Responsible Fisheries Management and Extension in Coastal Fisheries

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In developing Countries, the major aim of extension education is to change the traditional way of adopting the low yield technologies and production enterprises through extension interventions. These extension interventions in public or private domain change the behavior of clients in terms of their attitude, knowledge and skills. The change in behavior of stakeholders thus results in improved production, better living and improvement in the national economy. Extension education in fisheries aims to disseminate the various improved practices or technologies and assist them to adopt the innovations.

The annual marine fish production in India is estimated around 3.3 million tonnes and the country has exported about 9.28 lakh tonnes of marine products earning about USD 3.51 billion (Rs.18,856 crores) during 2012-13. It is estimated that in India about 25% of 8.5 million fisherfolk are actively engaged in fishing and these people are living in 3288 villages in the various coastal states and union territories. One of the primary roles of extension in marine fisheries is to increase the fish catch by transferring the proven technical know-how to the actual users. India has a vast potential for fisheries development. For example, in the marine sector it possesses, along a coast line of nine marine states, over 20 lakhs sq.km of Exclusive Economic Zone (EEZ), of which 4.15 lakh sq.km is the continental shelf rich in demersal and midwater fish resources. About two-third of marine fish production is contributed by 1.8 lakh motorized and non-motorized fishing crafts and the remaining one-third comes from about 59,000 mechanised boats.

Responsible fisheries codes requiring extension interventions

By the late 1980s, it became clear that fisheries resources could no longer sustain rapid and often uncontrolled exploitation and development, and that new approaches to fisheries management embracing conservation and environmental considerations were urgently needed. The code of conduct for responsible fisheries which was unanimously adopted on 31st October 1995, by the FAO conference provides a necessary framework for

national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment.

In this context, the following responsible fisheries codes requires attention in fisheries extension interventions so as to promote voluntary acceptance of the codes and their effective applications.

- Usage of improved gear/ practice to increase fish catch and at the same time, **avoidance of over fishing**
- Usage of improved gear/ practice to **conserve fishery resources**
- Usage of method to **reduce fuel consumption** for responsible fishing and energy optimization
- Observance of Government **fishing holidays like monsoon trawl ban**
- Usage of measures to **avoid catching non-target fishes** during fishing trips
- Usage of measures to **avoid catching of juveniles**
- Usage of measures to **avoid pollution of sea** and waste disposal to protect coastal areas
- Observance of government **restrictions on fishing in some selected areas** for conservation
- Following regulations or restrictions imposed by local people/ bodies for protecting fishery resources and to **minimize the adverse impacts on the environment due to aquaculture**
- Promoting the contribution of fisheries to food security and food quality, **giving priority to the nutritional needs of local communities**
- Promoting the protection of living aquatic resources, their environments and **management for sustainable fisheries**
- Ensuring good fishing facilities and equipment assuring **safe, healthy and fair working and living conditions**
- **Conservation of biodiversity** of aquatic habitats and ecosystems and protection of endangered species
- The **harvesting, handling, processing, and distribution** of fish and fishery products have to be carried out in a manner which will **maintain the nutritional quality and safety of the products**, reduce waste and minimize negative impacts on the environment.

Socio-economic profile of marine fisherfolk

In the micro level studies conducted by CIFT, (Balasubramaniam and Ashalatha, 2007), it was found that in fishing villages studied, even though the artisanal fishermen have more or less a common life style and social background, the ownership pattern of fishing craft and gear, and individual status varied between the geographical regions in a state and also between the states. The general characteristics of traditional fishermen included illiteracy/ low education level, employment in fishing for 200-300 days per year, underemployment due to off-season in fishing, annual income of around Rs.25000, dwelling in huts or semi-pucca houses, poor socio-economic living conditions and amenities, low investment and variation in ownership pattern of fishing craft and gear, less

fish catch due to non-availability or depletion of resources in nearby areas, unfavorable weather conditions and seasonal availability of fish. During offseasons, as the fish catch is very less, it results in getting loans for meeting the operational expenses in fishing, consumption expenses and other necessities. Chances of getting lower price for their catch, and uncertainty in prices during sale are found to be the reasons for their poor motivation for adoption of innovations.

It is reported that the fishermen operating catamarans (6-7 m LOA) had obtained an average fish catch of 40-60 kg perday per craft, and their annual income was about Rs.10,000 to Rs.13,000.The fishermen operating small FRP crafts (8.5 to 9.25m) had obtained a mean fish catch of 100 to 155 kg/day, and their annual income was about Rs.40,000/ to 1.5 lakhs. It is seen that the fishermen operating large plank built crafts (15 to 17 metres) had obtained an average fish catch of 550 kg/ day and their annual income was about Rs.40,000 to Rs.1 lakh due to higher operational expenses and size of crew (30 to 35).For mechanized fishing boat owners operating smaller boats (11.5 to 12.5 m LOA), the average annual catch varied from 40-100 with an annual income of Rs. 3 to 5 lakhs.

The key roles identified for extension education for responsible fisheries management are as follows:

a) Avoiding indiscriminate trawling and use of trawl cod ends with less than legal mesh size, catch of juveniles and discards/non-targeted species.
b) Use of improved trawl designs and large scale adoption of square mesh cod ends for the exclusion of juveniles.
c) Regulating the operation of ring seines and standardization of ring seine units for optimum exploitation.
d) Area-wise optimization of fishing fleet size and fleet categories to reduce over exploitation
e) Regulation of fishing by chartered foreign vessels and providing information on potential fishing grounds
f) Use of By-catch reduction devices and Turtle Excluder Devices.
g) Awareness on modern fishing techniques and hygienic on board handling of fish
h) Extension schemes to increase the awareness of improved fishing nets and practices, and to facilitate capacity building programmes.
i) Improvement of socio-economic conditions of fisherfolk through development programmes.
j) Usage of methods to reduce fuel consumption for responsible fishing and energy optimization.
k) Encouraging small scale fishing and schemes to own fishing units among artisanal fishermen

Extension Approaches

Different extension educational approaches were used in the past under the extension educational programmes. These approaches can be grouped under seven main headings: 1) the educational approach, 2) the training approach, 3) the cooperative self-

help approach, 4) the integrated development approach. 5) extension service approach 6) people participatory approach and 7) project approach. These are not watertight, mutually exclusive compartments, nor are they purely educational classifications. They differ mainly, not in their educational principles and methods, but in their quite different underlying conceptions and theories of rural development.

1. *Educational approach*

The educational approach uses the extension methods for educating the people. It believes that the extension can transform static economy into a dynamic economy. While improving the quality of life, it emphasizes the communication of information about innovative technical practices. It is mostly followed in America and Asia and is referred to as the classical model of extension.

2. *Training approach*

The training approach is considered to be related to the educational approach. It emphasizes more systematic and deeper learning of specific basic skills and related knowledge. The trained extension workers are supposed to transmit the useful knowledge grained by them to the rural people. The training and visit system is a good example of the training approach. The training and visit system evolved by Benor and Baxter (1984) was used in most of the developing countries with assistance from the World Bank to reduce the technological gaps.

3. *Cooperative self-help approach*

The cooperative self-help approach starts with the assumption that the complex process of rural transformation must begin with changes in the rural people themselves. The chief motive power for development must come from the people so that outside help of various kinds can be provided in response to the expressed needs of the people. There is heavy emphasis in this approach on the building of local institutions for cooperative self-help and governance.

4.*Integrated development approach*

The integrated development approach emphasizes the need of coordinating different agencies under a single management system of essential components required to get rural or fisheries development moving. The management system may be authoritarian. The main emphasis is on rational development and coordination of all principal factors required for rural and fisheries development. Fish Farmers Development Agencies (FFDA) in India used this approach in tackling the problem of inland fisheries development.

5.Extension service approach

Extension service approach is followed when an organization employs the extension process as a means of programme implementation. Here, the extension organizations often provide one or more supply and services such as credit, key inputs like fertilizers, seeds, pesticides, herbicides, etc. with or without subsidy.

6.People participatory approach:

This is based on the experience than much can be achieved when rural people organize for their own benefit. It assumes that farmers are knowledgeable regarding food production but they can also benefit from outside experience. Programme planning and staff are usually controlled by local people. The approach tends to be more efficient, since programmes tend to fit the needs and interests of local people.

7.Project approach

The project approach assumes that large, nation-wide extension is likely to be ineffective, so a small area is designated for a period of time and resources are poured. The assumption is that benefits demonstrated within the project area can then be replicated elsewhere. They tend to be controlled by officials, and have the advantage of focus.

Adoption of responsible fishing technologies

In the field of fisheries technology, a new idea cannot be transferred to the fishermen so easily. Education of fishermen and rural people is not the same as educating the organized clientele categories in the industrial sector. Educating rural people involves convincing them about the new knowledge in their fields or situations to produce more and live better. Rural people, particularly adults, can be convinced of improved practices only when knowledge is carried to them in a convincing way. Even when they are convinced, the decision to apply the knowledge to their specific local situation have to be made by themselves for sustainability.

Factors related to adoption of technology:

1. Social factors: When there is great emphasis on maintaining traditional ways, rate of technology adoption will be very slow.

2. Personal factors: It was found that people who are mentally flexible, more educated and having contact with research and development agencies, adopt the technology more quickly than those who are mentally rigid, less educated and having less/no contact with outside agencies.

3. Quality of technology

a) Complexity: Generally speaking, the more complex a technology and more change it requires in the existing operation, the more slowly it will be adopted.

b) Cost: Those technologies which cost less seem to be adopted more rapidly than those which are more expensive.

c) Net returns: Technologies which yield the greatest marginal returns in the shortest time seem to be adopted most rapidly.

d) Compatibility: A technique which is not compatible with the cultural norms of a social system will not be adopted so readily.

a. Divisibility: an innovation that can be tried in small installments will generally be adopted more rapidly than a technique which cannot be tried with small investment.

b. Communicability: If the result of a technology is easily diffused or communicable, its adoption rate will be very high.

Extension methods

The technologies developed in research institutes are transferred to the end users by different extension methods. Extension methods are classified as (1) individual contacts (2) group contacts and (3) mass contacts.

Extension methods to a particular situation have to be carefully selected taking into consideration the facilities available in the extension organization, number of staff, budget allocated, knowledge level of the clients, nature of technology etc.

Extension Management Constraints

As the fisheries extension work comes under the States' subjects, the analysis of extension management by the various State and Central Government Organizations, and Non-Government Organizations would help to activate the extension delivery mechanisms and also to improve the extension organizational development programmes. Some of the important management constraints are listed below :-

1) In extension organizations like State Fisheries Departments, the work is compartmentalized such as marine fisheries, freshwater aquaculture, brackishwater aquaculture, etc. and even within a sector, extension forms only a part besides activities such as administration, conservation and licensing, research, fish seed farms, marketing, etc. In some departments, the officials are designated as Fisheries Extension Officers and in some States, they are designated as Sub-inspector of Fisheries/ Inspector of Fisheries and as a result, extension approach is not followed. The number of fisheries extension officials working in a district or taluk levels are highly inadequate and usually, they have to cover more villages for extension work. For field activities, they don't get vehicle facilities, and teaching aids and equipments. The budget allocated for extension work is inadequate and comprehensive schemes are required to provide the key inputs with extension educational activities. In several States, the private agencies provide the inputs and technical guidance on commercial basis.

2) In extension organizations, the personnel management policies such as the periodical in-service training of extension officials, transfers and postings of suitable persons, promotional opportunities, improving job satisfaction, and timely recruitment for various vacant posts play an important role in bringing out efficiency in extension management (Balasubramaniam and Perumal, 1991). As ICAR Fisheries Research Institutes have all facilities and expertise to train the extension officials, they may have to be deputed at least once in five years for imparting the advances made in the technological sectors.

3) All research innovations cannot be adopted in the field, as they have varied attributes such as profitability, initial investment, complexity, local compatibility,

direct and indirect impact, availability of inputs, and other relative advantages of adoption. Hence, target based appropriate technologies have to be selected for wider adoption and popularization, and on such technologies, the extension efforts will be more useful. Many of the technological practices need higher investment on account of costlier inputs. When there is no substantial increase in income to the corresponding increase in expenditure, financial constraints are often reported as the reasons for the non-adoption of innovations.

4) In the extension organizations, appropriate technological schemes have to be planned and implemented to popularize the selected innovations. Starting separate extension units alone will not be sufficient if they are not empowered to provide the required key inputs. Providing infrastructural facilities and operating welfare schemes take a major share of the budget allocations and for effective transfer of technologies, adequate schemes have to be implemented. As the innovations are resource-specific and target oriented, constant monitoring and supervision are required to achieve the goals.

5) For strengthening interpersonal communication, local leaders, key communicators and cooperative clients have to be identified and trained in the technological subjects. District level Fisheries Training Centres and Krishi Vigyan Kendra may have to increase the number of training courses and trainees to provide the information support. Wider coverage by mass media channels such as the use of extension publications, exhibitions, radio and TV programmes may have to be periodically carried out to spread the innovations among the targeted audience.

6) Participatory management style at different levels is being followed for improving the socio-economic conditions of people engaged in fisheries. In community based fisheries management, fisherfolk and their NGOs have many roles as protectors and managers of coastal environment and resources.

7) In several areas, the environmental factors such as the use of Coastal Regulation Zones, the destruction of mangroves and conversion of agricultural fields, increase in soil salinity, environmental pollution due to industries, change in rainfall pattern, contamination due to heavy metals, antibiotics, pesticides and other toxic elements, and improper disposal of wastes influence the extent of adoption of innovations, and these areas need special attention and, policies to meet the constraints.

8) Non Governmental Organizations have important roles to motivate the organized groups of people to adopt the innovations, to facilitate the purchase of key inputs, to get credit facilities from banks, to provide technical guidance by availing the assistance of Government departments and to market the output without the exploitation of commission agents so as to improve the net earnings of the members. These NGOs could be effectively involved in technology transfer work, and they minimize the Government efforts and resources.

Conclusion

To conclude, though, there are several subject areas for responsible fisheries management in coastal fisheries, appropriate technologies have to be selected by the extension organizations for popularization and wide scale adoption among the targeted stakeholders. Without specific projects and allocation of funds, extension interventions will not occur in several situations due to the various constraints. Hence, even small scale pilot projects could be implemented in different centres and the successful technologies could be extended to several other centres

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