Chapter 5
ECONOMIC SECTORS

The economy of the municipalities in the MBA depends on fisheries, agriculture, industry, and to a small extent, tourism. The farming sector is the most important, with marine fishing ranking second with regard to source of livelihood and income.

The farming sector is the most important source of livelihood and income. Marine fishing ranks second.

FISHERIES

The fisheries sector includes marine and aquaculture fisheries. Marine fishing, both municipal and commercial, is done within the municipal waters of Malalag Bay which covers approximately 135 km^2 and serves as the fishing ground of the locality. Aside from marine fishing areas, the MBA is endowed with inland fishing grounds: brackishwater ponds and freshwater ponds.

MARINE FISHERIES

Capture Method

Based on the SUML survey in 1997, thirteen types of gear or methods of fishing were used in the MBA (Table 5.1). The most prevalent gear type in the bay was multiple hook and line (125 units), single hook and line (67 units), and gill net (37 units). Only three gear types, however, were monitored for actual catch landing enumeration: bottom set gill net, gill net, and lift net.

Table 5.1. Fishing gear used in the MBA.

Classification	Gear type	Number of units by municipality				Total
		Malalag	Padada	Sta. Maria	Sulop	
Impounding nets	*Basnig*			2		2
	Baling		2			2
	Sudlud				2	2
Entangling net	*Pamante (triple), pamante abay*		1	1		2
	Pamante, pamo, pukot, panganduhaw (with light*), patuloy (pangtamban)*	8	2			10
	Palaran, panglambay, panglampornas, pamalo, pangtamban, pukot, pukot-double, pukot-triple, pukot-paapong with light	17	3	13	4	37
Barriers and trap	*Bunsod*			3	14	17
	Panggal				1	1
	Bubo (pangnokos)				11	11
Lines	*Katay, palangre, pasol, pambariles*		7			7

Source: SUML (1997).

Among the 13 gear types reported in the SUML study, the top three most efficient gear in catching the most number of species were long line (31 species, dominated by the pelagic *Thunnus albacares*), fish corral (26 species, predominantly demersal such as the goatfish, *Upeneus* sp. and rabbitfish, *Siganus canaliculatus*), and multiple hook and line (18 species, predominantly pelagic such as *Thunnus albacares* and *Scomberomorus* sp.). Gill nets had a more varied catch of both demersal and pelagic species, with the belonid, *Strongylura* and an unidentified exocoetid predominating. Single hook and line only caught about 11 species, predominantly pelagics with the tuna, *Thunnus albacares* at the top of the list. The most species-specific gear, catching only one species (*Sepiotheutis* sp.) was the squid trap.

Malalag Bay is characterized by a fishery dominated by pelagic species which rake a higher income than demersals. The most important species in the fishery seems to be tuna, *Thunnus albacares*, caught by low-impact gear such as fish corral, multiple hook and line, single hook and line, and long line. Netting gear, which targets more demersals, showed less efficiency and profitability.

The results of the PCRA in 1998, however, showed that the most common fishing gear used in the MBA were multiple hook and line, single hook and line, and fish traps. Of the five municipalities, Sta. Maria has the most multiple hook and line locally called *undak* (2,688 units) and single hook and line locally called *pahawin* (1,596 units). Sulop has the most fish traps locally called *pasgong* (1,200 units). Table 5.2 shows the fishing gear used in the MBA.

Number of Fishers

Based on PCRA data in 1998, the MBA had a total of 1,611 municipal fishers of which 1,145 are full-time and 466 are part-time (Table 5.3 and Figure 5.1). The MBA also has 1,464 fishing *bancas* of which 425 are motorized and 1,039 are non-motorized. However, about 222 fishers are without *bancas*. As of 1996, the total annual production for municipal fisheries was estimated at 4,132 mt/year.

The commercial fishery is centered in Malalag. There are about 25 commercial fishers operating 3 units of fishery boats with a total tonnage of 14. Commercial fishing activities generate about 28 mt/year of fish.

Catch per Unit Effort

Table 5.4 shows the catch per unit effort (CPUE) and income per unit effort (IPUE) of the municipalities in Malalag Bay based on household interviews by SUML in 1997. CPUE refers to the volume of fish caught in kg per fisher per fishing hour while IPUE refers to the equivalent amount of fish caught in pesos received by each fisher per fishing hour. IPUE, however, does not reflect the cost of fishing, e.g., gasoline consumed during the fishing trip,

As seen in Table 5.4, the fish corral recorded the highest CPUE at 3.63 kg/man-hour, followed by the multiple hook and line (1.9 kg/man-hour), single hook and line (0.76 kg/man-hour), and gill net (0.64 kg/man-hour). The bag net and bottom set gill net had the lowest CPUE at 0.29 kg/man-hour.

In terms of IPUE, the fish corral reaped the highest income at PhP106.97/man-hour, followed by multiple hook and line (PhP75.84/man-hour), scoop net (PhP64.29/man-hour), and fish trap (PhP50.00/man-hour). The IPUE for single hook and line, gill net, and long line however generated lower incomes from PhP23 to PhP38/man-hour.

Table 5.2. Fishing gear used in the MBA based on PCRA data in 1998.

Type of gear	No. of units per municipality				
	Hagonoy	Malalag	Padada	Sta. Maria	Sulop
NETS					
Baling, basnig, bintol, hantok, lampornas, laya, pahubas, palabo, palaran, pamalo, pamangse, pamante, panamban, panapao, panglambay, paninilya, patuloy, pokot, sadyap, sagiwsiw, sahid, sudsud, trawl*, tumbok*	322	314	125	1,960	104
HOOK AND LINE					
Pahawin, palangre, pamariles, pamasol, pangaraw, pangnukos, paniwit, panubid, subid, talunton, troll line, ulang-ulang, undak	402	349	812	4,736	8
TRAPS					
Bubo, bunsod, panglambay, paugmad, panggal, tangab fry*, pasgong*	237	253	1,013	492	1,265
OTHERS					
Pamana, pamuga, panginhas, panulo	10	15	55	102	-

Table 5.3. Number of municipal fishers and corresponding fish production in the MBA.

Municipality	No. of municipal fishers					No. of fishing bancas					Total fish production (mt)			
	1993	1994	1995	1996	1998*	1993	1994	1995	1996	1998*	1993	1994	1995	1996
Hagonoy	521	525	446	253	205	172	176	184	178	139	285	290	155	330
Malalag	1,647	1,680	1,665	724	144	542	582	534	563	135	190	250	385	394
Padada	1,500	1,600	87	114	356	430	450	67	91	316	486	500	46	120
Sta. Maria	3,550	3,255	3,947	4,500	836	1,210	1,245	2,629	3,000	829	1,704	1,704	1,596	650
Sulop	62	62	1,083	1,083	70	62	62	1,248	1,248	45	20	21	2,636	2,638
Total	**7,280**	**7,122**	**7,228**	**6,674**	**1,611**	**2,416**	**2,515**	**4,662**	**5,080**	**1,464**	**2,686**	**2,744**	**4,819**	**4,132**

Source: PPDO (1993, 1996).
*Note: *Based on PCRA conducted in 1998.*

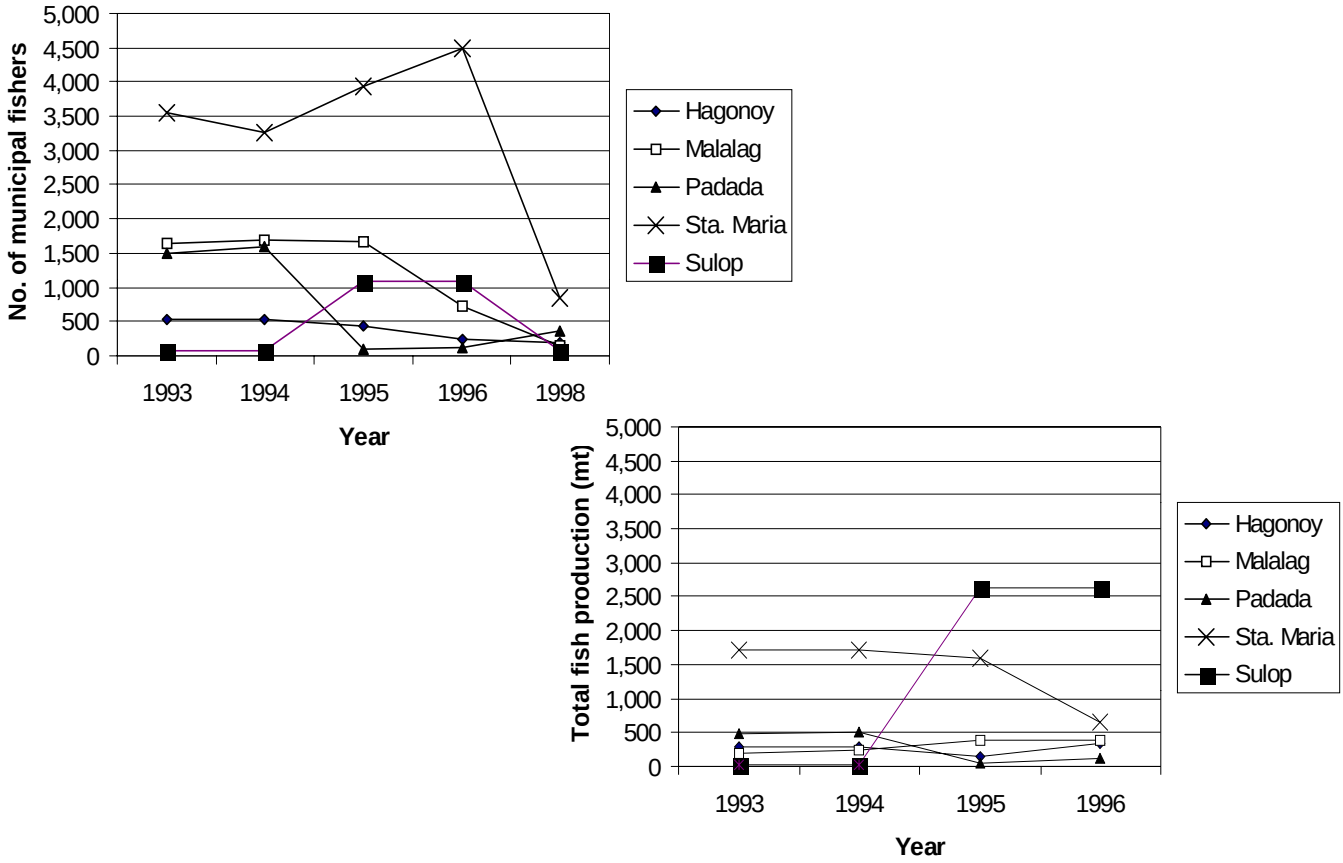

Figure 5.1. Number of municipal fishers and corresponding fish production in the MBA.

Table 5.4. Catch per unit effort (CPUE) and income per unit effort (IPUE) in the MBA, 1997.

Gear type	Average manpower utilized per trip	No. of hours per trip	Average effort (man-hour)	Average CPUE		Average IPUE	
				(kg/trip)	(kg/man-hour)	(PhP/trip)	(PhP/man-hour)
Bag net	8.50	12.50	7.11	31.50	0.29	773.75	7.11
Bottom set gill net	3.00	7.50	9.44	3.25	0.29	85.42	9.44
Drift gill net	1.15	12.40	12.02	4.05	0.32	154.30	12.02
Fish corral	1.18	2.70	106.97	4.66	3.63	149.21	106.97
Fish trap	1.00	10.00	50.00	5.00	0.50	500.00	50.00
Gill net	2.98	15.30	33.88	14.64	0.64	701.51	33.88
Long line	4.17	88.80	23.20	89.15	0.40	3,313.25	23.20
Lift net	2.50	4.00	6.59	6.75	0.51	116.30	6.59
Multiple hook and line	1.72	11.10	75.84	25.16	1.90	973.83	75.84
Scoop net	1.00	3.50	64.29	1.50	0.43	225.00	64.29
Spear gun	1.20	6.60	13.14	2.80	0.43	86.62	13.14
Single hook and line	2.97	59.70	38.08	62.92	0.76	2,301.39	38.08
Squid trap	1.50	3.00	21.39	1.63	0.42	82.92	21.39

Source: SUML (1997).

Catch per Species (Weight) per Gear

Based on the 1997 SUML study, 76 finfishes in 34 families (including eight unclassified species), five crustaceans in three families, and seven mollusks in three families (including three unclassified species) were recorded in four sites in the MBA from household interviews and actual catch data enumeration. Only 50 species were confirmed by actual catch data enumeration. About 14 species were identified during monitoring of landings, which were not reported by fishers: four species of wrasses (Family Labridae); five species of parrotfishes (Scaridae); the tuna, *Euthynnus affinis* (Scombridae); two rabbitfishes (Siganidae); one barracuda (Sphyraenidae); and the squid *Loligo* sp. (Loliginidae).

About 49 percent of the total species reported caught by fishers were reef species (30 percent) or reef-associated species (19 percent), i.e., species which inhabit nearby reef habitats such as mangrove and seagrass beds. The non-reef species comprised about 40 percent of the total number of the species reported caught, 13 percent of which were pelagic or migratory such as the clupeids, coryphaenids (dolphinfishes), and scombrids (tunas and mackerels).

In terms of reported landed volume, household interviews showed that the tuna, *Thunnus albacares*, locally called *bariles* or *carao*, was the major catch in the bay with a relative abundance of 54 percent. This species, however, was not seen during actual catch enumeration. What was caught most abundantly during fish landing monitoring was the pelagic/reef-associated species scads, *Selar crumenophthalmus*. Overall, this was reported as the second most abundant species landed by fishers in the bay. Table 5.5 shows the summary of catch composition, biomass, and relative abundance per gear type based on household interviews in 1977.

Based on PCRA data in 1998, multiple hook and line usually caught big-eye scads (*matambaka*), crevalle (*salay-salay*), and sardines (*tamban*). Single hook and line caught moonfish (*bilong-bilong*), groupers (*lapu-lapu*), jacks (*talakitok* and *mamsa*), Spanish mackerel (*tangigue*), snappers (*maya-maya*), and frigate tuna (*tulingan*). The third most abundant gear, fish trap, caught crabs, *lambay*, *kasag,* and *kagang*.

The intense exploitation of the marine resources, together with the increasing population of fishermen, has started to deplete fish harvest, which is already being felt in the MBA. Important management issues plaguing the fisheries sector include rapid population growth, poverty, and environmental degradation. An increase in coastal population implies an increase in the number of fishers. This number is

Table 5.5. Summary of catch composition, biomass, and relative abundance per gear type in the MBA.

Gear type	Species	TWT (kg)	(%) RA
Bag net	*Sepioteuthis* sp.	4.0	29.6
	Siganus canaliculatus	3.5	25.9
	Liza sp.	2.5	18.5
	Stolephorus sp.	2.5	18.5
	Punao	0.5	3.7
	Litub	0.5	3.7
	Sub-total	**13.5**	
Bottom set gill net	*Siganus canaliculatus*	122.5	
Drift gill net	*Siganus canaliculatus*	9.8	61.0
	Upeneus sp.	1.2	7.5
	Parupeneus sp.	1.0	6.5
	Scarus sp.	1.0	6.5
	Lethrinus sp.	1.0	6.2
	Portunus pelagicus	0.8	4.7
	Liza sp.	0.4	2.5
	Labrid sp.	0.3	1.9
	Terapon sp.	0.3	1.9
	Abudefduf sp.	0.1	0.6
	Acanthurus sp.	0.1	0.6
	Sub-total	**16.0**	
Fish trap	*Portunus pelagicus*	5.0	41.7
	Scylla sp.	3.0	25.0
	Upeneus sp.	2.5	20.8
	Nemipterus sp.	0.5	4.2
	Sepioteuthis sp.	0.5	4.2
	Epinephelus sp.	0.5	4.2
	Sub-total	**12.0**	
Lift net	*Auxis thazard*	20.0	30.3
	Clupeid sp.	13.0	19.7
	Decapterus macrosoma	10.0	15.1
	Selar crumenophthalmus	15.0	22.7
	Siganus canaliculatus	5.0	7.6
	Stolephorus sp.	3.0	4.5
	Sub-total	**66.0**	
Fish corral	*Upeneus* sp.	43.8	42.1
	Siganus canaliculatus	23.5	22.6
	Portunus pelagicus	7.1	6.8
	Penaeid sp.	5.3	5.1
	Caranx sp.	4.5	4.3
	Terapon sp.	3.4	3.3
	Sepioteuthis sp.	3.0	2.9
	Liza sp.	2.8	2.6
	Parupeneus sp.	1.4	1.4
	Penaeus sp.	1.1	1.0
	Apogon sp.	1.0	1.0
	Pelates sp.	1.0	1.0
	Scylla serrata	1.0	1.0
	Siganus guttatus	1.0	1.0
	Gerres sp.	0.9	0.8
	Dasyatis sp.	0.5	0.5
	Plotosus sp.	0.5	0.5
	Sillago sp.	0.5	0.5
	Octopus sp.	0.3	0.3
	Cheilio inermis	0.2	0.2
	Holocentrid sp.	0.2	0.2
	Lethrinus sp.	0.1	0.1
	Muraenid sp.	0.1	0.1
	Platycephalid sp.	0.1	0.1
	Tetraodontid sp.	0.1	0.1
	Shark	0.5	0.5
	Sub-total	**104.2**	
Gill net	*Strongylura* sp.	180.0	64.7
	Exocoetid sp.	48.0	17.2
	Siganus canaliculatus	10.0	3.6
	Rastrelliger kanagurta	8.0	2.9
	Portunus pelagicus	6.0	2.7
	Siganus guttatus	4.0	1.4
	Caranx sp.	3.0	1.1
	Parupeneus sp.	2.8	1.0
	Selar crumenophthalmus	2.5	0.9
	Clupeid sp.	2.0	0.7
	Scarus sp.	2.0	0.7
	Cheilio inermis	1.5	0.5
	Liza sp.	1.0	0.4
	Upeneus sp.	1.0	0.4
	Terapon sp.	0.5	0.2
	Salindangan	0.5	0.2
	Caraballas	5.5	2.0
	Sub-total	**278.3**	
Long line	*Upeneus* sp.	1.3	1.2
	Thunnus albacares	25.0	23.1
	Terapon sp.	3.2	3.0
	Selar crumenophthalmus	14.5	13.4
	Scomberomorus sp.	2.5	2.3
	Plotosus sp.	0.3	0.3
	Parupeneus sp.	3.2	3.0
	Nemipterus sp. 1	2.5	2.3
	Nemipterus sp. 2	0.1	0.1
	Muraenid sp.	1.0	0.9
	Lutjanus sp. 1	1.5	1.4
	Lutjanus sp. 2	0.9	0.9
	Lutjanus sp. 3	7.7	7.2
	Lethrinus sp. 1	0.1	0.1
	Labrid sp.	0.2	0.2
	Holocentrid sp.	3.5	3.2
	Epinephelus sp. 1	0.8	0.7
	Epinephelus sp. 2	0.2	0.2
	Dasyatis sp.	0.7	0.7
	Caranx sexfasciatus	1.5	1.4
	Caesio sp.	10.5	9.7
	Auxis thazard	0.45	0.4
	Apogon sp.	15.0	13.8
	Tulingan	5.0	4.6

continued

Table 5.5. (continued)

Gear type	Species	TWT (kg)	(%) RA
	Salmon-salmon	0.1	0.1
	Sunogan	0.3	0.3
	Bulgan	0.8	0.7
	Bagabaga/doding	1.5	1.4
	Bago	2.1	2.0
	Batwanon	0.2	2.0
	Gapas	0.2	0.2
	Sub-total	**108.4**	
Multiple hook and line .	*Thunnus albacares*	63.1	50.0
	Scomberomorus sp.	20.0	16.0
	Selar crumenophthalmus	14.6	11.6
	Auxis thazard	4.0	3.2
	Clupeid sp.	4.0	3.2
	Tulingan	3.5	2.8
	Rastrelliger brachysoma	3.0	2.4
	Salmon-salmon	3.0	2.4
	Samin-samin	2.5	2.0
	Coryphaena sp.	2.0	1.6
	Exocoetid sp.	2.0	1.6
	Bulatok	1.5	1.2
	Decapterus macrosoma	1.0	0.8
	Sepioteuthis sp.	0.5	0.4
	Epinephelus sp.	0.5	0.4
	Nemipterus sp.	0.5	0.4
	Cephalopholis sp.	0.5	0.4
	Chanos chanos	0.5	0.4
	Sub-total	**126.8**	
Scoop net	*Acetes* sp.	10.0	87.0
	Penaeid sp.	1.5	13.0
	Sub-total	**11.5**	
Spear gun	*Siganus canaliculatus*	7.0	50.0
	Portunus pelagicus	1.5	10.7
	Siganus canaliculatus	1.5	10.7
	Apogon sp.	1.0	7.1
	Parupeneus sp.	1.0	7.1
	Epinephelus sp.	0.5	3.6
	Muraenid sp.	0.5	3.6
	Sepia sp.	0.5	3.6
	Octopus sp.	0.3	2.1
	Scarus sp.	0.2	1.4
	Sub-total	**14.0**	
Single hook and line	*Coryphaena hippurus*	125.0	3.6
	Decapterus macrosoma	62.0	1.8
	Makaira sp.	100.0	2.9
	Scomberomorus sp.	13.0	0.4
	Selar crumenophthalmus	273.5	7.9
	Sepioteuthis sp.	7.0	0.2
	Thunnus albacares	2,275.5	65.8
	Pirit	263.5	7.6
	Salmon-salmon	2.0	0.1
	Tulingan	287.0	8.3
	Liplipan	50.0	1.4
	Sub-total	**3,458.5**	
Squid trap	*Sepioteuthis* sp.	1.5	

Legend: TWT = Total weight in kg; RA = relative abundance in %
Source: SUML (1997).

enhanced by migration of landless and marginalized farmers and unemployed urban poor who seek refuge in the fishery sector. Clearly, fisheries has become an employer of the last resort (Pauly and Chua 1988) and poverty is its constant companion. Pauly and Chua (1988) reported that many of these migrants, lacking the skills in artisanal fishing, were oftentimes the first ones to employ destructive techniques.

Pollution, forest denudation, siltation, denudation of mangroves, and degradation of coral reefs, and disturbances in the estuarine and seagrass beds by using illegal fishing activities have all contributed to the depletion of fishery resources. The presence of illegal fishing activities like dynamite fishing, the use of fine mesh nets, and others suggests a poor implementation of fishery laws. Based on the survey conducted by the PCAMRD in 1990, coral reefs along the Malalag Bay Area were heavily damaged. Only about 5 to 15 percent remained in good condition.

Aquaculture

In 1995, the brackishwater aquaculture in the MBA was estimated at 1,271 ha producing about 2,089 mt of milkfish *(bangus)* and prawn (*sugpo*). Of the total hectarage, about 1,227 ha are allocated for milkfish production and only 35 ha for prawn culture (Table 5.6). In 1996, the hectarage allocated for prawn culture was converted to milkfish production.

Table 5.6. Brackishwater resources data by municipality in the MBA.

Municipality	No. of operators				Milkfish				Prawn			
	FLA		Private		Area (ha)		Production (mt)		Area (ha)		Production (mt)	
	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996
Hagonoy	6	12	18	18	385	363	375	436	20	-	87	-
Malalag	21	32	4	17	189	191	153	182	-	-	-	-
Padada	6	17	4	3	169	215	126	214	-	-	-	-
Sta. Maria	3	3	22	22	131	131	141	144	15	-	6,654	-
Sulop	15	9	19	31	353	373	259	336	-	-	-	-
Total	**51**	**73**	**67**	**91**	**1,227**	**1,273**	**1,054**	**1,312**	**35**	**0**	**6,741**	**0**

Source: PPDO (1996).

From freshwater aquaculture, production of tilapia, carp, and shrimps reached 3.21 mt from a production area of 3.16 ha. Of the four producing municipalities, Hagonoy contributed 2.25 mt or 70 percent of the total production while Sulop had the least with 0.06 mt (Table 5.7). A downward trend is evident for freshwater aquaculture (Table 5.7).

Moreover, the total production area for seafarming was also observed to be on a downtrend due to the unstable market of seaweed, and oyster and the occurrence of a red tide. Seaweed farming was confined only to Malalag while the culture of oysters was confined to the municipal waters of Malalag and Sulop. The total area occupied by seafarming increased from 2.47 ha in 1995 to 3.4 ha in 1996. The increase was due to new oyster culture in the municipality of Sulop in 1995. However, production decreased from 44.2 mt in 1995 to 12 mt in 1996.

Malalag has a fish sanctuary of 50 ha. At present, there are small scale mariculture projects. There are 29 families engaged in oyster culture. With the red tide phenomenon (when poisonous substances infiltrate shells, clams, oysters, etc.) occurring from time

Table 5.7. Freshwater resources data by municipality in the MBA.

Municipality	1994			1995			1996		
	No. of freshwater operators	Area (ha)	Total production (mt)	No. of freshwater operators	Area (ha)	Total production (mt)	No. of freshwater operators	Area (ha)	Total production (mt)
Hagonoy	38	2.5	8	38	2.5	2.25	38	2.5	2.25
Malalag	1	0.02	Unproductive	1	0.02	Unproductive	4	0.33	Areas still on excavation
Padada									
Sta. Maria	5	2.31	2.53	5	2.31	1.68	2	0.08	0.90
Sulop							1	0.25	0.06
Total	**44**	**4.83**	**10.53**	**44**	**4.83**	**3.93**	**45**	**3.16**	**3.21**

Source: PPDO (1996).

to time, the market is adversely affected. The method of culture relied heavily on hanging coconut shells. The culture of the seaweed *Eucheuma spinosum*, financed by the DA, failed due to the attack of the "ice-ice" disease. However, the LGU has introduced the *Eucheuma cottonii*. The project started in 1994, which was operated by the LGU and Malalag Christian Cooperative Inc. (MCCI). The initial observation is that the variety thrives well in the area and it readily reproduces. Edible sea cucumbers also abound in the area but there are no steady buyers.

Aside from milkfish culture and marine fishing, oyster culture is being undertaken by a substantial number of residents of Barangay Balasinon in Sulop. In 1995, twenty families engaged in oyster culture. The method of culture relied on oyster beds with hanging sliced rubber. Basically, the product is sold in the form of oyster meat and is marketed in Sulop, Padada, and Digos at PhP20 per bottle.

The impact of aquaculture in the MBA may be viewed in terms of its positive and negative effects. Two of the most obvious benefits from the enterprise are its contribution to fish production and the generation of employment opportunities in rural areas. However, aside from the destruction of mangrove areas for fishpond development and the operation of fish farms, particularly intensive prawn farms, aquaculture contributes to coastal pollution and salt intrusion into domestic water sources. In addition, the proliferation of fish cages in the bay in recent years has contributed to the pollution loading of the bay. This pollution load contains uneaten fish feed and fecal and other excretory wastes. Intensive fish cages, floating pens and other systems that are relatively open to the natural waters have the greatest

potential to cause environmental degradation from totally untreated waste discharges. In areas where cages are crowded, the circulation of fresh seawater is impeded and the pollution caused by the decomposition of feeds affects broad areas and even natural stocks of fish.

INDUSTRY

In 1996, the MBA had ten major manufacturing firms (Table 5.8), all of which are agriculture dependent using the primary crops of the MBA such as sugarcane, cacao, banana, coconut, and other indigenous materials. However, a large percentage of their products are for the export market.

The DASUCECO at Barangay Guihing can mill 4,000 mt of sugarcane per day. The plant can accommodate the sugarcane produced from about 11,302 ha of sugarcane area from around the province and its neighbors. The FILINVEST and KLDI, two of the largest sugarcane plantations located in the MBA, both provide sugarcane to DASUCECO.

Table 5.8. Major industries in the MBA.

Name of establishment	Location	Product/service rendered
Cocoa Investors, Inc. (CII)	Hagonoy	Dried cocoa beans
Davao Sugar Central Company (DASUCECO)	Hagonoy	Raw and refined sugar
FILINVEST	Hagonoy	Sugarcane
Guihing Agricultural Development Corporation (GADECO)	Hagonoy	Cavendish banana
L and S Ventures Plantation, Inc.	Hagonoy	Cavendish banana
Kawayan Land Development, Inc. (KLDI)	Hagonoy	Sugarcane
Southern Davao Development Corporation (SODADECO)	Hagonoy	Prawns
United Sugarcane Planters of Davao del Sur (USPD)	Hagonoy	Sugarcane production and trading
Malalag Ventures Plantation, Inc. (MVPI)	Malalag	Cavendish banana
Phil. Cocoa Estate Corporation	Sta. Maria	Dried cocoa beans

Source: PPDO (1996).

The GADECO caters to the production of cavendish banana. As of 1996, the company had 1,920 ha planted to cavendish banana with an annual production of 1,871 mt. Also in Barangay Guihing is the CII, previously engaged in producing dried cocoa beans. In the later part of 1995, it shifted to mango production. Another company located in Hagonoy is the SODADECO which is engaged in prawn culture and hatchery.

The municipality of Malalag has a port which accommodates inter-island vessels and a docking area for some foreign vessels. The docking of foreign vessels in the bay, however, has generated some jurisdictional issues between the LGUs of Sta. Maria and Malalag and the Philippine Ports Authority and the Regional Maritime Command of the PNP. In May 2000, however, the full management and supervision of the port facility was turned over by the Philippine Ports Authority to the Malalag LGU. Malalag is also into banana plantation and export. It is lucky to have accommodated the MVPI, a joint venture project of the Lapanday Group of Companies and the Original Banana Exporters. Two existing storage facilities for molasses are also located in Malalag and owned by Total Bulk and CIFRA companies. Malalag is also known for its bamboo furniture, romblon mats and bags, and rope making.

Sta. Maria, Sulop, and Padada remain largely rural but rich in resources like coconut, corn, sugarcane, and cacao. Industrial activities in these municipalities are limited to either microscale or cottage.

Industrial effluents coming particularly from sugar milling and oil dumping from docking vessels have, however, contributed to the deterioration of the water quality of Malalag Bay.

AGRICULTURE

Food and Commercial Crops

The MBA is characterized by a predominantly production-based agriculture (Table 5.9). Food crops cover approximately 11,000 ha of the MBA's cultivable land area of which 6,500 ha are corn farms and 4,300 ha are rice farms (Figure 5.2). Commercial crops in the MBA utilize approximately 32,000 ha with coconut production covering about 23,000 ha.

Table 5.9. Food and commercial crops in the MBA in 1996.

Crops	Hagonoy	Padada	Sulop	Sta. Maria	Malalag	MBA
COMMERCIAL CROPS						
Coconut						
Area (ha)	2,262.79	3,679.00	5,173.00	7,400	4,460.66	22,975.45
Production (mt)	2124.00	3,222.00	4,867.00	8,233	5,789.00	24,235.00
Sugarcane						
Area (ha)	866.78	213.11	1,107.50	3.00	510.00	3,567.17
Production (mt)	52,387.04	12,052.85	44,548.64	206.23	21,810.40	131,005.16
Banana (Local)						
Area (ha)	321.20	180.00			78.00	579.20
Production (mt)	874.80	630.00			150.50	1,655.30
Banana (Export)						
Area (ha)	1,115.00		47.00	48.00	500.00	1,710.00
Production (mt)	82,405.00		235.00	546.60	19,000.00	101,186.60
Coffee						
Area (ha)			8.00	65.00	78.00	151.00
Production (mt)			6.40	169.00	26.87	202.27
Cacao						
Area (ha)	10.00		13.00	15.00	90.00	128.00
Production (mt)	10.00		13.00	30.00	21.50	74.50
Cotton						
Area (ha)	3.75		3.00			6.75
Production (mt)	3.00		3.00			6.00
Mango						
Area Planted (ha)	919.00	15.00	94.00	132.00	1,075.00	2,235.00
Area (Fruit bearing) (ha)	6.00	4.00	11.00	8.00	30.00	59.00
Area (Non-fruit bearing) (ha)	913.00	11.00	83.00	124.00	1,045	2,176.00
Production (mt)	360.00	225.00	75.00	525.00	1,800.00	3,485.00
Root crops (Cassava, *camote, gabi, ubi*, irish potato, carrots)						
Area (ha)		15.00	43.00	55.70	7.50	121.20
Production (mt)		35.00	43.00	400.50	7.50	486.00
Vegetables						
Area (ha)	30.00	6.50	14.50	39.30	23.00	113.30
Production (mt)	30.00	26.00	7.25	78.60	23.00	164.85
FOOD CROPS						
Palay						
Area (ha)	3,865.00	0	17.00	230.00	216.00	4,328.00
Production (mt)	23,190.00		51.00	920.00	788.00	24,949.00
White corn						
Area (ha)	900.00	1,048.75	1,700.00	2,520.00	82.00	6,250.75
Production (mt)	2,700.00	870.50	3,400.00	2,520.00	262.40	9,752.90
Yellow corn						
Area (ha)		24.00	80.00	134.00		238.00
Production (mt)		17.00	210.00	270.00		497.00

Source: PPDO (1996).

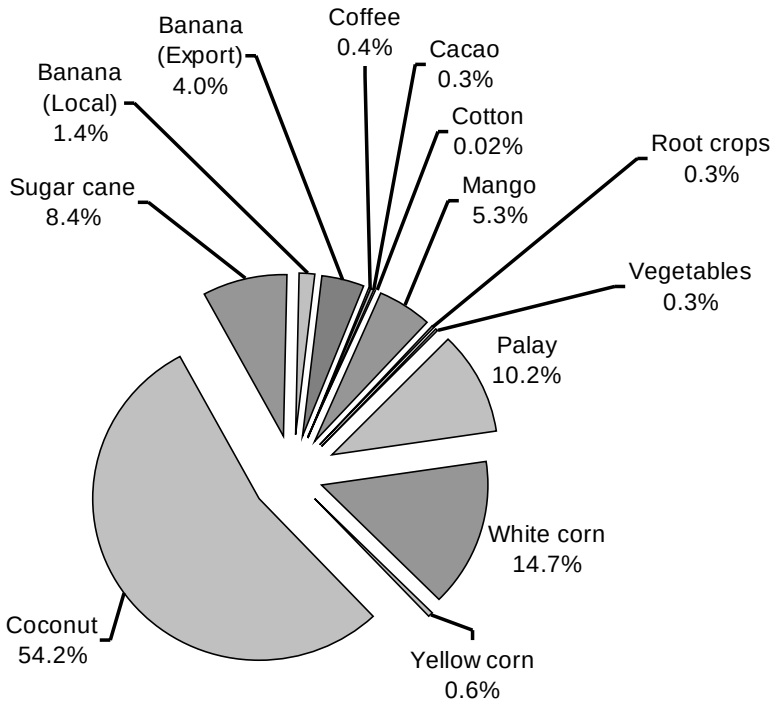

Figure 5.2. Land use for food and commercial crops in the MBA.

Other important crops in the MBA are sugarcane (3,567.17 ha), banana (2,289.2 ha), mango (2,235 ha), coffee (151 ha), cacao (128 ha), and cotton (6.75 ha). The top agricultural products of the MBA in terms of production value are sugarcane (131,005.16 mt), banana (102,842 mt), and palay (24,949 mt) (Figure 5.3).

The marketing of agriculture production derived from food and commercial crops in the MBA is hampered by infrastructural deficiencies, product seasonality, and price inelasticity. Improved infrastructure, a shift towards a high-value agriculture, and value added processing will significantly improve the learning area's competitive market position in the coming years.

The agricultural sector is one of the major contributors to water pollution. Agricultural production has increasingly relied on chemical fertilizers and pesticides to boost productivity. Lapanday, a big banana plantation, sprays chemicals by airplane and uses fertilizers for the production of its bananas for export. In general, waste associated with the agricultural sector includes runoff and leaching of fertilizers and pesticides and herbicides used. Agricultural runoff has been identified by the DENR as one of the reasons that led to the deterioration of the country's coastal waters. Agricultural activities are the source of excessive nutrients, oxygen-demanding wastes, and organic chemicals (pesticides).

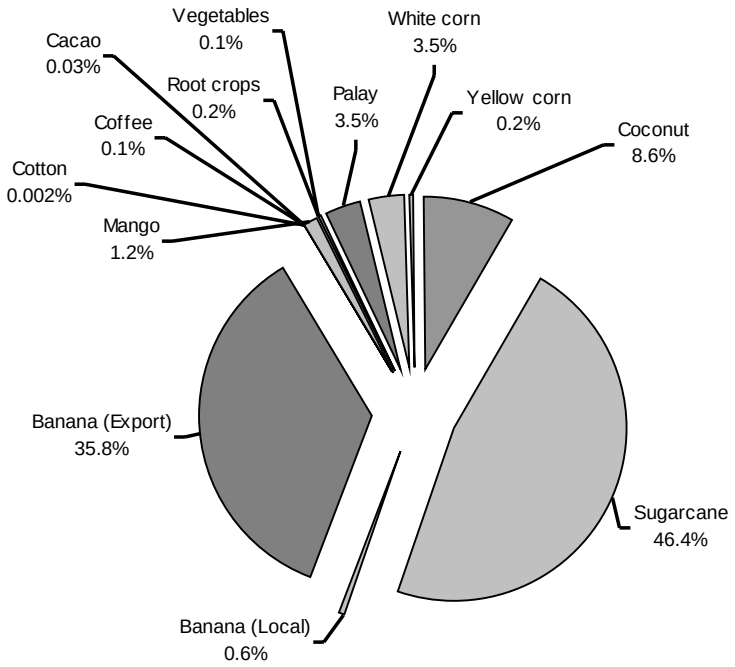

Figure 5.3. Food and commercial crops in the MBA.

Livestock and Poultry

The major livestock and poultry produced in the MBA are cattle, carabao, hogs, goats, chickens, and ducks (Table 5.10). Hogs registered the highest production at 39,872 heads in 1995 while goats exhibited the highest increase in the number of heads produced at 5,167 in 1994. Total chickens raised for 1995 reached 308,413.

Livestock farming, particularly pig farming, has significant pollution effects. Typical piggery wastes would have the following characteristics:

- BOD 9,000 to 12,000 mg/L
- COD 4,500 to 6,500 mg/L
- Nitrogen 120 to 180 mg/L
- Phosphorus 7 to 12 mg/L

The quantity of oxygen-demanding waste in water can be determined by measuring the biochemical oxygen demand (BOD) and chemical oxygen demand (COD). Oxygen-demanding waste are organic waste that deplete the oxygen level in water-bodies when it decomposes. Oxygen depletion can cause fish and other forms of oxygen-consuming aquatic life to die. BOD measures the amount of dissolved oxygen (DO) needed by organisms during the decomposition of organic waste. This is the

Table 5.10. Livestock and poultry (number of heads) in the MBA.

Animal	Year	Hagonoy	Malalag	Padada	Sta. Maria	Sulop	Total
Carabao	1994	1,791	1,434	1,070	3,109	2,821	**10,225**
	1995	1,938	1,505	1,338	2,953	2,679	**1,0413**
Cattle	1994	2,534	1,025	2,450	1,706	71	**7,786**
	1995	2,745	1,076	2,293	1,791	1715	**9,620**
Goats	1994	6,558	1,402	2,270	5,182	9211	**24,623**
	1995	6,990	1,076	2,436	9,395	9,893	**29,790**
Hogs	1994	6,181	5,622	8,393	9,537	9,966	**39,699**
	1995	6,974	5,903	8,270	10,013	8,712	**39,872**
Chicken	1994	31,589	45,885	58,122	75,017	78,589	**289,202**
	1995	33,684	49,679	63,765	78,767	82,518	**308,413**
Ducks	1994	9586	1,011	2,272	2,190	2,310	**17,369**
	1995	10,331	1,061	2,270	2,299	2,356	**18,317**

Source: PPDO (1996).

primary indicator of the magnitude of organic waste from land-based sources such as industrial, municipal, and agricultural activities. The higher the level of the BOD, the more polluted is the waterbody. Municipal sewage, distillery waste, and piggery waste are some examples of organic waste that can increase the BOD level of water. COD also measures the amount of DO needed by organisms during decomposition of waste. However, unlike BOD, COD can account for the portion of inorganic waste that undergo degradation. The DENR has set BOD and COD standards from 50 to 120 mg/L and 100 to 200 mg/L, respectively, on the receiving waterbody classification.

Livestock waste can also cause excessive nutrient loading of nitrogen and phosphorus to marine ecosystems leading to algal blooms. When livestock waste decay, they can deplete the oxygen in the water resulting in fish kills, widespread destruction of benthic habitats, surface algal scum, water discoloration, and release of toxins from sediment, and alter species composition and size structure for primary producers.

TOURISM

Davao del Sur is enriched by various scenic spots that are mostly natural attractions such as hot springs, caves, waterfalls, beaches, hills, and mountain parks. Also, historical attractions such as fortress remnants, Japanese tunnels, and foxholes are found in the province. In coastal areas, several beaches provide complete resort facilities for swimming, scuba diving, meetings, and other gatherings. These are the Treasure Island Catering Services and Beach Club in Balutakay, Hagonoy; the Little Boracay in San Agustin, Sta. Maria; and the Total Beach Resort in Malalag (Table 5.11).

The MBA offers moderate-to-good potential for growth of local tourism. The area's strategic road linkages to major urban centers in the north, south, and west and the development of day-use and overnight tourism attractions and support services (roadside motels, restaurants, car rental, urban entertainment, beach resort, travel and tour agencies, business service centers, etc.) may result in increased regional tourist market attraction.

Table 5.11. Existing tourist spots in the MBA.

Tourist spot	Location	Attraction facilities	Distance from nearest *poblacion*/accessibility
Leling Beach	Leling, Hagonoy	Clean beach, good for swimming, *nipa* and bamboo cottages, *sari-sari* stores	10 km from Digos, about half hour ride by tricycle from Digos central market
Bolinao Beach Resorts (Molina's, Llaban, Baywatch, Yncierto's, and Treasure Island, etc.)	Balutakay, Hagonoy	Clean beach suitable for swimming, open-air cottages	5 km from Digos, about 10 minutes ride by tricycle
Piape Beach	Piape, Padada	Clean beach, good for swimming, open-air cottages with electricity and sari-sari stores	5 km from Padada, about 20 minutes ride by tricycle from Padada Public Market
Dagandang Beach	Sta. Maria	White sand beach, cool water, good for swimming	3 km from Sta. Maria, about 15 minutes ride by tricycle
Giger Beach Resort (Little Dakak)	Sta. Maria	Clean beach suitable for swimming; open-air cottages	15 minutes ride by tricycle from Poblacion, Sta. Maria
Kisulad Beach Resort	Sta. Maria	White beach; overlooking the sea are coconut trees	10 km from Sta. Maria, about 30 minutes ride by tricycle
Mariscal Beach Resort	San Agustin, Sta. Maria	Fine white beach, with open-air cottages and a high mountain overlooking the sea	5 km from Sta. Maria, about 30 minutes ride by tricycle
Almina Beach Resort	Baybay, Malalag	Clean beach suitable for swimming and open-air cottages	2 km from Malalag, about 15 minutes ride by tricycle
Total Beach Resort	Baybay, Malalag	Clean beach suitable for swimming and open-air cottages	2 km from Malalag, about 15 minutes ride by tricycle

Source: PPDO (1996).

SUMMARY

Malalag Bay, consisting of 65 km^2 of marine water, supports a coastal population of 36,400 of which 1,611 are fishermen. Aside from the municipal fishery, the bay also supports commercial fishing and is an excellent site for a port, selected industries, and limited coastal tourism businesses.

The aquaculture industry is likewise dependent on the bay which is declining due to the unstable market for seaweed and oysters and the occurence of a red tide. Only brackishwaster aquaculture, primarily for milkfish, is increasing in prevalence as compared with freshwater aquaculture and seafarming.