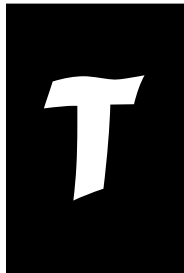# Chapter 5
ECONOMIC SECTOR

FISHERIES

T he fishery resources of Sarangani Bay and adjoining waters are derived from capture fisheries and aquaculture. Based on Presidential Decree 704, capture fisheries can be classified as commercial or municipal fisheries. The 2 differ in terms of boat tonnage person power involved and the fishing grounds where each can operate. Commercial fishers use boats with a gross weight of 3 t or over and fish in areas farther than 15 km from the coast. In contrast, municipal fisheries involve fishing in coastal waters less than 15 km from the shore and in inland waters, use of vessels not greater than 3 GT, or fishing without the use of vessels. In reality, however, many commercial and municipal fishers fish in all areas of the bay, regardless of the distance from the shore (Figure 5.1).

Aquaculture is the raising of aquatic and marine plants and animals in enclosures, usually freshwater and brackishwater ponds,

Figure 5.1. Commercial fishing boats still fish in municipal waters of Sarangani Bay.

fishpens and cages, or with the use of stakes and hanging lines as in the culture of mollusks (such as oysters and mussels) and seaweeds. Aquaculture is practiced in the coastal areas of Sarangani Bay and Celebes Sea. Construction of fishponds in the area has been a major issue due to the denudation of mangrove areas.

Based on national figures, the fisheries sector provides direct and indirect employment to over 1 million people, or about 5 percent of the national labor force of whom 65 percent are in municipal fishing, 25 percent in aquaculture, 5 percent in commercial fisheries, and 5 percent in ancillary activities including post-harvest handling, processing, transport, marketing, boat-building and repair, and manufacturing/distribution of fisheries-related activities.

Capture Fisheries
In the Philippines, municipal fishing has been in a steady downtrend. Its contribution to total production decreased from 57 percent in the early 1970s to just 30 percent in 1996. In general, production growth has been very minimal over the last 5 years, averaging 1.5 percent per year while catch per unit effort (CPUE) has steadily declined (White and Cruz-Trinidad 1998) (Figures 5.2 and 5.3). Nevertheless, fishing remains a major activity of residents in coastal areas, and GSC is the second major fish landing in the Philippines.

The succeeding discussions are based on the studies of MSU-SUML (1997), and the results of the PCRA activities. Based on the PCRA, the most common fishing method is hook and line/handline/dropline. This type of fishing method accounts for 65 percent of all the methods used. Drift gill nets account for 22 percent. This is true for all cities and municipalities except for Alabel. In Alabel, 9 out of 10 respondents admitted that illegal or controversial fishing is practiced in their coastal area (Table 5.1). However, it is very difficult to generalize from these data due to the small sampling size.
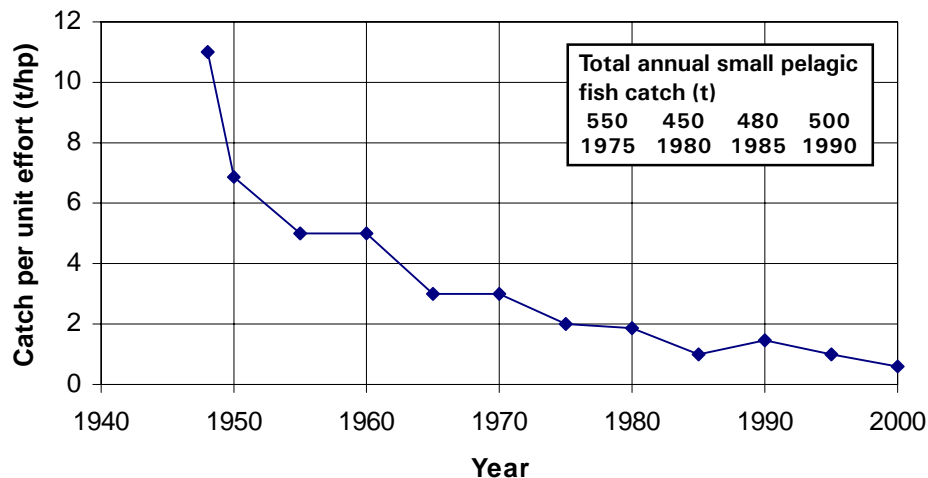

Figure 5.2. Trend of catch per unit effort for small pelagic fisheries since 1948.
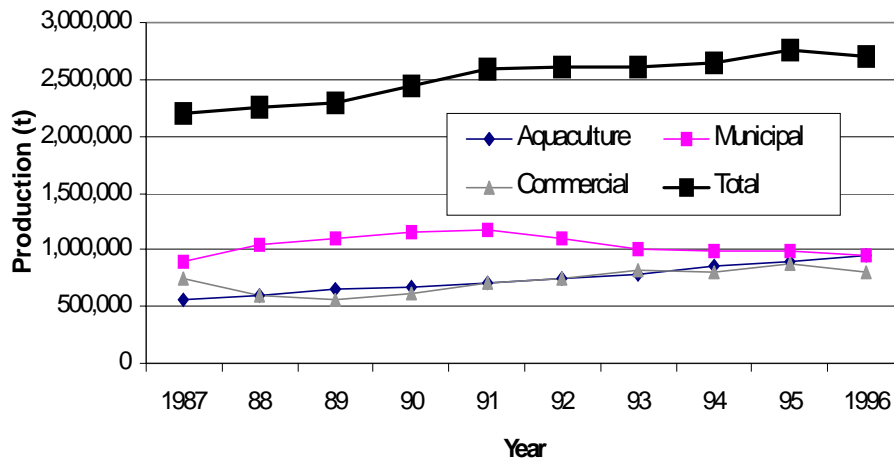*Source: White and Cruz-Trinidad (1998)*

Figure 5.3. Trends in Philippine fish production, 1987-1996.
Source: White and Cruz-Trinidad (1998)

Table 5.1. Most common fishing methods used and frequency of use in the profile area.

Fishing method	Glan	Malapatan	Alabel	Maasim	Kiamba	Maitum	GSC	Total
Hook and line/handline/ dropline	262	96		223	92	53	402	1,128
Drift gill net	98	37		74	31	41	108	389
Trawl	2	1	1	2	2	2		9
Muro-ami	1		1		1			3
Kayakas	1		1		1	3		6
Fishpot and crab pot	10	1			5	4	8	29
Compressor	5		7	1	2		1	9
Spear	25	1		6	5	1	6	51
Beach seine	1							1
Multiple hook and line	4			1				5
Cast net	2						1	3
Fish shelter				3				3
Scoop seine					2			2
Push net							28	28
Jigger				4				4
Total	**411**	**136**	**10**	**314**	**141**	**104**	**554**	**1,670**

Data from the Participatory Coastal Resource Assessment 1998

Table 5.2 presents the most commonly used fishing methods in 1 week. As in Table 5.1, the most popular fishing gear are hook and line/handline/dropline and drift gill net. Spears, although the third most used, are more commonly used once to thrice a week. The hook and line/handline/dropline is used 3, 4, and 7 times a week.

There seems to be some confusion among respondents in what is considered a good or bad fishing method (see Table 5.3). Some 92 to 93 percent of the respondents believe that the most common fishing gear used in the area are good practices while 7 to 8 percent believe that they are not. On some controversial fishing methods, the

Table 5.2. Number of times fishing methods are used in a week.

Fishing method	Once	Two	Three	Four	Five	Six	Seven
Hook and line/handline/ dropline	115	101	156	179	129	72	237
Drift gill net	62	28	44	60	51	19	59
Trawl	1		4		1		1
Fish pot and crab pot	10	5	2	3			7
Spear	9	11	6	3	4	4	1
Compressor	2		2		1		2
Fish shelter					1		
Beach seine							1
Kayakas							
Cast net	1	5	1				
Muro-ami		2					1
Set long line					1		
Scoop seine							2
Push net			2	3	9	12	2
Multiple hook and line			3		1		
Jigger		2		1	1		

Data from the Participatory Coastal Resource Assessment 1998

Table 5.3. Fishing methods identified as either good or bad.

Fishing method	Good		Bad	
	No.	Percent	No.	Percent
Hook and line/handline/dropline	989	64.59	84	5.48
Drift gill net	377	24.61	29	1.89
Trawl	7	0.46	3	0.19
Fish pot and crab pot	28	1.83	2	0.13
Spear	7	0.46	4	0.26
Compressor	11	0.72	10	0.65
Push net	12	.078		
Scoop seine	4	.026		
Muro-ami	1	0.06		
Kayakas	3	0.19	6	0.39
Multiple hook and line	4	0.26		
Jigger	4	0.26		

Data from the Participatory Coastal Resource Assessment 1998

respondents are evenly split. For instance, more than half believe that the use of compressors is a good fishing method. Seventy percent of the respondents believe that the use of trawls is a good fishing practice. With regard to illegal fishing practice, one respondent believes this is good. A majority believe that *kayakas* is a bad fishing practice.

Table 5.4 shows the various fishing methods that the family members of fishers also know how to use. This table is similar to Tables 5.1 and 5.2 except for jiggers, which figured prominently in this table. The use of explosives, considered the primary cause of coral destruction in the past years, occurs for the first time in Table 5.4.

Table 5.5 shows similar results in terms of the most popular fishing method in the area. Gleaning seems to be popular with women, particularly wives. However, overall, the results show similarities with the previous tables. Table 5.5 also shows that it is the father and the children who are the most active in fishing. Mothers usually gather shells, crabs, and fishes in the mangrove area together with their children. The catch from mangrove areas are generaly consumed rather than sold.

Table 5.4. Fishing methods used by other members of the family.

Fishing method	No. of fishermen	Percent
Hook and line/handline/dropline	767	50.06
Drift gill net	241	15.73
Jigger	159	10.38
Spear	67	4.37
Lights	56	3.65
Trawl	85	5.54
Scoop	33	2.15
Reef seine	31	2.02
Gleaning	15	0.90
Scoop seine	30	1.96
Push net	27	1.76
Fish pot and grab pot	26	1.70
Stop seine	15	0.98
Multiple hook and line	112	7.31
Troll line	28	1.83
Encircling gill net	5	0.33
Beach seine	2	0.13
Cast net	2	0.13
Set long line	2	0.13
Fish shelter	1	0.06
Explosives	1	0.06

Data from the Participatory Coastal Resource Assessment 1998

Table 5.5. Fishing methods used by various members of the fisher's family.

Fishing method	Family Members					
	Father	Mother	Children	Sibling	Wife	Husband
Hook and line/handline/dropline	353	44	134	8		5
Drift gill net	157	14	60	3	12	23
Trawl	17	2	12	1	1	1
Fish pot and crab pot	15		7			
Beach seine	2					
Jigger	14		2			
Multiple hook and line	44		18		7	
Cast net	2					
Set long line	2		1			
Spear	36	2	13	5		
Gleaning	5	2	21		24	
Fish shelter	1		1	4		
Scoop seine	5	3	17		5	
Light	3		1			2
Push net	27		5			

Data from the Participatory Coastal Resource Assessment 1998

Figure 5.4 shows the amount of time spent by fishers in fishing. A majority of the fishers fish from 1 to 6 hours. A few spend the whole day and night fishing, while there are also few who only fish for a few hours. More time is spent fishing than before because of fewer fish. However, no quantitative data are available to compare with the PCRA data.
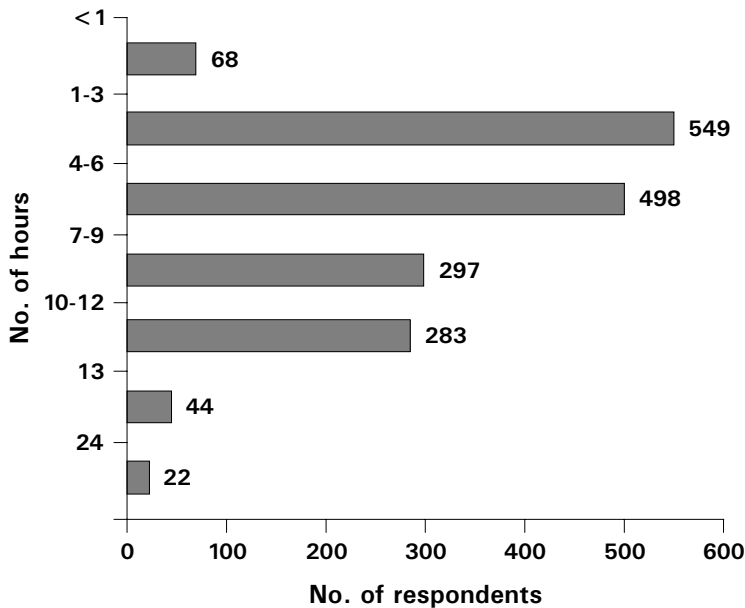
Figure 5.4. Number of hours spent by fishers catching fish.

SUML (1997) showed that 80 percent of the fishers work full-time and only 19 percent are part-time fishers. Figure 5.4 seems to corroborate this with only 68 respondents fishing less than 1 hour. However, the SUML studies covered only the major fishing villages in the municipalities of Alabel, Glan, Kiamba, Maasim, and Malapatan. PCRA data also show that fishers usually fish 7 times a week.

Full-time means that the income is entirely derived from fishing or fishing-related activities; part-time is defined as income derived from 2 sources: fishing and a non-fishing-related occupation such as farming, financing, teaching, convenience store business, or other.

Table 5.6 shows persons who accompany the fishers when he goes fishing. The results show that most fishers fish alone; they are accompanied, it is usually by their children. Interestingly, in GSC, there is a large proportion of passengers in fishing boats compared with the other municipalities.

Table 5.6. Persons who accompany fishers during fishing.

Person	Glan	Malapatan	Alabel	Maasim	Kiamba	Maitum	GSC	Total
None	127	48	2	154	37	26	172	566
Operator				3		1	22	26
Passenger			1	8			77	86
Children	61	9	3	59	37	22	82	273
Wife	11		4		3		6	24
Husband					2		10	12
Father	18	3		31	7	19	5	83
Mother							5	5
Grandparent		4					2	6
Sibling	13	2		6	2	8	17	48
Neighbor	19	1		30	1	1	3	55
Friend	3			16		1	4	24
Relative/in-law	4			4			2	10
Acquaintance		5				2		7
Total	**256**	**72**	**10**	**311**	**89**	**80**	**407**	**1,225**

Data from the Participatory Coastal Resource Assessment 1998

The data also show that 92 percent of the boats are engaged in municipal fishing and only 8 percent are engaged in commercial fishing. Of the 92 percent municipal boats, more than half (55 percent) are non-motorized (see Table 5.7).

Table 5.7. Number of fishers and *bancas* based on household interviews from the 5 municipalities of Sarangani Province.

Municipality	No. of fishers			No. of boats			
	Actual fishers*	Full-time	Part-time	Actual boats*	Commercial	Municipal	
						Non-motorized	Motorized
Alabel							
Kawas	70	18	4	28	1	13	5
Glan							
Gumasa	nd	10	7	nd	4	10	5
Lago	40	17	9	40	1	17	8
Kiamba							
Suli	90	30	6	90	3	22	17
Maasim							
Linao	50	13	2	60	2	9	4
Sinalang	100	1	2	62	3	12	3
Tinoto	35	35	4	nd	nd	16	22
Malapatan							
Lun Padidu	295	18	2	295	1	6	11
Total	**680**	**142**	**36**	**575**	**15**	**105**	**75**
Percentage		**805.0**	**18.9**		**7.8**		

Actual values as reported by the resource person.
Source: SUML (1997)

Based on data from the Office of the Provincial Agriculturist in 1993, the number of fishers and motorized and non-motorized boats are presented in Table 5.8. The highest number of fishers are in Glan (1,057), followed by Maitum (350), and Maasim (328).

The fishing effort for commercial fishing gear particularly the purse seine requires 46 to 90 fishers per operation. The rest of the gear require only from 1 to 20 fishers per operation. All the gear are used at least once a day for about 20 days a month.

The highest effort recorded regardless of the gear operation is as follows: purse seine (23,499 person-hours), drift net (202 person-hours), ring net (188 person-hours), single hook and line (151 person-hours), and lift net (148 person-hours). The lowest effort is for: jigger (3 person-hours), scoop net (5.7 person-hours), bottom set gill net (6.5 person-hours), set gill net (8.2 person-hours), and spear gun (9 person-hours) (Table 5.9).

Table 5.10 shows the average CPUE and income per unit effort (IPUE) per year. The gear with the highest CPUE are fish corral (165 kg/person-hour) and scoop net

Table 5.8. Number of fishers and motorized and non-motorized boats per coastal municipality of Sarangani Province and GSC.

Municipality	*Barangay*	No. of fishers	Motorized boat	Non-Motorized boat
Alabel		283	124	154
	Ladol, Poblacion	165	60	100
	baybay Kawas, Kawas	54	4	50
	Lago	64	60	4
Glan		1,157	298	822
	Baliton	21	4	26
	Batulaki	62	32	44
	Big Margus	79	26	47
	Burias	69	12	69
	Cablalan	136	7	127
	Elaya	24	0	0
	Glan Padidu	57	22	43
	Gumasa	58	19	68
	Kapatan	63	21	54
	Lago	83	13	67
	Pangyan	31	31	15
	Poblacion	105	35	95
	San Jose	52	27	27
	Small Margus	61	18	38
	Taluya	91	27	61
	Tango	54	4	37
	Tapon	11	0	4
GSC		nd	nd	nd
Kiamba		1,567	316	619
	Datu Dani	65	12	29
	Gumasa	28	2	22
	Katubao	98	17	47
	Kayupo	145	31	52
	Kling	6	0	6
	Lagundi	90	24	18
	Lebe	38	4	26
	Lomuyon	130	15	85
	Nalus	219	38	105
	Poblacion	412	112	76
	Salakit	45	8	21
	Suli	163	26	85
	Tambalil	128	27	47
Maasim		nd	328	661
Malapatan		nd	167	410
Maitum		nd	350	258

Data from the Municipal Planning and Development Ofice 1993 and the Office of the Provincial Agriculturist 1993

(17 kg/person-hour). In terms of IPUE, the highest are also fish corral (PhP1,958/person-hour), scoop net (PhP384/person-hour), and ring net (PhP280/person-hour).

SU reports about 120 fish species are caught based on the combined catches of all gear. Among the commonly used gear, multiple hook and line has the most number of species caught (60 species) dominated by scombrids (*Auxis thazard*) and clupeids (*Sardinella* sp.). This is followed by gill net (49 species) dominated by the same species plus a carangid (*Decapterus macrosoma*). The single hook and line catches about 32 species dominated by scombrids (*Thunnus thynnus* and *Auxis thazard*). Species-specific gear are squid jigging and a type of fish net that targets needlefishes (*Strongylura* sp.) and halfbeaks (*Hemiramphus* sp.).

Table 5.11 presents the most common catch, tuna and mackerel based on interview results during the PCRA. This is expected considering that GSC has the largest tuna landing in the Philippines. Scads are the second most common catch, followed unexpectedly by squids. This is due to the large number of respondents (150) in Maasim who identified squid as one of the most common coastal and marine resources they catch.

Table 5.9. Fishing effort of the common gear in the 5 municipalities of Sarangani Province and GSC.

Gear type	No. of samples	No. of hours per trip	Effort (person-hour)	No. of trips per day	Catch (kg/trip)
Beach seine	1	2.00	10.00	1.00	2.00
Bottom set gill net	2	6.50	6.50	1.00	8.75
Drift gill net	6	12.40	201.92	1.00	459.17
Fish corral	3	2.50	16.50	1.00	4,451.25
Fish net	1	12.00	36.00	1.00	10.00
Fish trap	1	3.00	12.00	1.00	4.00
Gill net	57	9.53	29.93	1.08	130.40
Jigger	1	3.00	3.00	1.00	0.31
Lift net	5	12.58	148.37	1.25	425.56
Multiple hook and line	77	11.50	14.75	1.54	36.34
Purse seine	4	436.40	23,499.00	0.67	2,478.50
Ring net	3	12.83	188.22	1.00	2,277.22
Scoop net	4	3.67	5.71	0.83	76.58
Spear gun	4	3.67	9.04	1.67	4.08
Set gill net	2	4.12	8.25	1.00	4.95
Single hook and line	38	33.45	150.77	1.16	1,100.94*

All values are average data.
 * This large kg/trip for single hook and line includes several boats catching large tuna in 1 trip. Without this the average would be 26.2 kg/trip

Table 5.10. CPUE and IPUE per gear.

Gear type	No. of samples	Average CPUE		Average IPUE	
		(kg/trip)	kg/person-hour	PhP/trip	PhP/person-hour
Beach seine	1	2.00	0.20	48.00	4.80
Bottom set gill net	2	8.75	1.05	298.75	36.00
Drift gill net	6	459.17	4.56	11,710.35	93.89
Fish corral	3	4,451.25	165.02	52,695.83	1,958.18
Fish net	1	10.00	0.28	350.00	9.72
Fish trap	1	4.00	0.33	257.00	21.42
Gill net	57	130.40	2.82	2,187.38	78.30
Jigger	1	0.31	0.10	80.57	26.86
Lift net	5	425.56	8.14	13,992.40	221.84
Multiple hook and line	77	36.34	3.07	1,854.99	156.06
Purse seine	4	2,478.50	6.00	11,120.62	41.79
Ring net	3	2,277.22	11.16	58,079.64	280.61
Scoop net	4	76.58	17.42	1,387.29	384.64
Spear gun	4	4.08	0.71	131.82	23.38
Set gill net	2	4.95	1.03	299.17	50.99
Single hook and line	38	1,100.94	7.46	3,599.32	47.34

Source: SUML 1997

Table 5.12 shows that 77 percent of fishers catch only 1 to 20 kg per day. This suggests that the majority of the fishers living in the area are municipal or subsistence fishers.

Table 5.11. Fish species caught in the profile area and the number of respondents in each municipality and city that identified the species accordingly.

Fish	Glan	Malapatan	Alabel	Maasim	Kiamba	Maitum	GSC	Total
Tuna and mackerel	47	9	1	98	26	27	265	473
Runner	5						1	6
Goatfish	4			9		5	2	20
Milkfish	6			1			1	8
Damselfish				2			1	3
Rabbitfish	7						3	10
Dolphinfish	2							2
Slipmouth, ponyfish	1							1
Jack, cavalla, crevalle, trevally, darts	5				1	10	12	28
Sardine, herring, sprat gizzard shad	2	6		1	1	8	10	28
Fusilier, bananafish						3		3
Shark							5	5
Whiting, sillago							2	2
Moonfish	2						2	4
Squid		2	1	150		12	1	166
Octopus	11						1	12
Billfish		3		2			37	42
Scad	43	30	1	98	15	24	43	254
Hairtail, cutlass fish	10						28	38
Mullet							23	23
Therapon, tigerfish							17	17
Parrotfish	14	1		8	2	22	26	73
Spadefish, scat							3	3
Emperor bream	16					2	1	19
Glassyfish							1	1
Mud/mangrove crab							1	1
Squirrel, soldierfish	2					2		4
Anchovy	2			3				5
Garfish, needlefish	3							3
Flyingfish	34	1		12	3	29		79
Threadfin bream and spinecheek	4							4
Halfbeak	2					1		3
Triggerfish, filefish	5			1		1		7
Snapper, sea pearch		5			1	9		15
Barracuda, seapike	2							2
Cardinalfish	1							1
Grouper, seabass, perchlet	8							8

Data from the Participatory Coastal Resource Assessment 1998, as enumerated by fishers.

The PCRA data reveal that most of the fishers sell 80 to 100 percent of their catch. Fishers from Sarangani usually fish within Sarangani Bay in the areas of their respective municipalities. In GSC, many of the fishers catch fish in Indonesia. This is probably because most of the boats in GSC are for deep-sea fishing. This is consistent with Table 5.9 (also from PCRA results). Although there are more fishers in GSC who fish 0 to 10 km from the shoreline, the city also has the most number of respondents by a wide margin who fish more than 15 km from the shore. Respondents who fish more than 15 km from the shore may actually be fish workers and not fishers. These fish workers work for big fishing corporations and receive wages for the work they render. Overall, most fish near the shore (0 to 10 km) (Table 5.13).

Table 5.12. Weight of fish caught in 1 day in the profile area.

Weight (kg)	Glan	Malapatan	Alabel	Maasim	Kiamba	Maitum	GSC	Total
1 to 20	323	102	12	249	64	121	291	1,162
21 to 40	12			21	7	37	77	154
41 to 60		1		47	1	2	48	99
61 to 80	1			5	1	1	1	9
81 to 100	1			1			28	30
> 100	4			1	3	2	28	38

Data from the Participatory Coastal Resource Assessment 1998

Table 5.13. Distance from the shoreline where fishers catch their fish.

Distance (km) from shoreline	Glan	Malapatan	Alabel	Maasim	Kiamba	Maitum	GSC	Total
0 to 10	290	77		186	50	91	205	899
11 to 20	6	17		57	10	11	27	128
21 to 30	5		2	55	7	34	3	106
31 to 40	1			7		1	4	13
41 to 50	1			13	9	1	11	35
51 to 90	11		3		3		4	21
91 to 100	2		2			1	5	10
101 to 501	2		4	1			11	18
> 501	1					3	93	97

Data from the Participatory Coastal Resource Assessment 1998

Table 5.14 presents the monthly production from municipal fisheries in 1999. Most fishers usually fish in municipal waters where they live although sometimes they fish in neighboring municipalities. Fishers from Davao also fish in the area, particularly in the municipal waters of Maasim. Indonesian and Taiwanese fishers have also been reported fishing in Sarangani Bay. Most of the fishers who live in the profile area report that only 1 to 10 fishers from outside the municipalities are seen fishing in municipal waters. These fishers usually fish from 1 to 12 hours in municipal waters. They use drift gill nets, hook and lines/handlines/droplines, and ring nets. There have also been reports of illegal fishing methods such as dynamite, *muro-ami*, and poisons and noxious substances.

Another important fishery harvest in the area is the *bangus* (milkfish) fry. *Bangus* fry gathering is seasonal with peaks during the months of July and August. During peak season, almost all members of the households both male and female, young and adult are involved in the activity. In Maasim alone, about 1,500 households (31 percent of the total households) are engaged in *bangus* fry gathering. The total average catch per year is 12 million fry. The value of a single fry ranges from PhP0.45 to 1.00. Other municipalities that are actively engaged in *bangus* fry gathering are Alabel, Kiamba, and Maitum (Figure 5.5). GSC is also engaged in *bangus* fry gathering. However, no harvest data are available for this area (Table 5.15).

Table 5.14. Monthly production from municipal fisheries in 1999.

Month	No. of municipalities	No. of cooperators	No. of *barangays*	Total target		Fishing gear (types)	Catch data	
				Motorized (no.)	Non-motorized (no.)		Motorized (kg)	Non-motorized (kg)
January	6	39	22	151	64	10	36,983.0	5,532.5
February	6	69	20	145	71	10	53,898.0	6,518.0
March	6	63	19	138	60	10	52,220.0	7,960.0
April	6	52	23	180	99	10	25,854.6	2,703.9
May	6	50	16	169	85	10	28,325.8	2,211.1
June	6	43	16	190	80	10	32,574.2	3,854.5
July	6	51	17	169	95	12	24,769.1	2,517.8
August	6	51	14	177	135	8	18,838.0	3,340.8
September	6	54	19	176	131	12	49,319.0	3,254.9
October	6	45	27	163	133	12	27,069.5	3,349.9
November	6	44	25	145	100	8	24,755.4	3,485.6
December	6	46	18	138	99	8	23,278.0	4,104.8
Total				**1,941**	**1,152**		**397,884.6**	**48,833.8**

Most of the fish caught are sold in the *barangays* where the fishers belong, in the *poblacion* markets of the respective municipalities, and in GSC. Sometimes the financier (person who finances the fishing trip in exchange for payment) of the fishers buys the fish that are caught. Sixty percent of the fishers in Sarangani Province reported that they have a regular buyer for their fish. However, majority of the fishers in GSC have no steady buyer for their fish. The most common complaint of the fishers about their steady buyer is the low price at which the fish is bought. In GSC, the financier buys the fish if there is no regular customer. This is expected since this is where the shipping operators reside. In Sarangani Province, the neighbors in the *barangay* and retailers buy the fish. In some cases, the financier or the regular buyer serves as the fish vendor. In the event that the fish is not sold, the fishers will sell even at a low price, at almost give-away prices. Fish are also processed or dried for future use.

The operating and maintenance costs of fishers seem to be small. Most of the repondents say monthly expenses for boats and other equipment range from PhP1 to 500 only.

Over 75 percent of the fishers in Sarangani Province have observed destructive fishing methods being used in Sarangani Bay. However, in

Figure 5.5. Bamboo stakes where fisherfolk hang their torch to attract *bangus* fry in Kiamba.

GSC, only 40 percent of the fishers have seen destructive fishing methods being used in the bay. The most common destructive fishing methods observed in the bay are dynamite fishing and use of poison and noxious substances (including cyanide). Other common illegal or controversial methods include beach seines, compressors, and ring nets. Most of the respondents in Sarangani Province believe that there has been no strict enforcement of the laws concerning

Table 5.15. Number of *bangus* fry concessionaires and their annual harvest.

Municipality/ City	No. of concessionaires	No. of *bangus* fry harvested per year (in millions)
Alabel	7	ND
Glan	11	ND
Kiamba	9	25
Maasim	11	12
Maitum	10	ND
Malapatan	ND	ND
GSC	ND	ND

Data from the Municipal Planning and Development Office 1993 and the Office of the Provincial Agriculturist 1993
ND=no data

illegal fishing. In GSC, fishers believe that it is all right to fish as long as they do not go beyond the municipal boundary. Lack of enforcement also seems to be the major reason why illegal fishing continues. Some fishers from Sarangani point to the lack of concern from the government, and to the fact that very few illegal fishers have been caught. Other issues include: there are no guards (Maitum); and illegal fishers are not caught because influential people protect them. Fishers in GSC, on the other hand, say that nobody is caught because of the lack of personnel to enforce the laws and they point to the difficulty in making a living in the area. Fishers point to poverty as a major reason for illegal fishing. Using destructive fishing methods allows fishers to catch more fish in the short run, hence enabling them to make ends meet.

Aquaculture
The aquaculture industry in the province is concentrated in the culture of milkfish (*Chanos chanos*), tilapia (*Oreochromis niloticus*), and prawn (*Penaeus monodon*). Table 5.16 shows aquaculture data for Sarangani Province. The municipalities and cities with the largest pond areas are Alabel, Glan, and GSC. Most of the fishponds in these 3 areas are semi-intensive. Overall, the practice is traditional.

Milkfish culture is common in the profile area and most ponds are privately owned (Figure 5.6). Food comes from the production of green algae, assemblages of phytoplankton and zooplankton, or a combination. Culture practices include the use of organic fertilizer such as chicken manure and the application of commercial fertilizers. Sun drying is

Figure 5.6. Fishponds near the pier in Glan.

Table 5.16. Monthly aquaculture production in 1999.

Month	No. of municipalities	No. of cooperators	No. of farms	Total targeted area (ha)	Culture system	Total area stocked	No. of fingerlings stocked	Total area harvested (ha)	Total volume harvested (kg)
January	7	60	32	210.98	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	33.76	3,334,300	18.91	82,533
February	7	62	34	215.23 + 12 cages	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	36.38 + 2 cages	7,657,100	25.16	16,953
March	7	64	36	203.85	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	25.94 + 2 cages	2,426,550	24.16	88,383
April	7	72	201.74 244.9 + 12 cages	201.74	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	19.56	1,171,600	32.16	146,458
May	7	78	57	11.15	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	21.83 + 2 cages	629,650	21.69	78,184
June	7	85	20	211.72 + 12 cages	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	19.56 + 2 cages	902,680	24.91 + 1 cage	122,113
July	7	54	20	233.01	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	35.11	9,454,636	23.5	114,119
August	6	45	35	225.09	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	35.06	2,495,530	27.72	124,330
September	7	47	54	231.88	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	48.69	3,843,830	42.49	266,709
October	7	53	37	225.79	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	58.58	6,093,130	44.63	46,953
November	7	37	14	211.67	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	68.85	4,768,910	32.54	35,420
December	6	31	799.64 + 12 cages	186.65	1. Brackish (intensive & extensive) 2. Freshwater (traditional)	42.85	2,038,250	24.65	24,590
Total				2,382.13 + 24 cages		454.06 + 8 cages	44,816,166	340.72 + 1 cage	1,146,745

common. Milkfish fry are available in nearshore waters. No standard stocking density is observed. Predation is a major problem of fry operators and leads to low survival of fry and fingerlings (LBII 1993).

Production of milkfish is very low, sometimes reaching only 50 kg/ha/year. Low production results from a lack of technical know-how, low inputs to production, wrong practices, and wrong site locations in some areas.

The yearly harvest ranges from 415 to 488 mt/km^2 for prawn, 142 to 298 mt/km^2 for *bangus*, and 89 mt/km^2 for *tilapia*. Assuming a kilogram costs PhP70 for prawn, and PhP40 for *bangus* and *tilapia*, the total earnings for the entire area are: PhP114 M for prawn, PhP35 M for *bangus*, and PhP0.028 M for *tilapia*.

TOURISM
The tourism industry in the province and GSC is confined mostly to beach resorts. Its coastline has some white sand beaches with abundant marine life. There are a number of falls and caves to see and explore but these are not fully utilized due to the absence of roads and transport system (Table 5.17). Another problem that inhibits potential tourist growth is the perception that there is an existing peace and order problem in the area. There are also a number of hotels and recreational facilities in GSC but their potential has not been optimized.

Other issues that contribute to the low level of tourist activities in the area are:
- Piracy;
- Beach sanitation and the problem of squatter habitation around beaches;
- Dynamite and other destructive fishing activities that extensively degrade reef areas; and
- Lack of investors.

Due to the low level of tourist activity in the area, environmental and socio-cultural impacts are minimal. However, once the Department of Tourism (DOT) properly promotes the area, and once the necessary infrastructure is in place, tourism has the potential for both positive and negative impacts, which include:
- Employment generation;
- Revenue earnings;
- Wastewater and other wastes from hotels and resorts; and
- Increased tourist population

INDUSTRY
Industrial establishments are generally concentrated in GSC. These include the 10 fish processing plants, which are often the subject of complaint because of the effluent that they discharge. Other food processing industries can also be found in the area.

Table 5.17. List of tourist attractions in Sarangani Province and GSC.

Name	Location
Marcom Falls	Sitio Rabaylon, Alabel
Lucirene Falls	Little Baguio, Alabel
Markom Falls	Prk. Cabugao, Paraiso, Alabel
Tapikong Falls	Datal Pon. Paraiso, Alabel
Matlisay, Tubay and Matnayan Falls	Datal Anggas, Alabel
Nalus, Badtasan and Salakit Falls	Kiamba
Domolok Lake	Sitio Rabaylon, Alabel
Anggas Lake	Datal Anggas, Alabel
Aspoton Lake	Spring, Alabel
Beto Lake	Poblacion, Alabel
Salimama Katimbol	Datal Anggas, Alabel
Ingay Lake	Datal Bukay, Glan
Ladol Beach	Sitio Ladol, Poblacion, Alabel
Kawas Beach	Kawas, Alabel
Alefre Summer Resort	Little Baguio, Alabel
Beehive Peak	Sitio Rabaylon, Alabel
Kiambing Beach	Kiambing, Maitum
Yabes Beach	Mabay, Maitum
Maguling White Sand	Maguling, Maitum
White Beach	lago, Gumasa, Burias, B&S Margus
Reyes Beach	Gumasa, Glan
BDC Beach Resort	Tango, Glan
Tuka White Sand Beach	Kiamba
Coastal areas of Tambler and Siguel	General Santos City
Napnap, Salimana, and Kawasan Caves	Datal Anggas, Alabel
Zion Cave	Zion, Maitum
Ayub Cabe	Pinol, Maitum
Lumasad	Lumasad, Maasim
Nomoh	Nomoh, Maasim
Poblacion	Poblacion, Maasim
Tinoto	Tinoto, Maasim
Amsipit Hot Spring	Amsipit, Maasim

The industrial site in GSC comprises the areas of Labangal, Calumpang, and Tambler. In and around the area are huge container yards of major shipping companies, fishing firms, and multinational corporations exporting agri-based products to Asia and the Pacific.

Newly registered business establishments in 1997 totalled 3,071 compared to 2,675 in 1996 posting an increase of 15 percent. Capital infusion of newly registered business establishments in 1997 reached PhP11.8 billion which has doubled compared to the previous year's PhP5.13 billion. Among the existing major industries, fishing ranks first with 49 companies, followed by tuna canning/processing with 10 companies. There are also 2 prawn hatcheries and 2 oil mills in the city.

The Espina Industrial Center in Makar is a 625-ha complex with provisions for institutional, residential, and recreational areas (Table 5.18). A number of foreign and domestic firms engaged in labor-intensive and export-oriented activities have shown

interest in setting up establishments in the area. The industrial center is less than 1 km from Makar Wharf and 5 km from the new international airport.

The banana plantation of Dole Philippines is located in Alabel. A potential issue is the use of pesticides on the plantation. However, previous sampling results in rivers in Sarangani and in Sarangani Bay show no trace of pesticides.

Table 5.18. Espina Industrial Center land use.

Land use	Land area (ha)
Institutional	19.80
Commercial	60.00
Residential	229.05
Industrial	200.35
Forest park	52.40
Golf course	57.00
Buffer zone	5.25
Parks/playground	2.20
Total	**626.05**

Another industry found in the province is salt making in Alabel. These are the San Andres Fishing, Inc. with an area of 0.53 km^2 and the Clemente Salt Farm with an area of 0.03 km^2. Their annual harvests are 144 mt/year and 72 mt/year, respectively. Other small-scale industries are mining of sand and gravel, hollow block making, cottage industries such as basket making, and rattan and wooden furniture.

The most significant industrial impact comes from the canneries primarily located in Tambler, GSC. The wastewater coming from this industry tends to have high biochemical oxygen demand, suspended solids, and oil and grease.

AGRICULTURE

The economy of GSC and Sarangani is primarily agri-based. As part of SOCSKSARGEN, it has contributed to the area's emergence as a leading producer of at least 8 major commodities.

At least 26 percent of the total land area of Sarangani is classified as suitable for agriculture. Crops account for 50 percent; livestock, 35 percent; and fisheries, 15 percent. Ricelands account for only 5 percent of the total cropland. Coconut has always been first; corn or cotton, second and third; followed by rice.

Due to its rich soil, good rainfall, and typhoon-free climate, SOCSKSARGEN accounts for 29.4 percent of the country's yearly corn production, 9.62 percent of its coconut and copra production, and 40 percent of the total pineapple production. In 1996, it supplied 99 percent of the country's asparagus and 20 percent of the total rice production with a 30 percent target increase in the year 2000. The area produces other high value crops such as exotic fruits, potatoes, vegetables, and cut flowers.

The major activities of Sarangani Province are crop production, livestock production, and fisheries. The essential agricultural products are coconut, corn, rice, and copra.

Palay production in Sarangani Province was 11,535 mt in 1997. Corn production reached 30,437 mt. Copra production was 116,042 mt. In GSC, rice production was 7,855 mt; corn production, 25,673 mt; and coconut, 10,356 mt. For the entire province, yearly production of rice was 2.20 mt/ha; corn, 1.38 mt/ha; and coconut, 4.63 mt/ha.

Aside from these major agricultural products, there are also many fruit tree products harvested in the area. These are banana, lanzones, jackfruit, rambutan, papaya, star apple, peanut, guava, atis, and citrus. The agricultural products of the province are abaca, cacao, coffee, cotton, sorghum, and rattan.

About 150 farms are engaged in livestock production. Many grassland areas are leased for cattle pasture. Cattle accounts for 42 percent of livestock production. In Maasim, there are about 17 sites or owners leasing a total land area of 104.46 km^2. The total number of cattle for 1994 is about 18,250 heads (Table 5.19). Hog raising is concentrated in Maitum, while ducks are raised mostly in Kiamba.

Table 5.19. Livestock and poultry production per coastal municipality of Sarangani Province, 1993-1994.

Livestock	Year	City/Municipality						Total
		Alabel	Glan	Kiamba	Maasim	Maitum	Malapatan	
Swine	1993	4,728	7,890	3,288	1,904	3,500	1,580	22,890
	1994	63,317	2,800	3,288	2,096	3,550	1,880	76,931
Cattle	1993	3,744	2,150	2,155	2,887		430	11,916
	1994	3,784	4,150	2,155	3,090	550	530	16,259
Goat	1993	3,078	3,700	1,400	2,566	2,550	2,300	14,044
	1994	4,103	3,100	1,400	2,600	1,000	2,850	15,253
Carabao	1993	2,530	1,705	1,580	774	1,025	292	7,906
	1994	2,530	3,205	1,580	1,096	1,025	442	9,878
Horse	1993							0
	1994	1,667	655	650	1,985	800	550	6,307
Poultry	1993	24,975	10,815	7,880	7,530	7,880	6,000	65,080
	1994	20,995	3,900	7,800	7,530	4,850	4,500	49,575
Duck	1993							0
	1994	1,100	2,500	5,378	9,138	7,830	750	26,696
Turkey	1993							0
	1994	2,150	500	385	500	275	120	3,930

Data from the Office of the Provincial Agriculturist 1994

SUMMARY

The most important industry after agriculture is capture fisheries in Sarangani Province. Most production is from commercial fishing operators. Tuna accounts for the largest portion of catch and supports 10 processing plants. Unfortunately, signs of overfishing are evident and many commercial size boats are fishing in foreign waters (mostly Indonesia). Aquaculture is also important accounting for more than 1 million kg annual production of mostly prawns, *bangus*, and *tilapia*. Tourism is not yet developed in Sarangani although a significant potential exists.