

Socioeconomics Of Responsible Aquaculture In Asia

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Abstract

Aquaculture provided 20% of global fisheries production and 29% of food fish in 1996. Much of the production was from low income food-deficit countries (LIFDCs). Between 1990 and 1996, the average expansion rate of aquaculture in LIFDCs was nearly six times than in non-LIFDCs. The expansion in production is not free of problems, however. Environmental, biological diversity, socioeconomic, and consumer safety issues have been linked to intensive aquaculture. These problems are seen in the context of a need for good governance of aquaculture development. The socioeconomics of responsible aquaculture and approaches of good governance of aquaculture is examined in this paper.

Introduction

“Socioeconomics” is a very broad word and so is the word “responsible.” For the benefit of all of us, I will clarify what is meant by these two words in the context of this discussion paper. Both these words are important in the social sciences. The social sciences are scientific in the sense that we seek true knowledge about society and its functions. It is the task of social scientist to examine the issues that affect humanity and society and take responsibilities as social engineers for inducing necessary changes in the political process so that better outcomes are realized for the society as a whole. Socioeconomics is made up of two words, “socio” and “economics.” In using the word “socio” the focus is on society, organizations and social well-being. While in using the word “economics,” the attention is on welfare, efficiency and equity. The word “responsible” refers to accountability, knowledge and understanding of one’s actions and a value system that emphasizes the use of the knowledge and understanding of one’s actions for improving the social well-being of society. Responsible also means the participation of governments, stakeholders, users and consumers and their understanding of the ecological support system on which aquaculture production depends on and takes place. Responsible aquaculture is therefore aquaculture activity which is accountable to society and involves the participation of all stakeholders in the decision-making process.

Aquaculture’s contribution to world food supplies has been increasing rapidly in recent years and has maintained its position as one of the fastest growing food production activities in the world. Aquaculture provided 20% of global fisheries production and 29% of food fish in 1996 (FAO, 1998). Another important feature of aquaculture is that the low-income food-deficit countries (LIFDCs) feature among the top producers. In 1996, 82 percent or around 27.9 million tons of world total finfish, shellfish and aquatic plant production originated in LIFDCs. The contribution of this group of countries to world production has increased sharply since 1990. The average expansion of aquaculture production in the LIFDCs is nearly six times that in non-LIFDCs. Between 1990 and

1996, the average expansion rate of aquaculture in the LIFDCs was 16.7% compared to 2.9% in the non-LIFDCs (FAO, 1998). Most of the production comes from six countries namely China, accounting for 83%, India 6%, Indonesia 4%, the Philippines 3%, Democratic Peoples Republic of Korea 2%, and Bangladesh 1%.

The booming aquaculture production and trade coupled with its increased socioeconomic benefits such as employment and foreign exchange earnings are however not free from problems. Deteriorating environments, destruction of mangroves, displacement of local people, inequality in income and rent distribution are examples of some of the problems that have raised questions on the sustainability of aquaculture, especially of intensive aquaculture.

This paper will address some of the socioeconomic problems arising from aquaculture development and explore how these problems can be handled within an improved governance framework. It is the premise of this paper that most of the problems that arise from aquaculture development are the result of weak regulatory frameworks and inadequate governance of the industry. The greater participation of the various stakeholders involved within a coastal environment in coastal resource management can lead to reduced negative socioeconomic impacts and ensure sustainability of aquaculture.

Relationship between Social and Economic System and the Aquaculture Production System

Aquaculture production involves the use of natural resources such as a land, materials, water, fry and feed and fertilizers. How these resources are acquired will depend on the property rights arrangement in the society. If property rights are well organized, there is less chance for the development of serious social problems. Social problems arise often when property rights to the resource used in aquaculture are not well defined. This can lead to displacement or taking away of rights to resources enjoyed by local communities as a result of an aquaculture development in a coastal area. In addition, the activity of converting these resources into aquaculture outputs creates wastes and how these wastes are managed creates opportunities for negative impacts on others.

The social and economic systems in a society determine the property rights arrangements and opportunity sets available for individuals in a society to use resources in the society. The development of effective property rights systems to manage coastal resources has been a very difficult task in most societies. The need to develop more efficient property rights regimes in coastal areas so that negative externalities can be reduced or prevented is one of the goals of responsible aquaculture.

Problems of Intensive Aquaculture Development

Shrimp aquaculture, once hailed as a promising export earner, has produced some social and environmental problems in many Third World countries, mainly in Asia. Hundreds of farming and fishing communities throughout the region have protested against the intrusion into their lands and the despoliation of their land and water resources by aquaculture farms (Patil and Krishnan, 1998). These farms have been set up by commercial companies, mainly in the past five to 10 years, along coastal areas, as part of national government policies and often aided technically or financially by international agencies. Since the 1970s, global production of cultured shrimp has increased rapidly, mostly in Asia, which in 1990 produced 556,500 metric tons or 80% of the world output. In the same year, it was also estimated that 820,000 hectares was being used for coastal shrimp aquaculture in Asia. (Khor, 1999).

Another problem associated with aquaculture according to Goldberg and Triplett (1997), is the

so-called “fishmeal dilemma” wherein huge amounts of small pelagic fishes, such as anchovy, jack mackerel, herring, and sardine, etc. are harvested to make fishmeal and fish oil used in animal feeds. It is estimated that 27% (31,000,000 mt) of the world’s total wild fisheries production is now being converted to animal feeds. Of this, only 15% of this total is being used in fish feeds; however, many aquaculture feeds are 20 to 70% fishmeal, while most feeds for poultry and hogs are only a few percent fishmeal. The most obvious problem with feeding wild fish to farm fish is that it is inefficient. Feeding fish to fish leads to a net loss of protein in a protein-short world. Lesser obvious problems of the “fishmeal dilemma” are the ecological effects of massive harvest of small pelagic fishes. Removal by fishing vessels of huge quantities of small fish from the marine food webs means that less food may be available for commercially valuable predatory fish and other marine predators, such as sea birds and seals. The impacts of these activities will have to be studied carefully to examine the nature of negative externalities created by the “fishmeal dilemma.”

As a result of these problems, there are requests on governments to review their aquaculture and rural policies, and for the international and regional agencies financing and encouraging aquaculture to seriously reflect on some of the ill-effects of their funds and advice (Khor, 1999).

It should also be recognized, however, that aquaculture is capable of contributing to environmental improvement and conservation in many ways, such as through small-scale integrated farming systems, conservation of species, and water-quality improvement in coastal waters. It is also increasingly needed to meet the growing demand for aquatic food, which cannot be met by static or declining capture fisheries yields. It must be recognized that many of the environmental problems caused by aquaculture can be dealt with through improved management at various levels. From the farm level through to watershed or shared coastal area, and at local, national and regional levels, the challenge is to fully integrate an improved understanding of environmental interactions of aquaculture systems.

It is now increasingly acknowledged that environmental interactions of aquaculture should be viewed and resolved within a wider environmental and political context, with due account of the social and economic circumstances in which aquaculture is taking place (Barg and Phillips, 1997).

The Food and Agricultural Organization (FAO) of the United Nations, in its effort to make capture fisheries and aquaculture more sustainable, is lobbying for the need to promote and implement a Code of Conduct for Responsible Fisheries (FAO, 1999). The Code’s Article 9 on Aquaculture Development contains provisions relating to “aquaculture production, including culture-based fisheries, and their responsible development in areas of national jurisdiction and within trans-boundary aquatic ecosystems, to conservation of genetic diversity and ecosystem, and to responsible practices at the production level” (Barg and Phillips, 1997). The code is envisioned to create an “enabling environment” essential in striking a balance between the need for development and growth and the need for ecosystem conservation. Such an environment will consist of economic, legal, social and physical components and should guarantee fair access to resources, mechanisms for conflict resolution and access to information, credit and markets (FAO, 1998).

Socioeconomics of Responsible Aquaculture

An issue which has been contentiously debated in the realm of socioeconomics is who are the primary beneficiaries from aquaculture and to what extent the local communities benefit from such developments (Bailey, 1988).

On the downside of aquaculture development (Table 1), there have been reports of lands taken from farmers and coastal villagers to make way for intensive aquaculture (Sierra Club, 1996a,b). According to Bailey (1988), coastal villagers and farmers tend to have traditional rather than legally

recognized rights. Until recently, government has allowed these people to exercise their traditional rights to the sustainable use of mangrove resources for the staples of life. Generations of women and children have collected wild fruits and vegetables, gathered plants for medicines and found construction materials for their homes. Farmers have harvested rice, millet and other crops from small plots while fisherfolks have repaired their boats and relied on small catches of fish and crustaceans spawned in

Table 1. Socioeconomic problems in aquaculture

Nature of Problem	Country	Aquaculture type	Reference(s)
Forest lands converted to aquaculture farms	Thailand, Bangladesh, Philippines	Shrimp aquaculture	Sierra Club 1996a; FAO, 1995; Tisdell 1995
Loss of mangroves, salination	Bangladesh; Andhra Pradesh and Tamil Nadu, India	Shrimp and culture ponds	Barraclough <i>et al</i> 1995; Sierra Club, 1996a; Tisdell 1995; Khor, 1999;
Increasing unemployment	India	Shrimp aquaculture	Shiva 1995; Patil and Krishnan, 1988
Social exclusion Social unrest and conflicts	India, Bangladesh India, Bangladesh, Thailand, Philippines, Taiwan, Vietnam, China	Shrimp aquaculture Shrimp Aquaculture	Sierra Club, 1996ab Sierra Club, 1996b
Disease outbreaks and abandonment of exhausted ponds	India, Bangladesh, Thailand, Malaysia, Philippines, Taiwan, Vietnam, China	Shrimp aquaculture; intensive monoculture aquaculture	Kutty, 1997
Income inequality	South Asia	Shrimp aquaculture; high end intensive aquaculture	Kent, 1995
Aquaculture versus tourist development and coastal ship traffic	Hong Kong, Singapore, Thailand	Offshore intensive aquaculture and offshore cages.	Beveridge <i>et al</i> , 1997
Sedimentation	Bangladesh, South and Southeast Asia	Shrimp aquaculture	Barraclough <i>et al</i> , 1995; Sierra Club, 1996a
Lands taken/land conversion	Andhra Pradesh, India	Shrimp aquaculture	Tisdell, 1995; Sierra Club, 1996a,b
Food security	Andhra Pradesh and Tamil Nadu, India	Shrimp aquaculture	Shiva, 1994
Dislocation of people	Andhra Pradesh	Shrimp aquaculture	Thamina, 1995; Sierra Club, 1996b

mangrove nurseries. The way of life of these people was changed abruptly with the introduction and expansion of large scale, intensive aquaculture (shrimp farming, etc.). What was traditionally been a multiple user system was turned into a privately owned, single-purpose resource.

In some cases, Kent (1995), insinuated that intensive aquaculture operations sometimes even make the poor worse off. An example is the case of fingerlings, which previously had been consumed by the poor, are fattened in aquaculture operations to cater to upscale markets. Coastal shrimp mariculture has displaced many traditional coastal fishermen in Asia, and has damaged or destroyed mangrove ecosystems, which have served as breeding grounds for local fisheries for local markets. Export-driven aquaculture operations often channels resources away from production for local consumption. In general, any land, water, labor, or capital that is devoted to aquaculture for upscale markets has an associated opportunity cost in that those resources could have been used to help feed the local people.

Moreover, the destruction of mangrove forests that usually accompanies intensive aquaculture development has a direct effect on the coastal communities' sources of income and employment. For generations, coastal populations have been enjoying unrestricted access to mangrove products, earning their livelihood by felling and gathering poles, making charcoal, gathering firewood, collecting materials for making wrappers, roofs and the like. However, with the expropriation of mangrove forest for intensive shrimp mariculture, what was originally a common property and multi-user coastal resource is now transformed into a privately owned single-purpose resource (Jahaya, 1994). The fact that coastal communities do not have legal property rights over mangrove resources makes it much easier for outsiders to expropriate this resource. The net result is the deprivation of the use of a resource by the coastal population dependent on such resource for their livelihood.

Declining municipal fisheries yield can also be traced to the decline and loss of mangrove covers among other factors. The conversion and salination of rice and other agricultural land also leads to marginalization of coastal rural communities. Farmers who are stripped of their land are then forced to seek work elsewhere, migrating to cities and swelling the ranks of urban unemployed (Primavera, 1997).

Moreover, governments at times offer to lease or sell coastal lands to the farmers at greatly inflated unaffordable prices. Many have had their land "acquired" and confiscated without any compensation at all. With no alternatives, thousands have been forced to work for wages on their own land, or to migrate to the cities for low-wage work (Sierra Club, 1996a,b).

If left unchecked, many of the environmental and socioeconomic problems that have accompanied the development of modern aquaculture could be repeated. It is up to the present generation to learn from the mistakes of the past and remedy its errors for there is still considerable opportunity to guide its future course.

According to Kutty (1998), aquaculture sustainability itself has been questioned in several international, regional and national studies and discussions. However, definitions of sustainable and "responsible" aquaculture still remain vague and ranged from "strong" to "weak", and from being ecocentric to technocentric. Many who have thought about it prefer to see it as a broad goal and a concept and not to be defined at all. The concept has been variously defined, from a general goal of inter-generational equity to concerns for biophysical, economic, and/or social stability in a specific production system (Batie, 1989).

Biological definition of sustainable aquaculture is more often defined as a method of culturing aquatic plants and animals at reasonable stocking densities, which allows efficient production without undue dependence on chemicals and artificial feeds and without any negative impacts on the environment.

According to Tisdell (1995), "the sustainability of an aquaculture industry depends on its continuing economic viability and its relative profitability," which in turn depends on how well the productivity of aquaculture is sustained utilizing natural factors, reflected in prices paid for inputs used in aquaculture and the price(s) obtained for its product(s). The impacts of a sustainable aquaculture industry cannot be determined in isolation from the rest of the economy or its broad impact on natural resources and environmental systems. For example, although the productivity and economic profitability of an aquaculture industry may be sustainable, this may only be at the expense of the economics of operating another industry or industries (e.g., because of pollution from aquaculture). The overall value of production may therefore be reduced and the potential income available to future generations might be lower due to natural resource depletion or deterioration. In this respect, most economists define sustainable development (aquaculture) as development that ensures that the income of future generations is no lower than that of present generations, as required by the inter-generational equity principle".

In the past, economics have ignored the dependence of economic activity on the maintenance of life-support systems, or often their maintenance has been taken for granted. Economics concentrated mainly on the social sphere with the inter-dependence of economic and natural systems being given little or no attention. It is now known that economic activity cannot be assessed in isolation from its impacts on the natural systems. Most economic activities, including aquaculture, use natural resources and returns wastes to these, thus forever changing the resource base of these systems and do so substantially when the economic activity occurs on a large scale (Tisdell, 1995).

In considering the sustainability of any aquaculture production systematically, it is important to 1) define concepts of sustainability and of sustainable development, 2) identify factors internal to aquaculture that contribute to its sustainability or otherwise, 3) isolate impacts from outside of aquaculture that affect the sustainability of aquaculture and identify consequences of aquaculture for the sustainability of economic activities and economic welfare external to aquaculture, and 4) discuss policies that should improve the ability of aquaculture to contribute to the fulfillment of sustainability objectives (Tisdell, 1995).

To make aquaculture more sustainable and responsible than it often already is will include attention to the activity not standing by itself, but being nested in a complex environmental, economic, and social matrix.

Aquaculture Developments in Asia

It is well recognized that the current debate on aquaculture is primarily focused on the environmental sustainability of salmonid and shrimp culture, which apparently is leading to attempts to control such types of coastal aquaculture. Much less attention has been given to the need to support and develop sustainable inland culture systems producing food affordable to poor consumers (Bailey and Skladany, 1991).

It has been suggested by Barg and Phillips (1997) "that semi-intensive systems are more environmentally friendly and more socially acceptable, due to their significant potential to use less exogenous supplementary inputs, while providing many opportunities of efficiently converting locally available nutrient resources into production of fish affordable to a wider range of consumers in rural communities and urban centers". In addition, as suggested by Bailey (1997), "such systems often are within the reach of a wider range of resource-poor producers, being significantly less dependent on capital investment, and are therefore more likely to contribute to local economies and to enhance the ability of local communities to maintain social and economic viability."

In general, aquaculture can be a significant contributor to local food security providing food directly to the producer or to the immediate community, especially in many areas of Asia. This contribution can also be direct, as an economic activity, which is regular and reliable, especially in comparison with traditional capture fisheries, and as an option for diversification into new opportunities. In those locations where food security can be a significant issue, the key producers often operate at a small scale, directly involving families and communities. In terms of policy direction and options for specific development aims, this offers possibilities for involving disadvantaged groups, in targeting activities for the benefit of women, or in helping landless groups where there are under-utilized bodies of water.

Future Directions for the Governance of Aquaculture

In most of Asia, food production will always remain an overriding priority and thus intensification of aquaculture will continue. This will promote investment in research, which eventually leads to improved production efficiency. Sustainable development of aquaculture, be it intensive or extensive, would be the overriding strategic issue and challenge to all economic sectors. Issues of sustainability can be expected to change our perceptions of desirable forms of aquaculture development and management, and new ways of farming that will have to find a balance between food security, environmental and socioeconomic concerns.

According to FAO (1999) “over the last few years, there has been a growing interest in many countries to develop a comprehensive regulatory framework for aquaculture that will protect the industry, the environment, other resource users and consumers. This interest is being fueled by a host of factors which includes greater political attention as the economic importance and potential of aquaculture becomes more evident, greater awareness that inappropriate laws and institutional arrangements can significantly constrain the development of the sector, evidence of environmental damage and social disruption as a result of rapid and largely unregulated expansion of some high valued species in certain coastal areas, and a growing emphasis on assuring the quality and safety of aquaculture products in international trade”. These issues have pushed FAO to advocate the Code of Conduct for Responsible Fisheries as an answer to problems associated with aquaculture and fisheries in general.

The Code is beginning to have a worldwide influence on the development of an “enabling environment” for a more sustainable and responsible aquaculture; however, much remains to be done. Greater progress can be expected as new guidelines are developed on how to strike a balance among economic, social and environmental concerns, how sustainability choices apply in practice and how to analyze the economic and social cost of resulting actions (FAO, 1999). The focus in the future will be the issue of governance of aquaculture.

The governance of aquaculture can be improved if aquaculture is seen as a part of an integrated coastal resources management program. The concept of an integrated coastal zone management can succeed in dealing with the negative socioeconomic impacts of aquaculture since the approach from the very beginning attempts to identify the links between different activities and resource requirements and tries to reduce the negative impacts of one activity on the other. The optimum use of resources thus becomes the overall objective (Lohmeyer, 1999). The regulatory framework will then focus on 1) the creation of a legal basis for environmental provisions to regulate harmful side effects (externalities) from industry in accordance with the polluter-pays principle so that one sector's development efforts do not hamper another's, and 2) clarification of the rights of use so that investors are accountable and exploit natural resources on a sustainable basis. The effective governance of aquaculture must therefore come from the prevention of externalities through integrated coastal zone programs and the management of externalities through regulation using the polluters-pays principle,

as is the case in all other industries. In addition, clearer definition of rights to coastal areas would be a basis for effective reduction in negative social impacts of development. Legitimacy for any form of governance, however, has to come from the broader participation of both resource users and the local population. This is important to ensure that the de facto laws and de jure laws are close to each other. This means effective governance requires co-management with all the stakeholders and user groups.

Conclusion

Aquaculture will continue to expand especially in Asia but its development will be seen in much broader terms than the narrower technical aspects of production. Political, economic, social, environmental and legal aspects will be given greater emphasis as aquaculture emerges as an industry competing for resources from other sections of the economy. The need for well-informed policy measures and regulatory frameworks would push governments to consider frameworks for more responsible governance of the aquaculture industry. One such governance approach would be to include aquaculture as part of an integrated coastal zone management program. Such an approach will be concerned with the reconciliation of competing demands for the same coastal resources and trade-offs between competing uses. More responsible governance also means that the governing authorities should establish mechanism to work with all stakeholders in the coastal zones. Greater participatory management of coastal zones will be an important cornerstone of good governance to enable responsible aquaculture.

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