CHAPTER 6

Conclusion
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Similar to the Green revolution, the blue revolution has dispelled the myth that monoculture and global market system in food production ensure food security. The perceived high producers of cultured shrimps in the world are facing bankruptcy. Moreover, cultured shrimps are produced primarily for the consumption of developed countries. These developed countries pay high prices for importing shrimps mainly from the Asian countries. In order to meet the increasing world demand for shrimps, intensive and semi intensive monoculture of shrimps have acquired the status of a new and a very profitable industry in India.

The boom in the Indian cultured shrimp industry witnessed a total marine production increase from five percent in the early 80’s to more than forty percent in 2000. This reflects a growth of over eight hundred percent in a short span of 20 years. In pursuit of enhancement of national export income, the Government of India encouraged brackish water aquaculture in a big way in the coastal areas of the country. The production reached a peak of 1500 Kilograms per hectare and is now witnessing a sharp downward trend. The shrimp aquaculture industry has been generously aided by transnational agencies like the world bank, Asian Development Bank etc. actively spurred on by the government of India’s quest for higher export revenues. The major portion of the World Bank aid for the development of shrimp industry was allotted to
the states of Tamil Nadu, Andhra Pradesh and Orissa. The shrimp industry thus witnessed a fast paced growth and brought along acute environment problems.

In India aquaculture had been harvested for hundreds of years which was natural, eco compensative, non-destructive and environmental friendly. The aquaculture practice was commercialised only during the 1980's. The central and the state governments fully supported and took all initiatives for the development of shrimp aquaculture, to earn foreign exchange and also to take advantage of the vast coastline and the natural brackish water resources.

Tamil Nadu and Andhra Pradesh were the two states where the Governments themselves started for the first time adopting modern technology. Tamil Nadu, having a vast coast line of 1000 Kilometers and 56,000 hectares of brackish water land was the main thrust area for the development of shrimp aquaculture. Out of the 12 coastal districts of Tamil Nadu, Nagapattinam, Thanjavur and Ramanathapuram became centres of shrimp culture development.

The Tamil Nadu government also pursued the of development of shrimp industry wanted to offer a opportunity of better employment to the local people. From the Sixth Five Year Plan onwards, development of shrimp farming was given full importance. Government of Tamil Nadu constructed few model and demonstration farms for research and training purpose and encouraged private parties to take up this
business by providing subsidies. As a result, many small and big companies and individuals invested their money in this industry.

With the financial support from Government and technical support from governmental organisations like Marine Product Export Development Authority (MPEDA) and Brakishwater Fish Farmers Development Agency (BFDA) the shrimp industry boomed in the early part of 1990s. During this period intensive and semi-intensive models of shrimp farming were popular as the production rate was very high. In 1998 there were as many as one thousand two hundred and fifty shrimp farms operating in Tamil Nadu, on four thousand and thirty two hectares of land. The shrimp farming was done on all possible brackishwater sources like sea, estuary, backwater, creek and Pulicat lake. With a view to expand and develop fast, shrimp aquaculture farms were established very haphazardly by floating the norms, rules and regulations which proved against the very purpose of planned development. As a result, within a few years of its introduction, the industry caused a lot of environmental degradation and decrease of production.

The adverse result of the unmindful increase of shrimp culture became very obvious when a number of fertile lands near these farms and also ground water in the vicinity of farm turned saline. The fertile lands of Nagapattinam and Thanjavur once called the granary of South India almost fallow as a result of percolation of salt water let out from the shrimp farms and the presence of high salt content in the soil. This made the farmers, who were dependent on the agricultural lands, lose their sole source of income. The
outflow of creek and back water from their original sources reduced the availability of fish stock, in the process of which reduced the income opportunities. The mad rush for shrimp farming did not spare even the coastal wet lands, mangrove forests and also the bird sanctuaries. The loss of mangroves forests in Muthupet and Pichavaram not only affected the ecological balance but also impoverished the near by local communities who depended on the mangrove forest for their livelihood. The salt water seepage from the shrimp farms to the adjacent agricultural lands destroyed the fertility of the land by the vertical seepage, thus affecting the ground water. Salinization of land and water reduced the production of paddy especially in Nagapattinam and Thanjavur. Exploitation of large amount of ground water by the shrimp farms also reduced the water availability for agriculture. As a result of horizontal seepage from shrimp farms, the agricultural lands were destroyed which led to poor farmers selling of their lands to aquaculture farm owners. In Tamil Nadu eight percent of the total available paddy fields have been converted to shrimp farms since the inception of shrimp farms. Thanjavur and Nagapattinam recorded the maximum amount of conversion of agricultural lands to shrimp farms. More over a varied range of chemicals and artificial feeds are fed in intensive and semi-intensive shrimp culture which resulted in multidimensional environmental degradation. The repeated use of these chemicals increased the effluent level in the shrimp pond water which increased the chances of self pollution. Even in normal conditions monocultured shrimps are highly susceptible to viral diseases, more so in intensive and semi-intensive form of shrimp farming. In 1995, the whole of cultured shrimp production was very badly hit due to viral attacks, as a result of
self pollution in Tamil Nadu. This phenomenon was prevalent amongst all shrimp farms in India.

Seeds are collected from natural marine water sources as hatchery grown seeds are not sufficient to cater to all the shrimp farms which deplete the shrimp stock in natural marine sources. In recent years, use of stimulation of hormone genes have been introduced in commercial shrimp culture, for higher productivity and faster growth. This leads to a higher risk of destabilising the natural aquatic ecosystem. Loss of biodiversity is becoming increasingly common in Muthupet and Pichavaram in Tamil Nadu, as a process of forcibly removing important natural habitat for establishing shrimp farms. As a result of mangrove destruction and degradation, the estuaries and river mouths have become narrow thus obstructing the free flow of water.

Shrimp culture not only degrades the environment but also displaces the local communities. Being a profit and capital oriented industry, aquaculture does not provide much employment opportunities to the locals people when compared to agriculture. The conversion of agricultural lands to aquafarms has deprived the local farmers of job opportunities. Both men and women labourers are suffering after losing their traditional livelihood. Shrimp farming has also increased the problem of child labour. Children are generally employed for less payment by the shrimp farm owners to collect shrimp fry and larvae from natural eco system like mangroves, backwaters, estuaries etc. Shrimp farming has hit not only the social life but also the health aspects of the local people. Shrimp farm
labourers and workers in the processing unit are prone to viral infection and respiratory problems. It is proved that shrimp farm effluent are very hazardous to public health.

After the introduction of commercial shrimp farming the land prices in coastal areas have increased. Lured by high price offered for land, many small farmers have sold their lands to aquaculturists to convert them into shrimp farms. The shrimp farm owners not only acquire the private lands but also occupy the government poromboke property.

Though local people supported this industry initially in the faith that it would give them better employment opportunities but in reality just the opposite happened. People have lost even their traditional occupation and are deprived of their rights over the natural resources from mangrove forests, marine sources and yield from agriculture. The expansion of shrimp farming in last one decade has seen a dramatic transformation in the livelihood of coastal dwellers and local inhabitants in Tamil Nadu. All over the globe, from India to Ecuador shrimp farming has met with significant resistance by local residents, as is the case of Tamil Nadu. The main reason for the displeasure and agitation was the issues of pollution, loss of agricultural land, denial of access to water resources, deterioration of soil and water quality and subsequent reduction of livelihood.

In India the resistance against shrimp culture was first staged in Tamil Nadu in 1994. Many local NGOs, activist groups and environmentalists supported the move of people and staged a collective resistances in the form of organizing of mass rallies, hunger
strikes, and holding public meetings. In 1996, as for an appeal to the Supreme Court had passed an order banning shrimp farms in Coastal Regulation Zone (500 meters from the High Tide Line). The Court also directed the Government of India to form the Aquaculture Authority to monitor shrimp farming in the country. In 1997 Aquaculture Authority of India (AAAI) was formed with Justice Ramaijam as the Chairman of the Authority. At the same time a review petition was filed by MPEDA and other supporters of shrimp farming for which the Supreme Court granted stay order for his judgement. The review petition is still pending in the Supreme Court.

Though there are many laws for environment protection, lack of efficiency in implementation of law resulted in no change in the situation. The water (prevention and control of Pollution) Act 1974, the Environment (Protection) Act, 1986, and even the coastal regulation zone Modification were variably violated by shrimp farm owners. In 1995 the Government of Tamil Nadu enacted the Tamil Nadu Aquaculture (Regulation) Act to regulate the indiscriminate growth of Shrimp aquaculture. But it could not totally complied with technical and various reasons of implementation. Even though the Government of Tamil Nadu in 1994 and Central Government in 1995 proposed a set of guidelines for sustainable shrimp culture none of the shrimp farms could not understand the seriousness of the guidelines, not even the Government owned farms. There is no suitable mechanism to monitor the implementation of presented set of guidelines by the Government.
Proper measures have to be taken by the Government so that the laws of the land are properly implemented and to ensure overall development. Enforcement of strict regulations and stringent rules are needed to protect the environment and to put a curb on the destructive nature of shrimp aquaculture. The problems of the small farmers, and local fishermen could be addressed adequately. Proper training and use of indigenous products in shrimp farming are very much essential. This would help to maintain a environment friendly shrimp aquaculture. Though the Government encouraged shrimp farming initially, the adversities of the shrimp farming has brought of with reasonable legislation and notification to curb the indiscriminate aquaculture.

The Environment Protection Act of 1986, provided enough scope for the prevention and control of environmental pollution. The Act envisaged to implement long term requirements of environmental safety, which included water, air and land. However, to prevents specific environmental problems the Tamil Nadu Aquaculture Regulation Act of 1995 was enacted. This Act made licensing compulsory. One of the provision of the Act envisaged the formation of District Committee comprised of Government officials. The major limitation of the committee is that it remains mainly as a bureaucratic phenomenon neither understands the concern of the local people nor understands the problems of the aqua farms. The whole bureaucratic mechanism becomes shaddle of a futile exercise, and therefore the policy and problems fall apart.
As policy is farmed from above, it has got its own operative limitations, which could not envisaged the changing trends and new emerging situations. The study shows that some times due to the lack of operative reasoning and some times due to occupational pathology, the bureaucratic apparatus could not raise to the occasion and therefore even some of the comprehensive law enacted the Government does fulfill the desired goal. However, some of the laws are incomprehensive and could not address the ground realities. The problem of top down approaches are evidently seen in the case of aquaculture farms in Tamil Nadu.

The growth pattern of this industry has slowed down in many countries including India. It may slow down even further. But if proper arrangements and safeguards are implemented then this industry will definitely run for a longer period without degrading the environment. There is no doubt that shrimp industry has a great market potential. If properly planned it has a great chance for further expansion in a sustainable way. But if this has to increase its capacity for a long term effect, then it has to work for a convergence of different national and state laws. Otherwise, it would open doors to more disastrous consequences. The shrimp farms have to forego their own short term interests, but in the overall long term interest of the industry as well as the environment. For overall sustainability of the shrimp industry it is necessary to build in more independent monitoring institutions which could include non-profit and non-governmental organisations representing local people and users, consumers, environmentalists and
researchers. This principle of broad participation would ensure that policy making tools are not merely a bureaucratic exercise.

The following can be considered for a sustainable, eco-friendly shrimp aquaculture:-

Before creating shrimp farm Environmental Impact Assessment (EIA) is very necessary. This would help to find a suitable site for the shrimp farm, so that destruction of other lands which can be used for other purposes can be avoided. Moreover a suitable site would always help in enhancing the productivity of shrimps and longevity of the farm. EIA would also assess the adversities on environment that a shrimp unit could cause. With the help of the EIA Report proper measures can be taken to avoid environment degradation. The government and the concerned governmental agencies may prepare EIA before allotting any land for shrimp farming. This procedure should be free from any prejudices and haphazardness. A sincere effort needs to be put for implementation. Care should be taken as not to allow any agricultural land to be converted for shrimp aquaculture purposes. Even grazing lands, public utility lands and salt pans need to protected. The Government of Tamil Nadu as well as the aquaculturists should strictly adhere to the CRZ Notification, 1991 and 1994, Tamil Nadu Aquaculture (Regulation) Act, 1995 and above all the Supreme Court judgement of 1996.
Though the above acts need some reforms, there has to be a monitoring mechanism to enforce the laws in its spirit and purpose.

Proper laws are to be framed to abate pollution caused by the waste water and effluents discharged by the shrimp farms. There has to be proper regulations on effluent discharge. The effluents and wastes need to be treated properly and the pollution level may be brought down to the "approved level" i.e. with minimum environmental degrading elements. The treatment methods that need to be adopted are preferably on the methods for making effluents biodegradable. The aquaculturists in Tamil Nadu should adhere to the guidelines given by the Expert Committee set up by the Government of Tamil Nadu in 1994, as well as to that of the Department of Agriculture, Government of India in 1995.

Though many do not approve compensation given to the third party by the shrimp farm owners, this helps in bringing a significant discipline in the farming procedure, provided the "polluter pays" principle is sincerely practiced. The Government should have periodical survey of the shrimp farms to assess the level of pollution and also the farming procedures and practices.

Chemical feeds and therapeutics may be strictly avoided and if in unavoidable circumstances only permitted quantity and quality should be used. The aquaculturist should take enough care not to use any banned chemicals. In the same way, it is the duty of the Government to regulate the use of any chemicals in shrimp farms.
Ground water usage may not be permitted as it affects the water table badly. Methods have to be adopted to prevent the spread of salinity to the groundwater and lands adjacent to the farms. Proper laws have to be enacted for regulating and preventing the indiscriminate use of ground water for shrimp culture purpose.

Government may form a single body which would coordinate the establishment, functioning of the aqua farms in each state. The members of the body should be comprised of both Government, non governmental bodies, representatives of local people and farm owners.

The Government needs to make every effort to ensure the right to life and livelihood of the fish workers. States have to take up regulatory regimes for shrimp aquaculture with the participation of all stakeholders including fish workers. The states also have to provide a cohesive set of legislation for the management of shrimp aquaculture and to ensure greater coordination between industry, finance, trade, agriculture, forestry, fisheries and other relevant departments at national as well as regional levels in planning, implementing and monitoring shrimp aquaculture activities.

Prevention is always better than cure. Given the extent of negative externalities arising from the shrimp industry it is important to apply a precautionary approach, which has to include ecological, economic and social point of view. Before installing an aquaculture project, thorough research has to be done to assess the real capacity of the proposed ecosystem to sustain aquaculture development. The study should assess the
capacity of the ecosystem and how much it can withstand. This concept can be applied to pollution control.

Government, multilateral funding agencies, bilateral development agencies may withdraw credit support for aquaculture units which are causing damage to the environment.

Use of fishmeal should be discouraged as this can be used for local consumption which would feed the poor locals. This fish meal are manufactured from marine caught fish by grinding them. Preference should be given to shrimp culture practices that are dependent on locally produced feed and which can be integrated into fishing and farming operations (the traditional type of shrimp culture in India).

Regulations need to be imposed on farmed shrimps for the use of chemicals. The rich countries who import farmed shrimps need to take initiatives for regulating eco-degrading shrimp farm products through stringent rules and import policies.

Traditional, extensive, improved traditional and modified extensive types of aquaculture may be encouraged rather than intensive and semi-intensive type of shrimp farming. The Governmental can make use of all available brackishwater for shrimp culture throughout the country's coastal line, provided only indigenous products are used in shrimp farming. The intensive and semi intensive systems should be changed to traditional and improved traditional systems. This would definitely produce the required quantity of shrimps to fetch a huge amount of foreign exchange without degrading the environment.