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Milkfish culture in sea cages

Aquaculture Department, Southeast Asian Fisheries Development Center

Early warning for pollution

Milkfish sea cage operators may soon be warned of impending water pollution that may kill their stock. SEAFDEC is currently developing an early warning system to guard against the negative impacts of fish cages in mariculture parks.

Intensive rearing of milkfish in cages uses a much higher amount of input like feeds. Feeds that are not eaten or digested properly, plus other waste products go into the water and some will eventually settle onto the sediment bottom and may cause marine and sediment pollution. It is therefore necessary to monitor the water and sediment quality around the fish cages.

The operator could also check the feeding regime, avoid overfeeding of stocks, and use only good quality formulated feeds to help reduce wastes. The cage operator may likewise step-up the water monitoring parameters.

Pollution not only affects the fish in the cages. The toxic conditions could impact infauna, or animals living within submerged sediments. These include polychaetes, marine worms which play an important role in the marine environment. Their burrows contain microorganisms which produce enzymes that degrade organic matter.

What the operators of fish cages or mariculture parks need to do is periodically collect soil samples under the cages, and compare these to a color chart being developed by SEAFDEC. A reference color will let them know how far off or how near they are from ideal conditions. This method is basically the same technique used by rice farmers to see if their rice needs additional fertilizer.

If there are early signs of pollution, the fish cage operators are advised to observe a "fallow period" by moving the cages to another area in the mariculture park to allow the sediments and infauna to recover.

Raise milkfish in sea cages in mariculture parks

WHY MARICULTURE?

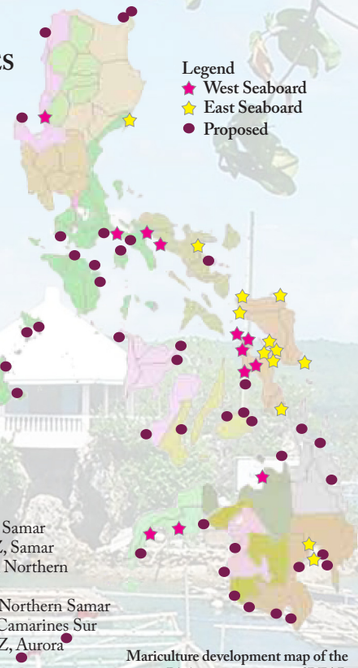
- Land resources are becoming scarce
- The vastness of the sea remains the last frontier for fish production
- Mariculture profitability has been established
- Could provide fisherfolk with alternative sources of income
- Demand for fish continues to grow with increasing population
- Wild catch from the sea is declining due to overfishing

WHY RAISE FISH IN A MARICULTURE PARK?

- The park concept provides farmers technical assistance and water monitoring services, moors and cage frames
- Fish farmers spend only for nets, feeds, seed stock and other inputs
- The park may also include on-site guard house, feed warehouse, net mending & drying shed, communication & transportation facilities, and guest houses

WHERE ARE THE MARICULTURE ZONES (MZ) IN THE COUNTRY?

The Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture has established mariculture parks throughout the Philippines, with plans of establishing several more in the future



West seaboard

- Margosatubig MZ, Zamboanga del Sur
- Tungawan MZ, Zamboanga Sibugay
- Balingasag MZ, Misamis Oriental
- Ormoc MZ, Leyte
- Merida MZ, Leyte
- Leyte, Leyte MZ, Leyte
- Biliran MZ, Biliran
- Naval MZ, Biliran
- Ragay MZ, Camarines Sur
- Tagkawayan MZ, Quezon
- Padre Burgos MZ, Quezon
- Sto. Tomas, La Union

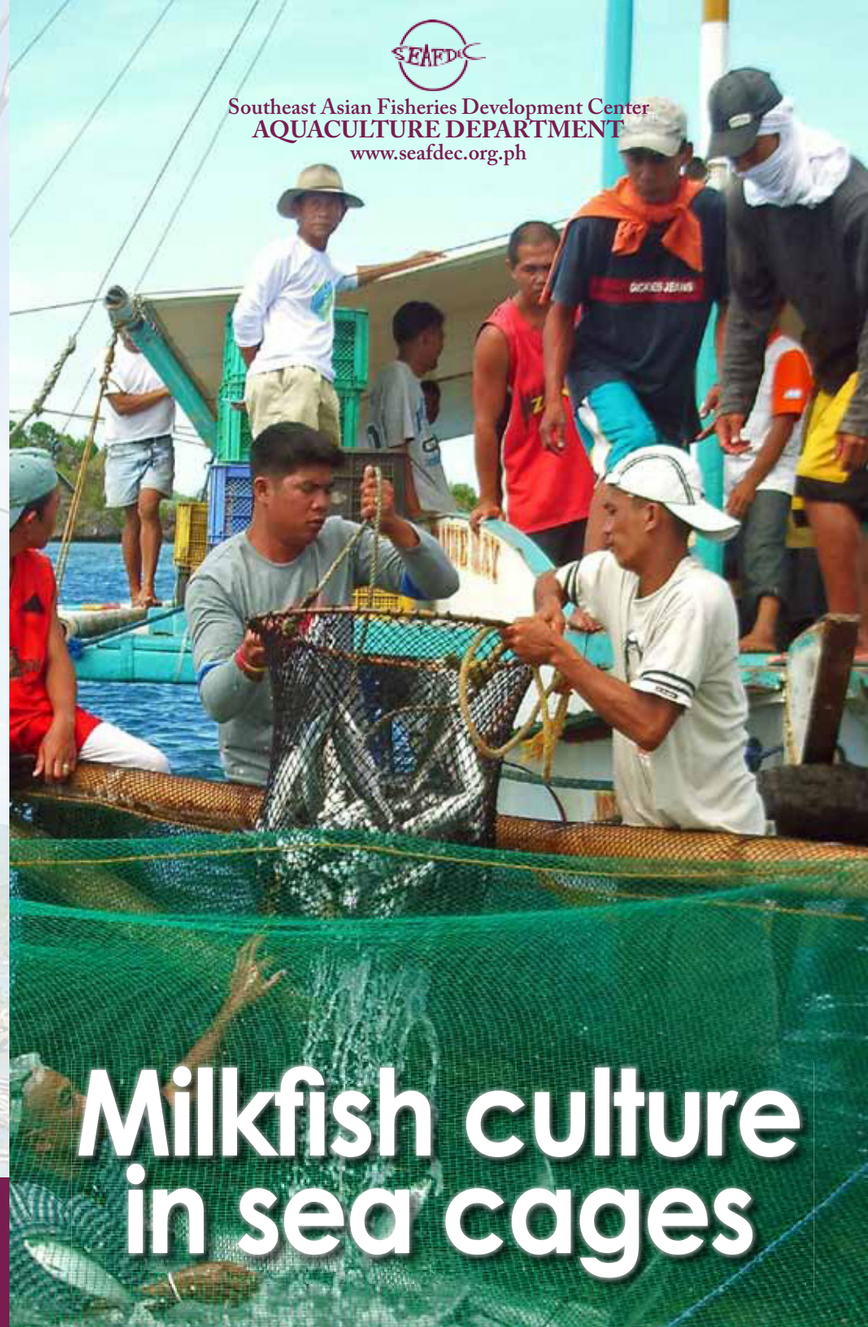
East seaboard

- Panabo MZ, Davao del Norte
- Samal Island MZ, Davao del Norte
- Liloan MZ, Leyte
- Quenapondan MZ, Eastern Samar
- Tacloban MZ, Leyte
- Basey MZ, Leyte
- **Babatngon MZ, Leyte**
- Sta Rita MZ, Samar
- Calbayog MZ, Samar
- San Jose MZ, Northern Samar
- Laoang MZ, Northern Samar
- Sagnay MZ, Camarines Sur
- Casiguran MZ, Aurora

Mariculture development map of the Philippines courtesy of BFAR

For inquiries, contact :
SEAFDEC Aquaculture Department, Tigbauan, Iloilo 5021, Philippines
Tel. : (63-33) 511 9170 Fax : (63-33) 511 9070
Email : aqdchief@seafdec.org.ph

Southeast Asian Fisheries Development Center
AQUACULTURE DEPARTMENT
www.seafdec.org.ph



Milkfish culture in sea cages

Milkfish (*Chanos chanos*) is an important food fish in the Philippines, Taiwan and Indonesia. It is a popular fish for culture because it tolerates a wide variety of salinity, temperature and water quality, adapts well to high density, and reaches marketable size in 4-7 months.

According to the Food and Agriculture Organization (FAO), the most important milkfish producers for 2006 are the Philippines with 315,074 metric tons (mt), Indonesia with 212,932 mt, and Taiwan with 56,135 mt. This comes up to a combined value of about US$645 million.

Milkfish can be raised either in extensive, semi-intensive and intensive systems. Culture areas include ponds, pens or cages. Milkfish 'seeds' for culture can be sourced either from the hatchery or from wild stocks.

Culture of milkfish in marine cages is intensive, characterized by a small area, high levels of inputs like seeds and feeds, which result to high yields. Milkfish farmers in the Philippines are finding it advantageous to culture fish in mariculture parks.

Site selection

The following should be considered in selecting a site for the cage culture of milkfish:

- Free from pollution
- Protected from adverse weather condition
- Accessible but secured from poachers
- Should be at least 12-15 meters deep
- Far from seagrass and coral beds

SEAFDEC has a mariculture park in Igang, Nueva Valencia, Guimaras. Four fisherfolk associations from the barangays of Igang, Magamay, San Antonio and Sto. Domingo are some of the locators in the park. Poverty alleviation and environment protection are important goals that may be pursued together in mariculture parks

Cage design and construction

- Net squares or rectangles measuring 10 x 10 m with a depth of 6 m
- Frames made of bamboo, lumber, GI or HDPE pipes
- Floats made of styrofoam, empty plastic containers
- Mooring made of cement blocks, GI pegs or anchors
- Sea cage may be arranged in quadrant or in clusters

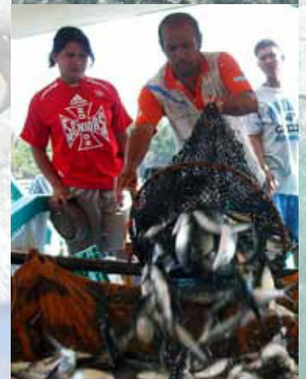
Principal components of the sea cage

Culture conditions

Area of cage, m^3	600
Stocking density, m^3	35
Size of fingerling, inch	5-6
Amount of feed, kg	24,937.5
Feed conversion ratio (FCR)	2.5
Duration of culture, days	120
Survival rate, %	95

Harvest

Average body weight (ABW), kg	0.5
Total harvest, kg	9,975
Selling price, PhP	95



Investment requirements

Capital outlay	
Bamboo cage frame with drum floats & mooring system (2 units)	PhP55,000
Net cages (10 x 10 x 6 m)	59,750
Motorized boat	25,000
Working capital (1 crop)	
Fingerlings	115,500
Feeds	623,438
Maintenance (5% of capital outlay)	7,561
Family labor (PhP3,000/month)	18,000
Marketing expenses	66,334
Total investment	PhP 830,833

Economic analysis

Sales	PhP947,625
Less these expenses:	
Fingerlings, feeds, maintenance, marketing expenses, family labor	830,833
Depreciation (5 years)	13,975
Total cost	844,808
Net income: 1 run	102,817
1 year (2 runs)	205,634
Return-on-investment for 1 year, %	21
Payback period, years	4.16