

CMFRI

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on Indian Marine Fisheries

Lecture Notes

Part 2

Compiled and Edited by

E. Vivekanandan and J. Jayasankar

Central Marine Fisheries Research Institute (CMFRI),
(Indian Council of Agricultural Research)
P.B. No. 1603, Cochin - 682 018, Kerala

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R. Sathiadhas

Central Marine Fisheries Research Institute, Kochi 682 018

Introduction

Marine fisheries ensure the livelihood security of about three million people inhabited along the coastal belt and an equal number living elsewhere and depending on the post harvest sector, besides supplying nutrition rich food to the entire population. In the export front, the foreign exchange earnings of marine products reached the level of Rs. 8363.53 crores (2006-07). Fisheries sector contributes to about one per cent of the GDP (2005-06). Though the marine fish production has increased from 0.5 million tonnes in 1950 to 2.71 million tonnes in 2006, the per capita production of all types of fishing units has declined over the years. The post harvest sector of marine fisheries employs about 15 lakh people. In marine fish marketing, initially almost the entire 1332 landing centres located all along the 8129 km of Indian coast, served as primary markets. Gradually the commercial importance of traditional landing points shifted to a few selected urban centres mainly because of the better fishery infrastructure facilities available in these areas, mechanisation of fishing and diversion of the fish catch to the export marketing channel.

Resource management for maintaining sustainable production of marine fisheries demands in-depth economic analysis of different production technologies to ensure optimum exploitation, equitable distribution, efficient marketing and evolving alternate management strategies. The Socio-Economic Evaluation and Technology Transfer Division (SEETTD) of Central Marine Fisheries Research Institute (CMFRI) has conducted a number of studies pertaining to Fisheries Economics during the last three decades in different regions of Indian coast such as 1) Economics of different craft – gear combinations 2) Studies on marine fish marketing and price spread 3) socio-economic evaluation and impact assessment 4) Economic evaluation of mariculture practices and Gender issues in fisheries

Economics of different types of marine fishing units

The effective economic evaluation of different marine fishing techniques to assess the resource allocation and profitability in the context of overall socio economic analysis is very complex. Fishing methods vary with type of craft/gear, efficiency of gear, investment, labour requirement, fuel efficiency etc. Economics of industries are worked out on per unit production and that of agriculture is based on per hectare of production which is not applicable in the case of calculation of economics of fishing units. A unique way of calculating economics of fishing units; working out costs and earnings per day of operation of a unit in each season and then calculating the annual operating cost and revenue on the basis of average number of fishing days (seasonwise) in a year was propounded through the studies of the SEETT division of CMFRI and are now widely accepted as methodology for economic evaluation. These studies have benefited the policy makers, academic community, financial institutions and the fishing community.

Costs and earnings studies have been conducted for all types of fishing units such as trawlers, purseseiners, gill-netters, ringseiners in the mechanised sector and other types of motorised and non-motorised fishing units with different types of craft-gear combination to bring out their profitability and techno-economic viability (Devaraj *et al* 1997, 1998; Sathiadhas, 1989, 1996; Sathiadhas and Narayanakumar 2001; Sathiadhas and Panikkar, 1989; Sathiadhas *et al* 1991, 1992, 1993, 1995; Sehara *et al*, 2000). These studies have helped the entrepreneurs and fishermen for decision making in their technological options for their fishing venture and the financial institutions to verify the economic viability of various fishing methods in formulating their credit policies. Some of the important highlights of the study are:

- Economics of different types of fishing units indicate that almost all types of fishing units, on an average, run on profit as their production surpasses the breakeven point. However, due to the nature of stiff competition of open access marine fisheries, many of the less efficient units belonging to each category go out of operation due to losses.
- The non-mechanised sector is surviving and sustaining only as a family enterprise.
- Marginalisation of indigenous sector and over capitalisation poses a serious problem. The gross capital investment on marine capture fishing sector during 2004-05 is estimated at Rs.11,328 crores comprising Rs.9724 crores in mechanised, Rs.1009 crores in motorised and Rs.595 crore in non-mechanised sector
- There is substantial idle capacity of fishing fleets in the mechanised, motorised and non-motorised sectors.
- Employment in active fishing is 12.47lakh fishermen. The pre and post harvest sectors provide employment for another 15 lakh fisherfolk.
- The increase in the operational costs including expenditure on fuel has been compensated by the increase in fish prices.
- The over-dependence on prawn catches for the sustenance of trawlers is slowly getting reduced due to the increase in the price of other varieties of fish in the internal markets.
- The purseseiners which require high quantity of fuel for operation was more fuel efficient as the return for the one rupee spent on fuel was maximum for purseseiners than all other fishing techniques (11.4 kg for purseseiners, 2.1 kg for trawlers and 3.4 kg for gill-netters)
- The nearshore trawl operations by sail boats along the Tamil Nadu coast and mini trawls introduced since 1985 along the Kerala and Karnataka coasts were found to catch large quantities of juvenile prawns, and hence, are not advisable for the long term development of marine fisheries.
- The multi-species and multi-input nature of marine fisheries led to under exploitation of the stocks of many low value species of fishes and over-exploitation of certain high value vulnerable stocks.
- With the intensification of multi-day fishing units, there is increase in the discards.
- The average annual production per active fisherman was 408 kg for those operating non-mechanised craft and 3701 kg for mechanised craft. This wide gap has not only led to marginalisation of traditional fishermen, but also enhanced the conflicts between mechanised and non-mechanised boat operators.
- The pressure of fishing in the inshore zone can be further reduced through deployment of existing larger mechanised vessels with suitable modifications in the offshore regions.
- The gross income generated at landing centre level from the marine fish catch of 2.71 million tonnes in 2006 is worked out as Rs. 13,287 crores.
- Promotion of “co-operative fishing” instead of “competitive fishing” is advisable for optimum exploitation and introducing regulations.

Fish marketing problems and price behaviour

The consumer preference and demand for fish is continuously increasing over the years. The increase in price of fish at primary, whole sale and retail level has been much higher than any other food grains

during the last two decades. The price of fish fluctuates far widely than any other agricultural commodity. The price fluctuations are due to the changes in the supply or the prices of other varieties of fish in the market. The variation of fish prices at all stages of transactions is attributed to the uncertain nature of fish production and perishability. Studies on fish marketing and price behaviour conducted by CMFRI helped acquire knowledge in fish marketing system in India and to improve its efficiency (Devaraj *et al*, 1997, 1998, Sathiadhas, 1996, Sathiadhas and Panikkar, 1988, Sathiadhas *et al* 1995, 2000). Some of the highlights of the findings are:

- Fishermen's share in consumer's rupees at all India level ranged from 51 per cent for silverbellies to 71 per cent for seerfish and mackerel. It has increased over the years (1989-90 and 2005) for varieties like the seerfish (63 to 71 %), pomfrets (62 to 70%), mackerel (54 to 71%), rays (39 to 64%), silverbellies (41 to 51%) etc indicating increase in fish marketing efficiency.
- Marketing costs including transportation range from 6% to 13% of the consumer's rupee. The wholesalers receive 5% to 32% and the retailers from 14% to 47% of the consumer's rupee for different species/groups of marine fish.
- Statewise analysis indicates that fishermen in Gujarat receive 37% (catfish) to 83% (ribbonfish) of the consumer's rupee, while it ranges from 36% (sharks and barracudas) to 81% (seerfish) in Maharashtra, 31% (lizardfish) to 71% (cephalopods) in Kerala, 32% (silverbellies) to 67% (bigjawed jumper) in Tamil Nadu and 17% (shark) to 58% (sardines) in Andhra Pradesh.
- The post-harvest sector has shown substantial growth in infrastructure development, expansion of internal marketing and boost in export earnings.
- The extent of spoilage of fish is reduced due to the widespread use of ice, technological improvement in the processing and the transportation facilities.
- The gross earnings from marine fisheries at first sales in India recorded an increase of 48 percent between 1995 (Rs.7409 crore) and 2005 (Rs.11, 007.6 crore).
- The value of marine fish at the consumer level during 2006 is estimated at Rs. 22,236 crores.
- About 80% of the catch is channelised to the internal marketing system and the rest for exports.
- Hardly 5% of fish in the internal marketing system is marketed by co-operatives and the rest through private marketing agencies and traders.
- Fishermen's share in consumer's rupee is high for the varieties having higher consumer preference.
- Product development and utilisation of discards, thrust for value added products, support price for commercially important varieties, identification and cataloguing of pharmaceutically important marine products, utilisation of idle capacity of processing plants for internal marketing, promotion of co-operative marketing and cautious marketing policy of according parallel importance to both domestic and export marketing are some suggestions for improvement.

Socio-economic evaluation and impact studies

Lack of socio-economic information has been one of the most serious impediments to effective policy making and planning, especially in the case of small-scale fisheries. The marine fishermen households located along the coastal belt have increased from about 3.5 lakh in 1980 to 7.5 lakh in 2005. Studies on the socio-economic status of marine fisherfolk have been conducted at selected fishing villages (Panikkar and Sathiadhas, 1993; Sathiadhas, 1996; Sathiadhas and Panikkar, 1988). The highlights are:

- Fishing villages all along the Indian coast are almost similar in their backwardness and underdevelopment.
- Currently (2005) only 19% of the active fishermen have ownership on fishing equipment. The annual per capita production per active fisherman declined from 3250 kg in 1980 to 1837 kg in 2005.
- The literacy level of coastal fisherfolk is 56.5% as against the all India average of 65%. The lowest literacy rate of 32.47% is recorded in Andhra Pradesh and the highest of 73% in Kerala.
- Socioeconomic impact of motorisation in Kerala indicated that its expansion with phasing out of the artisanal sector would be economically viable.
- Studies in Kerala indicated that the introduction of brackishwater and coastal mariculture through cooperatives is more advisable due to the common property nature of resource and the existence of traditional fishing rights.
- Impact of coastal aquaculture in Tamil Nadu was studied. The widespread socioeconomic conflict is mainly due to the excessive stocking density and also the non-involvement of the local fisherfolks.
- Responsible fishing through awareness is advisable for introducing regulatory mechanism.

Economic analysis of mariculture practices

India is endowed with 1.2 million hectares of potential area suitable for aquaculture. India produced about 1,12,780 tonnes of shrimps by culture from an area of 1.55 lakh hectares in 2003-04. There is urgent need to bring the entire area suitable for mariculture into effective use not only for culture of shrimps but also for crabs, lobsters, bivalves and fin fish depending on site suitability and economic feasibility. The economic feasibility of different types of aquaculture practices for different locations and the viability of establishing feed and other aquaculture based industries have been studied (Devaraj, *et al* 1996; Diwan, *et al* 2000; Goswami *et al* 2000; Panikkar, *et al* 1995; Paulraj, *et al* 1997; Sathiadhas, *et al* 1987, 1996, 2000; Sathiadhas and Juliet Joseph 2001). The important findings are:

Profitability of mudcrab culture, lobster fattening, mussel culture, edible oyster culture and pearl culture have been worked out and released as technology transfer series for the benefit of end users.

- Investment avenues in feed industry and hatchery production of seeds have also been indicated to guide prospective entrepreneurs.
- Input-output relationship and factor efficiency in prawn farming in different regions have shown enormous scope for further development.
- Impact of coastal aquaculture in Tamil Nadu was studied. The widespread socio-economic conflict is mainly attributed to the excessive stocking density and also due to the non involvement of the local fisherfolks.
- Studies in Kerala indicated that the introduction of brackishwater and coastal mariculture through co-operatives is more advisable due to the common property nature of resource and the existence of traditional fishing rights.

Status of women in fisheries

Fisherwomen contribute significantly to the coastal economy as well as their own disposable household income. Yet their socio economic status in the society is lagging far behind men. Some of the important highlights of gender-based studies were:

- Women in smallscale fisheries in Tamil Nadu are engaged in fish curing, marketing, net making and prawn seed and seaweed collection. In Andhra Pradesh, they are engaged in collecting fish and molluscan shells. In Orissa, they are increasingly involved in drying, curing, marketing, shrimp processing and net making. While fisherwomen in Kerala are engaged in net making, fish curing and drying, shrimp processing, fish and clam shell collection, in Minicoy island of Lakshadweep, fish products like *Masmin* and *Riha Akru* of tuna are produced by women.
- Women in aquaculture are engaged in collection of seed, stocking, feed preparation, handling, transportation and marketing the end product.
- Women engaged in prawn peeling are in the lower socioeconomic strata and face a number of ergonomical problems. Their nutritional intake is lower than the recommended dietary allowances. Squatting on the floor posture developed backache amongst the peelers. Productivity study has shown a decline with the advancement of working hours.
- The high degree of wage disparity between men and women for doing the same job indicates the general level of exploitation and gender inequalities.
- The women workers in marine fishery sector are to be encouraged with adequate financial and technical support to motivate them to earn more income and ensure household security.
- Fisherwomen can be given training in processing activities like salting, drying, curing etc to improve their share in marketing of fishes.
- The CMFRI has developed bivalve farming technologies which are commercially viable for adoption. This offers high employment potential to women.
- Self Help Groups (SHGs) undertaking livelihood options can offer a better opportunity for empowerment of women. Institutional village linkage programme undertaken by CMFRI in Elamkunnappuzha Village of Ernakulam district undertook activities of women empowerment through strengthening the activities of SHGs.

Current programmes and thrust areas of research

Some of the future programmes identified for detailed studies are : 1) Macro-level studies on the costs and earnings of different production techniques, and the input-output relationship to evolve the factor productivity in different production methods, 2) The impact of the introduction of the new technologies and practices in the capture and the culture fisheries, 3) Environmental economic aspects of the developmental programmes in the coastal fisheries and the aquaculture, 4) Economic assessment of monsoon ban, post harvest losses and juvenile fisheries, 5) Economic assessment of discards in Indian marine fisheries, 6) Shaping the policy to make the fishing compatible with both the sustainable limits of the resource and the human welfare, 7) Cost- benefit analysis of fishing harbours and other coastal infrastructure 8) Role of intermediaries in fish marketing, marketing margin and fishermen share in consumers rupee 9) Impact of export promotion in domestic market, 10) Using markets and consumer pressure to encourage responsible fishing practices, 11) Studies on product diversification, value added products and by products, 12) Surveys on consumption pattern and consumer preference, 13) Employment and HRD issues in marine fisheries , 14) Problems of financing the fishery projects, 15) Research prioritisation and socio-economic analysis and 16) Geographical Information System of the coastal agro-climatic zone.

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