www.jolsc.com e ISSN: 2455-0930

General Article

Rural Aquaculture as Source of Livelihood to Rural People: A General Overview

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Abstract

''Aquaculture is the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants''. Aquaculture can be defined as treatment of the confined water for growing aquatic organisms and harvesting. India's Aquaculture production is classified into two types first is fresh-water and second is brackish-water production. Freshwater Aquaculture production contributes 55 % of total fish production in India. Aquaculture is the fastest growing enterprise within the agricultural sector. However, aquaculture is more complex than agriculture and animal husbandry, owing to diversity of taxonomic groups and unfamiliarity of the environment/medium to the cultivator. Aquaculture expansion will involve increasing the number of fishponds and optimizing the use of available natural resources. Hunger and malnutrition remains amongst the most devastating problem,s facing the world poor and needy (FAO, 2002). About 80 to 90 million people have to be fed yearly and most of them are in the developing countries.

Key words: Aquaculture, Fish production, Rural livelihood

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www.jolsc.com e ISSN: 2455-0930

www.jolsc.com e ISSN: 2455-0930

Introduction

The most reliable source of protein for many is fish, yet millions of people who depend on fish are faced daily with the fear of food shortage Fish is a vital source of food for poor rural people. ‘‘Aquaculture is the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants’’. Aquaculture can be defined as treatment the confined water for growing aquatic organisms and harvesting. Aquaculture is a significant socio-economic activity, especially for rural communities, contributing to livelihoods, food security and poverty alleviation through income generation, employment, services, use of local resources, diversified farming practices, domestic and international trade and other economic investments serving the sector. An excellent source of high quality animal protein and highly digestible energy, as well as an extremely rich source of omega-3 polyunsaturated fatty acids (PUFAs), fat-soluble vitamins (A, D and E), water-soluble vitamins (B complex) and minerals (calcium, phosphorus, iron, iodine and selenium). Consumption of omega-3 fatty acids from seafood products (including those from aquaculture) has been shown to prevent certain types of diseases (e.g. coronary heart disease and stroke, autoimmune disorders, cancers of the breast, colon and prostate, hypertension and rheumatoid arthritis). At present, aquaculture is regarded worldwide as one of the fastest growing food producing sub-sectors, demonstrated by a continuous increase in total production throughout the last decade in developing countries. At present, aquaculture is regarded worldwide as one of the fastest growing food producing sub-sectors, demonstrated by a continuous increase in total production throughout the last decade or more, particularly in a number of developing countries. Per capita fish availability to an average Indian is about 9 kg, less than the world average (12 kg) and the quantity (11 kg) recommended by the WHO for nutritional security. In India, aquaculture activity was discovered first by the farmers of West Bengal and later in Andhra Pradesh. Asia has been the centre of fishing and aqua cultural activity. Among the Asian countries, India ranks second in culture and third in capture fisheries.

Aquaculture system:

An aquaculture system may be characterized by its degree of intensity of farming as extensive, semi-intensive and intensive system.

1) Extensive systems

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Extensive systems are characterized by low level inputs and low rate of production. Feeding activity in the field. Fertilization of ponds promotes the growth of simple plants. Fish stocked in these ponds feed on phytoplankton and zooplankton. Stocking density is too low (1 to 2 fish per m^2) Food safety is low level. There is a little control over the stocks and hence, a yield is low. The yields of extensive farming system vary from 500-1500 kg/ha.

2) Semi-intensive systems

Semi-intensive system is characterized by medium level inputs and medium rate of production. It is partially dependent on natural productivity, fertilization, supplementary feeding, stock management, semi-intensive systems having particular importance for poor farming communities, because they depend largely on natural food which may be increased by low-cost fertilizers such as manures and supplementary feed range from cereals and fishery by-products to formulated feeds. Semi-intensive aquaculture employing earthen ponds is by far the most common system in developing countries by virtue of its simplicity and the low required investment. In semi-intensive systems, fingerlings are stocked at medium density i.e., 2-5 per m^2 and fish are fed mostly with commercial feed. Good water quality and sufficient dissolved oxygen are maintained by continuous water exchange and occasionally with aerators. Food safety is at medium level. The yields of semi-intensive farming system vary from 3,000-4,000 kg/ha.

3) Intensive systems

Intensive systems are characterized by high level inputs and high rate of production. Intensive fish farms can be operated using earthen ponds, but more often tanks or cages of concrete or fiberglass are employed. There is a decreased dependence on the availability of natural food and greater dependency on the use of commercial feeds. Scientific management of the fish stock, ponds, fertilization, harvesting and control of various diseases of fishes is of necessity. In intensive systems, fish production per unit of surface area can be increased at will, assuming sufficient supplies of oxygen, fresh water and food are provided. Fish production costs in intensive farming are higher than in extensive farming, mainly because of the high cost of feed (100 percent of required diet ideally comprised of at least 30% of pure protein) in intensive aquaculture with densities 4-8 fingerlings per m^2. Artificial aeration is essential, usually relying

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on bubblers, cascades or liquid oxygen dissolution. High densities involve a very high risk of infections by parasites, fungi and bacteria, which mean that intensive aquaculture requires close monitoring and a high level of knowledge on the part of the farmer. The yields of this farming system vary from 5,000-8,000 kg/ha.

Constraints:

1) Inadequate knowledge

In general there is insufficient knowledge or information relating to rural aquaculture available throughout the systems from potential new entrant farmers to service providers and from extension workers to government policy makers. An outline for a proposed knowledge base for rural aquaculture should be presented. At the local administrative unit or grass roots level there is a need for an aquaculture knowledge base for service providers. This should outline the range of technologies that currently exist, including their social, economic and environmental and implications for the diverse resource profiles of poor household. The knowledge base would also provide basic information for service providers at grass roots level to facilitate their work in partnership with farmers to develop locally appropriate technologies and corresponding extension materials. Local development workers need to be provided with the skills to deal with information about how to access it, interpret it and use it in partnership with farmers to adapt technologies and to develop extension materials. Basic knowledge and interactive skills needed to develop locally through appropriate technology and an experiential, learning based approach.

2) Supply of seed

A crucial factor in the development of aquaculture is a supply of seed. The poor may attempt to culture fish if they have access to seed in small household ponds in areas where aquaculture is not traditional, as wild fish decline due to over fishing and environmental degradation.

3) Diseases

A major constraint to the development of aquaculture is the loss caused by microbial diseases which cause heavy mortality and loss of several hundred million dollars. For microbial diseases, early detection of pathogens is very important. Molecular techniques for early and rapid detection of pathogens are being developed in India. Diagnostic laboratories with facilities for rapid detection of pathogens by molecular methods, such as Polymerase chain reaction (PCR)

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should be set up in all the fisheries colleges of India. Farmers should have easy access to these laboratories to get the desired diagnosis, medicine and suggestions at subsidized cost.

Suggestions:

Following suggestions are made for sustainable aquaculture in India

- The use of chemicals and fertilizers should be minimum.
- Maintain aquaculture biodiversity of the area in case of species transfer in case of aquaculture.
- Monitoring aquaculture system by expert group should be made mandatory to aqua farmers.
- Judicious stocking of seeds should be done and adequate supply of seeds should be monitored.
- Effective drainage system should be provided to remove harmful pollutant from water.

Advantages of Aquaculture

The development and wider adoption of aquaculture can be seen as a significant basis for improving household food security and other needed welfare. Being a supplier of food and a commodity for trade, aquaculture has the potential to contribute to the food and nutritional status of people.

1) Food and nutritional security

In addition to supplying cheap protein for human consumption, aquaculture provides excellent opportunities for employment and income generation, particularly in the more economically depressed rural areas. Aquaculture employs large numbers of people either directly in fish farming activities (as for example, fish pond/fish pen/fish cage operators, caretakers, construction workers, pump tenders, vehicle/machine operators, harvesting aides) or indirectly as employees in related or ancillary industries (as net manufacturers, boat-makers, fry gatherers, bamboo suppliers).

2) Health benefits

Long-chain polyunsaturated fatty acids present in fish and fish oils have several positive health benefits during different stages of human life like conception, growth and development and

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prevention of diet-related chronic diseases. Iron deficiency is the most common micronutrient disorder. This problem is most severe in India, where 88 per cent of pregnant women are anemic. Eating fish 1-2 times/week before conception, during pregnancy, lactation and breast feeding will significantly contribute to the growth and development of babies and ensure good health of both mothers and babies. In Asia, aquaculture products are essential in improving the largely high-carbohydrate, low-protein diet predominant in the rural area. A relatively small amount of fish protein in combination with a cereal-based diet would enhance the nutritional quality of the cereal protein thus improving the overall quality of the diet.

3) Foreign exchange

Aquaculture has likewise proven to be an excellent source of foreign exchange for aqua culturally-producing countries with the export of high value species like shrimps, oysters, and seaweeds. In this sense, aquaculture therefore not only provides employment opportunities but also contributes to the development of rural areas. It also helps to maximize the use of idle or marginal lands in a number of developing countries where land is still the basis of wealth and social status and thus general well-being.

4) Income generation

Aquaculture is increasingly being recognized as the generator of good income for households, particularly cash income to subsistence and semi-subsistence households in rural farming. In many countries, especially in the developing world, fish and other aquaculture products serve as the main source of cheap protein to combat malnutrition and under-nutrition, fish having essential amino acids that are often lacking in cereal protein substitutes. Value-wise, cultured fish products compete with poultry and livestock in the local market. Nutrition wise, however, aquaculture species are more efficient in converting food into body tissue than poultry or livestock.

Conclusion

Aquaculture's proven potential as a supplier of vital nutrition to poor households and a contributor to poverty reduction and overall welfare of low-income and resource-poor or asset-poor households in developing countries. Aquaculture over recent years has not only led to

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substantial socio-economic benefits such as increased nutritional levels, income, employment and foreign exchange but has also brought vast underutilized land and water resources under culture. With freshwater aquaculture being compatible with other farming systems, it is largely environmentally friendly and provides for recycling and utilization of several types of organic wastes. Aquaculture contribute to the sustainable rural livelihoods of poor farming households and it could contribute more widely to improving the welfare of the poor, if appropriate approaches were implemented by development agencies. Sustainable aquaculture system can be developed in harmony with the physical-chemical and biological environment as well as the socio-economic environment involving other sub-sectors namely fishing, agriculture, forestry, tourism, public health and housing among others, ensuring protection of all the stakeholders involved.

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