



A Study of Environmental and Socio-Economic issues on the Governance of Aquaculture

Dr.G. Veerraju
Lecturer in Political Science, Principal investigator
AG&SG Siddhartha Degree College Vuyyuru,
Andhra Pradesh, India.

Dr. M. Rama Krishna
Research Associate
Dept. of History & Archaeology
Andhra University, VSP-530003.

Abstract:

Aquaculture sector is expanding very fast and has great potential for food security and nutritional support. However Aquaculture as it is poses a major threat to our environment as it generates hazardous consequences for the environment, including chemical and biological pollution and disease outbreaks. Impact of aquaculture on the ecosystem will not only affect fish, but also cause pollution of open waters and make it unsafe for human consumption, for recreational use, and for other wildlife, it has a devastating effect on the environment. Working towards better understanding of environmental and socio-economic issues related to aquaculture this work aims to critically engage the discourse on aquaculture and sustainability, in particular relevance to feed for fed-aquaculture.

Introduction:

Aquaculture is necessary for our country as it is one of the fast growing food production sectors and has great potential for food security and livelihoods. Overfishing of our lakes and oceans and high consumer demand due to rising population made it a necessary industry in our economy. An efficient aquaculture system can limit its own environmental impact and can benefit the economy. This study provides an overview of the main factors of ecological concern within aquaculture, their interactions with the environment, and highlights sustainable alternatives that are currently in use. The study also suggests that the Government should bring appropriate policies to protect the environment from aqua related pollution.

Government regulatory policies as well as social acceptance are equally important for Aquaculture farming but, less effective institutional mechanism allowed the landed gentry to exploit the land to the hilt to make huge profits but with heavy cost on environment and livelihood of common man, aqua farming in East, West Godavari and Krishna districts of Andhra Pradesh is under taken in open contravention of a set of laws encompassing environment, agriculture, aquaculture, health etc. Soil degradation, water contamination, pollution of Groundwater, Stagnation of fresh water sources, and loss of assured agricultural work resulted

in gullible common folks developing several ailments. Vacation of villages as they are rendered uninhabitable is practically creating an alarming situation in the study area.

Sustainability and the control of ecological impacts depend on the governance of aquaculture also. Many countries with important aquaculture production have some environmental regulations but lack clear frameworks for emerging tendencies as well merging technologies. E farmers may develop and follow sustainable principles, methodologies or practices. Practicing sustainable aquaculture can reduce the ecological impact without affecting the productivity. It is so poorly regulated at the state, national and international levels, thus it is necessary to have local and global policies and regulations to control the pollution. Therefore, it is recommended for improved legislation by revision and updating of certain laws along with effective implementation by the government and environmental agencies for sustainable aquaculture practices.

Aquaculture plays an important Role:

Aquaculture is one of the fastest growing sectors and it plays a very important role in the national economic development, providing nutrition and earning foreign currency. India is the second largest producer of aqua products which accounts for 7.5% of world production. About 5.3% income comes from fish among the total national income. Fish farming has its own advantages as well as adverse effects in relation to the environment and natural resource. The importance of fish farming in India is to improving nutrition condition, earning foreign currency and improving socio-economic condition etc.

Marine aquaculture refers to the culturing of species that live in the ocean. Freshwater aquaculture produces species that are native to rivers, lakes, and streams. Freshwater aquaculture is dominated by shrimp, catfish but also produces trout, tilapia, and bass. Freshwater aquaculture takes place primarily in ponds and in on-land, manmade systems. With the rising population, stress on existing resources is increasing tremendously to meet the growing demand for nutritional diet and at the same time there is a growing concern about environmental degradation. Fisheries and Aquaculture sector plays a vital role in meeting this growing demand for protein.

Environmental efficient production with trapping of solid waste and balanced nutrient management (recirculation technology, waste heat/green energy/integrated production systems) Policy instruments: legislation, economic incentives, socioeconomic dimensions, labeling, organic farming and other certification schemes. Fish is an affordable and rich source of protein, minerals and vitamins changing lifestyle and food habits towards animal-based diet and increasing the demand for protein due to growth of population.

Supply-Side Drivers:

Rich and diverse set of water resources implying diverse fisheries resources 10 % of the global biodiversity in terms of fish and shellfish species found in India. 2.02 million Sq.km EEZ and underutilized inland waters offer a huge potential. Aquaculture continues to significantly expand its production, making it the fastest-growing food production sector globally. However, the sustainability of the sector is at stake due to the contamination of natural resources that is not only a future but also a present reality. In this project study has observed the potential effects environmental pollution on aquaculture production and its implications on the sector's sustainability.

Elements of a Changing Climate:

Elements of a changing climate, such as rising temperatures, sea-level rise, diseases and harmful algal blooms, changes in rainfall patterns, the uncertainty of external inputs supplies, changes in sea surface salinity, and severe climatic events have been discussed. Furthermore, several adaptation options have been presented as well as some gaps in existing knowledge that require further investigations.

Overall, effects and implications on aquaculture production sustainability are expected to be both negative and positive although, the negative effects outweigh the positive ones. Adapting to the predicted changes in the short-term while taking mitigation measures in the long-term could be the only way toward sustaining the sector's production. However, successful adaptation will depend on the adaptive capacity of the producers in different regions of the world.

Aquaculture Governance and Sector Development:

Aquaculture governance is the set of processes by which a jurisdiction manages its resources with respect to aquaculture, how its stakeholders participate in making and implementing decisions affecting the sector, how government personnel are accountable to the aquaculture community and other stakeholders, and how the respect of the rule of law is applied and enforced. Good governance of aquaculture is a necessary condition for the sector to fully realize its potential for growth. Good governance will also ensure the order and sustainability of this growth.

The present technical guidelines on "aquaculture governance and sector development" have been produced to support the implementation of Article 9 of the Code of Conduct for Responsible Fisheries on aquaculture development. In addition to principles of good aquaculture governance (effectiveness and efficiency, equity, accountability and predictability of the law), these technical guidelines include suggestions/recommendations for the aquaculture sector; its administration, its legal and regulatory framework, license policies and non-state participation in decision making and implementation.

The guidelines are to be interpreted and applied in their entirety in a manner consistent with national laws and regulations and, where applicable, international agreements. They are for use by government and non-government agencies responsible for aquaculture, and producer associations at the sub-national, national

and regional levels. The objective of these guidelines is to assist policy makers and other stakeholders in the establishment and implementation of good governance in aquaculture by producing a blueprint of practices that can be tailored to suit particular administrative, cultural and legal environments. Such good governance practices could be adapted to any jurisdiction wishing to enhance aquaculture sustainability.

The predictions of climate change during the recent decades viz., consistent warming trends (increase in frequency of hot days and multiple-day heat wave), increase in extreme rains, and more frequent and intense extreme weather events (flood, cyclone and drought) has greater impact on aquaculture. This impact has been disproportionately felt by small-scale farmers who are already amongst the poor and vulnerable members of the society.

The present study in West Godavari, East Godavari and Krishna Districts of Andhra Pradesh documented the Environmental and socio economic change experienced by the respondents of the study area in brackish water and freshwater areas and their perceptions, attitudes, risk management behavior, adaptive capacities and impacts on aquatic farming systems through focus group discussion (FGD), extensive survey of 450 respondents through standard questionnaires, and stakeholder workshop (SW).

Aquaculture and Environmental Integrity:

The rapid increase in aquaculture production over the past four decades has been fuelled by increased production inputs and resource use that inevitably result in increasing environmental footprints. For decades, the environmental impacts have been drawing criticism and stimulated debates and lobbying against aquaculture, particularly targeting intensive shrimp farming. The negative environmental impacts often under scrutiny include the destruction of mangrove forests in the early years of intensive shrimp culture, salinization and acidification of soils, pollution of water for human consumption, eutrophication of effluent receiving ecosystems, ecological impacts caused by use of chemicals and drugs, changes on landscape and hydrological patterns, and negative effect on fisheries.

Challenges and issues:

Aquaculture development in the region is increasingly constrained by the limited availability of natural resources, including land and water so there is limited scope to increase aquaculture production in inland or coastal areas through expansion of culture areas. There are also restrictions over the use of farming land and open water bodies for aquaculture in many countries to protect crop production and other land and water uses.

Despite the improvement in efficiency of aquaculture feed and feeding, dependence on fish meal and fish oil persists. Other issues related to feed and feeding management in the region include the increasing reliance on terrestrial ingredients, competition for feed ingredients with other sectors, dependence on imported feed ingredients from other regions, lack of specialty feeds, inappropriate feeding practices and poor access of small-scale farmers to cost-effective quality feed.

It is not always possible to source high quality fish and shrimp seed with the desired genetics, specific pathogen free status, of uniform size at the right time and in the required quantities. Sourcing seed and brood stock from the wild for aquaculture of certain species is often associated with issues of uncertainty about stock quality, the risk of introducing diseases, overfishing of natural stocks and in general is regarded as unsustainable. There are also issues of brood stock quality, seed quality and disease risks specifically related to small-scale backyard hatchery production.

Compared with terrestrial agriculture, aquaculture is lagging behind in terms of genetic characterization, domestication and improvement. Many farmed species resemble their wild stocks with little to no genetic improvement and often experience genetic quality deterioration caused by reduced genetic biodiversity and inbreeding. Uptake of genetic improvement to develop better farmed types for aquaculture has been slow, especially for species with long life cycles and opportunities exist to enhance production efficiency through targeted genetic improvement. However, there is often a lack of attention to maintenance of genetic quality in seed supply systems, resulting in deterioration of performance of domesticated farmed types.

With fast growth of the sector, the region has made great progress in aquaculture research with increasing investment and research capacity. However, investment in aquaculture research in most countries in the region is probably inadequate and research efforts often lack strategic planning and effective coordination at national, regional and international level. Public access to private-sector research and innovations by large companies is often limited due to potential conflict of interests.

The region has been striving to establish extension networks for technology transfer with most nations having their institutional systems set up specifically for aquaculture extension, consisting of government agencies and extension officers at various administrative levels. Despite the progress, there is still a shortage of skilled extension workers and often good scientists do not appear to be good extensionists, hence research and field work are often uncoordinated. Small-scale farmers are especially disadvantaged in terms of access to the latest research information and innovations.

Diseases remain the major threat to the industry and this is aggravated by the lack of emergency preparedness and response in many countries when a new disease emerges. Prevention and spread of these emerging diseases remain a challenge to most countries, as proper bio-security measures are still lacking especially at farm level.

Environmental pollution:

Environmental pollution is the introduction of different harmful pollutants into certain environment that makes this environment unhealthy to live in. The most common pollutants are usually chemicals, garbage and waste water. Environmental pollution is happen in multifold parts of Earth usually in the form of air and water pollution. It causes great damage to ecosystem that depends upon the health of this environment to live in. Air and water pollution can cause death of myriad organisms in given ecosystem, including humans.

Fish farming activity is also significant contributor to environmental pollution if not properly planned to channel waste water during cleaning of ponds and dams. Usually this activity produces a lot of waste water, which affect negatively the wider environment as well as human health. Coastal resources provide important social, cultural, and economic benefits in many communities throughout the world. However, in many locations resource use practices are degrading the natural resources upon which coastal communities depend. Practices such as intensive and/or destructive fishing can threaten coral reefs and other coastal ecosystems.

Instituting changes in destructive resource use practices is often difficult because such practices may be related to social, economic, and cultural factors. Individuals and communities may participate in or tolerate resource-degrading practices because they may be the only option amidst difficult social and economic conditions. Initiatives that aim to deter resource abuse should identify and address the underlying factors that lead to such behaviors.

Social and economic factors influence resource:

To determine how social and economic factors influence resource use, this thesis will examine relationships between socio-economic variables (including wealth, education, migration, age, and coastal residency) and the ways in which people use and perceive coastal resources in the fishing village of Andhra Pradesh. Analysis of how socioeconomic variables influence resource use and perception within the community. Finally, key issues regarding the integrated management of coastal resources in the state of Andhra Pradesh are summarized. Potential interventions are also suggested that aim to address the needs and concerns of the socioeconomic sectors of the community presenting the greatest challenge to coastal management goals.

Social and Economic Factors Influence Coastal Resource Use:

It is important to recognize that communities do not necessarily have a single perception regarding their natural environment. Social and economic factors can influence how people perceive their resources. Nazarea et al. (1998) state: Different groups within local populations (e.g. rich versus poor, landed versus tenants, old versus young) may have different perspectives and priorities in appraising their quality of life or their environment. In short, different categories of people view “reality” with different lenses based on their positions in the internal socioeconomic hierarchy. These different vantage points can help account for how each group or category of individuals manages the resources at its disposal to attain goals it considers important, as opposed to pursuing the goals of scientists or planners. Understanding these variations both within groups and among outsiders, can help facilitate the search for a common ground in the pursuit of broader goals such as environmental management.

Because of economic and population pressures, governments and individuals are over exploiting the natural resources they control in order to generate income to satisfy immediate needs – whether those requirements are to generate foreign exchange at the national level or to increase current income at the level

of the household.” For example, economic pressures may force poorer farmers to utilize land more intensively by cultivating higher proportions of their land and shortening fallow periods.

Conclusion:

Aquaculture has gained increasing recognition as a major food producing industry, with its benefits like increased food supply, but also negative effects, such as ecological impacts. As the fastest growing animal food producing sector aquaculture raises certain concerns in general, yet it is the fed aquaculture sector that uses high-protein feed, from fishmeal and feed additives of fish oil, that are most controversial.

Employment creation is the process by which the number of job in an economy increases or is the process of providing new jobs, especially for people who are unemployed. Through urban fish farming the urban dwellers have found employment and apart from fish production also urban fish industry can provide recreational services and care services to the communities which can help to create job opportunity to other people.

Furthermore, fish farming generates indirect employment through backward linkages e.g. to hatcheries and feed suppliers and forward linkages e.g. harvesting, post-harvest handling, processing and marketing activities which could generate important employment opportunities for the poor depending on the degree to which fish farming is integrated into the local economy.

Fish farming contributes to food security both qualitatively and quantitatively. The impact of urban fish farming on food security can be computed as the amount of food produced by a household as compared to total household food demand or the income a household raises for food consumption as compared to amount required to ensure the requirement of that household. Much of literature reports an increase in household consumption of fish for those who invest in pond based fish farming.

References:

1. Acharyulu, SNCN. Centre amends lockdown for fishing, aquaculture. Deccan Chronicle, 2020;4:12.
2. Alagaswami, K.1995, Status of coastal aquaculture in India, Aquaculture in Asia, Asian Fisheries society, Indian branch, Mangalore, Pg. 163-190.
3. Andrews D, Nonnecke B, Preece J. Conducting Research on the Internet: Online Survey Design, Development and Implementation Guidelines. Intl. J. Human-Computer Interaction, 2003; 16(2):185-210.
4. Bandyopadhyay K. Kolkata: Demand-supply gap leaves dear fish dearer. Times of India, 2019; 68, <https://timesofindia.indiatimes.com/city/kolkata/demand-supply-gap-leaves-dear-fish-dearer/article-show/68880715>.
5. Constantinos Perdikaris, Anna Chrysafi & Kostas Ganiats (2016) Environmentally Friendly Practices and Perceptions in Aquaculture: A Sectoral Case-study from a Mediterranean-based Industry, Reviews in Fisheries Science & Aquaculture, 24:2, 113-125,
6. DADF. Hand book on Fishery Statistics. Department of Fisheries Ministry of Fisheries, Animal Husbandry and Dairying New Delhi, 2019, 190.
7. Evans JR, Mathur A. The value of online surveys. Internet Res. 2005; 15(2):195-219.
8. FAO (Food and Agriculture Organisation, United Nations), 2011. World Aquaculture 2010.FAO fisheries and Aquaculture/ Technical Paper.

9. Ghosal S. Slow movement of fish seeds from Bengal due to lockdown to impact fish production in the country. Economic Times, 2020; 15:20. <https://economictimes.indiatimes.com/news/economy/agriculture/slow-movement-of-fish-seeds-from-bengal-due-to-lockdown-to-impact-fish-production-in-the-country>.
10. Goswami 2007 “Natural and Anthropogenic Hazards on Fish and Fisheries” NPH, New Delhi.
11. H.R. Singh 2009 “Biodiversity and Ecology of Aquatic Environment” NPH, New Delhi.
12. Jayasankar P. Review Present status of freshwater aquaculture in India - A review. Indian J.Fish. 2018; 65(4):157-165. DOI: 10.21077/ijf.2018.65.4.81300-20.
13. Jigeesh AM. Distressed fisheries sector demands immediate support. Business online, 2020.
14. Karl F. Lagler 1962 “Ichthyology”: The Study of Fishes John Wiley and Sons, New York.
15. Lorentz C. Pearson 1973 Principles of “Agronomy “ Affiliated East- West Press PVT Ltd, New Delhi.
16. Mandal N. Study on Fish demand and supply and engagement of private sector in the fish sub sector in Jharkhand. jslps.org/wp-content/uploads/2018/02/Final-Fishery-Report.pdf
17. Narasimhan TE. Rough times for fisheries to get worse after Covid-19 lockdown is lifted. 2020, Business Standard, 4:20. https://www.business-standard.com/article/economy-policy/rough-times-for-fisheries-to-get-worse-after-covid-19-lockdown-is-lifted-120040400841_1.html.
18. Nautiyal 2005 “Biological Diversity in Freshwater Environments” Srinagar Garhwal.
19. Patnaik S. Lockdown turns out to be a boon for Vizag fishermen. The Hindu, 2020, <https://www.thehindu.com/news/national/andhra-pradesh/lockdown-turns-out-to-be-a-boon-for-vizag-fishermen/article31798531.ece>.
20. Ritu Bir., 2009 “Environmental Studies” Vayu Education of India, New Delhi.

