2 Irrigation development (Rehabilitation / Construction (NIS/NIP)	NIA	Maguindanao, Lanao del Sur	5 years plan of NIA
2.3 Irrigation development (Rehabilitation / Construction (CIS/CIP)	NIA in coordination with LGUs	Major: Lanao del Sur, Maguindanao Minor: Island provinces	5 years plan of NIA
2.4 Irrigation development (Development of GWIPs)	NIA in coordination with LGUs	Maguindanao, Lanao del Sur	5 years plan of NIA

Project/Intervention	Implementing Agency	Possible Site	Source (proposed by)
2.5 Establishment of dual-purpose (dairy and meat) small ruminant breeding farm	DAF-ARMM	Upland in Lanao del Sur, Basilan, Sulu, Tawi-Tawi	MTDP of DAF-ARMM
2.6 Establishment of dual-purpose (dairy and meat) livestock farm	DAF-ARMM	Maguindanao, Lanao del Sur	MTDP of DAF-ARMM
2.7 Animal dispersal	DAF-ARMM	All provinces	MTDP of DAF-ARMM
2.8 Distribution of planting materials	DAF-ARMM	All provinces	MTDP of DAF-ARMM
3. Research, Development and Extension			
3.1 Construction of a regional training center for extension workers in ARMMIARC Central Experiment Station	DAF-ARMM	ARMMIARC (Maguindanao)	Proposal of ARMMIARC
3.2 Renovation of a room in one of ARMMIARC bldg to be a certified seed laboratory with necessary equipment	DAF-ARMM	ARMMIARC (Maguindanao)	Study Team

(2) Fisheries sub-sector

Project/Intervention	Implementing Agency	Possible Site	Source (Proposed By)
1. Capacity Building			
1.1 Capacity building of BFAR on resource assessment including establishment of fish health and cyanide detection laboratories	BFAR, DAF-ARMM	Maguindanao, Sulu, Tawi-Tawi	MTDP of DAF-ARMM
1.2 Capacity building of coastal LGUs on resource management and law enforcement, including community empowerment	DAF-ARMM	Coastal LGUs (manily island provinces)	Study Team
2. Production			
2.1 Provision techno/demo fish cages production with training to fisher folks (marine and fresh water)	DAF-ARMM	Lanao del Sur, Sulu, Basialn	MTDP of DAF-ARMM
2.2 Establishment of seaweed nurseries and seaweed demonstration farms	BFAR, DAF-ARMM	Island provinces	2003/4 plan of BFAR/ MTDP
2.3 Renovation of freshwater fish farms	DAF-ARMM	Maguindanao, Lanao del Sur	MTDP of DAF-ARMM
2.4 Renovation of sea gardens	DAF-ARMM	Sulu	MTDP of DAF-ARMM
2.5 Seaweed seedling dispersal	DAF-ARMM	Sulu, Tawi-Tawi	MTDP of DAF-ARMM
2.6 Fingerlings / brood stock dispersal	DAF-ARMM	Maguindanao, Lanao del Sur	MTDP of DAF-ARMM
3. Research, Development and Extension			
3.1 Establishment of techno-demo farms	BFAR, DAF-ARMM	Basilan, Sulu, Tawi-Tawi	2003/04 plan of BFAR

(3) Post-harvest / Marketing Infrastructure and Others

Project/Intervention	Implementing Agency	Possible Site	Source (Proposed By)
1. Post-harvest / Marketing			
1.1 Rehabilitation / construction of farm-to-market roads	DAF/DAR-ARMM	All provinces	MTDP/ 5 yrs plan of DAR
1.2 Construction of multipurpose drying pavements	DAF-ARMM	Major: Maguindanao, Lanao del Sur Minor: Island provinces	MTDP of DAF-ARMM
1.3 Construction of stilt dryers	DAF-ARMM	Island provinces	MTDP of DAF-ARMM
1.4 Construction of warehouses	DAF-ARMM	Maguindanao, Lanao del Sur	MTDP of DAF-ARMM
1.5 Provision of community-based rice/corn mills, corn sheller, coffee de-huller and banana chip chopper	MTDP/ 5 yrs plan of DAR	All provinces	MTDP/ 5 yrs plan of DAR
1.6 Establishment of seaweed / fish techno/demo processing plants	DAF/DAP-ARMM	Sulu, Tawi-Tawi	MTDP/ 5 yrs plan of DAR

Project/Intervention	Implementing Agency	Possible Site	Source (Proposed By)
1.7 Establishment of ice plant and cold storage	DAF-ARMM	Island provinces	MTDP of DAF-ARMM
1.8 Establishment of techno/demo fruit processing plants	DAF-ARMM	Sulu	MTDP of DAF-ARMM
1.9 Construction of trading posts, livestock auction market, or slaughterhouse	DAF-ARMM	All provinces	5 yrs plan of DAR-ARMM
2. Capacity building and Others			
2.1 Capacity building for farmers / fisher folks, technicians and LGUs	DAF-ARMM	All provinces	MTDP of DAF-ARMM
2.2 Advocacy regarding relevant laws, rules, regulations and projects updated on crops, livestock and fisheries	DAF-ARMM	All provinces	MTDP of DAF-ARMM

5.4 Proposed Anchor Projects

Of all the programs / projects listed in the former section, anchor programs/projects are identified. These are considered effective in tackling the prevailing issues and help bring about the development thrusts for the sector. They are outlined in the following section, but all are still on a conceptual level. Therefore, a detailed study needs undertaking prior to implementation.

Some programs / projects were taken from existing plans of agencies and the region with or without modifications. Others are proposed on the basis of study findings of the present condition. The outlines of the proposed anchor projects are also described in the following sections.

5.4.1 Agricultural Development

(1) Irrigation Project

Several types of irrigation development can be implemented in the Study area based on the five-year plan of NIA. Annex Tables 42 to 46 give more detailed information on each project of the five (5) year plan by province.

Rehabilitation / Construction of National Irrigation Systems / Projects

Based on the five-year development plan of NIA, there are three (3) rehabilitation projects covering about 6,800 ha and 12 new construction projects for about 31,900 ha in Maguindanao province. Of the 12 new projects, one project in Maguindanao, Pagalungan Irrigation project, has a completed detailed design (1987, review of this design should be needed) and another project in Lanao del Sur (Ditsaan-Ramain irrigation project) has been proposed to the Japanese Government for a grant aid project.

Rehabilitation / Construction of Communal Irrigation Systems / Projects

Some 53 CIS for rehabilitation are listed in the five (5) years plan, with a service area of about 4,700 ha. Most (33) are located in Maguindanao and some (8) in Lanao del Sur. The island provinces have 4 sites each. On the other hand, the Study area has a total of 180 potential CIPs, composed of 42 sites (5,200 ha) in Maguindanao, 23 (3,100 ha) in Lanao del Sur, 31 (1,100 ha) in Sulu, 19 (1,600 ha) in Tawi-Tawi and 12 (600 ha) in Basilan. Since operation and maintenance is a nagging problem for communal irrigation systems, the Study would recommend consideration of CIPs that would have beneficiaries coming from a single clan. They should be cohesive enough to properly operate and maintain the facility.

Development of Groundwater Irrigation Development

There is no potential for groundwater irrigation development in the island provonces. Likewise, only one (1) project whose service area is 35 ha is located in Lanao del Sur. The rest (35 projects) are in Maguindanao and would cover about 1,100 ha.

The development effect would be higher and sustainable provided that other supporting components such as rehabilitation / improvement of farm-to-market roads, establishment of post-harvest facilities, provision of agricultural extension services and strengthening of irrigators association (IAs) are tied up with irrigation development.

(2) Integrated Rural Development in Upland Area

This mainly aims to assist the communities in upland areas develop better upland farming through crop diversification and farming systems. The upland area along Lake Lanao and inland municipalities of the island provinces (especially Sulu and Basilan) are possible sites for development. For further study, the SAFDZ maps will help to identify the proposed site.

The proposed components would include the provision of agricultural extension services with farm inputs, improvement of farm-to-market roads, provision of post-harvest facilities, establishment of water supply and organizational strengthening (or community organizing). It may also be important to operate a model farm to demonstrate appropriate technology (modern farming as well as sustainable land management such as SALT). One of the aspects emphasized through the organizational strengthening is market development. The beneficiaries need to acquire the know-how to gather and assess market information and the way of developing linkages so that they could identify the most viable crops.

The type of assistance / project component is similar to the on-going Agrarian Reform Infrastructure Support Project (ARISP)[1] funded by JBIC starting 1996. The project has provided assistance in the development of support infrastructures (irrigation, farm-to-market road, drying pavement, warehouse) and build-up beneficiaries' capabilities through organizational strengthening in ARC areas.

(3) Reinforcement of ARMMIARC Functions Through the Construction of a Training Center and Provision of Equipment

As described in Section 3.3, the number of extension workers seems to be relatively sufficient. However, many of them have to be trained on the updated farming technology as well as sustainable land management technology. Since a training center is not yet available in ARMM, the construction of a training center with appropriate facilities in the ARMMIARC Central Experiment Station is deemed necessary.

In addition to the enhancement of its extension activity, its laboratory function also needs to be strengthened. One of the important laboratories is a seed certification laboratory. This is closely related to promoting the usage of certified rice seeds, which is a major component in the approach of GMA rice program. The region could secure the foundation seeds for the purpose from the Midsayap experimental station in collaboration with PhilRice and also influence rice farmers in the region to be cooperating farmers for seed multiplication. What is lacking right now is a laboratory / station to control and certify the quality of seeds. The needed intervention to be made would be the renovation of a room in one building of ARMMIARC into a seed certification laboratory and the provision of necessary equipment.

(4) Implementation of a Training Program on Rice-based Farming Systems

The training for agricultural technicians (ATs) and farmer leaders on rice-based farming system had been undertaken in 2003 by PhilRice. In terms of rice-based farming system, the PhilRice is the most capable institution to provide training on the matter. Although its training system seems practical, the trainees (beneficiaries) would not be motivated without having irrigated fields. Therefore, this training should be tied-up with irrigation development rather than being implemented independently.

[1] The Agrarian Reform Infrastructure Support Project (ARISP) has been implemented since 1996. ARISP aims to support Agrarian Reform Communities (ARCs) through the development of farm-to-market roads, establishment of post-harvest facilities (drying pavements and warehouses), and strengthening of ARBs organizations. The project covers the entire country.

(5) Establishment of Breeding Stations for Dual-urpose Small Ruminants

This aims to enhance the livelihood of farmers in the area, especially upland farmers in Lanao del Sur and the island provinces, through the promotion of small ruminants (like goat) raising. In fact, animal food products, which are meats and especially milk, are in relative short supply in the area. Therefore, the implementation of a dispersal program of dual-purpose small ruminants, in which recipients shall undertake to give back the first offspring for further dispersal to others, is recommended. In order for this to be sustainable, the establishment of breeding farms is necessary.

Training would also be needed in proper management of small ruminants including "cut and carry" system of feeding. In addition, technical assistance in pasteurizing milk on farm as well as processing into such products as whey and cheese would be further needed later on.

5.4.2 Fisheries Development

(1) Improvement of Quality of Marine Products Through Establishment of Drying Facilities

This aims to improve the quality of marine products (seaweed and dried fish), especially in the island provinces through the establishment of drying facilities (stilt dryers and/or drying pavements). In the development plan of BFAR and MTDP, about 140 stilt dryers are to be constructed. Of which, 100 dryers are to be located in Tawi-Tawi and Sulu and the rest in Basilan and Maguindanao.

An on-going project of DENR, Forestry Sector Project[2] funded by JBIC, shows one of the possible interventions in this regard. In the said project, one subproject in Sulu has organized local people and encouraged the organization to reforest mangrove in their coastal area. The organization pooled their labor fees and invested the money in seaweed trading. The project has also constructed a drying pavement to support their seaweed enterprise. This kind of intervention combines supporting activity for fisheries development with proper resource management could help local people manage their coastal resource in a sustainable manner.

[2] The Forestry Sector Project has been implemented since 1993, which includes 24 watershed management subprojects and 12 mangrove reforestation projects throughout the country. One mangrove subproject is located in Sulu province.

(2) Capacity Building of LGUs for Proper Coastal Management

The weakness of LGUs in the management of coastal area including low enforcement of municipal fisheries ordinances is a great issue on sustainable marine resource management in the Study area. Many coastal LGUs that are supposed to be the managers of the municipal water need to be reinforced in terms of i) institutional capability, ii) logistics and equipment support, and iii) policy making.

(3) Increase of production and improvement of quality of seaweeds

The market demand for seaweeds has been increasing over the past years. On the other hand, the share of ARMM to the national production has gradually decreased, although the Study area produced about 42 % share of total production of seaweeds of the country in 2002. Therefore, the region presently aims to expand the seaweed farms in the area through renovating / establishing seaweed nurseries in the island provinces.

There is also a need to upgrade / improve the present technology on seaweed farming employed in the area so as to improve the quality of seaweed and its productivity. Development of demonstration farms with the provisions for training in the demo farms is also a proposed project of BFAR and supported by the Study.

(4) Improvement / Rehabilitation of Municipal Ports

Although there is no written information on the status of ports and fish landing centers, the Study team often heard all through the study that most of the ports / fish landing centers were generally wood-based with insufficient capacity. Therefore, it is recommended that an in-depth study should be undertaken to determine the present status of existing ports and fish landing centers, identify the strategic ports or centers, define the necessity to upgrade facilities and centers and formulate a upgrading/rehabilitation plan. The study should cover the three (3) island provinces and the municipalities around Lake Lanao in Lanao del Sur. Actual implementation should be done based on the result of the study.

The following table shows anchor projects, the implementing agencies, possible provincial locations requirements for implementation, etc.

Table 5-7 A Matrix of the Proposed Anchor Projects and its Requirement

Project	Implementing Agencies	Proposed Province	Construction	Requirement Equipment	Technical Assistance	Remarks
Agriculture Rehabilitation / construction of NISs/NIPs	NIA	Maguindanao, Lanao del sur	Foreign / local contractor	Unknown (need a in-depth study)	Foreign & local consultant	Peace & order is inevitable.
Rehabilitation / construction of CISs/CIPs	NIA in coordination w/ LGUs	All provinces	Local contractor	Materials to be procured locally.	Local consultant and NIA	Need to give consideration to maintenance.
Construction of GWIPs	NIA in coordination w/ LGUs	Maguindanao, Lanao del sur	Local / People organizations	Small pumps & drilling machine	Local consultant and NIA	Need to verify the potential.
Integrated rural development in upland area	DAF-ARMM	Lanao del Sur, Basilan, Sulu	Local contractor	Materials to be procured locally.	NGOs / Local consultant	Need to provide continuous support to communities.
Reinforcement of functions of ARMMIARC	DAF-ARMM	ARMMIARC Central Experiment Station (Maguindanao)	Local contractor	Some equipment might be procured from overseas.	Local consultant / other institutions around the region.	Need to develop linkages with other technical institutions for effective training.
Implementation of a training program on rice-based farming	PhilRice-DA central	North Cotabato (Region 12)	-	-	PhilRice	Need to be tied-up with an irrigation project.
Establishment of breeding stations for dual-purpose small ruminants	DAF-ARMM	Lanao del Sur and island provinces	Local contractor	Materials to be procured locally.	Local consultant / NGOs	Need to review the plan of DAF Need to provide training on technical skills and management of dispersal scheme.
Fisheries						
Establishment of drying facilities	DAF (DENR / LGUs)	Basilan, Sulu, Tawi-Tawi	Local contractor	Materials to be procured locally.	Local consultant / NGOs	Need to select proposed sites. The plan must be formulated based on the needs of local people Project to be tied up with a coastal resource management program.
Capacity building of LGUs for coastal management	LGUs	Basilan, Sulu, Tawi-Tawi	-	Patrol Boats and attached equipment might be procured from overseas.	Foreign & local consultant	Need to select proposed sites Building of Institutional capability building is very important.

Project	Implementing Agencies	Proposed Province	Construction	Requirement Equipment	Technical Assistance	Remarks
Increase of production and improvement of quality of seaweeds	BFAR / LGUs	Sulu, Tawi-Tawi	Local contractor	Materials to be procured locally.	Local consultant / NGOs	Need to develop linkages with other technical institutions for effective training.
Rehabilitation / upgrading of municipal ports	LGUs, PPA	Lanao del Sur, Basilan, Sulu, Tawi-Tawi	Local contractor	Materials to be procured locally.	Local consultant / NGOs	Need to conduct an inventory survey on existing ports.