NEW ENVIRONMENTAL POLICY: THE ENVIRONMENTAL LAWS OF INDIA AND OTHER COASTAL LAWS VERSUS THE MENACE OF AQUACULTURE – *A CRITICAL ANALYSIS AND RECOMMENDATIONS*

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1. INTRODUCTION:

Development comes at a cost, the cost is often the degradation of the environment. This Article focuses on such degradation to our coastal lands by the menace of aquaculture. Human agglomerations in the coastal zone bring about unprecedented changes which adversely affect the coastal areas. Aquaculture has been considered as an option to cope with the world food demand and also to meet economic ends in a developing economy but the rapid growth of intensive aquaculture for species with high commercial value intended for export has already caused dreadful environmental damage and the displacement of many local farmers and fishers whose livelihoods have been destroyed.[1] A clear picture has emerged recently on the deterioration of the highly fragile and sensitive zone of the coastal ecosystem due to overexploitation of living and non-living resources. The formulation of "coastal regulation zones" (CRZ) in this context necessitates the proper management and conservation of these regions by identifying areas that require adequate attention for preservation and development. [2] The CRZ, 2011 and the Coastal Aquaculture Authority Act (CAAA), 2005 have had a positive impact on the preservation of our coasts, however, it is not free from loopholes and thus, this article will also focus on recommendations to these laws.

[1] Marcel Martinez & Luis R. Martinez, World Aquaculture: Environmental Impacts and Troubleshooting Alternatives, The Scientific World Journal, Volume 2012 (2012), Article ID 389623

[2] http://www.sciencedirect.com/science/article/pii/S0964569100000417

2. WHAT IS AQUACULTURE?

"Aquaculture" means artificial culturing, under controlled conditions in ponds, pens, enclosures or otherwise, in coastal areas, of shrimp, prawn, fish or any other aquatic life in saline or brackish water.[3] It implies an ownership of the organisms by one organization and includes the exploitation and use of public resources with or sometimes without licenses.[4] It denotes the cultivation of fresh water fish and aquatic marine species. It involves their breeding, feeding, protection from predators and creation of favorable circumstances which protect their growth.[5]

3. THE NEXUS BETWEEN THE MENACE OF AQUACULTURE AND THE LAW

The current generation, government and beneficiaries ought to understand that to meet their needs; they must not hamper the opportunity of future generations to meet their needs.[6] On the Aquaculture front, many researchers, aquaculturists and conscious governments have advocated that sustainable aquaculture must happen and made possible but it all bottles down to the way it is managed.[7] It has social, cultural, economic and political implications.

Now, a problem arises when aquaculture is overused and misused. It is a double-edged sword. It provides food, economic benefits in trade and commerce, huge employment opportunities and helps in the development of coastal villages[8]. However, its overuse causes depletion of the food source, exploitation of the indigenous population and destruction of the water eco-system[9].

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[3] Section 2 Coastal Aquaculture Authority Act, 20005,; Madireddy Padma Rambabu and Ors.Vs. District Forest Officer, Kakinada, E.G. District and Ors, AIR 2002 AP 256.

[4] Maheshwari fish seed farm Vs.T. Nadu Electricity Board and Anr. , AIR 2004 SC 2341

[5] Concise Oxford Dictionary, The New Edition for the 1990's, pg. 53, Oxford University Press

[6] World Commission on the Environment and Development (WCED), Our Common Future, Oxford University Press, New York, NY, USA, 1987.

[7] R. R. Stickney and J. P. McVey, Responsible Marine Aquaculture, World Aquaculture Society, New York, NY, USA, 2002

[8] M. D. Smith, C. A. Roheim, L. B. Crowder et al., "Sustainability and global seafood," Science, vol. 327, no. 5967, pp. 784–786, 2010.

[9] FAO, The State of the World Fisheries and Aquaculture 2008, FAO, Rome, Italy, 2009

3.1 *Provisions of Law Regulating and governing Aquaculture.*

It is trite that our legislature and the Supreme Court have been active and prudent in the cause for protection of the coasts and water resources from the abuse of aquaculture. The legislations such as Indian Fisheries Act, 1897, Environment Protection Act, 1986, Water Act, Wildlife Protection Act, the CRZ 2011, the CAAA, 2005 and some other regional legislations.[10] The SC has also passed some very effective guidelines in 1997 after the *Jagannath Case*[11] known as **Notification SO 88 (E) (1997).**

An analysis of these legislations gives us the following points which can be said to be the legal framework regarding aquaculture in India:

1. Some of these legislations are really old and can be said to be ancient, they do not discuss the technological changes and the changes in the process of aquaculture and thus the regulations and processes mentioned therein are now redundant.

2. They basically deal with the duty of organizations and individuals taking permissions and sanctions from the authorities such as the Aquaculture Authority of India established by the CAAA, 2005. The permissions and sanctions relate to:

a. The Quantity and Quality of the Stock of the species

b. The quality and the salinity of the soil

c. the uses and the effects of the chemicals

d. the area and the land demography where such farms are being set up

e. The Compliance of the CRZ which deals with the distance from the coast where such farms are being set up.

f. Compliance of the security and the compensation of the fisherfolk community as per the CRZ.

[10] http://www.fao.org/fishery/legalframework/nalo_india/en#tcNB0019

[11] AIR 1997 SC 811

g. The Act also provides for some regulations such as the use of higher technology, the land resource test, an inquiry by the authority on whether to grant the license or not, and periodic tests and surveillance.[12]

3. The EIA Notification, 1991 also regulates the waste generation from such farms.

4. The feed is regulated by the Export (Quality Control and Inspection) Act (1963) regulates the feed of the species and states that the feed is to be in accordance with the International Standards set by the WTO, WHO, Network of Aquaculture in Asia and the Pacific (NAAPA) and other bodies.[13]

3.2 *Target Areas where Excessive Aquaculture is degrading the Environment*

The Environment and the Ecosystem has always had a way to regenerate and replenish itself, however, even nature has a limit. Excessive abuse and exploitation takes away the power of replenishment from the environment and leaves it with the disease of degradation.

The following target areas where such a disease can be identified as under:

a) *The Mangroves*: Mangroves are inherently an ecological marvel providing a rich source of resources and diversity fostering many species of flora and fauna[14] and are the primary source of organic resources to a coastal ecology. However, due to excessive aquaculture, the mangroves all over the world are being destroyed rapidly. Various researchers and studies have attributed the loss of mangroves to aquaculture. The basic issue here is the taking away of the organic components from the Mangroves and the construction of dams, barriers and trading and processing units at these Mangroves, which is causing a mass scale deforestation and removal of the Mangroves[15]. Fisheries and aquaculture are the main causes for mangrove deforestation in India, approximately 1,50,000 ha of mangroves were destroyed to promote and set up aquaculture in India and Bangladesh in the past century[16], which is not sustainable.

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[12] Sections 3, 11, 13, 14

[13] Order SO 729 (E) (1995), Order SO 729 (E), Order SO 477 (E) (2002)

[14] D. M. Alongi, "Present state and future of the world's mangrove forests," Environmental Conservation, vol. 29, no. 3, pp. 331–349, 2002

[15] Bhatt JR, Kathiresan K (2011) Biodiversity of mangrove ecosystems in India. In: Towards conservation and management of mangrove ecosystem in India.

[16] Vyas P (2013) Sundarban Biosphere Reserve, India: Conservation and management of mangrove ecosystem: In: Mangroves in India: their biology and uses, pp. 33-56

The importance and the need for protecting the mangroves was emphatically stated in ***S. Jagannath v. Union of India***.[17]

b) *The Soil and the Coast:* Aquaculture involves a wide use of chemicals and treatments to the soil to make it fit for breeding and sustaining the imposed species onto the area. This leads to high salinization and acidification of the soil which further leads to mass erosion.[18] This causes the people indulged in aquaculture to eventually abandon the area leaving the soil and the land unusable. In India, it is causing large scale erosion, contamination of drinking water, chemical absorption by food source and changes and effects to the humans by consuming such chemicals through water and sea-food.[19]

c) *The Flora and the Fauna:* An over-dedication to the growth and culture of one species will always have adverse effect on others. By cultivation of shrimps alone a great deal of flora and fauna has been destroyed, also leading to mass waste product generation. Producing 3 tons of fresh water fish via aquaculture results into as much waste as community of 240 people per annum would.[20] A study has found that for each million of shrimp larvae cultivated, four-seven million of other species die as a result of getting trapped in the nets for shrimp cultivation.[21] Also, the introduction of exotic and non-indigenous species to the area leads to elimination and displacement of the indigenous species often causing imbalances to the biome of the area.[22]

d) *Changes in the Natural Structure and the Dimensions of the Coastline:* Erosion, salinization, acidification, removal and depletion of the natural flora and fauna have caused an unprecedented change in the land use, the changes in the natural structure of the land and the ecological and geographical changes in the dimensions of the coastline in India.[23] This is

[17] AIR 1997 SC 811

[18] Pathak, S. C., Ghosh, S. K., & Palanisamy, K. (2000). The use of chemicals in aquaculture in India.

[19] Ibid

[20] Y. Avnimelech, Biofloc Technology. A Practical Guide Book, The World Aquaculture Society, Baton Rouge, La, USA, 2009.

[21] H. A. González-Ocampo, L. F. Beltrán Morales, C. Cáceres-Martínez et al., "Shrimp aquaculture environmental diagnosis in the semiarid coastal zone in Mexico," Fresenius Environmental Bulletin, vol. 15, no. 7, pp. 659–669, 2006.

[22] R. L. Naylor, R. J. Goldburg, J. H. Primavera et al., "Effect of aquaculture on world fish supplies," Nature, vol. 405, no. 6790, pp. 1017–1024, 2000

[23] Dr. K. Krishna Dorababu, Impact of aquaculture on land use patterns, environment and economy: a case study of west Godavari district, Andhra Pradesh, India, International Journal of Current Research, issue 5 Vol 7, 2013

causing depletion of natural biome and would eventually lead to loss of the indigenous eco-system and would eventually culminate with a loss to the indigenous communities residing in these areas.[24]

e) *The overall sustainability of the sea-food resource:* Sea-food is regarded as a very important source of protein and its use and importance in trade and commerce is extremely high.[25] This creates an even higher responsibility on the current generation to think and use this resource sustainably and carefully. We must leave resources for our future generations. Also, the chemicals and the pesticides which are entering the sea-food resource is killing the resource and causing biological alterations which imposes a great threat on this precious resource.[26] We must protect it, it is our fundamental duty.

4. RECOMMENDATIONS

1. *The evaluation of the land, the soil, the components and the indigenous species:* None of the legislations deal with the study and calculation of the indigenous species present in the proposed area. The indigenous species are highly important to the sustainability of the water and food source. It is recommended that the legislation should focus on the existing indigenous species and only allow such commercial species to be cultivated which adversely do not affect the indigenous species. The evaluation of the soil and the land source is limited to the levels before the process of aquaculture and not after, policies must be framed to improve and to basically restitute the land source of its nutrients and balance after aquaculture is completed there.

2. Cultivation of similar species at the same time which counter each other's ill-effects: This process is known as Polycultures or Integrated Multitrophic Aquaculture (IMTA). This basically denotes the cultivation of similar species of aquatic organisms which have opposite waste generation to counter the ill-effects of one species from the other. It has scientifically been proven that Polycultures reduce the Nitrogen poisoning of the soil and also reduces the

[24] Krishnadevi Malchand Kamathia and Ors. Vs. Bombay Environmental Action Group and Ors, AIR 2011 SC 1140

[25] M. D. Smith, C. A. Roheim, L. B. Crowder et al., "Sustainability and global seafood," Science, vol. 327, no. 5967, pp. 784–786, 2010.

[26] Dr. T. Patanjali Sastry, President, Environment Centre Vs. Chairman, Andhra Pradesh Pollution Control Board and Ors., MANU/AP/1510/2001

waste generation by the other species.[27] A regulation mandating Polyculture can go a long way in protecting the soil pollution.

3. *Stricter regulations on the chemicals used:* The laws regulating the chemicals and the pH levels and toxin levels are old and outdated, many new target chemicals with lower toxicity but higher degrading effect to the human body and the flaura and fauna have been developed[28], and our law must change to tackle this change in the structure of chemical compounds.

4. *Feeding Strategies:* For sustainable use of aquaculture, one very important change which must be made is to the feeding strategies, these are again outdated and not very scientific. Studies have shown that the current feeding practice is one which involves a high protein diet to the species which leads to greater waste generation which the soil can't handle. The best option is for mandating feed with higher hydrostability which means feed which results into waste products which are soluble in the water

5. *Setting up of Authorities with greater Scientific Know-How:* Dedicated authorities with scientific know-how and the sole objective of improving the technology for aquaculuture and reducing the costs related to it must be established. This will aid in improving the sustainability of the aqua feed and thus protect the environment.

6. More research and development with Education: Another huge challenge is imparting education about existing improvements in the process of aquaculture and the negative impact of the abuse of aquaculture, so the legislature and the Supreme Court must look into the prospect of establishing an authority which imparts education and some technical knowledge to the aquaculture stakeholders.

5. CONCLUSION

No doubt, aquaculture must flourish and is needed. The food source of sea-food is perhaps an essential for a country like India with such a large coast line. However, this must be used prudently and sustainably. The laws in place have improved the situation by the regulations

[27] T. Chopin, A. H. Buschmann, C. Halling et al., "Integrating seaweeds into marine aquaculture systems: a key toward sustainability," Journal of Phycology, vol. 37, no. 6, pp. 975–986, 2001.

[28] J. M. E. Hussenot, "Emerging effluent management strategies in marine fish-culture farms located in European coastal wetlands," Aquaculture, vol. 226, no. 1–4, pp. 113–128, 2003.

imposed. However, primarily these legislations are old and the times have changed. The recommendations provided in this article are an attempt to bring the legislation up to date with the modern developments, as a pre-requisite for protecting the environment.