

The Impact of Aquaculture on Environmental Degradation

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Abstract

The fisheries sector is discussed as a sunrise industry with huge potential for global food security, nutrition, income generation, and sustenance in developing countries of which India is a part. By 2050 the world population would be above 9.1 billion and India by 2030 may become the most populous country, consequently raising the demand for animal protein on an exponential scale, including fish. In this context, aquaculture is the fastest-growing food production sector worldwide and plays a very important role. However, with the transition from traditional to intensive aquaculture, many environmental issues have manifested, namely habitat destruction, overexploitation of wild juveniles, water salinization, disease outbreaks, and genetic pollution of wild fish stocks. These problems have been amplified by a lack of environmental awareness and poor regulatory enforcement. The socio-economic importance of fisheries, looks at future prospects, and assesses ecological impacts from modern aquaculture. It stresses the immediate and pressing need for sustainability, effective policy frameworks, and technology-based solutions for the sector's long-term viability and contributions toward global food systems.

Keyword: Fisheries, Aquaculture, Salinization, environmental awareness, Technology, Degradation

Highlight Point

- ✓ Fisheries is a Sun raising sector & Promising sector
- ✓ Important sources of food, nutrition, income and livelihoods for hundreds of millions of people
- ✓ Major role in satisfying the needs & palates of the world's growing middle income group consumers
- ✓ Richest food for the poorest of the poor
- ✓ Fish represents 16.6% of all the animal protein and 6.5% of the all protein consumed globally
- ✓ Fish is a highly traded commodity in international markets.

Introduction

Fisheries sector occupies a very important place in the socio-economic development of the country. It has been recognized as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries, and is a source of cheap and nutritious food besides being a foreign exchange earner. Most importantly, it is the source of livelihood for a large section of economically backward population of the country. The fisheries sector is a source of livelihood for over 14.49 million people engaged fully, partially or in subsidiary activities pertaining to the sector.

Future Aspects of the Fisheries Sector

By 2050 the world's population will reach 9.1 billion, 34 percent higher than today. Nearly all of this population increase will occur in developing countries. On the contrary the demand for protein of animal is increasing day by day due to rapid urbanization. The crown of the world's most populous country is on China's head for decades; India is all set to take the number one position by 2030. With the population growth rate at 1.2%, India is predicted to have more than 1.53 billion people by the end of 2030.

By 2050, consumption of meat and dairy products is projected to increase by 173% and 158%, respectively, as that of 2013. To meet the growing demand and to cope up with 9 billion world population by 2050, agricultural production needs to increase by 60% (compared to 2005/2007 production) including of increase in animal production and animal product. In addition, cropland per capita is one of the biggest challenges for feeding Indian people who are on the track of rapid urbanization.

The growing world population, environmental degradation, limited natural resources and climatic change pose a greatest challenge to the food security of human population. Hence, it is necessary to provide an insight into India's future challenges of food security with special emphasis on livestock production and to explore a possible strategic options applicable to the country so as to overcome these challenges which have major policy implications on India's food security and livestock development.

Fisheries and aquaculture must address many of these difficult challenges. Especially with rapidly expanding aquaculture production around the world, there is a large potential of further and rapid increases in fish supply—an important source of animal protein for human consumption. Aquaculture is the fastest growing food-producing sector in the world, contributing one-third of global food fish production.

But the way we produce food cannot be at the expense of the Earth Planet. Sustainability will be at the heart of the new global developmental goals. Production increase must occur in a

context where resources necessary for food production, such as land and water, are even scarcer in a more crowded world, and thus the sector needs to be far more efficient in utilizing productive resources. Further, in the face of global climate change, the world is required to change the ways to conduct economic activities.

From Traditional to Modern Aquaculture

With the increase in human population, the need for farmed fish increased and accordingly farming systems were modified and new systems were developed. Thus, the traditional simple aquaculture system began to be replaced by controlled farming methods such as the semi-intensive / intensive type of farming systems where resources are stocked in high densities and farmed under controlled conditions.

However, unplanned growth and farming without considering the ecological potential of the farming area has led to several negative impacts both to the farm and also to the natural ecosystem.

Impacts Of Aquaculture on Environment



I. Destruction of Habitat for Agricultural activities:

- The creation of ponds for marine shrimp aquaculture has led to the destruction of thousands of hectares of mangroves and coastal wetlands.
- Mangroves provide nursery grounds for many species, including commercially important fish, and their destruction may lead to substantial losses for commercial fisheries.

II. Collecting wild Juveniles as Stock:

- Aquaculture of some species relies on juveniles' fish or shellfish being caught from the wild to supply stock, rather than using hatcheries to rear them.
- Shrimp farms in many areas rely on wild caught juveniles.
- This has led to over exploitation and shortages of wild stocks.

- The main environment impact of crab culture is the procurement of larvae from wild brood stock, and the on growing of wild crablets.

III. Depletion and Stalinization of Water/ land

- Pumping of groundwater to supply freshwater to marine shrimp farms has resulted in depletion and, sometimes, Salinization of local water supplies, causing water shortages for coastal communities.
- There have also been many reports of crop losses after agricultural land has become salinized by effluent water pumped out from shrimp farms onto land.

IV. Poor Research in fish diseases and abuse of medicines:

- Novel fish diseases cannot be treated and diagnosis of aquatic diseases in the third world involves undeveloped instruments and weak technical power.
- Hence inability to distinguish bacterial and nutritional diseases, which directly influence correct medications. Once the diseases come on, the abuse of medicines is imminent.

V. Residual feeds and excrements (Fish waste):

- Feeds are the basic material of aquaculture and the sources of main nutritional matters.
- Most feeds of aquaculture are outside sources of food and given to aquatic animals directly.
- Large number of residual feeds and the excrements of aquatic animals all impact the water environment.

VI. Escaping Salmon and their threat to Wild Fish:

- Farmed Atlantic salmon have escaped in vast numbers and are successfully breeding with their wild counterparts.
- Farmed salmon have a lower genetic variability than wild salmon.
- Experiments show that the offspring are less fit than wild salmon and a high proportion die.
- Interbreeding of farmed with wild salmon could therefore drive already vulnerable populations of wild salmon towards extinction.

VII. Weak environment protection consciousness:

- Though various high-yielding aquaculture methods such as industrial fish farming, cage fish culture and raceway culture are developed to some extent.
- Fishing and environment protection consciousness are still deficient, and the random discharge of aquaculture waste waters without any treatment has deteriorated the whole aquaculture environment and blocked the sustainable development of this industry.

Introduction of Alien species

- Introduction of exotics to the pond has high adverse impacts. They may alter the already existing communities of the receiving ecosystem through competition for food, space, habitat etc.
- Some of the countries prevent the alien species because of loss of genetic adaptation to local species as well as potential susceptibility to diseases.
- Genetically modified organisms including microorganisms have adverse effects on humans and animals as well as disruption of ecological processes. Currently, there are no effective regulations of control.

Policy and Regulations

Aquaculture process has both positive and negative impact. Growth of aquaculture is initiated by governments and they are eager only for economic growth but now, governments have

started to implement strict regulatory guidelines addressing environmental and social issues to ensure sustainability. No. of countries have passed laws that can protect mangrove and marine ecosystem but enforcement is difficult in practice because it is most essential alternative for coastal communities. In India, India Fishery act, 1987, Coastal Aquaculture Authority act, 2005 developed for sustainable aquaculture. (NALO, 2004) In the United States some adaptive measures are taken by the Environmental Protection Agency, Food and Drug Administration, the National Marine Fisheries Service, the United States Department of Agriculture and numerous state environmental agencies and local groups. Canada has also developed stringent guidelines to maintain the health of the environment, and Brazil, Malaysia, Sri Lanka and others have all made progress in the establishment of legal and regulatory frameworks which are starting to have a positive effect on aquaculture development.

Presently The Brazilian Institute of Environment and Renewable Natural Resources (Ibama) and the Army carried out an unpublished decision of Justice to destroy a shrimp bed in Tibau do Sul (Rio Grande do Norte) because it worked irregularly to stop the mangrove destruction (MAP, 2011, 2012).

Promote better practices

New technologies are available for lessening the impact of aquaculture on the surrounding environment, but many countries cannot take advantage of these expensive innovations. To accomplish population demand food production will remain an overriding priority, and aquaculture will continue to grow. We should develop or adapt some needs and capacity of developing countries. Government organizations, society, aquaculture federation should adopt best practice. Lower energy consumption, reduction in carbon tax, potential market premiers etc. will help to promote good practices. Using our intelligence and ingenuity, the human species can preserve biodiversity and unique places for future generations, without compromising the quality of life for present populations.

Conclusion

Aquaculture is a highly promising and very essential sector in meeting the food and nutritional needs of an ever-increasing global population. It provides great livelihood possibilities to millions and adds much to the national economies. For India and most such developing nations, aquaculture has a preeminent position in the gross domestic product. However, the expansion relied on its consumption of natural resources leading to environmental impacts such as destruction of habitat, degradation of water resources, and pollution together with genetic impacts to the wild species. Unplanned and unsustainable practices threaten not only the natural ecosystems but also the very survival of the industry itself in future. Thus, it is urgent to adopt such environmentally sound aquaculture practices, develop scientific research and disease management, as well as bring forward awareness and enforcement of environment regulations. In fact, to continue as possible with aquaculture, it must continually sustain sustainability with coexistence between humanity and the health of our planet and future generations. Mangroves, The Management of Natural Coastal Carbon Sinks, IUCN Gland, Switzerland. These habitats are cleared to construct dike ponds for farming, and restoration becomes nearly impossible. India ranks second in aquaculture. Farmed shrimp can improve a developing country's foreign exchange earnings, but it is hard to reconcile lost sensitive habitat.

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