

Pen culture of mudcrab in mangroves



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FOREWORD

The recently held workshop on Mangrove-friendly Aquaculture shows the direction that aquaculture has taken in the past few years. The workshop paved the way for the implementation in AQD of a five-year program that would formulate a Code of Conduct for responsible mangrove-friendly aquaculture. Acknowledging the loss of 30 to 80% mangrove cover in Southeast Asia due to aquaculture, the workshop recommendations in most ways strengthened AQD's program for sustainable development.

This volume on pen culture of mudcrab in mangroves is one of the technologies generated in support of such program through its Technology Verification Program. Launched in mid 1996, TVP aims to field test technologies that are found to enhance production and profit without losing sight of its sustainability.

Net enclosures in mangroves for mudcrab culture is now gaining support from government and non-government groups. It is easy to operate and most important, environment friendly. It can also help the local communities supplement their livelihood.

We hope this manual would be of use to fishfarmers and aquaculturists, extensionists, and students of aquaculture not only in the Philippines but also in other mudcrab producing countries in Southeast Asia.



ROLANDO R. PLATON, Ph.D.
Chief, SEAFDEC Aquaculture Department



Project site of the pen culture of mudcrab in mangroves at Barangay Manalo, Puerto Princesa City, Palawan.

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Tidal flat suitable for mudcrab pen culture.

Pen culture of mudcrab in mangroves

General information

Over the years, commercial production of mudcrab *Scylla spp.* has been undertaken only in bamboo or net-fenced brackishwater ponds. The technical feasibility has been demonstrated through series of verification trials conducted in commercial ponds by SEAFDEC/AQD researchers and which is now being adopted by mudcrab farmers in several parts of the country.

Today, the use of net enclosures in mangroves or tidal zones offers a better alternative to culture of crabs in ponds. The set-up is easy to construct, simple to operate, and requires low investment cost. Aside from being environment-friendly, the system offers a bright prospect for creating livelihood for coastal communities. The method has been done for quite some time in Indonesia, Malaysia, Vietnam, and China. The recent success of SEAFDEC verification runs in Palawan and Aklan paved the way for the widespread interest to establish similar methods of crab culture in the Philippines.

Site selection

Mangrove areas should have sufficient supply of marine or brackishwater throughout the year. Water depth at high tide should range between 0.3 to 1.0 m. Salinity should range between 10 to 35 ppt and temperature between 25 to 30°C. The site must be free from big waves and pollution, protected from environmental hazards such as big waves and floods, and secure from vandals and poachers.

Installation of net enclosure

The design for a 4,000 sq m (50 m X 80 m) net enclosure used in the trials conducted by SEAFDEC is specified in Figure 1.

Materials

Green polyethelene (PE) net, 1-2 cm mesh size and 2 mm twine diameter (6 rolls).

Plastic sheets # 5, 2 rolls

Bamboo (whole length) for structural framework (horizontal bracing) 30 pcs.

Wooden posts, 3-4 m in length (vertical post); 5 - 8 cm diameter

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Figure 1. Design of nylon net enclosure for mudcrab culture in mangroves

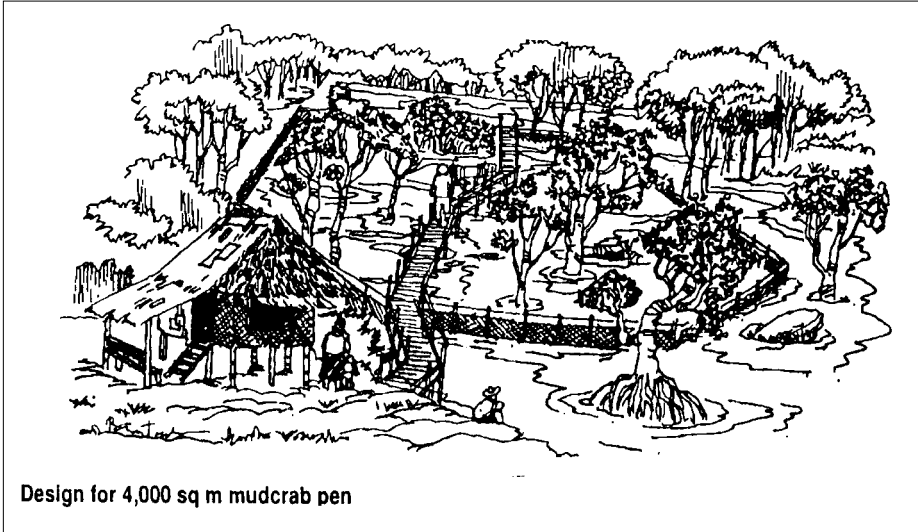


Figure 2. Actual nylon net enclosure for mudcrab culture in mangroves at Barangay Manalo, Puerto Princesa City, Palawan. Inset shows details of a net enclosure



PROCEDURE

- 1** Design the enclosure with shapes that may vary from square, rectangular, etc. depending on the contour and vegetation of the area. Area of enclosures may vary but manageable size would range from 0.2 - 1.0 ha.
- 2** Install net enclosure (PE net 1-2 cm mesh size) or other materials (bamboo slats or other appropriate netting materials) with bamboos or wooden posts as structural framework. The upper portion of the net should extend not less than 30 cm above the water marks of highest tide level experienced in the area. Along the top edge of the net enclosure, plastic strip/sheet of about 30 cm should be installed to prevent the mudcrabs from climbing over the top. The lower end of the net is embedded about 50 to 70 cm along the base of the enclosure.
- 3** Dig ditches/puddles *libaong* with depth of about 20 - 40 cm representing at least 20 to 30 percent of the total area of the enclosure. These are intended to hold water in the enclosed area during lowest low tide for the crabs to withdraw and take refuge in. Cutting the main roots of mangroves during the digging should be avoided.
- 4** Install catwalks around or perpendicular to the enclosure for ease in feeding and monitoring of stocks.

Figure 3. Installation of net enclosure



Figure 4. Ditches dug inside the net enclosure



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Figure 5. Mudcrab stocking at project site



Figure 6. "Bintol" (lift net) used for sampling mudcrab stocks

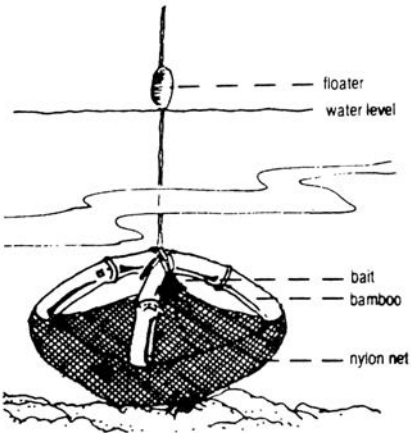


Figure 7. Chopped trash fish as feed for mudcrab stocks



Rearing operation

TRANSPORTING MUDCRAB JUVENILES FOR GROW-OUT CULTURE

Mudcrab juveniles for stocking are normally contained in bamboo wicker baskets *bakag/kaing* or in plastic/pandan *bayong* bags during transport from source to pen site. Normally a pandan bag would contain about 150 to 200 pcs of 20 to 50g juveniles for a 10 to 12 hours transport time. Fresh mangrove twigs are placed between layers of crabs to lower the temperature, serve as cushion, and prevent juveniles from fighting each other. Chelipeds or pincers of young juveniles below 30g should not be cut or removed so as not to subject them to stress or infection which could cause mortality. However, juveniles weighing more than 30g must have their pincers tied using strips of soaked *suwak* (coconut sheath) or plastic straw. Sprinkling them with brackishwater during transport or storage would keep them alive and active.

STOCKING AND ACCLIMATION

Before stocking, ensure that the enclosure is cleared of debris, unwanted species, and predators. Nets must be checked all around for possible holes or scouring.

Stock monosize mudcrab juveniles weighing 30 to 50g per piece or measuring to 10cm carapace length at the recommended rate of 5,000 to 10,000 per hectare.

Stocking must be done in early morning or late afternoon when the temperature is cool and tidal water is available.

Before releasing the juveniles, acclimation is done by placing them inside plastic basins where they are sprinkled with seawater until they are completely submerged for about an hour. Make sure that crabs have adapted to the pen water temperature and salinity before releasing them.

During stocking, tilt the basin and allow crabs to crawl out freely. Ties on chelipeds or pincers are cut prior to release.

Feeds and feeding

Feeds comprise 40 to 60 percent of the total cost of production. Chopped trash fish, animal hides or entrails, mussel meat and snails (golden apple snail) are cheap but effective locally available feeds for mudcrab. Feeds are evenly broadcast daily

preferably with the incoming tide. Feeding rate is at 10% of the total biomass reduced by 1% monthly down to 5% towards the end of the culture period.

Stock sampling

To determine the growth and feed requirement, stock sampling must be done every 30 days using *binol* (lift net) or baited traps. Take 30 to 50 samples and measure the weight, carapace length, and width and determine their increments.

Water quality and pen management

Monitoring of the physico-chemical parameters to include dissolved oxygen, salinity, turbidity, and water temperature is essential to avoid possible adverse conditions that are harmful to the cultured crabs. This should be done at least three times a week. Monitoring should also be done relative to feed consumption, swimming behavior, presence of berried female crabs, etc. Daily inspect enclosures for destructive debris, scouring and torn nets where stocks could possibly escape. Secure them against possible poachers by making routine inspection of the area especially at night.

Figure 8. Harvesting mudcrabs by baited traps



Figure 9. Harvesting of mudcrabs by handpicking



Harvesting

Partial harvesting is done when mudcrabs reach marketable size of 200g and above. This could start, at the earliest, after 45 to 60 culture days. This is done by handpicking them during low tide and/or catching them by using baited traps like *bintol* during high tide. Only fat crabs are selected.

During harvest, either partially or totally, the chelipeds of the harvested crabs are tied using tying straw or *suwak* before these are transported to the market or picked up by the buyers.

Marketing

In all cases, mudcrabs are marketed live. In the Philippines, female crabs with mature gonads are relatively expensive. Mudcrab are sold in the market year-round, but, generally, those found in the domestic markets are grouped in mixed sizes and are smaller than exportable crab. Mudcrab sold in restaurants are 250 g and above. Prices vary with markets and seasons. During Christmas season, the price is relatively high because of the increased demand. The major markets for the Philippine mudcrab are Taiwan, Hongkong, Guam, Japan, and the USA.

Minor markets include Singapore, Brunei, Germany, Korea and other neighbouring countries. Taiwan has been the biggest buyer of mudcrab from the Philippines.

Trading of mudcrab throughout the Asian region involves a series of intermediaries between the fishfarmer/suppliers and local consumers or the exporters.

PROFITABILITY OF MUDCRAB PRODUCTION IN MANGROVES

Technical Information

Project location	: Palawan
Total area	: 4,000 sq m
Culture period	: 5 to 6 months
Initial stock	: 2,040 pieces
Size @ stocking	: 10 to 50 grams
Method of harvest	Partial starting from 3rd to 5th month
	: Total: 6th month
Survival rate	: 1,767 pieces or 86%
ABW	: 275 grams
Yield	: 485 kilograms
FCR	: 5:1
Croppings/year	: 2

Figure 10. Harvested mudcrabs



Investment Requirement

Pen construction materials		
nylon nets 5 rolls	P	8,000
bamboos for horizontal bracing 25 pcs		750
wooden posts, 130 pcs @ P30/pc		3,900
monofilament # 150 mm, 5kg @ P120/k		600
plastic sheet # 5, 2 rolls		4,000
Labor		
canal excavation for fence		5,500
fencing		26,000
backfilling		2,400
Seeds		16,320
Feeds		16,975
Wages of laborer (feeder)		<u>7,500</u>
Total investment requirement		91,945

Cost and Return

Costs

hydrated lime	600
ammonium sulfate	400
crab juveniles @ P8/piece	32,640
trash fish, 2,425kg X 2 @ P7/k	33,950
wages of Laborer @ P2,500/mo	30,000
transportation Expenses	1,000
maintenance & Repairs	500
contingencies	500
depreciation of pen enclosure	<u>10,230</u>
Total costs	109,820

Returns

Sales: 485 kg x 2@ P170/k	164,900
Profit	55,080

Return on Investment

≅60%

Payback Period

1.4 years

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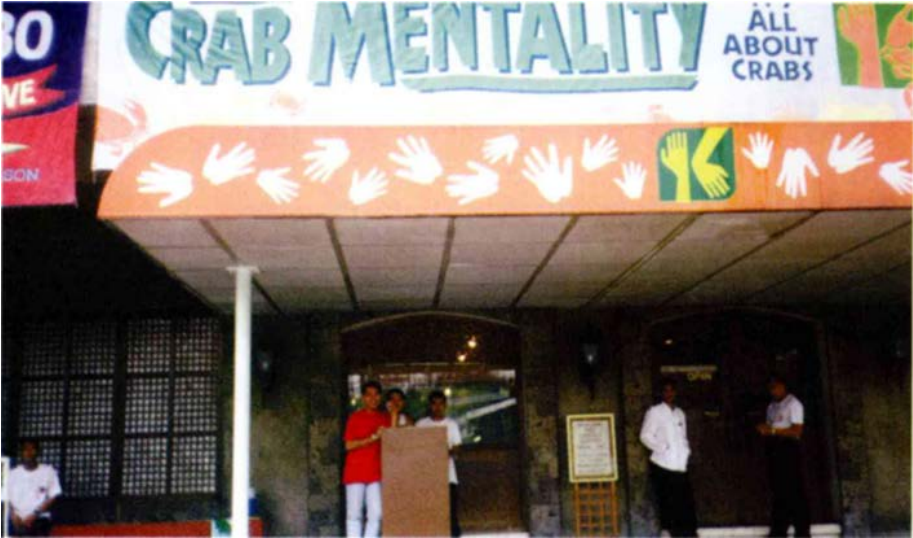
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SEAFDEC Aquaculture Department

Tigbauan, Iloilo, Philippines

MARCH 1999



The Southeast Asian Fisheries Development Center (SEAFDEC) is a regional treaty organization established in December 1967 for the purpose of promoting fisheries development in the region. Its Member Countries are Japan, Malaysia, the Philippines, Singapore, Thailand, Brunei Darussalam, and the Socialist Republic of Vietnam.

Representing the Member Countries is the Council of Directors, the policy-making body of SEAFDEC. The chief administrator of SEAFDEC is the Secretary-General whose office, the Secretariat, is based in Bangkok, Thailand.

Created to develop fishery potentials in the region in response to the global food crisis, SEAFDEC undertakes research on appropriate fishery technologies, trains fisheries and aquaculture technicians, and disseminates fisheries and aquaculture information. Four departments were established to pursue the objectives of SEAFDEC.

- The **Training Department (TD)** in Samut Prakan, Thailand, established in 1967 for marine capture fisheries training
- The **Marine Fisheries Research Department (MFRD)** at Changi Fisheries Complex, Singapore, established in 1967 for fishery post-harvest technology
- The **Aquaculture Department (AQD)** in Tigbauan, Iloilo, Philippines, established in July 1973 for aquaculture research and development
- The **Marine Fishery Resources Development and Management Department (MFRDMD)** in Kuala Terengganu, Malaysia, established in 1992 for the development and management of the marine fishery resources in the exclusive economic zones (EEZs) of the SEAFDEC Member Countries