Research Update

Pond Culture of Mud Crab (*Scylla serrata*): An Economic Analysis

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Mud crab (*Scylla serrata*), locally known as "alimango", is a highly esteemed table delicacy in the Philippines. It is the most important crab for commercial culture in the Philippines and commands a high price in both the domestic and export markets. In the recent seminar-workshop on Aquaculture Development in Southeast Asia (ADSEA II), *Scylla serrata* was ranked first requiring research among crustaceans.

In 1987, marine and inland fishery production of mud crab in the Philippines was 613 mt and 224 mt, respectively. Mud crabs are caught in mangrove swamps and estuarine waters by gill nets, baited traps, fish traps, and hooks. They are also incidentally harvested together with milkfish or shrimp in ponds. Recently, the culture of mud crab in ponds has become popular in the country. This study was conducted to determine the economic feasibility of the pond culture of mud crab at various stocking densities.

Technical data used in the economic analysis of the monoculture of mud crab (*Scylla serrata*) were derived from the experiment of Baliao, et al. in 1981 conducted at the Southeast Asian Fisheries Development Center's Leganes Research Station. An economic analysis was performed on the monoculture of mud crab at stocking densities of 5000, 10 000, 15 000, and 20 000 juveniles/ha with two crops/year. Crab juveniles weighing approximately 25 g were cultured for 90 days. Calculations are presented on a per hectare basis using August 1991 prices. Philippine currency was used in the computations (PHP 25 = US$ 1).

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Investment, costs and returns

Mean weight, percentage survival, relative growth increment, gross production, and feed conversion ratio (FCR) of mud crabs grown at different stocking densities in ponds are shown in Table 1. Investment requirement for a 1-ha crab monoculture ranged from ₱88 201 for 5000/ha

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Table 1. Stock and harvest data for mud crab (*S. serrata*) monoculture at four stocking densities in ponds

Stocking density (100 sq.m.)	Harvest/100 m²		Percentage survival	Relative growth increment (g/day/crab)	Feed conversion ratio	Gross production (kg/ha/crop)
	Number recovered	Average wt. (g)				
50	44	231.60	88	2.28	1.72	1019.04
100	52	196.63	52	0.89	2.16	1022.48
150	57	171.11	38	1.61	3.85	975.33
200	62	178.11	31	1.69	4.04	1104.28

Source: Baliao, D. D., Rodriguez, E. M. and Gerochi, D. D., 1981. Culture of the Mudcrab *Scylla serrata* (Forsskal) at different stocking densities in brackishwater ponds. Q. Res. Rep. SEAFDEC Aquacult. Dept., 5(1):10-14.

to ₱111 484/ha for 20 000/ha. Investment consisted of capital assets and working capital for one crop. Capital assets include pond development, perimenter fencing, construction of mounds, caretaker's hut, and tools and equipment.

Comparative costs and returns of the different stocking densities are shown in Table 2. An annual net income after tax of ₱58 583/ha was highest at stocking density of 5000/ha and decreased as stocking density increased. Net income obtained in this study is higher than the income (1888/ha) reported by Lapie and Librero (1979) because of higher production. Production was 339 kg/ha in their 1979 study compared to 1019 kg/ha in this study.

Fattening of crabs for 15 days is practised in Iloilo. Net income from 3 crab fattening farms in Balasan, Iloilo averaged ₱39 074/ha/year (Table 3).

Feed and labor were the major costs for crab monoculture at 5000/ha stocking density. At stocking densities of 10 000 to 20 000/ha, the costs of feeds and juveniles comprised a larger portion of production costs. Average production cost ranged from ₱35.78/kg at 5000/ha to ₱55.05/kg at ₱20 000/ha.

Return on investment (ROI) and return on equity (ROE) decreased as stocking density increased. ROI at 5000/ha stocking density was 66% at 2 crops/year. Agbayani, et al. (1990) obtained an ROI of 124% for the same stocking density at 3 crops/year. Seville (1987) obtained ROI of 44% for a crab farm stocked with 30 000/ha.

Feasibility analysis

Partial budget analysis of crab at 5000/ha and 10 000/ha stocking densities show that cost of crab juveniles, trash fish, and marketing expenses increased by ₱5262. This resulted in a decrease of ₱4988 in net benefit, indicating that no incremental benefit accrued from increasing the stocking density to 10 000/ha.

Five-year cash flows of crab monoculture at the four stocking densities were discounted at 10% discount rate to determine the net present value (NPV), benefit-cost ratio

Table 2. Costs and returns for a 1-ha crab monoculture at various stocking densities

Item	Unit Cost ₱	5000 Quantity	5000 Total value ₱	10 000 Quantity	10 000 Total value ₱	15 000 Quantity	15 000 Total value ₱	20 000 Quantity	20 000 Total value ₱
Revenue (kg)	80.00	1019	81 523	1022	81 798	975	78 026	1104	88 343
Variable costs									
Chicken manure (kg)	0.66	1000	660	1000	660	1000	660	1000	660
Crab juveniles (pc)	0.55	5000	2750	10 000	5500	15 000	8250	20 000	11 000
Trash fish (kg)	5.50	1753	9640	2209	12 147	3755	20 653	4461	24 537
Labor (manhours)	5.50	1000	5500	1000	5500	1000	5500	1000	5500
Marketing expenses (2%)			1630		1636		1561		1767
Sub-total			20 181		25 443		36 623		43 464
Fixed Costs									
Repairs & maintenance			1600		1600		1600		1600
Interest			3969		4206		4709		5017
Depreciation			8309		8309		8309		8309
Caretaker's salary₱400/month/ha			2400		2400		2400		2400
Sub-total			16 279		16 516		17 019		17 326
Total Costs			36 459		41 958		53 642		60 790
Net income before tax (per run)			45 064		39 840		24 384		27 552
Net income before tax (2 crops/year)			90 128		79 679		48 769		55 104
Tax (35%)			31 545		27 888		17 069		19 286
Net income after tax (2 crops/year)			58 583		51 791		31 700		35 818
Return on investment(%)			66		55		30		32
Return to equity(%)			133		111		61		64
Payback period (years)			1.17		1.37		2.17		2.13

(BCR), and internal rate of return (IRR). The NPV gives the net worth of the project for its entire project life and was highest at ₱14 9331 for 5000/ha stocking density. The BCR indicates the cost efficiency of the project. Stocking at 5000/ha was more cost-efficient as indicated by the higher BCR (1.28) compared with stocking mud crab at 10 000/ha. The IRR represents the return over the life of the project to the resources engaged in the project. Highest IRR (365%) was obtained from 5000/ha stocking density. The discounting method showed that stocking at 15 000/ha and 20 000/ha are not economically viable.

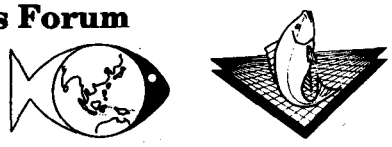
Mud crab monoculture in brackishwater ponds is economically feasible at stocking densities of 5000/ha and 10 000/ha.

Table 3. Costs and returns of crab fattening in ponds in Balasan, Iloilo

Item	Pond 1	Pond 2	Pond 3	Average
Farm area (sq.m.)	1000	7500	2500	3667
Fattenning period (days)	15	30	15	20
Returns:				
Ave. weight (g/crab)	188	500	833	507
No. of crabs harvested	40	100	48	63
Production (kg)	8	50	40	33
Selling price (₱/kg)	95	100	110	102
Total returns	714	5000	4398	3371
Costs:				
1. Stocking				
Stocking density (pcs)	40	130	50	73
Cost of crabs (₱/pc)	6	8	6	7
Total cost of seed (₱/crop)	240	1040	300	527
2. Feeding				
Feeding (kg/day0	5	6	12	8
Cost of feed (₱/kg)	2	24	3	
Cost of feed/day	10	12	42	21
Total cost of feed (₱/crop)	150	360	630	380
3. Labor:				
Mandays	8	15	8	10
Opportunity cost of labor	40	40	40	40
Total labor cost	300	600	300	400
Total cost (₱/crop)	690	2000	1240	1307
Net income per crop (₱)	24	3000	3168	2064
Number of crops/year	24	12	5	14
Net income/year (P)	586	36 000	15 841	17 476
Per hectare:				
Stocking density (pcs/ha)	400	173	200	258
Net Income (₱/ha/year)	5856	48 000	63 365	39 074

Report

Researchers attend Third Asian Fisheries Forum



Twenty-three researchers from SEAFDEC/AQD attended the Third Asian Fisheries Forum held on 26-30 October 1992 at the World Trade Center, Singapore. All of them presented papers (oral and poster).

The Conference held simultaneous (at least 5) symposia on specific topics. It was the most important component and formed the backbone of the conference; it also achieved the conference's objective of promoting scientific interaction among members for the exchange of experience and research results. It provided a venue for fisheries and aquaculture specialists to share knowledge and discuss common problems. The Conference was accompanied by a trade show/exhibition.

As reported by a participant, the most valuable part of the Conference was the social contact and discussion that took place outside of the meeting. It was an opportunity to meet again former SEAFDEC/AQD colleagues who have gone on to succeed in other institutions. There was a brisk exchange of papers presented despite the high noise levels during the presentation due to the crude partitions of the session halls. All in all, the Conference was well-attended by almost one thousand participants.

New Book

Reservoir Fisheries of Asia: Proceedings of the 2nd Asian reservoir fisheries workshop held in Hangzhou, People's Republic of China, 15-19 October 1990
by Sena S. De Silva.

Reservoir fisheries in Asia are a source of relatively cheap animal protein for poorer sectors in the community, as well as employment opportunities. Accordingly, Asian governments have begun to pay more attention to the development of fisheries in reservoirs. This workshop brought together a total of 32 reservoir fishery scientists from 11 countries. This subsequent publication is intended to contribute to knowledge on reservoir fishery practices in Asia and better management of this resource. The need to adopt a multi-disciplinary approach to this practice; as well as more interaction among fisheries scientists, managers, and planners is also highlighted.

The book is published by IDRC.