

Use of fine mesh nets	<p><b>FAO 155, s1986</b></p> <ul style="list-style-type: none"> <li>• A fine of not less than PhP500.00 but not more than PhP5,000.00 or imprisonment of not less than 6 months to 4 years, or both such fine and imprisonment, at the discretion of the court: Provided, however, that the Director of BFAR is empowered to impose upon the offender an administrative fine of not more than PhP5,000.00 including the confiscation of the fishery nets or paraphernalia and the fish catch.</li> </ul>	<p>imprisonment ranging from 6 months to 2 years.</p> <ul style="list-style-type: none"> <li>• The fishing vessels, fishing equipment, and catch shall be forfeited.</li> <li>• A fine from PhP2,000.00 to PhP20,000.00 or imprisonment from 6 months to 2 years, or both such fine and imprisonment at the discretion of the court: Provided, that if the offense is committed by a commercial fishing vessel, the boat captain and the master fisherman shall also be subjected to the penalties provided herein; Provided, further, that the owner/operator of the commercial fishing vessel who violates this provision shall be subjected to the same penalties herein: Provided, finally, that the Department is hereby empowered to impose upon the offender an administrative fine and/or cancel his permit or license or both.</li> </ul>	<ul style="list-style-type: none"> <li>• Fine has increased but duration of imprisonment has decreased. Included also as liable to the law are the boat captain, master fisherman and the owner/operator of the commercial fishing vessel.</li> </ul>
Exportation of <i>bangus</i> (milkfish) fry	<p><b>Section 36 PD 704</b></p> <ul style="list-style-type: none"> <li>• Imprisonment of 1 year to 5 years or a fine of PhP1,000.00 to PhP5,000.00 or both.</li> </ul>	<ul style="list-style-type: none"> <li>• Imprisonment of 8 years, confiscation of the breeders, spawners, eggs or fry or a fine equivalent to double the value of the same, and revocation of the fishing and/or export license/permit.</li> </ul>	<ul style="list-style-type: none"> <li>• Severity of penalty has increased.</li> </ul>
Fishing in Philippine waters with the use of <i>muro-ami</i> (drive-in-net), <i>kayakas</i> , scareline or <i>serosca</i> )	<p><b>FAO 163, s1996</b></p> <ul style="list-style-type: none"> <li>• Imprisonment of 6 months to 4 years or fine of PhP500.00 to PhP5,000.00 or both.</li> </ul>	<ul style="list-style-type: none"> <li>• Imprisonment of 2 to 10 years or a fine of PhP100,000.00 to PhP500,000.00 or both such fine and imprisonment at the discretion of the court to the operator, boat captain, master fisherman.</li> <li>• The catch and gear used shall be confiscated.</li> </ul>	<ul style="list-style-type: none"> <li>• Severity of penalty has increased. Included as liable to the law are the operator, boat captain, and master fisherman.</li> <li>• Additional penalty.</li> </ul>
Operation of trawls and purse seine	<p><b>FAO 156, s1986</b></p> <ul style="list-style-type: none"> <li>• A fine of not less than PhP500.00 but not more than PhP5,000.00 or imprisonment of not less than 6 months to 4 years, or both such fine and imprisonment, at the discretion of the court to those that fish using trawl or purse seine within 7 km from shorelines of all provinces: Provided, however, that the Director of BFAR is empowered to impose upon the offender an administrative fine of not more than PhP5,000.00 including the confiscation of the fishery nets or paraphernalia and the fish catch.</li> </ul>	<ul style="list-style-type: none"> <li>• The boat captain and master fisherman of the vessel using active gears such as trawls, purse seines, bag nets, Danish seines, <i>paaling</i>, drift gill nets, tuna longlines, and other fishing devices characterized by gear movements and/or pursuit of target species shall suffer imprisonment from 2 to 6 years. The owner/operator of the vessel shall be fined from PhP2,000.00 to PhP20,000.00 upon the discretion of the court: provided that if the owner/operator is a corporation, the penalty shall be imposed on the chief executive officer of the Corporation: provided further that if the owner/operator is a partnership the penalty shall be imposed on the managing partner.</li> <li>• The catch shall be confiscated.</li> </ul>	<ul style="list-style-type: none"> <li>• The number of gears covered has increased. Penalty has increased. The penalty of the fishers differ from the penalty of the owner/operator.</li> </ul>

## Something Better

First, the Code consolidates previous laws governing fishery resources and affirms traditional “working” models. The important role of LGUs in legislation, enforcement and overall management is stressed including that of the corollary features of devolution.

Interventions such as sanctuaries, closed seasons and licensing of municipal fishing vessels are affirmed to be within the purview of the local government. However, a traditional

model which was carried over and is questioned for its seeming failures is that of law enforcement. As discussed in the previous section, the multiplicity of agencies involved in law enforcement is a bane.

Second, the Code resolved conflicts between existing fishery laws and the Local Government Code. The issue of commercial fishing in municipal waters is one such issue that has been settled and clarified (Table 1). Although, other sectors would like to focus on the downside of this issue, i.e., entry of commercial vessels up to 150 gross tons in municipal waters, this article invokes the power of LGUs to determine this situation; otherwise, the default condition is for no commercial fishing to occur. Meanwhile, the power of LGUs to exclude non-resident fishers as a form of limiting access is affirmed and strengthened by the Code (Table 1). This clarifies the notion that all Philippine waters is owned by

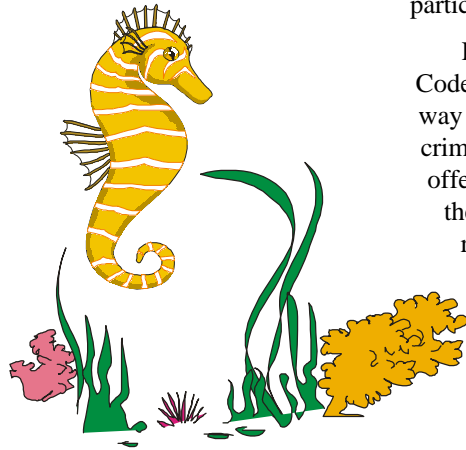
the state and should be accessible to any citizen. Residents of particular municipalities shall have priority over the use of its municipal waters.

Third, the Code introduces novel concepts for limiting access, subscribes to the integrated management framework and provides ample support mechanisms for community participation.

Fourth, the Code reflects the way society views crimes and offenses related to the fishery resource. There is a prevailing pattern of viewing crimes against fishery

resources as a grave offense.

This is reflected in the higher level of fines, facilitation in the handling of evidence and additional prohibitions (Table 2). In cases (e.g. blast and cyanide fishing) where the imprisonment period was shortened *vis-à-vis* the pre-RA 8550 regime, additional prohibitions were incorporated and handling of evidence was made more simple. The final level of enforcement is lodged with the Courts. This ultimate and definitive step is dogged by problems that beset the



entire justice system (such as low ratio of prosecutors/judges to offenders) and those that are unique to fisheries (handling of evidence, witness support and protection). The Code provides for the

augmentation of prosecutorial efforts dedicated to fishery-related crimes and offenses. This will help in solving some of the enforcement bottlenecks.

Fifth, the Code restored essential line functions to BFAR. This should not be viewed as a re-centralization of fisheries functions rather, as a technical support to LGUs especially in the implementation of new management interventions such as MSY, total allowable catch and municipality-based licensing.

There are more achievements and probably some imperfections and misgivings, depending on who acts as the evaluator. However, the Fisheries Code does provide a solid framework to address coastal and fishery management issues.

## Acknowledgement

Many thanks to Mr. Leo Pura, Policy Research Assistant of CRMP, who helped develop the penalty tables and Mr. Pol Zara of the Office of Senator Leticia Shahani.

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Department of Environment and Natural Resources (DENR), Department of Interior and Local Government (DILG), Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) and Coastal Resource Management Project (CRMP). 1997. **Legal and Jurisdictional Guidebook for Coastal Resource Management in the Philippines**. Coastal Resource Management Project, Manila, Philippines. 196 p.



# Banacon, the First Mangrove Community-based Forestry Management Area in a Protected Area

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Banacon Island has come a long way since Nong Denciong's initial effort at mangrove farming in 1959 (see related story on page \_\_). From a humble plantation eked out to provide household needs, it has since put Banacon on the map. Banacon is now known for its vast tracts of *bakauan* (mangrove) plantations.

From 1984 to 1992, Banacon was made a model for the Community-based Mangrove Reforestation component of the World Bank funded Central Visayas Regional Project. The island has also been a popular site with fishermen's associations for cross visits; local and foreign scientists doing research studies; and policy makers who are challenged by the biggest and most successful *bakauan* plantation initiated by a community without assistance from the government. Fulgencio Factoran Jr. and Victor O. Ramos, former Department of Environment and Natural Resources (DENR) Secretaries and even Fidel V. Ramos, President of the Republic of the Philippines, were keen enough to visit the area. At present, there is a pending bill by Congressman Aumentado of the Second Congressional District of Bohol declaring the island an eco-tourism site.

Banacon Island is located seven kilometers north of Getafe, Bohol, Philippines. It consists of 30 hectares of Alienable and Disposable land and 37 hectares of timberland. The island is one of several islets within the Danajon Bank. The other two adjacent islets west of Banacon, Jaguliao and Nasingin, are also surrounded with plantations. In the east, Calituban island has 300 hectares of young plantation. This makes Getafe the

center of community-based mangrove forest management, with Banacon as the flagship with 400 hectares of *bakauan bato* or spider mangrove (*Rhizophora styloza*) plantation, half of which were planted by the community.

Mangrove planting in Banacon began with Nong Denciong who recognized the values of *bakauan*. As the plantation near his house grew, some of his neighbors started to plant *bakauan*, too. After a few more years, the islanders started staking claims around west of the island where the area is shallow with sandy substrate suited for *bakauan bato*. Through time, the plantation has grown and expanded into other plantations extending to a total of 60 hectares by 1984. *Bakauan* planting has become a regular activity of the islanders.

*Bakauan* growers earn income from the plantation by selling *bakauan* poles for fish fences and as housing materials. Each pole measuring 10 cm in diameter at breast height and 10 m long sells at P50 (\$1.35). They are more highly prized though, as firewood for bakeries, selling at P300 (\$8.11) per cubic meter (Melana 1995). In dire times, whole plantations of approximately 0.5 hectare each of half a year old mangroves can be sold to businessmen as some people did back in the late 1970s. Aside from timber, the community also earns by selling the propagules (mangrove seeds) at approximately P0.20 each. Business is brisk with orders ranging from 100,000-200,000 per year. Banacon has been the main supplier of propagules in the Visayas and Mindanao

since the start of the first wave of mangrove reforestation in the late 1980s and early 1990s when DENR started the Contract Reforestation Program. Banacon itself got a contract for 200 hectares. Today, selling of propagules is managed by the people's organization (Alcaria, pers. comm.)

Three species are found in the island: *bakauan bato*, *pagatpat* (*Sonneratia alba*), *bungalon* or grey mangrove (*Avicennia marina*) and a few *piapi* (*A. lanata*). In an attempt to improve biodiversity in the island, the Ecosystem Research and Development Bureau (then Forest Research Institute) of the DENR introduced several new species: *tangal* (*Ceriops tagal*), *busaing* or black mangrove (*Brugueira gymnorrhiza*), *nipa* (*Nypa fruticans*), *tabigi* (*Xylocarpus granatum*), *tabyao* (*X. mekongensis*), *bakauan babae* (*R. mucronata*) and *bakauan lalaki* (*R. apiculata*). Of these species, only *Ceriops*, *Brugueira*, *X. mekongensis* and the two *Rhizophora* species have survived, with some already fruiting. *Nipa* and the others failed, probably due to

high salinity.

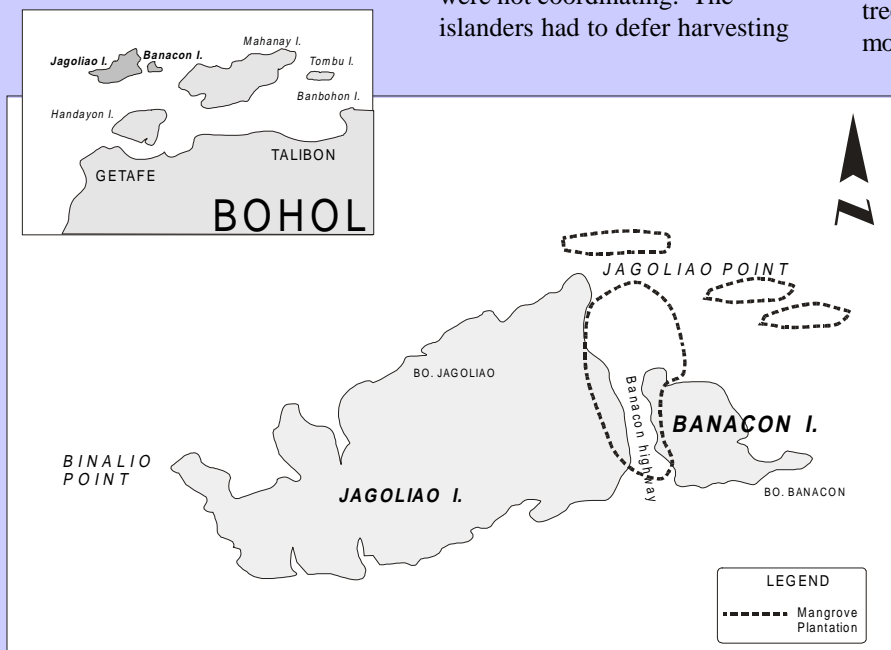
Some conflicts exist in Banacon about the vast mangrove reserves and how they are used. When the old Bureau of Forest Development became aware of the large bakauan plantation in Banacon in 1981, it was placed under the Integrated Social Forestry (ISF) Program. At that time, no one checked whether there were users of this resource and on how much were natural growth. At any rate, under the ISF the community could still harvest what they had planted. Unfortunately, in 1984, while processing the Certificate of Stewardship Contract (CSC) for the tenurial instrument in Banacon, it was discovered that Presidential Proclamation 2151 Series of 1982 had declared the island as a Wilderness Area. Subsequently, the NIPAS (National Integrated Protected Areas System) law included it as a Protected Area, together with Jaguliao and Nasingin. The proclamation and the NIPAS law ban extraction of mangroves and would render the CSC useless. Obviously, the concerned government agencies were not coordinating. The islanders had to defer harvesting

and wait until they could start earning from the plantation again.

Then, as if 2151 was not enough to contain harvesting in Banacon, Republic Act 7161, banning cutting of all mangroves, was passed in 1991. This time, not only the community protested. The DENR said that the law contradicted the department's mission on social equity and people empowerment. The said law did more harm than good to the coastal dwellers. The Community-based Forestry Management (CBFM) Program, the banner program of DENR, in line with its paradigm shift from the traditionally, regulatory approach to a more pro-people orientation, is in jeopardy if this law is not changed.

Regulated harvesting is the best reason to join the program. Without it, the community will not waste time and effort protecting the mangroves knowing that they would not get any return. As stated by Mayor Camacho of Getafe, the said government policy is "forcing the islanders to violate the law." To date, for plantations that have not been cut because of the ban, some trees are already 30 years old or more.

After some deliberation, the DENR formulated Department Administrative Order No.10 Series of 1998, permitting the cutting of planted mangroves as long as they are under a CBFM area. Unfortunately, because of Presidential Proclamation 2151 of 1982, Banacon can not readily apply for the CBFM program. It is also part of a protected area by virtue of the NIPAS law. The plantation has to be zoned as a Multiple Use Zone before harvesting can be granted. This means that the fate of the islanders are now in the hands of the



MANGROVE PLANTATIONS IN BANACON AND VICINITY.

Protected Area Management Board that is responsible for zoning. The DENR, the local government units (LGU) and non-government organizations (NGO) need to facilitate zoning.

The Coastal Resource Management Project is coordinating with DENR to facilitate the establishment of CBFMA in four municipalities in Bohol (Getafe, Inabanga, Mabini, Candijay) through its Mangrove Management Component (MMC). The MMC team are coordinating with the DENR, appropriate LGUs and NGOs in helping the community apply for CBFMA. Also, the MMC will assign a community organizer in each municipality to help the community implement CBFM effectively. Of particular concern is making Banacon the first mangrove CBFMA under a Protected Area. Banacon is the cradle of community-based mangrove forest management in the country and the people of Banacon deserve that honor.

In order to facilitate implementation of CBFM in Banacon and effectively manage their mangrove forest, including natural mangrove stands, the MMC recommends the following:

- Immediate appointment of PAMB members to effect zoning at the soonest possible time.
- Harvesting of overmature trees and replanting with bigger bakauan species, *R. apiculata* and *S. alba*. Old plantations hardly grow anymore due to over-crowding, a result of the community's planting technique. It is better to harvest these trees and invest the proceeds in other livelihood activities.



- Establishment of a seed production area by thinning 5-10 year old plantations or developing a new plantation using *R. apiculata* and *S. alba*.
  - Establishment of a "Mangrovetum" for conservation and seed production purposes and as a tourist attraction. A "Mangrovetum" is a plantation consisting of several genera and species planted by blocks per genus per species for easy identification and growth comparison of look-alike species among the mangroves. This would also complement the proposed Eco-tourism Bill.
- *Amatong* (an indigenous way of catching fish using an excavation filled with rocks and mangrove branches that provide a niche to fishes) fisherfolk should practice conservation measures such as releasing juveniles and gravid fish.
- DENR should also work toward the granting of CBFM agreements, good for 25 years and renewable for the same period, to beneficiaries who could guarantee protection of the remaining mangrove stands.
- Concerned people's organizations and LGUs should pledge accountability for abuse of the privilege and inability to enforce forest protection through an ordinance.

[If Banacon has been declared as "ecotourism" area, it might be useful to preserve some of the 30-year old trees since these are unusual in Philippine mangrove forests. Editor]

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## Acknowledgement

J.A. Atchue III, Field Operations Leader of CRMP's Mangrove Management Component, reviewed this article.



# Lobster Farming

Sea farming is the growing of fishes, molluscs, seaweeds or crustaceans to marketable size on the sea bed or in special structures. Pen culture near the shore is an environment-friendly sea farming activity that employs simple technology and low investment. The most recent trend in pen culture is growing of lobsters and is practised in Singapore, Thailand, Australia and now, in the southern part of the Philippines.

Lobsters are crustaceans from Family Homaridae. Common to Guimaras Island near Iloilo, Philippines are *Panulirus ornatus* (tiger), *P. versicolor* (green) and *P. longipes* (red). These spiny lobsters are characterized by a hard shell, stalked eyes, four pairs of walking legs, a pair of antennae below the eyes and a pair of chelipeds for grabbing food.

Lobsters are valued in the export and local market for their delicate flesh. At present, Guimaras fishers sell them at P800 (\$21.62) per kilogram from a total island catch of about 100-160 kilograms a month from the wild. The capture method from the wild include use of gillnets and spears (hookah fishing is not advisable). For the newly introduced culture method, juveniles are caught from shallow reef flats at night using kerosene lamps, scoop nets and gillnets.

## Site Selection

Critical to any sea farming activity is site selection. Below is a list of parameters and requirements that would guide the potential entrepreneur in selecting a site for lobster farming.

## Steps in Lobster Pen Construction

A cubical pen measuring 5x5x4-6 meters is the most widely used. It is made with 3 cm mesh synthetic net, framed by wood or bamboo. It takes only 15 days to construct, from the lay-out to the construction of the caretaker's hut.

**1. Lay-out.** Mark the corners of the area measuring 5x5 m with stout poles.

**2. Staking.** Prepare the stakes. These are materials made from bamboo stumps or

Ipil-ipil, sharpened at one end and driven into the substrate 40-60 cm deep and carefully placed 20 cm apart to form all sides of the pen. They are secured to each other by means of a bridging (molding poles made from similar materials tied perpendicular to the stakes).

**3. Installation of screens, netting or bamboo slats for enclosure.** Dig a third of a meter-deep canal prior to the installation of netting materials. Make sure that the netting reaches the bottom of the canal and cover again with the substrate to prevent burrowing lobsters from escaping. Two people, one person "inside" and the other "outside", can set up the screen with an 80 lbs. nylon twine.

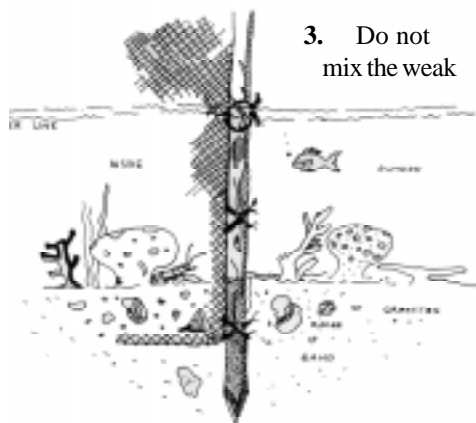
**4. Division of compartments.** Large mesh size nets and bamboo slats are also used to install these compartments to provide protection to stocks in the molting stage. There are 3 main compartments: the rearing area (15 sq m), transition area (6 sq m) and the nursery area (4 sq m). Steps in dividing the pen into these compartments are similar to step 3. Note the recommended stocking density and corresponding weights in the sample pen layout.

**5. Construction of caretaker's hut.** A caretaker's hut is essential in every pen to provide protection against inclement weather, not only for the workers but also for the lobsters during harvest. Local materials (e.g., nipa, cogon) are recommended.



## Management of Pen

- Lobsters grown in pens have the tendency to accumulate algae on the external portion of their exoskeleton probably due to the low level of salinity and exposure to sunlight. To control: (a) provide shelters made from old tires, bamboo and rock piles on pen floors, with coconut, nipa or *Buri* leaves as roof; (b) polyculture with siganids and other herbivorous fish species; (c) harvest the lobster one week after molting; and (d) regularly clean the nets.
- Clean the netting twice a month by scrubbing it with coconut husk or net bag material to take away barnacles and other debris, allowing for the smooth flow of water.



- Do not mix the weak

and newly molted ones with the healthy juveniles. Put the weak lobsters in the nursery compartment for them to recuperate.

- Feed twice daily. Weigh 10 of the lobsters (representative sample) in the pen and compute the average. The amount of feed for each lobster would be 15-20 % of the body weight. Lobsters may be fed with chopped or ground rays, shark meat, sea urchins and other animal foods. Food may be broadcasted. Wet weight food

PARAMETERS	REQUIREMENTS
<b>substrate</b>	sandy/rock/ coralline, with patches of seagrass if possible
<b>location</b>	marine waters, away from rivers and creeks; free from domestic, industrial and agricultural wastes and from other environmental hazards
<b>water quality</b>	always clear, with abundant plankton and other food organisms, salinity not less than 30 parts per thousand
<b>water current</b>	minimum of 10-35 cm/sec or moderate current exchange; free from strong wave action
<b>water depth</b>	not less than one meter during the lowest low tide (neap tide) and not more six meters during high tide
<b>availability of the species</b>	indigenous species preferred to ensure supply of juvenile

conversion ratios (wet weight food consumed: increase in body weight) between 3.6:1 and 9:1 have been reported with natural foods.

- Monitor the growth rate twice a month to determine the feed requirement and for record purposes.
- Establish perimeter stakes with light or kerosene lamp to warn off boats at night.
- Constantly monitor and record all activities and finance-related aspects of the project.

## Harvesting

- Selective harvesting is done six



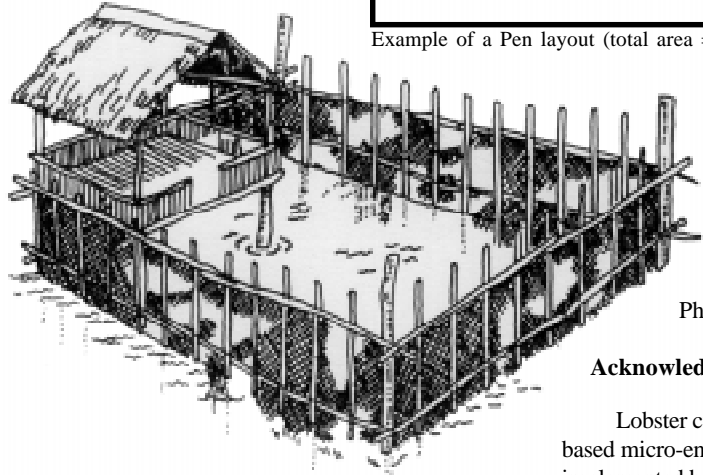
months after the first stocking, when the lobster weighs an average of one kilogram a piece and every month thereafter, depending on the available marketable lobster.

- The ideal time for harvesting is from 6:00 to 8:00 in the morning, or when the weather is particularly cloudy.
- Use scoop net in harvesting or simply pick the lobsters. Goggles and snorkels may be needed. Weighing scales should be ready to immediately determine the weight of the animals before packing for transport to the restaurant or market. Care must be exercised

to ensure that all appendages are intact. Damage to any part will reduce the market price. Survival is high at 90% for stocks of 250 gm for the culture period of four to seven months. Thus, the culture of juvenile lobsters in pens is also a profitable micro-project.

<p><b>Rearing Compartment</b></p> <p>area = 15 sq m  SD = 10:1  = 150 pieces  w = below 800gm/pc</p> <p><i>Note:</i>  SD or stocking density = no. of lobsters per square meter  w = weight of the lobster during stocking</p> <p><b>Selective harvesting can be done when the lobster reaches about 1 kg/pc.</b></p>	<p><b>Nursery Compartment</b></p> <p>area = 4 sq m  SD = 40:1  = 160 pc  w = all below 300 gm/pc</p> <p><b>Grading/transfer can be done when the lobster is about 400 gm/pc.</b></p>
	<p><b>Transition Compartment</b></p> <p>area = 6 sq m  SD = 25:1  = 150 pc  w = all below 600 gm/pc</p> <p><b>Grading/transfer can be done when the lobster is about 700 gm/pc.</b></p>

Example of a Pen layout (total area = 5x5 m)



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**Acknowledgement**

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- Always use a floating box made of plastic screen, partially buoyed by bamboo poles, styropore or just an ordinary floatation device, with dimensions of 60x60x60 cm to keep the lobster in the water thereby reducing stress until the collection is over.
- Newly molted lobster should not be harvested as it could not withstand stress during transportation.

**Marketing**

Classifications		Price by species or color		
Weight (gm)	Category	Red	Green	Tiger
all below	juvenile	N/A	N/A	P200.00/kg
200-299	small	P200.00/kg	P200.00/kg	P370.00/kg
300-499	medium	P400.00/kg	P400.00/kg	P650.00/kg
500-1.7 kg	large	P600.00/kg	P600.00/kg	P850.00/kg





*Economics of Production (1997 Guimaras Prices)*

# OF UNIT	UNIT	BUDGET ITEM	TOTAL COST
		Investment Cost	6,000.00
90	meters	Plastic Screen # ½	2,500.00
50	meters	Polyethylene net # 3 cm x 100 mesh	1,300.00
10	kg	Nylon twine # 100 lbs	650.00
5	kg	Nylon twine # 180 lbs	750.00
5	rolls	Nylon cord # 8	300.00
30	pcs.	Bamboo stumps - 4 m	750.00
30	pcs.	Bamboo poles	400.00
6	pcs.	Coconut trunk - 5 m each	1,600.00
1	unit	Weighing scale (with clear gram readings)	14,250.00
		Operating Cost	3,200.00
160	pcs.	Lobster juvenile at P20.00/pc.	9,500.00
500	kg	Feeds for 180 days	3,600.00
15	days	Construction of farm: 3-persons x P80.00	5,100.00
60	days	Labor: P85.00	3,000.00
		Less annual repair (maintenance)	24,400.00
		Summary	76,800.00
		Total revenue from expected harvest of 96 kg @ P800.00/kg	38,650.00
		Cost of Production	38,150.00
		Net Return	

Note: Assumptions were based on 20% mortality rate. 80% of total stocks are harvested after 6-10 months.

## Nong Denciong and His Legacy

Banacon Island, lying eight kilometers north of Getafe, Bohol, Philippines, was noted for *banak* (*Mugil caeruleomaculatum*), the silvery thick scaled fish belonging to family Mugilidae, from which the island got its name. Banacon is one of several islets that has been supplying Cebu City with fishes, blue crabs and shells daily. On the way back, traders bring basic goods thus, establishing trade and commerce between Pasil, Cebu City and Banacon.

It was only in the early 1980s that Banacon started to make waves when visitors began to come in droves to see the biggest *bakauan* (mangrove) plantation in Central Visayas—if not in the whole country (Yao 1984)—established through community effort without government assistance (see article on page ??). The increasing number of visitors encouraged the islanders further to plant more *bakauan*, specially the late Eugenio Paden, popularly known as Nong Denciong, the man who started it all.

When Nong Denciong established his first *bakauan* plantation in 1959, he had no inkling

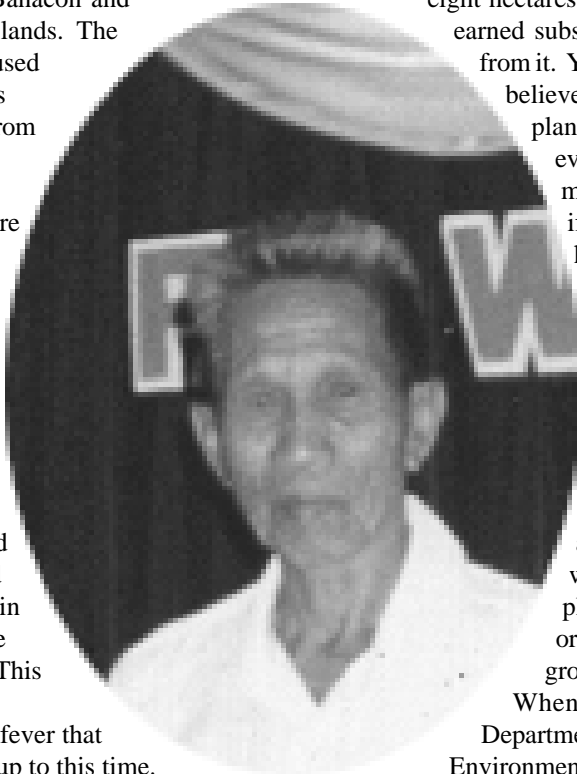
that he would put Banacon in the map as a model for community-based mangrove restoration 25 years later. He planted *bakauan* with a simple objective, that he would not have to go far to cut or buy firewood and poles for his housing needs.

Nong Denciong started planting with propagules collected from a few mother trees of *Sonneratia alba* and *Avicennia marina*, the dominant species at that time, and floating propagules found in fish pens (Cimagala pers. comm). He established his first plantation of about 500 square meters at the eastern side of the island. The trees grew up to 9 m with an average diameter at breast height of 8 cm. They had an initial spacing of about 30 cm x 30 cm so the propagules could protect each other from strong waves and winds especially in the exposed areas. This strategy has been adopted by other planters not only in the island but in the whole province as well. Where and how Nong Denciong learned the technology, nobody seems to know. It is possible that he learned it from Mindanao where he spent some time working as a carpenter in the early 1950s.

Not long after Nong Denciong established his plantation, others, like the brothers Sotero and Milan Torreon, also planted bakauan along the now popular “Banacon Highway”, the 30 m boat passage presently surrounded by about 400 hectares of mangroves and connects Banacon and Jaguliao Islands. The Torreons used propagules collected from Ipil river in Trinidad, Bohol where they did their marketing. Not to be outdone by several planters, Nong Denciong established his second plantation in front of the Torreons. This started the plantation fever that continues up to this time.

In the 1960s, a self proclaimed firewood permittee tried to control the island’s mangroves, including the plantations. Many were discouraged to plant until Nong Denciong, together with his nephew, Erning Paden, who was an employee of the then Bureau of Forestry, confronted the guy. It turned out that the alleged permittee had no proper documents.

By 1970, there were several plantations established already and some capitalists from Cebu started buying young plantations, proving that bakauan is truly bankable. During a financial crisis, a bakauan plantation would always come in handy. More people therefore, were encouraged to plant more bakauan.



Nong Denciong, the silent type who simply wanted to mind his own business, was happy that his initiative has created an opportunity for his fellow Boholanos, making money out of the bakauan. Nong Denciong himself planted a total of about eight hectares and earned substantially from it. Yet, he believed that the planters could even make more money if the island had not been proclaimed as a Wilderness Area where harvesting was not allowed, whether planted or original growth.

When Department of Environment and Natural Resources (DENR) Undersecretary Victor O. Ramos visited Banacon in 1989, Nong Denciong requested that DENR do something to amend the said proclamation and let the people harvest their plantation so they can sell bakauan to Cebu City at a higher price. It finally happened but unfortunately, Nong Denciong did not live long enough to see the effort of the Department come to fruition, the issuance of Department Administrative Order 98-10 that permits harvesting plantations provided the area is under the Community-based Forest Management Program (CBFM). The CBFM is the most recent DENR program that integrates all the pro-people programs in line

with the Department’s new paradigm shift, from the traditionally regulatory to community-based management.

For his pioneering effort on mangrove restoration, Nong Denciong received several citations including DENR’s Likas Yaman Award given by President Corazon Aquino in 1989 and the outstanding Tree Farmer Award given by Her Royal Highness Princess Maha Chakri Sirindhor in Bangkok, Thailand in 1991 under the auspices of the Food and Agriculture Organization (Melana 1991). Recently, in posthumous recognition by the people of Banacon, the Banacon Barangay Council passed a resolution naming the Banacon Highway as Paden’s Pass in honor of the man who put Banacon in the map, including the small boat passage in honor of other original bakauan planters. It is in poignant remembrance of how Nong Denciong was always on the lookout for new plantations that encroached in the boat passage, aware that the passage was one of the attractions of the island. He would pull out new plantings whenever he found some in the effort to keep the passage clear. Nobody challenged him. He was recognized and respected as the pioneer of bakauan planting. True to the spirit of environmentalism, Nong Denciong also practised the use of *amatong* (Calumpong 1996), an indigenous way of catching fish using an excavation filled with rocks and mangrove branches that serve as a niche to fish, aside from pioneering bakauan planting.

Days before he passed away on January 17, 1993, he ordered a walking stick made from mangrove wood to support his weakening legs. He held the stick as though holding to the trees he loved so much. His last request to his eldest daughter was to take good care of his mementoes.

Nong Denciong's bakauan plantation lives on and Banacon continues to make waves as the candidate for the first Community-based Forest Management area under the protected area system and as visitors continue to journey among the mangroves of the island.

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By **Calixto E. Yao**, Mangrove Technical Specialist, CRMP



## Development of SimCoast™ Continues

### the news

After a series of workshops in the Philippines last year, SimCoast™ prepares to take on other parts of the world in its continuing effort to make the program even more efficient for coastal and regional planners. SimCoast™ had its debut in 1995, the first phase of a European Union-Association of Southeast Asian Nations (EU-ASEAN) funded project resulting in SimCoast™, a fuzzy logic rule-based expert system and PC based software that was developed by Prof. Jacqueline McGlade. SimCoast™ is designed as a management tool for coastal and regional planners, supplying guideline information during development programs. The second phase, initiated in 1997, was comprised of a series of workshops, the first of which was hosted by the Philippine Council For Marine And Aquatic Research And Development in Manila in August 1997. The workshops were designed as a forum in which the SimCoast™ expert system can be further refined for release in its PC based format. Further programs have now been initiated in Africa and America.

The marine environment has been exposed to many pressures by both social and economic forces, emanating from land and aquatic based developments world-wide. These environmental stresses take the form of conflicts over resource allocation, degradation of habitats, exploitation of resources, land and water misuse coupled with pollution by chemical and biological wastes. The resulting decline in condition of the marine environment has exposed social and institutional issues which are relevant to future development programs and need to be addressed. Through the EU-ASEAN study on Interdisciplinary scientific methodologies for the sustainable use and

management of coastal resource systems, experts from Europe and the ASEAN countries are being brought together to determine key issues within the coastal zone and to develop a transect based environmental management system.

A large part of integrated coastal management deals with the creation of a framework in which information from many diverse sources can be evaluated and explicit guidelines issued. Managing coastal areas requires an interdisciplinary approach which takes into account interactions between natural, social and economic elements. Therefore, an integrated system such as SimCoast™ based on an intelligent knowledge based expert system is required.

The sustainable management model involves the development of analytical techniques based on an information data base; which, when coupled with software designed to set policies and monitor the effects of changes, results in a dynamic process promoting conservation and sustainable multiple use of resources. As a direct result of the coordinated allocation of environmental, socio-cultural and institutional resources, the values, interests and goals of people, many of which are in competition with each other, can be integrated.

There are three key intelligent systems techniques which can be used in different combinations for sustainable coastal zone management: expert systems, neural networks and genetic algorithms. The expert system is comprised of a knowledge base where the information is stored, an inference engine which decides how that information should be applied to a task and a user interface through which commands are issued to the system by the user. Fuzzy logic combined with an expert system, takes into account imprecision

within the knowledge data base. On the other hand, issue analysis combined with an expert system facilitates analysis of qualitative data from many fields and indicates overall environmental policy priorities. In some expert systems, results are given as either “true” or “false”. In fuzzy systems, variables become words or sentences and operate with the same “natural” language as that used in everyday life. SimCoast™ itself uses fuzzy logic embedded in an expert system together with issue analysis.

The other components utilized in SimCoast™ software are inference nets which are composed of data groups supporting the ideas and hypothesis of experts. These link together the knowledge stored within the data base and can be encoded into a network of connections or relations between evidence and hypothesis. In most inference nets, the data sets and connections are

fixed so the relationship within the knowledge base is retained. However, the most important feature of the SimCoast™ system is that the inference net is dynamic, allowing for connections between data sets and probabilities to have no fixed connections.

The resulting soft intelligence system uses stored knowledge to make inferences and deductions which are presented through a multilingual user interface. This incorporates a multidisciplinary lexicon enabling users from different countries to find key words and derive new information, in conjunction with a 2D visual representation of the transect.

SimCoast™ unites expert knowledge from different fields within one system creating a powerful tool for identifying which processes and issues have the most significant

impact within an environment. It examines their importance in terms of the influence each activity exerts on itself and others within the transect zone and also takes into account the effect of activities taking place outside the designated area. This produces a weighting of activity impacts in terms of targets such as biodiversity or fisheries within the designated area. Policy changes related to activities within the coastal zone and the order of their priority are indicated by SimCoast™. The weighted impacts can then be used by policy makers and planners during coastal development programs.

By **Ann Novello Hogarth**, Project Manager, FUGRO GEOS, Singapore and **Jacqueline McGlade**, EU-ASEAN Co-ordinator, England.



## Three Cheers for Caliling, Cauayan, Negros Occidental

Caliling residents are excited over their close encounters with large schools of fish like jacks, snappers and rabbitfishes in the

Hulao-hulao Fish Sanctuary. According to the people, catches have been increasing in nearby waters. Also, salt production, a

supplementary livelihood which began in 1994 has yielded about two metric tons of salt up to the present. Salt production in this *barangay* (village) is mainly dependent on direct solar energy so operations take place only during summer.

Overfishing was one of the coastal management issues in Caliling. In order to improve the nearshore fishery, the community, together with the local government, Department of Environment and Natural Resources and professionals from a research institution, established the Hulao-hulao Fish Sanctuary in 1994 through a project that terminated in 1997. Hulao-hulao is one of four coral reefs in Caliling.

To date, Hulao-hulao boasts of 63.13% live coral cover up from a dismal 27.0% in 1984 (SUMML 1997,



*Salt production, a supplementary livelihood of fisher and family in Barangay Caliling.*