

Chapter 5

ECONOMIC SECTORS

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he economy of northwestern Bohol is not well diversified and resulting incomes are low. Reliance on the sea and land makes changes in the natural base of the area readily apparent in local incomes. Fisheries and agriculture are the mainstays of the local economy, while smaller industries have yet to make a substantial impact. Ecotourism and well-managed aquaculture have income-generating potential but have gained foothold only recently.

FISHERIES

Fisherfolk's Attitudes and Beliefs

Fishing is a subsistence livelihood in the profile area and many people start to work in the sea in their younger years. Quite seasonal, fishing peaks from March to June when there are large runs of pelagics (Spanish mackerels, scads, etc.) mostly in the south, east and west of Bohol. The fisherfolk observe that most species are gravid during this period and that, because the weather is calm and the water is warm, the fish rise to the water surface. During this period also, fishers from Mindanao are sighted within the province's seawater boundary. On the other hand, the subsistence fishermen just look at the sky or feel the wind to know whether or not the time is right for fishing.

Christmas day, Good Friday and other religious holidays are no-fishing days in Bohol. Fishing on Sundays is also sometimes frowned upon, although many people go to the beach with the family and catch fish for *kinilaw* (raw fish dipped in vinegar, salt and spices).

Most fisherfolk and their households are superstitious. For a new boat about to be set to sea, the fisherfolk would slaughter poultry or livestock and sprinkle its blood on the helm of the boat in a ritual called *padugo*. The owner's family and friends partake of the cooked animal after the *padugo* ceremony which they believe will bring in a bountiful catch and spare the owner of bad weather.

Many also believe that certain spirits inhabit the sea. For example, they believe that catching and eating whales, dolphins and turtles will bring *gaba* or curse to their person or their families because these animals also have souls. They also believe that bad spirits accompany them at times when there is no catch, so that while returning to dry land, they would drive away the spirits with hand gestures telling them to go back (*padulong*) to the sea. Some fishermen would collect flower petals, leaves and other pieces adorning their favorite patron saints during processions (most especially on Good Friday) and insert them into certain parts of their boats in the belief that doing so will bring in a bountiful catch.

Being mostly Catholic, the fishermen always take a respite from fishing and celebrate the annual feast day of the patron saints of their villages. By social custom, some fishermen place under taboo certain areas they hold sacred or think as having an inviolable nature. Non-observance of these traditions signals trouble and bad luck.

Aside from fishing, households of coastal communities glean for shellfishes, crustaceans and seaweeds at daytime (*panginhas*) and at night (*panulo*, aided by kerosene-fueled gauze lamp and spear gun). Like fishing, gleaning not only supplies food on the table but also provides regular or extra income.

Superstitions and other beliefs are gradually being forgotten especially among the younger generation of fishers who go for bigger boats, nets and gear and are always in search of the "jackpot" catch that will make them "one-day millionaires".

Marine Fisheries

In the profile area coastal communities, fisheries and related industries appear to supplant traditional agriculture as the main source of livelihood. SUML (1997) reports that the majority of fishermen own their fishing boats (*bancas*), and most boats are non-motorized (66.8 percent). Eighty-four percent of the boats are owned by the users, while the rest are rented or borrowed. The boats are hand-made, wooden, outrigger canoes, ranging in length from 8 to 18 feet. The designs of the boats, especially the outriggers, vary depending on the barangay or municipality of origin.

All of the surveyed fisherfolk use non-commercial fishing gear. This means that their boats have gross weights of less than 3 tons, and are allowable within municipal fishing waters. Typically, the number of operators required per gear ranges from 1 to 6

persons (Table 5.1). The cost of fishing gear is listed in Table 5.2. Many of the fisherfolk purchase their gadgets and other paraphernalia in Tubigon where vessels plying the Cebu-Bohol route dock everyday. Crossing the Bohol Strait takes at least 2 hours. With the availability of fast crafts, travel time has been shortened.

Table 5.1. Fishing gear used in the profile area (SUMML 1997).

Classification	Gear type	Local name
Lift nets	Cast nets Fish nets Scoop nets	<i>yabyab</i> <i>bilaw</i> <i>sikpaw, papyaw</i>
Pull nets	Baby trawl Push nets Seine net with scaring devices Ring nets	<i>palakaya</i> <i>sudsud, dosdos</i> <i>liba-liba, ring-ring, kubkob, de-ring</i> <i>lawag</i>
Entangling nets	Bottom set gill nets Drift gill nets Gill nets Set gill nets Squid nets Two-ply Fish corral	<i>pukot</i> <i>pangasa, pamo</i> <i>pukot</i> <i>pukot</i> <i>pang-nokos</i> double-net <i>bunsod</i>
Barriers and traps	Fish pot Fish trap Bamboo structure with lift net	<i>panggal</i> <i>bobo</i> new look
Line	Jigger Single hook and line Multiple hook and line Line with no hook Troll lines	<i>sarangat, panglabyog</i> <i>pasol, latak, subid</i> <i>palangre, kitang</i> <i>rentex</i> <i>subid, subid-subid</i>
Hand instrument	Spear gun Spear gun with compressor Gleaning Barehand Torch/Kerosene-fueled lamp Torch with scoop nets	<i>pana</i> <i>buso</i> <i>panginhas</i> <i>panalum</i> <i>panulo</i> <i>panulo</i>
Others	Dynamite Sodium cyanide Poison seeds Poison vine Pesticides Electricity fishing Tobacco and tobacco-chili mix for small octopus Purse seine Drag seine Baby ring net Bag net for schooling fish Drive-in net with scaring device Small drag seine, beach seine Fine-mesh gill net Small barrier nets	<i>tiro, dinamita</i> <i>cyanide, kuskos</i> <i>lagtang</i> <i>tubli</i> <i>indrin, malathion, muriatic acid</i> <i>kuryente</i> <i>likom-likom</i> <i>basnig</i> <i>sinsoro</i> <i>baling</i>

Table 5.2. Cost of fishing gear.

Gear type	Cost (pesos)
Gill net	2,100 upwards
Double net	500
Hook and line	25
<i>Panulo</i> (kerosene-fueled gauze lamp and spear gun)	500
Non-motorized outrigger boat plus oar	2,500
Motorized outrigger boat (10 hp)	30,000
Large pumpboat with big engine (>10 hp)	100,000

US\$1 = P40 in 1999

The top 10 fishing methods (in terms of reported usage) along the northwestern coast are:

1. Fish pot
2. Gleaning
3. Single hook and line
4. Multiple hook and line
5. Scoop net
6. Spear gun/spear gun with compressor
7. Drift gill net/*pamo*
8. Bottom-set gill net
9. Troll line
10. Double net

According to interviews at various landing sites, the 161 species of catch are composed of: 133 species of fish, 16 species of mollusks, 9 crustaceans and 3 echinoderms (SUML 1997). Of the different species, 54.5 percent are non-reef (mostly pelagic), 28.8 percent reef-associated and 16.7 percent unclassified. Table 5.3 lists the various species captured in the area.

The most abundant family of fish captured is Scombridae (mackerels and tunas). In terms of biomass, 12 pelagic and reef-associated species comprise approximately 20 percent of the total catch, while 31 demersals comprise 52 percent. The next most abundant catch consists of squid, which dwells in soft-bottom habitat, and crabs which are caught by bottom set gill nets, fish pots and traps. Shrimp caught in the sea are not an important component of the catch, and are more likely to be produced in fishponds, except in areas where the baby trawl is still in use, or areas with push nets and fine-mesh fish corrals.

In terms of effort, the highest catch per unit effort (CPUE) is reportedly dynamite fishing, which averages 17.5 kg/man-hour and has an average income of PhP 439/man-hour. This method has the added distinction of being illegal as well. The next (and legal!) method is fish corrals. CPUE is a good indicator of success (or failure) in fishing management of coastal waters. Increased CPUE (in overfished areas) tends to reflect decreased fishing effort. It can also reflect improved productivity of shallow water habitats (Vande Vusse 1996), or the use of destructive fishing methods like dynamite.

Table 5.3. List of captured species reported by fishers (SUML 1997).

Species	Local Name	Species	Local Name
Anchovies <i>Stolephorus</i> sp.	<i>bolinao, libod</i>	<i>Siganus guttatus</i>	<i>kitong</i>
Barracuda <i>Sphyaena barracuda</i>	<i>pangalwan, tabangko</i>	<i>Siganus spinus</i>	<i>danggit</i>
Big eyes <i>Priacanthus</i> sp.	<i>buan-buan</i>	<i>Siganus virgatus</i>	<i>tagbago</i>
Cardinalfish <i>Apogon</i> sp.	<i>moong, pangan</i>	Rays <i>Dasyatis</i> sp.	<i>pagi</i>
Cutlassfish <i>Trichiurus haumela</i>	<i>panangitan</i>	Sardines and herrings <i>Sardinella</i>	<i>mangsi, caraniase</i>
<i>Trichiurus lepturus</i>	<i>liwit</i>	Scads and jacks <i>Alectis ciliaris</i>	<i>samin</i>
Damselfish <i>Abudefduf</i> sp.	<i>kapal</i>	Scorpionfish <i>Sebastes</i> sp.	<i>bantol</i>
<i>Chromis</i> sp.	<i>pata</i>	Seabreams <i>Scolopsis cancellatus</i>	<i>salingukod</i>
<i>Pomacentrus</i> sp.	<i>pata</i>	<i>Scolopsis ciliatus</i>	<i>gapas-gapas</i>
Emperor breams <i>Lethrinus</i> sp.	<i>katambak</i>	Silversides <i>Atherina</i> sp.	<i>guno</i>
Flatfish <i>Crossorhombus</i> sp.	<i>dali-dali, palad</i>	Slipmouths <i>Gazza minuta</i>	<i>kiampe, sapsap</i>
Flyingfish <i>Cypselurus</i> sp.	<i>barongoy</i>	<i>Leiognathus</i> sp.	<i>sapsap</i>
Fusiliers <i>Caesio caeruleaureus</i>	<i>bilason</i>	<i>Leiognathus bindus</i>	<i>parutpot</i>
<i>C. erythrogaster</i>	<i>sulid</i>	<i>Leiognathus elongatus</i>	<i>parutpot</i>
Glassyfish <i>Ambassis</i> sp.	<i>ibis</i>	<i>Leiognathus fasciatus</i>	<i>lawayan</i>
Goatfish <i>Liza</i> sp.	<i>yakmo</i>	<i>Leiognathus splendens</i>	<i>lawayan</i>
<i>Parupeneus</i> sp.	<i>timbangan</i>	Snapper <i>Lutjanus</i> sp.	<i>maya-maya</i>
<i>Upeneus</i> sp.	<i>saramulyete</i>	<i>Spratelloides</i> sp.	<i>turnus</i>
<i>Upeneus sulphureus</i>	<i>timbangan</i>	Stingrays <i>D. kuhili</i>	<i>kuyampaw</i>
Gobies <i>Cryptocentrus</i> sp.	<i>banghutin</i>	Surgeonfish <i>Naso</i> sp.	<i>bagis</i>
Grouper <i>Cephalopholis</i>	<i>suno</i>	Tarpons <i>Megalops cyprinoides</i>	<i>buan-buan</i>
<i>Epinephelus</i> sp.	<i>galot, lapu-lapu</i>	Threadfin breams <i>Nemipterus</i> sp.	<i>silay, lagaw, bakay, tuwas, tulirit</i>
Halfbeaks <i>Hemiramphus</i> sp.	<i>sasa</i>	Tiger fish <i>Pelates quadrilineatus</i>	<i>gong-gong</i>
Indian halibut <i>Psettodes</i> sp.	<i>palad</i>	<i>Terapon jarbua</i>	<i>bogaong</i>
Jacks <i>Caranguides armatus</i>	<i>badlon, bakan, malapati</i>	Triggerfish <i>Balistes</i> sp.	<i>pakol, pugot</i>
<i>Caranx</i> sp.	<i>mamsa, lawayan, taway, laya</i>	Whitings <i>Sillago sihama</i>	<i>asohos</i>
<i>Selar boops</i>	<i>tamarong</i>	Wrasses <i>Cheilio inermis</i>	<i>tad</i>
<i>Selar</i> sp.	<i>tamaraw</i>	<i>Halichoeres</i> sp.	<i>labayan</i>
<i>Selaroides leptolepis</i>	<i>karabalyas</i>	Invertebrates	
<i>Gnahanodon speciosus</i>	<i>badlon</i>	Conch shells <i>Lambis</i> sp.	<i>saang</i>
Lizardfish <i>Synodus</i> sp.	<i>bakan, tiki-tiki</i>	Cone shells <i>S. luhuanus</i>	<i>liswi</i>
Mackerels and tunas <i>Decapterus kurroides</i>	<i>bodboron</i>	Cuttlefish <i>Loligo</i> sp.	<i>nokos</i>
<i>Euthynnus affinis</i>	<i>tulingan</i>	<i>Sepia</i> sp.	<i>kobotan</i>
<i>Scomberomorus commerson</i>	<i>tanguigue</i>	<i>Sepioteuthis lessoniana</i>	<i>nokos</i>
<i>Scombrid</i> sp.	<i>panit</i>	Helmet shells <i>Cassis cornula</i>	<i>budyong, tambuli</i>
<i>Rastrelliger brachysoma</i>	<i>agoma-a</i>	Jingle shells <i>Placuna placenta</i>	<i>tipay</i>
Marine catfish <i>Plotosus</i> sp.	<i>ito</i>	Melon shells <i>Voluta</i> sp.	<i>kibol</i>
Mojarras <i>Gerres oyena</i>	<i>samook</i>	Octopuses <i>Octopus</i> sp.	<i>kugita</i>
<i>Gerres</i> sp.	<i>samook, botowanon</i>	Penaeid shrimp <i>Metapenaeus</i> sp.	<i>pasayan</i>
Moonfish <i>Mene maculata</i>	<i>buan-buan</i>	<i>Trachypenaeus</i>	<i>pasayan</i>
Moray eels <i>Gymnothorax</i> sp.	<i>hawig, buwanon, baybayon</i>	Portunid crabs <i>Portunus pelagicus</i>	<i>lambay</i>
Needlefish <i>Strongylura</i> sp.	<i>balo</i>	<i>P. sanguinolentos</i>	<i>kasag</i>
<i>Tylosurus</i> sp.	<i>balo</i>	<i>Thalamita</i> sp.	<i>kasag, kubaw</i>
Parrotfish <i>Scarus</i> sp.	<i>molmol, buntog, birig-birig</i>	Sea urchins <i>Diadema setosum</i>	<i>tuyom</i>
<i>Pentapodus macrurus</i>	<i>tuwas</i>	<i>Salmasis bicolor</i>	<i>sawaki</i>
Pufferfish <i>Canthigaster patoca</i>	<i>tikong, botete</i>	Seahares <i>Dolabella auricularia</i>	<i>lokot</i>
<i>R. kanagurta</i>	<i>anduhaw</i>		
Rabbitfish <i>Siganus canaliculatus</i>	<i>danggit</i>		

During a field survey by SUML researchers, it was noted that most of the fish species caught are small in size and low in weight. Only 2 out of 12 species were actually within the size range deemed proper for harvesting. This small size is an indicator that younger fish are increasingly being harvested indicating severe overfishing in the area. This overfishing decreases the potential for fish recruitment in the future.

Illegal Fishing Practices

Fish are not considered as a biologically renewable resource; they just hide away sometimes and at other times they appear. Most fishermen attribute a good catch to pure luck or *suwarte* and people nowadays have great admiration for those who are lucky in fishing. Sadly, however, many fisherfolk in the profile area have lost the art and skill in order to become *suwarte* and have resorted to illegal and destructive fishing methods. They have forgotten the local adage that “we did not inherit the sea from our forefathers; we merely borrowed it from our children”. Following are some of the destructive, wasteful and inefficient fishing methods observed in the profile area.

Dynamite fishing. Introduced during World War II, dynamite fishing has been regarded as an easy means of catching schools of fish. Local fishermen made hand bombs from leftover explosives that were gradually replaced by potassium fertilizer and sodium or ammonium nitrate. These chemicals, as well as the blasting caps, are readily available from Cebu City just across the Bohol Strait through well connected individuals.

Dynamite can be used year-round, most especially when the sea is rough, or when certain target species (e.g., schooling fishes) aggregate and form schools. Blast fishing is destroying large areas of corals in the profile area. In most cases, the dynamite users know that what they are doing is illegal and feel some remorse. Sadly, however, they have to carry on the practice to feed their families, although they express willingness to stop only if alternative livelihoods are available. Some of those who have been earning a lot from illegal fishing activities have become accustomed to living a good life and having much fun drinking and gambling. Meanwhile, the other members of the community or families do not complain because the fishers who have a lot of catch tend to share their proceeds (i.e., food, *tuba*, etc.) with their neighbors. This deters the latter from complaining.

For over 20 years now, the fishers of Mantatao, a small island off Calape, are notorious for using compressors, cyanide and dynamite while fishing in Loon up to Inabanga. The suppliers of the chemicals come in regularly from Cebu every 2 to 3 days via motorized boats. They also buy the catch and sell it in Cebu City. It is interesting to note that the Mantatao fishers also supply illegally caught fish and the obnoxious substances to other barangays of Loon and Tubigon. On the other hand, they have a very unique and strong fisherfolk association which requires each member

a weekly contribution of PhP 50 to the general fund which amounts to PhP 2,000 per week on the average when catch is high. This fund is used by the association to pay the fine imposed on members arrested for illegal fishing or, worse, bribe the arresting officers. Most of the fishers of Mantatao profess that they would stop their destructive methods only when an alternative income is available.

Dynamite fishing is also rampant around the islands of Cuaming and Hambongan (Inabanga), Nasingin and neighboring islets (Getafe), and Cabul-an (Buenavista). In Cabilao Island (Loon) some residents act as lookout for dynamite fishers, mostly relatives or friends, who are afraid of being caught by law enforcers. Once the blasting is done, they receive a good share of the catch. Scared that the dynamiters are armed, the other fishermen pretend not to notice and do not report the incident to concerned authorities. Meanwhile, they also dive for dead fish left uncollected by the blast fishers.

Two types of dynamite fishing are prevalent in the profile area: blasting near the water surface and blasting underwater at depths that require the use of compressors. Sometimes, the fishermen release dynamite to kill a small school of fish and leave the dead fish in the water. A second release is done when bigger predatory species come into the area to feed on the smaller fish.

Cyanide. Stunning the fish with cyanide is becoming more and more rampant in the profile area. On a smaller scale, this method is used for collecting aquarium species.

Mostly used by spearfishers to catch groupers and other larger species, cyanide has been used in a variety of ways. One of these is spreading the cyanide powder on bread or mixing it with cooked rice when preparing fish baits. The bait is dropped onto the water, with the fisherman pretending to use a hook and line. Another technique is suspending underwater a transparent plastic bag filled with the poison and some small fish to attract bigger fishes. Once there is a bite on the line or a school of fish moves near the area, the line is pulled hard to rip open the bag and release the chemical to the water. In 10 to 15 minutes, the stunned fish rise to the surface of the water. The most common method is pouring the cyanide solution into baby feeder bottles and squirting the chemical into coral reefs and crevasses killing the corals and stunning the fishes. This method has been employed by collectors of live grouper species.

Cyanide supplied in the profile area originates from Cebu City. The poison is sold in plastic packets for about PhP 35 (Loon price) per small cube, which can last up to 3 days of fishing. The presence of cyanide on poisoned fish is difficult to detect because of the absence of testing facilities. Also, regular sampling of fish is not done.

According to the fisherfolk, fish poisoned by cyanide have reddish, blotched eyes and foul-smelling intestines. They also deteriorate faster than those caught without the use of poisons.

Mantatao Island off Calape and the barangay of Tangaran, Clarin are examples of cyanide-using communities. They are also notorious for using dynamite and spearguns, leaving trails of destruction on the waters of Maribojoc, Loon and Calape up to Getafe. The very low coral cover of the Calape Bay has been attributed by many to these destructive fishing methods, which have been practiced since the 1970s.

Stories among the small-island communities in the area reveal that some cyanide-using fishermen frequent an islet off Clarin. They place cyanide into their trousers and wade in the water, gradually releasing the chemical. In a few minutes, fishes and other marine organisms just float on the water surface.

Other chemicals are similarly being used to catch fish. The fishermen simply scatter the powder poison on the water and wait for dead fish to appear on the surface. In rivers, fiercely toxic agricultural pesticides are dropped upstream. The stunned or dead fish are collected by hand or nets downstream or near the estuaries. The human health effects of eating fish caught with these various poisons is not well known, thus people do not worry about it. In contrast, the ecological impact is well known and should be a major concern.

Commercial fishing. *Likom*, or large trawlers and purse seiners equipped with ring nets, still encroach on the 15-km municipal waters within the profile area (Bureau of Fisheries and Aquatic Resources (BFAR) lists 27 registered commercial fishing boats in Bohol). Unfortunately, however, the Philippine National Police-Maritime Command (PNP-MARICOM) reports that 16 of Bohol's 30 coastal municipalities (including Tagbilaran City) have yet to declare their water boundaries. It was only in 1996 that the importance of delineating the province's municipal waters started to be recognized as a major issue. In that year, a commercial fishing operator filed a case in court questioning the powers of the LGUs to ban fishing activities within the 15-km radius and at a depth of 7 fathoms from the shoreline. Reacting to the court's dismissal of the complaint, 17 mayors filed petitions for the declaration of the municipal waters of their respective jurisdiction.

Some fishermen use high-wattage superlights which are dropped onto the sea to attract schooling species such as herrings and Spanish mackerels. Notwithstanding the Department of Interior and Local Government (DILG) memorandum that limits the wattage to about 800 kW per boat, some operators in and around Bohol use generators and light systems powered with up to 1,800 kW. They also operate well within the 15-km radius.

A lot of small fishers complain about the regular intrusion of commercial boats especially on the southern waters of Bohol during the peak season for pelagic fishes (March to June). The boats harvest fish within 5 km from the shoreline and, in some cases, within 1 km. Although shoaling pelagic fish are mostly caught, shoaling reef species such as *mamsa* (trevallies) juveniles have also been harvested. The commercial fishers, however, share the big catch with the local fishermen so that the latter will not complain when they come and fish in the area. At certain times of the year small fleets arrive in Bohol while local boats leave for other areas. Most *likom* operators in the profile area do not even come from Bohol, which makes this illegal fishing operation most inequitable for Boholanos. Usually originating from Cagayan de Oro, Siquijor, Bacolod and Cebu, these 'intruders', can be found in the Bohol Strait and in other fishing grounds of the province.

Bagongbanwa, an island off Tubigon, is surrounded by locally designed *payaw*, a fish aggregating device (FAD) usually made of bamboo poles and coconut fronds tied together, suspended near the surface of the water by buoys, and anchored to the seabed. The *payaw* attracts pelagic species, Spanish mackerels, tunas and other seasonal runs of fish. Those who set up the *payaw* inform the operators of *likom* when it is time to harvest the fish under it. A "jackpot" catch means up to 200 *banyera* of fish (1 *banyera* is equivalent to 40-50 kg of fish). The *payaw* owners get one-third of the total value of the catch, which ranges from PhP 10,000 to 30,000 per night of operation. *Likom* is totally illegal and not allowed within municipal waters. In Bagongbanwa, however, *likom* operates within the first 2 km of the municipal waters of Tubigon. In view of an existing municipal ordinance prohibiting this kind of fishing activity within the municipal waters, there is a need to investigate the operations of and arrangements between *payaw* owners and *likom* fishers.

A similar scenario is observed in Napo, a fishing community of Loon. Local fishers have established strong linkages with the commercial fishers of Bohol, Cebu, Negros and Camotes. When fish abound under the *payaw* (there are about 70 of them in Loon), they would contact commercial fishing operators through radio equipment provided by the latter. They would also warn them through radio whenever the local *Bantay Dagat* patrol team is around. The indiscriminate fishing leaves the small fishermen with almost nothing to catch, and ensures the fish are not able to carry through their spawning migration and recruitment cycle.

Fish stocks in Bohol are depleted by commercial fishing which encourages total harvest of fish, i.e., including the spawners. Thus, banning it outright from municipal waters is a must. The use of FADs should only be in combination with hook and line and small nets. Superlights or lightboats should also be banned totally.

In recent years, commercial boats have been equipped with sonars and 'fish finders' that have rendered the superlights useless. These contraptions allow fishing even during moonlit nights (which last a week) when fish are not attracted to other sources of light. An alarming situation indeed, because fewer and fewer fishes will now be able to escape and spawn. Some sonars can track other vessels including the *Bantay Dagat* patrol boat. In Loon, commercial fishers already know the logistics and schedule of the patrol team and the cat-and-mouse game is carried on everyday.

Fine-mesh nets. Most common in the profile area, fine-mesh nets such as the 'double nets' are used near seagrass beds and coralline areas. After casting the net onto the sea, the fishermen scare the fish, mostly juvenile, towards the net by throwing stones at them, shouting and swimming. Most fishermen think that it is not illegal to catch fish using fine-mesh nets especially if the catch is intended for household consumption only. On Pangangan Island, Calape large fine-mesh lift nets (*basnig*) have become a serious problem of the municipality, due to the indiscriminate catching of juvenile anchovies and siganids in huge quantities.

Other fine-mesh nets include the beach seines and those that are used for catching small species that do not grow beyond a certain size, e.g. *bulinaw* (anchovies). These nets are also used to catch *tagum-tagum* or *kuyug* (siganid or rabbitfish juveniles), *lap-ot* (anchovy juvenile) and other species that aggregate during full moon and at certain times of the year usually affected by tidal rhythms. These fishes are highly priced because they taste best as *kinilaw* (raw fish salad) or are processed into *ginamos* of the best quality. *Ginamos* is salted fish and eaten as appetizer or as main dish. Fine-mesh nets are also used to catch shrimp fry (*uyap*) which is a popular topping for green mango.

Liba-liba (seine net with scaring device), *palakaya* (baby trawl) and *lawag* (fine-mesh lift net) are common in the profile area, especially in Calape, Tubigon, Clarin, Inabanga and Buenavista. They are not only destructive but they also catch juvenile fish.

According to the fisherfolk, *liba-liba* was introduced in Bohol in the late 1980s from Leyte and Samar. The method involves the use of a seine with a scaring line. Also popularly known as *ring-ring*, *de-ring*, *hulbot-hulbot* or *kubkob*, it normally operates from very shallow areas up to depths of 50 m depending on the size of the net. Requiring very little manpower, larger units of this efficient technique can sweep an area of up to 17 ha per fishing trip.

Because of its fine mesh, *liba-liba* catches large amounts of juveniles and trash fish that do not have a ready market. It also scrapes the bottom of the sea thus causing turbidity, and catches a lot of invertebrates including eggs of squid and

cuttlefishes, as well as useless by-catch such as seagrasses, sponge, corals and many others. This degrades the actual soft-bottom communities. CPUE averages about 5 kg per hour. A larger and mechanized version called *de-zipper* is also used in the profile area. This gear requires 10 to 15 persons to operate, sweeps a wide area of seabed, and results in a very large CPUE.

Palakaya is commonly used in seagrass and soft-bottom areas. It is a net held with 2 plywood 'otter boards' at the back of a motorized boat. The trawl normally has a 'cod-end' or a small bag made of mosquito net (net with very fine mesh) that catches the juvenile fishes, shrimps and other small organisms. The net scrapes and damages the bottom areas, and catches too many juveniles and trash. *Palakaya* and *liba-liba* were introduced by BFAR during the late 1970s as a "more efficient" fishing method to be used by communities to enhance their livelihood.

Storage chemicals. Because of the high daytime temperatures in Bohol, a few fishing operators and fish buyers use chemicals (usually diluted formalin) instead of ice to prolong the storage life of the fish albeit giving off a slight smell. Others use a dye locally known as *indigo* to create a fresher and bluer or more purple look for pelagic fish so that they can demand a higher market price. Both are highly detrimental, with formalin literally "pickling" one's innards.

Aquaculture Development

In the mid-1970s, the Philippines encouraged the expansion of fishponds for the production of both *bangus* (milkfish) and *sugpo* (prawns) as a way of increasing protein intake and providing foreign exchange. This led to the development of mangrove areas and rice lands into fishponds. There are an estimated 1,258 ha of developed fishponds under 25-year Fishpond Lease Agreements (FLAs) in the province of Bohol (PPDO 1997). It is interesting to note that most FLAs in Bohol involve non-Boholanos and non-residents (i.e., Ilonggos and Cebuanos). According to the BFAR, there are 2,193 ha of fishponds in Bohol that are not covered by FLAs, almost twice the number with FLAs. Talibon, a neighboring municipality, has the largest area of illegally constructed fishponds at 506.5 ha. The status of fishponds in the profile area is presented in Table 5.4.

Much of the land bordering the profile area's coastline is classified as Sr (suitable for rice land), or Sf (suitable for mangroves and forest). In most coastal barangays, there are fishponds in varying stages of use. Many are locally owned and remain inactive, which makes them suitable for reversion to mangrove areas. Others are owned by outsiders and are operated on a large-scale, commercial production basis. For example, there are several intensive tiger prawn operations, but these are owned by businessmen from outside of Bohol. In addition, there are *nipa* plantations within much of the native mangrove areas. Mangrove species were replaced in the 1970s and

Table 5.4. Status of fishponds in the profile area (BEMO 1999; BFAR 1999).

Municipality	No. of lessees	With FLA (ha)	Without FLA (ha)
Loon	9	67.88	*
Calape	23	315.48	*
Tubigon	6	109.11	11
Inabanga	13	263.73	*
Buenavista	1	10.43	48
Getafe	14	156.57	410.2
Clarin			10
Profile area	66	923.20	-

* No data

1980s with *nipa* due to its higher market demand at the time. With the advent of the metal roof, *nipa* is no longer as marketable as in the past and may decline in production.

The municipality of Calape (barangay Lawis) is home to the DA's Central Visayas Integrated Agricultural Research Center/Research Outreach Station. This facility conducts research on *bangus* (milkfish) breeding, prawn fry development, cage culture of *danggiti* (rabbitfishes) and adaptability of *Eucheuma* species in 3 sites around Calape. Set up in 1986, it typically hosts 25-30 fisheries students per academic semester to allow them to have hands-on experience. While this type of complex is a valuable educational and awareness (as well as extension) facility, the majority of the students are from Cebu province, not Bohol.

Outside the research station are large tracts of fishpond most of which are underutilized or abandoned. There are also several intensive prawn (mostly tiger) ponds that are quite profitable but these are owned by businessmen mostly from Negros Oriental. A former local government official is known in Calape to have constructed some fishponds and sold them. Also, there had been so many local disputes regarding rights over fishponds and illegal expansion of fishpond areas that some mangrove pockets had to be entrusted to the Comprehensive Agrarian Reform Program (CARP) of the government for the issuance of FLAs to qualified applicants.

BFAR also manages the Calape Fishery Complex in Barangay Bentig. This was funded in the 1980s by the United Nations Development Programme, but is currently running low on resources. Several hectares of the milkfish fishponds were turned over to a federated fisherfolk organization as a livelihood project, but productivity is low.

Two of the biggest fishpond operators in Bohol established a prawn processing plant in Tubigon that produces high-quality prawns (head off/tail off; 1-kg frozen blocks) for direct export. Meanwhile, oyster culture, crab fattening and aquaculture techniques have been launched in Inabanga, Buenavista, Clarin, Tubigon and Calape.

TOURISM

The fledgling tourism industry continues to develop in Bohol, and is the provincial government's priority development thrust. In 1993, there were 22,779 foreign and domestic visitors, most of whom chose tour packages concentrating on Panglao Island, the Chocolate Hills, Baclayon Church and Antequera Market (DOT 1997).

There are not yet many established tourist hotels and resorts in the province. Hotels with air-conditioning are small, with a 20-30 person capacity. There are various hotel and resort establishments in the province, mostly located in or around Tagbilaran City. The average occupancy rate is 52.2 percent and the average length of stay is 5 nights (DOT 1997).

Bohol has a multitude of natural attractions, the more famous of which are the Tarsiers of Corella, the Chocolate Hills of Carmen and adjoining towns, the white beaches on Panglao Island and the underwater paradise of Balicasag, an islet off Panglao. These, however, are located outside the profile area. Table 5.5 lists some of the potential tourist attractions in northwestern Bohol. Noteworthy is the ecotourism potential of the Mualong river and watershed in Loon town which is considered the best preserved among Bohol's smaller rivers. The preservation of Mualong's pristine splendor is attributed to the townsfolk's proclivity to get employment or engage in business, thus leaving its banks almost untouched by any agricultural activity.

Nature-based tourism is one of the development thrusts of the provincial government. The latter seeks to protect watersheds and mangrove forests and to establish marine sanctuaries. With an emphasis on mangrove replenishment, the potential for bird and botanical sanctuaries raises itself for consideration. Walkways and observation towers, as well as tree-houses could be established for visitors to tour protected areas.

Another potential tourism attraction under consideration by the local tour operators is the utilization of local fisherfolk and their crafts. Fishing and sightseeing trips are being considered as possible income-generating activities by the local fisherfolk. In addition, Inabanga, Buenavista and Tubigon, main producers of raffia (stripped and dried palm leaves) products, may garner tourist interest for their handicrafts. These municipalities currently produce baskets and woven materials that are sold in Tubigon, Tagbilaran and Cebu City. Community theater is actively pursued in Napo, a densely populated coastal village of Loon. This tradition, which involves stage acting, singing and dancing, dates back to the 1920s and was only cut short by the World War II. Every fiesta time, Napo stages a 'drama' with the community members themselves as actors, directors, stage managers and playwrights. In nearby Tangnan, the Japanese art of bonsai has become a passion nurtured by young male members of the community.

Table 5.5. Potential tourist attractions and ecotour destinations in the profile area (PPDO 1993a; DOT 1997; PPDO 1997).

Municipality	Attractions/Destinations and significant information/features
Getafe	<ul style="list-style-type: none"> ● Banacon Island: biggest man-made mangrove forest in Southeast Asia; bird watching; seahorse conservation ● Danajon Double Barrier Reef
Buenavista	<ul style="list-style-type: none"> ● Old stone church ● Island-hopping ● Cambuhat river and oyster farm community
Inabanga	<ul style="list-style-type: none"> ● Iwahig River: one of Bohol's extensive river systems ● Old stone church: on its churchyard were sown the seeds of the 85-year Dagohoy Rebellion (the longest anti-Spain revolt in the Philippines) ● Cantacoy Falls ● Cottage-type beach resorts in Pasil ● Hiking and camping
Clarín	<ul style="list-style-type: none"> ● Island-hopping ● Upland viewing area
Tubigon	<ul style="list-style-type: none"> ● Old stone church: declared a provincial heritage structure ● Inanuran island beach resort ● Island-hopping ● Matabao and Tinangnan beach resorts ● Potential dive sites ● <i>Buri</i>-based cottage industry
Calape	<ul style="list-style-type: none"> ● Church: declared a provincial heritage structure; neo-Gothic revival style ● Pangangan Island: Treasure Island and Darak beach resorts; cottage-type beach resorts; bird-watching (migratory species) ● Bentig-Calunasan-Mandaug strip: broom-making (<i>huri</i>); traditional cane milling and production of <i>tinunlob</i> (dried banana dipped in cane extract)
Loon	<ul style="list-style-type: none"> ● Old stone church: "crowning glory" of the Recollect Mission in Bohol; declared a provincial heritage structure; biggest stone edifice in the province; ceiling paintings; Filipino baroque and <i>baldaquin</i> (<i>retablos</i>) of the neo-classical style ● Inang-angan: five flights of stairs (212 steps) made of hewn coral stones or <i>tinableya</i>; connects the old church to Napo (a coastal village which has a community theater tradition that dates back to the early 1920s) ● Cabilao Island: dive site; beach resorts; saltwater lake (migratory birds) ● Sandingan Island: beach resorts ● Mualong River: river cruising, kayaking, bird/monkey-watching; waterfalls ● Tubig-Loon: abundant spring water flowing from a cave beside the sea

Northwestern Bohol is expected to experience an influx of tourists from Cebu City because of its proximity. In anticipation of this development, the local office of the Department of Tourism (DOT) has developed tourist circuits or loops with focus on certain themes (i.e., nature trips, heritage tours, etc.). These, however, are concentrated on Chocolate Hills, Panglao Island and some southern towns, despite the rich potential of the western and northern towns. Meanwhile, the 40-member Bohol Association of Hotels, Resorts and Restaurants is actively pursuing collaborative efforts to support tourism in the province.

The potential of the profile area for tourism is, however, hampered by a multitude of problems, among which are high coliform count, lack of electricity and lack of potable water particularly in coastal and island communities. Small-scale electric power plants, though, have been established on a few islands. Getafe has the safest coastal water for public swimming, but is hampered by lack of potable water supply and little electricity. Currently, the low coliform count in the town's coastal waters supports it as a potential destination. A projected problem is that population pressure from municipal centers will push squatters into mangrove areas. This encroachment threatens natural ecosystem patterns and the potential of nature tourism.

SMALL- AND MEDIUM-SCALE INDUSTRIES

There are many small-scale industries in the 7 municipalities of the profile area, most of which are handicraft. The materials used are shells and the native-grown bamboos and palms, such as *nipa* and *buri*. There is also a growing hollow-block production, which is burgeoned by increasing construction in the area. Unfortunately, this business is dependent upon sand extracted from beaches which will have an impact on the "white-sand beaches" for which Bohol is renowned.

Many of the small-scale industries cannot expand their operations for a variety of reasons. Most of the employees are only part-time workers who tend to revert to farming and fishing for their main source of subsistence. The lack of financial support, poor marketing linkages and the resulting low human resource development lead to weak infrastructure and facilities.

The municipality of Tubigon is in the process of expanding its urban center to accommodate a new industrial area. This industrial center will reportedly focus on low-level technology such as textile and clothing manufacturing. Depending upon the base of the various dyes, there may or may not be a problem with industrial effluents into the surrounding environment. Buenavista is targeted for the establishment of a ceramics and glass industry, while Getafe is slated for an Industrial Estate Development. In fact, all of the profile area municipalities are proposed Bohol Special Economic Zone (BSEZ) sites. Tubigon, Calape and Loon are BSEZ priority sites, while Getafe, Buenavista, Inabanga and Clarin are secondary sites.

AGRICULTURE

Ninety-one percent of the profile area consists of rural households most of which depend on agriculture and agro-related industries as the major source of income.

Water for the agricultural land comes from the Inabanga River and the 3 major watershed systems in the area. There is a series of waterworks within each municipality that are utilized for servicing 918 ha. There are approximately 45.6 km of irrigation canals, and most soils are clayey which is beneficial for the development of rice fields.

On the average, 78 percent of the total land area is used for agriculture. This is approximately 38,791 ha of land (PPDO 1993b). The people living in Getafe, Buenavista, Inabanga, Tubigon and Clarin engage mainly in rice farming and coconut growing. Coconut plantations account for 36 percent of the agricultural land use in the area, while rice takes up 15 percent.

Coffee and cacao are other important crops. The rest of the area is left for corn, root crops, legumes and bananas. The planting of mangoes in areas devoted to coconut and rice is fast gaining popularity. On the average, farming households manage approximately 3 ha, which illustrates the low labor requirement of the agricultural sector.

Rice and coconut are the most important cash crops. Corn, root crops and legumes are typically for household consumption and are considered to be subsidiary food crops. Livestock production is also typically for household consumption, and tends to consist of hogs and poultry. While some cattle are raised in backyard lots, cattle raising is not common among most households. Ducks are raised for their eggs and goats for their meat (on a small scale). Carabaos (water buffaloes) are utilized as draft animals in rice paddies and typically butchered when they are too old to plow effectively. Carabao meat is a popular fiesta fare in Bohol, especially in Loon where more than 200 heads of the beast of burden are butchered during the annual celebration of the town's fiesta.

High-value crops (HVCs) are being promoted by the DA under Republic Act (RA) 7900. These are crops that can be optimally and sustainably produced in the area, and can generate revenues higher than that of traditional crops. These include citrus, mango, rambutan, watermelon, coffee and cacao as well as a variety of vegetables, fruits and flowers.

While some of these HVCs can theoretically generate more income, for the most part there is a problem with marketing. Many of the HVCs are not commonly eaten by rural communities, and sales must occur in the public markets of Tagbilaran or Cebu for farmers to make money.

Rice land in Bohol, which is mostly rainfed, has an average yield of 2.9 mt/ha, while the regional average yield is 1.79 mt/ha (DA 1997). The province is in fact the rice granary of Central Visayas. The average yield in Bohol for corn is 0.6 mt/ha (compared to the regional average of 0.8 mt/ha), while vegetables and root crops yield an average of 10.97 mt/ha. Coffee, cacao and spices have much lower average yields. Coffee yields an average of 0.02 mt/ha, while cacao yields 0.0001 mt/ha. Spices yield 1.37 mt/ha (DA 1997; Governor's Report 1997-1998). This should encourage part-time growers with small plots to grow spices/condiments for sale in local markets,

instead of attempting to grow other HVCs. As inter-island transportation becomes more routine and travel costs drop, it may become more viable for farmers to market their goods in Cebu.

In terms of nutrition and production, root crops are the better home-consumption crops for people to grow. Not only is there a high yield, but the starch and caloric contents are higher than those of rice. These crops, however, have not established themselves as a major staple food, although production of *ube* (particularly the *kinampay* variety) is a profitable venture as experienced by some farmers on Panglao Island and a few other rainfed areas.

SUMMARY

Fisheries and agriculture are the main economic activities in northwestern Bohol. While there are a lot of small-scale industries in the area, they are not able to expand due to a variety of reasons. What is clear, however, is the direct relationship between agriculture and fisheries and the quality of habitat in which they thrive. This quality of coastal habitat is in turn strongly related to the quality of life of the people in the vicinity. As upland areas erode and coastal habitats become degraded, all economic sectors suffer and thus living standards for most people.

In recent years, however, fishing is not only subsistence. It has become a big source of income especially among fishing operators who encroach on the municipal waters of northwestern Bohol as well as those who engage in highly extractive yet illegal methods such as using dynamite. Illegal fishing practitioners know that what they are doing is environmentally destructive and an infraction of the law, but they either refuse to engage in alternative livelihood or do not have the opportunity to do so.

Alternative income-generating projects in the profile area include diversified farming, limited aquaculture and tourism, and expansion of small-scale “cottage” industries. If properly planned and managed, these can provide more jobs and income. The decision rests with the local communities to pursue different avenues of employment, which could be carefully designed into an integrated development management plan.

As mentioned in previous chapters, incomes are relatively low among coastal inhabitants of northwestern Bohol. This is due, in part, to the low CPUE for normal fishing methods. In addition, fish species that are caught are generally undersized, which adds to the trend of low income generation. Mangrove conversion to fishponds has not solved the problem of poverty, since idle fishponds and low productivity remain the norm. A program of rehabilitation of these unproductive areas needs to be embarked upon. Aquasilviculture and community-based management of mangrove forests offer good possibilities.

Even though there are many small-scale industries at the local level, these continue to be part-time in nature so expansion has not yet occurred. However, these industries form the base of alternative income-generating projects, while the natural beauty of selected sites may enable nature tourism to gain a foothold in the area.