



# FISH AND FISHERIES

NEWS LETTER OF THE FISHERIES TECHNOCRATS FORUM - MADRAS

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*Best Wishes  
for a  
Happy and Prosperous 1995*

YEAR FOR SUSTAINABLE FISHERIES

## IS AQUACULTURE SUSTAINABLE IN INDIA ?

Yes. Our answer is quite positive. Sustainable Aquaculture Development (SAD) would be possible, provided the planning process is scientifically carried out, with due respects and regards to the ecological and social needs. We feel that for SAD there is no short-term strategy. The planning has to be done on long term policies and appropriate targets.

We asked Dr. T.V.R. Pillay, Ex Chief of FAO's Aquaculture Development and Coordination Programme, about his views on this issue. He was quite emphatic that SAD is possible in India, provided the necessary conditions and parameters are properly considered and implemented. When asked for comments on the current conflicts in coastal aquaculture development in some regions of India, he said that possibly the main reasons for the negative impacts relate to improper site selection and poor designs. He felt that at least some of the fears are based on assumptions. During further discussions, Dr. Pillay stated that in Thailand many

of the situations which caused social unrest have been mitigated by introducing "Contract Farming". He opined that such programmes may give positive results in India also. Dr. Pillay reiterated that the objective of aquaculture development should be to cater for both domestic markets and exports.

The Fisheries Technocrats Forum, Madras, has been discussing in detail the issues and criticisms relating to shrimp farming industry. Most of the members are advocates of SAD and this issue of our News Letter therefore is devoted to presentation of some of the views expressed by our members.

We take this opportunity to stress that profitable aquaculture is not confined to shrimp farming alone. There are several systems which could be developed in our country on industrial scale, using fin-fish, molluscs, sea weeds etc. both for exports and domestic markets. For example, Integrated Fish Farming Systems in fresh and brackish waters can be established on a high-profit



basis, using environment-friendly technology. Having accepted the fact that land is generally a valuable and sometimes scarce resource, the multipurpose use of the same for crop, animal and fish production will have to be achieved with proper planning and management. Land evaluation leads to possible farm systems criteria for production of crops, vegetables, livestock, poultry and fish. The feasibility of combinations of farming and animal husbandry practices involving fish and animal production; crops and fish; and crops, fish and animal production in order to achieve maximum sustainable benefits leads to successful

integrated fish farming. Under such conditions, available natural resources need to be efficiently utilized and recycled in order to increase and maintain the overall production rate. In determining management principles of Integrated Fish Farming systems, the technical efficiency of different farming combination and economic benefits need to be properly understood.

We sincerely hope that all concerned will be prepared to work hand-in-hand towards implementation of only sustainable aquaculture in order to avoid further devastating situations.

## CONFLICTS IN COASTAL AQUACULTURE DEVELOPMENT

Shrimp farming is being considered as a highly lucrative industry and India has joined the band wagon during the past decade. But a million-dollar question remains to be answered by all who have been responsible and advocate strongly for indiscriminate development of the industry, particularly in certain favoured coastline stretches. Are we inclined to learn from the costly mistakes made in several countries while developing shrimp farming as an industry? There is no denying of the fact that the growth (and perhaps the subsequent fall) of the industry has been the most sensational story in the history of fisheries development throughout the world! Many investors have compared the growth of the industry to "gold rush"! The high profitability rate, export earnings and associated tax concessions have been the "El Dorado" to several entrepreneurs and corporations in their strategic business diversification programmes.

Scientists as well Research and Development Agencies have been crying at the top of their voices that aquaculture is like the proverbial 'Golden Goose' and emphasizing that if one cares to grow and maintain the same as a sustainable enterprise, regular availability of 'Golden Eggs' would be assured. But history repeated itself in India! Those with characteristic business acumen and those who could be "watch dogs" closed their eyes and ears to the need for sustainable development of the industry! Development and growth of the shrimp farming industry have presently provided successful results, as judged by the profits made, without any short-term and long-term strategies. Thus the negative impacts of the shrimp farming explosion have been brought into focus by several environmentalists, sociologists, agriculturists and coastal fisherfolk groups. The media have joined the crusade and it appears to us that all these people have joined hands to kill a promising industry

during its growth phase! An unbiased review of the situation makes us believe that while the investors and their associates have pocketed high gains during the growth of the industry, the ecological and social costs of the development have been left for others to face! Due to lack of proper control and monitoring systems, the growing shrimp farming sector has begun to exceed the carrying capacity of the major regions where intensive / semi-intensive culture practices have been adopted. It is therefore only natural that allegations and counter-allegations become the talk of the town!

### *Where do we stand*

It is not our intention to support the extreme pro-shrimp farming group or those who advocate a complete ban on coastal aquaculture. We believe that with proper planning of aquaculture projects, with due concern for both the environment and society, the industry can grow further and continue indefinitely to produce food for the people and also earn valuable foreign exchange. In this context we wish to quote the President of India, Dr. Shankar Dayal Sharma, who recently said "Economic development and environmental protection are intrinsic to each other in the long run. Growth strategy must be technologically sound, culturally compatible and environmentally positive". These great words summarise the appropriate planning strategy - short term as well as long term - for future growth of the shrimp farming industry.

### *Negative impacts*

A casual review of media reports, seminar presentations, R&D findings and personal communications will reveal that the adverse or negative impacts of shrimp farming, especially in West Bengal, Orissa, Andhra Pradesh and Tamil Nadu, have reached a dangerously critical situation.



In essence, the threats posed are under the following categories :

1. Villages have become flood prone due to establishment of aquaculture facilities in the coastal region. While this may be true of certain locations, the adverse impact cannot be generalised.
2. Land subsidence has occurred due to drawal of underground water for dilution in coastal shrimp ponds. This condition is possible in some areas, but again cannot be considered as a general issue.
3. Cultivable lands are being converted to salt water prawn farms, mainly as a result of the high prices and incentives offered to the land owners. The main reason in such conflicts is non-involvement of the community at the planning phase itself. In this connection it would be of interest to observe that surveys made in some of the coastal regions have indicated the saline nature of the soils now being claimed as cultivable areas!
4. Underground water in many villages become saline and/or get polluted by prawn farm effluents. Such instances are factual, but need not be a general phenomenon.
5. Shrimp pond effluents discharged into surrounding water systems are reported to cause multifarious problems like salinity disturbances, destruction of spawning and nursery areas, physico-chemical contaminations, biological degradation, increase in BOD causing oxygen depletion in receiving waters, eutrophication, benthic overloading, hypernutrification etc. Some villagers in Tamil Nadu are reported to have complained bitterly about the occurrence of skin diseases among people living near shrimp farm discharge zones.
6. Conversion of land to shrimp farms is believed to be unreversible and also may lead to intrusion of salt water into drinking water sources.
7. Unregulated collection of wild shrimp seed from natural waters is reported to have reduced abundance of species in shrimp fisheries, habitat destruction for spawning and nursing grounds and wasteful destruction of other species of shrimps, other invertebrates and fin-fish.
8. Use of antibiotics in the shrimp ponds could lead to antibiotic resistant bacterial strains.
9. Although mangroves are protected areas under the Wildlife Act, several instances of

aquaculture facilities established in such wet lands have been reported in recent years. The Pulicat Lake (in Tamil Nadu and Andhra Pradesh) appears to be a typical example of such negative impact on environment. Destruction of sanctuaries and fishing grounds have been reported in different States.

10. Cultured shrimps are known to be targets for diseases. Imported shrimp seed and feed could have been responsible for the deadly shrimp diseases reported in Nellore Dist. (Andhra Pradesh).
11. The negative social impacts reported include loss of paddy fields and other cultivable areas, vocational problems caused by depletion of natural fishery resources, difficulties encountered in fishing operations due to aquaculture structures erected in coastal waters, community displacement caused by drinking water depletion, harmful effects suspected to be caused by shrimp farm effluents, lack/loss of employment opportunities etc.

#### ***How true are these reported negative impacts?***

As could be expected, most of the aquaculturists strongly oppose the reported seriousness of the negative impacts, while environmentalists and sections of communities are equally vehement in their protest against aquaculture development. A balanced review of the situation will reveal that it is high time for the aquaculturists as well as the concerned authorities to realise that while the potential for aquaculture development in the coastal zone is indeed high, what is needed is a co-ordinated approach to ensure that only sustainable aquaculture projects should be allowed and developed in future. One of the major reasons for social opposition appears to be the lack of community interaction while planning major aquaculture projects. The general belief appears to be that the intensive fish farming potential has been overplayed to a dangerously critical stage. In this connection it would be interesting to note that all the above negative impacts of shrimp farming development had surfaced in many countries during the later half of 1980's. The concern expressed on this by different affected countries led to a meeting of the Food and Agriculture Organization of the United Nations in 1991, which discussed the situation *in extenso* and arrived at a set of guidelines towards development of strategies, related mainly to:

1. Balanced plans for coastal aquaculture development and management



2. **Establishment of Environmental Impact Assessment (EIA) programmes**
3. **Regulating and monitoring of aquaculture management methods**
4. **Treatment of aquaculture effluents**
5. **Appreciate the importance of assessing the carrying capacity of the surrounding ecosystem**
6. **Establishment of appropriate regulations and enforcement mechanism for pond construction and management, mangrove protection and use of wet lands.**

It is well known that intensification in land-based systems has resulted in numerous socio-economic conflicts in strategic situations. There is no second opinion to the fact that for aquaculture to be established as a sustainable industry in the country, public involvement is a must. To quote from an authority on this subject : "Aquaculture must be good for the investor as well as the community at large. Communities which accept aquaculture will allow it to succeed". We believe that there is a good future for sustainable shrimp farming in the country, provided due consideration is given, without further delay, to proper planning with due concern for the environment as well as the community, enforcement of appropriate guidelines for pond management and allowing equitable use of coastal zones to the benefit of all concerned. It is therefore suggested that urgent action may be taken on the undermentioned lines towards enactment and implementation of rules and regulations for further growth and standardisation of the shrimp farming industry, taking into consideration the technical requirements, social harmony and ecology protection, for production of food and earning foreign exchange.

#### ***Our suggestions***

1. Implement a crash programme in all relevant States to determine the land and water areas available for coastal aquaculture development. Within each State, the coastal zone readily available for shrimp farming should be demarcated after interacting with local communities. The public at large should be made aware that profitable aquaculture would be feasible in land not suitable for agriculture as well as other development purposes.
2. Available data indicate that sizeable extent of brackishwater zones are available in the country for development of sustainable aquaculture enterprises. Hence there appears to be no justification for shrimp farming to be concentrated in selected regions like Nellore, Thanjavur districts. Other paddy and farm produce growing land could be easily excluded from potential shrimp farming operations, without in any way affecting the future development of the industry. Norms for coastal zone management on a sustainable basis have to be defined.
3. As regards constructing aquaculture structures in mangrove areas, it is true that indiscriminate destruction of the mangroves can certainly cause serious adverse effects on the ecosystems and water movements. However, if proper care is taken to locate and design the facilities with due consideration of biological and ecological parameters, it would be possible to arrive at compromises and develop viable projects in specified areas.
4. The rules to be made for licensing shrimp farm construction should provide for expert appraisal of the location and design. The precise regions where shrimp farms would be allowed during the next 5-10 years should be clearly demarcated. An additional requirement would be rules for specifying the minimum distances to be maintained between individual farms and strategic freshwater resources as well as those areas affected by tidal erosions.
5. Future development of coastal aquaculture should be in a phased manner. Short term and long term action plans may be developed.
6. Production targets have to be controlled scrupulously. The terms intensive, semi-intensive, extensive, traditional etc. are rather vague and can be twisted to meet one's own needs. Appropriate area specific and technology specific production targets have to be worked out in all approved zones, in relation to the carrying capacity of the surrounding waters. A maximum production target of 2 tons/ha/crop, with a maximum of 2 crops per year, appears to be the safe limit for sustainability. Further, the specified targets should be inter-linked with the stocking rate, anticipated survival rate, feeding rate and composition of feed used. If there is justification for stipulating a higher production target for shrimp mariculture, the same should be allowed only if the carrying capacity of surrounding waters warrant such a decision.
7. Environmental Impact Assessment process (EIA) should be strictly enforced. The standards to be evolved in this connection should be precise and meaningful. Non-profit organizations and R and D institutions may be encouraged to specify EIA requirements.

8. The salt water seepage problem appears to be genuine and such areas should be avoided for establishing new shrimp farms.
9. The concepts of satellite farming and co-operative farming should be encouraged provided the location and designs meet legal, social and biological requirements.
10. A strong controlling and monitoring system should be statutorily established urgently. Adequate measures to ensure adoption of sustainable management methods should be taken.
11. Import of shrimp seed should be totally banned.
12. Import of shrimp feed should be progressively reduced. The composition of imported feed would have to be strictly monitored and urgent action to prevent inclusion of growth promoting substances in the feed is needed.
13. Appropriate effluent treatment systems should be included in the designs for shrimp culture facilities. Methods to reduce and treat wastes are available and obligatory provisions need to be incorporated in the licensing system. Biological methods to mitigate at least some of the harmful effects of shrimp pond wastes are known and they would be acceptable to majority of the aquaculturists for implementation.
14. Export earnings should not be the only criterion for development of shrimp farming. Similarly, provisions should be made for concessions and exemptions for production of fish/shrimps for domestic consumption. Such a strategy would make aquaculture acceptable to many communities.
15. Diversification of shrimp species used for farming could be insisted upon, at least on a percentage basis, in coastal zones. Emphasis should therefore be placed on the culture of species like *Penaeus indicus*, *P. semisulcatus* *P. merguensis*, rather than only *P. monodon*. Such an action will result in establishment of shrimp farms in saline areas alone.

In conclusion, we strongly urge that a concerted and substantial rethinking of the shrimp production strategy be effected urgently. Mechanisms for resolving most of the conflicts are feasible, but may not be fully acceptable to vested interests. Aquaculturists, particularly those involved in shrimp farming as an industry with an eye only on quick and large profits, should consciously accept their social obligations and change their philosophy and outlook in order to promote sustainable and socially acceptable systems with strict control and monitoring mechanisms.

*Prepared by V. Gopalakrishnan  
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and a few other Forum members*

## AQUA TALK

- ☼ I am a great believer in the importance of aquaculture. However, it is only important when it benefits people in a way that does not cause pain for others.  
- Gary Newkirk
- ☼ We should stop criticising people who suggest that the industry might have real or potential problems. Suppressing this kind of discussion does aquaculture a disservice.  
- William E. Manei
- ☼ Intensive aquaculture may ultimately have to be controlled by legislation or will limit itself by auto-pollution.  
- Michael B. New
- ☼ A powerful new class of professional aquaculture development specialists and national elites sustain the vested interests behind international capital flows at the expense of natural eco-systems, long-standing occupations and wider segments of the population.  
- Mike Sklodany
- ☼ The benefits of shrimp farming are confined to a limited number of entrepreneurs, government officials and foreign experts.  
- Louis Landesman



- ✿ The expansion of the (aquaculture) industry has introduced new concerns because much of this has been achieved by multiplying successful units without giving serious thought to the carrying capacity of the receiving waters. This has affected entire regions and tarnishes the image of modern aquaculture in many parts of the world.

- Harlod Rosenthal

- ✿ Development will continue to suffer social dislocation and failure as long as we keep separately social knowledge and biological knowledge.

- Priscilla Weeks and L.James Lester

- ✿ Quality conscientious Asians have known for centuries what biochemists discovered only recently that the taste of shrimp improves significantly with increasing salinity of the water

- Imre Csavas

### FISH TALK

- ☞ If you see "Brush-wood shrimp" on a Chinese menu, you'd better think twice about ordering. It means grasshopper".
- ☞ "When told that the phosphorus in fish improves the brain, Mark Twain once suggested that some folks he knew should eat a couple of whales".
- ☞ "If your fish smells fishy, it probably is .....  
Two thirds of all fresh fish tested, bought at various markets, was technically rotten. It had toxic level of bacteria and parasites, eventhough it looked, smelled and tasted (yuck) normal".  
*From a Foreign TV Programme*

### IS INDUSTRIAL SHRIMP CULTURE A SUSTAINABLE DEVELOPMENT ?

Large business concerns are being attracted to intensive monoculture of shrimp in a big way. Is this sustainable ? Sustainability is "being based on improved human welfare for the disadvantaged, not just increases in production and consumption. It is maintaining average output indefinitely without depleting renewable resources and conserving socio-cultural aspects of rural society" (Bruntland Commission Report).

The available land and water resources have to be utilized for sustained food production for feeding the undernourished, by culturing finfish, edible seaweeds, etc., at affordable cost. Industrial shrimp aquaculture can only provide large quantity of expensive animal protein. (M A Schaefer; Hora and Pillay). Using our land and water to raise shrimp for the affluent foreigners is like "hiring the womb to raise a foreigner's child". Industrial shrimp culture is capital intensive and not labour intensive. The talk that it will provide 2 million jobs directly and 4 million jobs indirectly cannot be true since the artisanal fisheries sector producing over 50% of

the world's fish catch employs only 8 million people! On the other hand industrial shrimp culture may create "Shrimp culture refugees", out of displaced agricultural labourers and small farmers. The product goes to feed the gourmets of rich nations and the profits go to the affluent firms.

The world's production of farmed shrimp dropped from 721,000 mt in 1992 to 609,000 mt in 1993. The production of many countries also dropped as in China from 153,000 mt in 1987 to 50,000 mt in 1993; in Indonesia from 140,000 mt in 1991 to 80,000 mt in 1993 and in Taiwan from 89,600 mt in 1987 to 25,000 mt in 1993 (despite the availability of 3 billion seeds). In India some of the existing units are put up for sale. Lack of quality fish meal and seed supply as seen in Ecuador presently will certainly restrict the future expansion of shrimp industry. High protein shrimp feeds and even seed are currently imported in India. All these facts indicate the unsustainable nature of industrial shrimp culture as practised at present. We should not loose sight that it is possible to raise



30,000 mt of finfish with an investment required to produce only 200 mt shrimp.

#### **Environment impacts**

The traditional ecofriendly farming systems in 30,000 ha of brackishwater impoundments in West Bengal and Kerala ("Pokkali", "Bheris" and "Balabadha") presently yield 15,000 mt of prawns. With suitable refinements like selective stocking, predator control etc., the yield could be doubled.

Indiscriminate setting up of shrimp farms can cause salt water seepage to the adjoining croplands or affect drinking water sources as reported in Nellore and Thanjavur areas. In China, Taiwan, Thailand etc., similar impairment of water and soil quality has been documented. Due to excessive pumping of ground water not only has the water table gone down and the water turned saline but even the land has sunk.

Use of a wide range of chemicals, antibiotics, steroids, etc., can adversely affect the ecosystem. There is a strong possibility of bacteria developing resistance to antibiotics. Overcrowding and high density feeding in shrimp ponds lead to "self pollution". These wastes cause oxygen depletion with large quantities of phosphates, nitrates, etc., released into the system causing eutrophication, occurrence of "Red Tides" and fish mortality and also liberate toxic gases like ammonia, hydrogen sulphide, etc. Reliance on imported feed and seed has already introduced diseases in epidemic proportions.

Indiscriminate destruction of wetlands and mangroves to make room for shrimp culture has occurred in Thailand, Indonesia, Malaysia, Vietnam, Bangladesh etc. Similarly, rice fields and mangroves have been converted to shrimp farms in some areas of Tamil Nadu and Andhra Pradesh. 10% of the

shrimp farms in East Godavari district are rice fields converted to ponds. In Sathkira region of Bangladesh, rice production crashed from 40,000 mt/year to 36 mt in 10 years since shrimp ponds were established. Erosion of coastal embankments and aggravation of cyclone effects have also been attributed to mangrove destruction.

Mother prawns removed from the sea for use in hatcheries and collecting of wild seed in millions to stock the farms deprives the sea of regeneration of prawn stock. Further, the collection of seed is also non-selective since a number of fish seeds are wasted or destroyed in the process. This is sheer callous decimation of living resources of the sea, in contrast to the Japanese practice of releasing certain portions of the hatchery reared seed into the sea.

It might be wise to ponder why rich nations like the USA, Japan and European countries, have not undertaken intensive shrimp culture but import shrimp from developing nations, mostly from Asia. Is this because agro-climatic conditions are unsuitable for shrimp culture or because these countries do not want to damage the environment? United States of America which has given the "Galveston Technology" for shrimp seed production does not culture shrimp on large scale - only 3,000 mt are produced as against India's 68,000 mt.

In the face of situations that have caused disaster by uncontrolled industrial intensive shrimp farming in many south-east Asian countries, it would be wise to seriously consider how to enforce the principle of "Pollutor pays and not Pollution pays" and plan and implement rational use of our land-water resources for sustained aquaculture development. A torn shirt can be mended or replaced but a damaged environment cannot be!

*A. Sreenivasan*

## FISH AND CHIPS

Quotes from recent reports :

- ☞ A fisherman was killed when a fish which he had caught hit him with its tail in the sea off Danushkodi. Local name of fish : "Poova thirukkai" (Ray Fish).
- ☞ Out of 2,546 fish species found in India, detailed information is available only of commercial species. India has 2% of world's land area, but has 7% of all known species of animals, adding up to 81,000 species. One hundred and forty species are threatened with extinction. Eleven mammals and birds will disappear in next 5 years !
- ☞ Industrial societies have an obligation not only to recycle but also to reduce the waste they generate.

**FISHERIES - A MULTI-BILLION DOLLAR INDUSTRY**

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