Streamlining Fisheries Extension

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Introduction

The fishery sector is increasingly recognised as a sunshine sector as it contributes immensely not only to the foreign exchange reserves and GDP, but also to the food and nutritional security. More important is the livelihood security of the 15 million people depending on the sector. But, the sector faces a number of challenges. The major issues are overexploitation of the resources and consequent decline in catch, upsurge in cost of fishing, climate change and vulnerability issues, low yield from inland resources etc. (Kurien, 1991; Kurien and Achari, 1994; Devaraj and Vivekanandan, 1999). In the recent years, aquaculture and inland sectors has outgrown the stagnated marine sector and contribute 65 % in 11.41 million tonnes in 2016-17.Given the extensive river and canal system of about 195 thousand km, consisting of 14 major rivers, 44 medium rivers and numerous small rivers and streams, in addition to the pond and tank resources of at 2.36 million ha, inland sector including aquaculture to remain as the major sources of growth in Indian fisheries sector. The recent evidences suggest an increasing role of inland sector, both as a share and in growth performance (Suresh and Sajesh, 2017). A significant issue is the impact of climate change and the adaptation to it. The coastal population is vulnerable to climate change and reduced fish catch remains a major challenge to the livelihood security. Further, fishing operations contribute to the climate change due to increased emission of greenhouse gases. For every tonne of fish caught, the CO2 emission has increased from 0.50 tonnes to 1.02 tonnes during 1961 to 2010 (Vivekanadan et al., 2013).The fisheries sector has to respond to these challeneges, so as to achieve the envisaged sustainable development targets.

In order to consolidate the gains and to mitigate the emerging challenges, a strong extension system should be there in place. Extension provides the information and services needed and demanded by farmers and other actors in rural settings through different activities to assist them in developing their own technical, organisational, and management skills and practices so as to improve their livelihoods and well-being. Fisheries extension envelops the fisheries development in action (Ananth, 2010). Cole (1977) has opined that that fisheries extension services is mainly intended to achieve all-round development of the fishing sector. Wang(2001) have noted that effective extension services have contributed to increased aquaculture production.

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Further it could support the economic development and wellbeing of aqua farmers. In India, though both the central and state governments formulate policy guidelines, the states have the major role in executing the extension programs at field levels through their respective Departments of Fisheries (DoFs). The Union government also provides financial support through its schemes to provide technical, financial and extension support to aqua farmers (Kumaran et al., 2002).

Fishing community in India is at the lower rung of the development (Sarkar,2012). It has been pointed out that the low standard of living of fishing communities in southern Asia is

due not only to low productivity caused by primitive production methods and processing technology, but also to the poor socio cultural and economic conditions with which these technologies are incompatible. Extension work includes attempting to change views, beliefs, norms, abolishing social taboos and exploitation, with the aim of improving the standard of living. Tietze (1984) has suggested areas of activities to be undertaken to achieve the goals like welfare of fishermen as well as conservation and efficient exploitation of fishery. Scope of fisheries extension is evolving overtime with the emergence of new challenges, concepts and practices. It encompasses many aspects like entrepreneurship development, disaster management, organizational development etc.

Table 1: Functions of Fisheries Extension Services

Area of Work	**Objectives**
1. Technology transfer	Improved techniques of mariculture and aqua culture Introduction of modern craft and gear material for fishing Scientific post- harvest practices Diversified technology application in fisheries Introduction of innovative technology application methods
2. Information And support services	Information support to fishermen about prices, types and availability of known and new fishing inputs
3. Food safety and quality.	Awareness creation on importance and methods of hygienic handling of fish. Promotion of food safety and quality standards among various stakeholders.

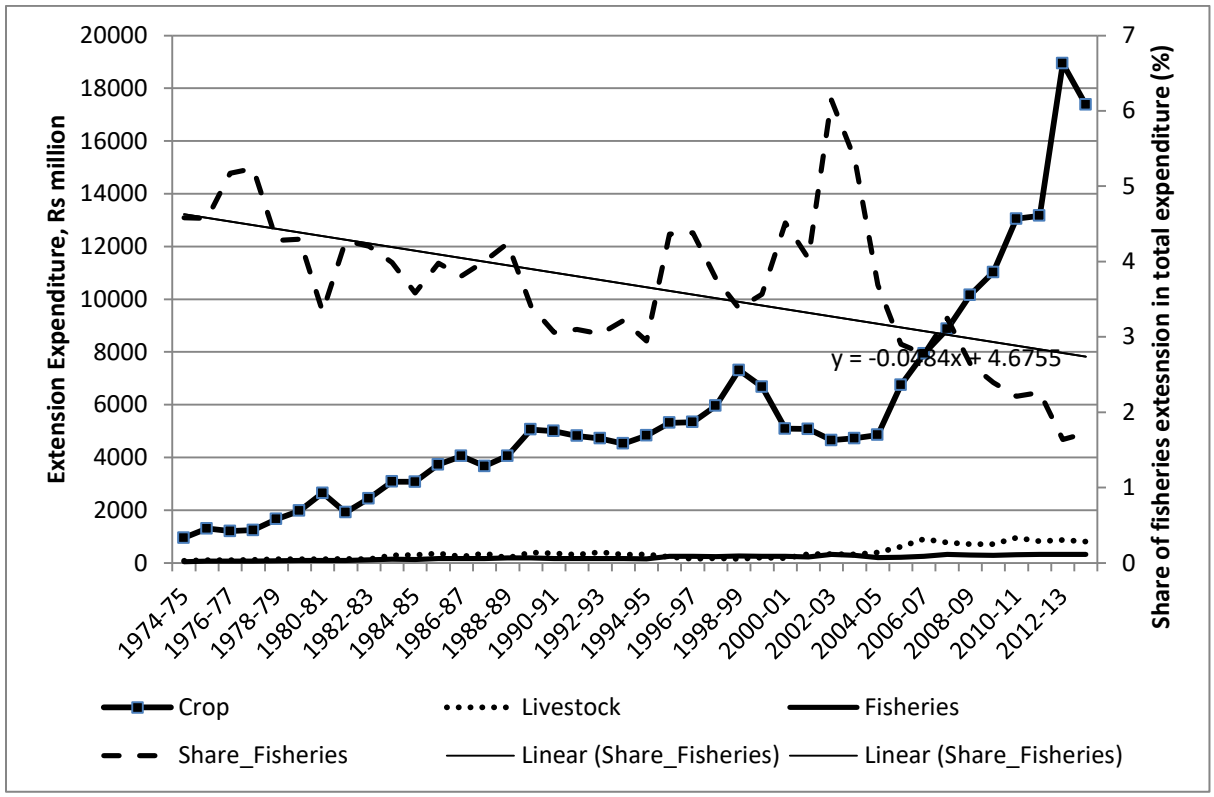
4. Marketing and distribution	Provision of real time marketing information to fishermen about wholesale and retail prices, ultimate market places etc. Strengthening the position of the fishermen against middlemen by organizational and financial support of marketing through fisher women and co-operatives
5. Sustainable fisheries	Advising and educating fishermen in resource conservation methods and responsible fishing practices
6. Credit and finance	Facilitating direct contact between banks and fishermen Facilitating indirect institutional finance through self help groups, co-operatives, credit societies etc. Implementing welfare schemes for the development of poorer fishermen Promotion of institutional savings
7.Organizational and capacity development	Facilitating the development of fishermen organization to promote collective action. Capacity development of various actors in the value chain.
8.Entreprenurship development	Identification and promotion of entrepreneurial possibities in fisheries sector Development of entrepreneurial capacity of students, rural youth , fishermen and women Incubation support to potential entrepreneurs Facilitating technology commercialisation
9. Safety measures	Awareness generation about life saving equipments, risk communication devises and survival strategies. Skill development on use of communication devises and survival techniques
10. New extensionist approaches	Networking, promotion of interagency collaboration, facilitation, creating many-to-many relationships among the wide range of actors.

Though extension has multitude of roles to play spanning from technology dissemination to conveyance of policy goals to major stakeholders, role performance of extension system depends on the policy support with respect to financial outlay and human resource. The paper is an attempt to analyse the policy support to fisheries extension in terms of public expenditure on it.

Indian fisheries sector faces a multitude of issues. Some of the issues are emerging and begs for renewed focus of the extension system. The overexploitation of fish stocks, climate change and its consequence on fish catch and livelihood of the coastal population, quality and food safety concerns, pollution of marine ecosystem, sustainable fishing practices, fish processing and entrepreneurship development are few issues where the extension system has to focus. Further, information on development initiatives and institutional support are to be spread among the clientele. To address these challenges, the research outputs need to be passed on to the farmers, for which an efficient extension system is required. For this development of adequate human resources and institution development, supported with adequate financial outlays are required. The financial supports needs to be in the realm of establishing extension methods, including traditional methods as well was usage of Information and communications techniques (ICTs) and infrastructure development.

The trends in the expenditure on agricultural extension disaggregated across crops, livestock and fisheries are provided in Figure 1. The figure also provides the share of fisheries extension in overall extension expenditure. Trends in expenditure (Centre plus State governments) on fisheries extension from 1974-75 to 2014-15 (Figure 1) pointed out that there is a steady rise in expenditure on fisheries extension except for the reversal during the periods 1990-91 to 1994-95 and 2002-03 to 2004-05. The expenditure on fisheries extension has increased from about Rs 50 million in 1974-75 to Rs 319 million (real price, 2004-05 base) by 2014-15. Though the trend is impressive, at the absolute level, it appears to be quite meagre, considering the vast coast line and emerging trends in aquaculture.

Figure 1: Trend in Expenditure on Extension in India,1974-75 to 2013-14, real price (2004-05 base)



But, while comparing the expenditure on fisheries extension with expenditure on other sectors, especially with expenditure on agricultural extension, huge difference is observed. Further, the difference was found to be getting widened over years. There was large scale expenditure on agricultural extension from 2004-05 on wards owing to the implementation of Agricultural Technology Management Agency Programme. But, there was no commensurate increase in the case of expenditure on fisheries extension or livestock extension. Expenditure on agricultural extension is justifiable as there are around 158 million operational holding to be reached. But, it is also important to enhance the spending on fisheries extension, given the contribution of the fisheries sector to food and nutrition security, employment generation and foreign exchange earnings.

Over the years, the share of fisheries extension in the total extension expenditure was found to be less than 5 per cent except during 2002-03 (6.14%) and 2003-04 (5.35%). Further, there was decrease in the share during recent years as evident from meagre 1.7% during 2013-14. The trend in the share of expenditure on fisheries extension in total extension expenditure points out continuous decline over years with average annual reduction of 0.048 percentages. The findings have serious policy implications, given the potentials of the sector being confronted with deficits in the realm of information, advisory, capacity building and support services.

While the total fish production has increased, it is characterised by an increase in the share of the inland fisheries and a corresponding decline in the marine fisheries. The issues facing in both the

sectors are also different. The aquaculture and inland fisheries constitute close to 60% of total fish production in India, and this share is on increase. The public expenditure towards fisheries extension carries a significant role in it. It is reported that the marine fisheries is facing the issue of sustainability, as there is a decline in the catch due to several factors (NCAP,2004). Various state governments have developed regulations with regard with an aim to ensure sustainable fisheries. For example, Government of Kerala has developed trawl ban in during the monsoon period. Also there are technologies with regard to craft and gear which can help reduce juvenile fish. ICAR- Central Institute of Fisheries Technology, Kochi has developed several technologies including gear with square mesh codend. This technology is proved to address juvenile harvesting. Another important issue is catch of unintended organisms including sea turtles, which are classified as endangered. The Turtle Excluder Devices (TED) developed by ICAR-CIFT is found to be effective in addressing this issue. Usage of energy efficient fishing vessels including solar powered one, post-harvest management of fisheries, safe fish consumption, fish processing, gender issues and entrepreneurship development are the major areas of concern. Another area of concern is safety of fishermen at sea and pollution in marine ecosystem. There are several technologies to boost marine fish production including cage culture which need to be promoted. Reducing the cost of the equipment is a concern for promoting its adoption. It is estimated that cage culture has the potential to produce almost million tonnes in India, so as to address the growing demand for marine fishes.

The management of marine fisheries is complex on account of the property rights issues. Marine fisheries, operates with the common property or open access regime, where the principles and practices applicable to private property regime is not tenable. Strong participation of the community is essential for implementing any kind of regulation, development activity. Awareness generation is an important pre-requisite. Local knowledge, norms and beliefs of the fishermen community has strong linkage with the fishing operation and livelihood. The issues of marine fisheries are not recognised in mainstream agricultural extension system, which serves as the major impediment in the effort to uplift the dependent population from the abject poverty.

On the other hand, inland fisheries faces serious issues with regard to its production managed including pond preparation to marketing and value addition. Feed preparation, application of feed supplements, antibiotics and other chemicals are matter of concern. However, the need for a strong extension system has not received the attention it required.

A disaggregated analysis of the growth in the real expenditure in extension activities reveals that the extension expenditure over years has not registered a consistent growth (Table 2). In fact, during the period between 1995-96 to 2004-05, the real extension expenditure has suffered a negative growth for crop and fisheries sectors resulting in negative growth of overall expenditure. The trend has reversed in last one decade.

Table 2: ***Level and Growth of Extension Expenditure in India, by Sector, 1974-5 to 2013-14*** **in million Rupees and percentage per year**

	Crop	**Livestock**	**Fisheries**	**Total**
Expenditure (Rs.)				
1974-75	949.96	82.61	49.56	1082.14
1994-95	4826.16	320.64	156.17	5302.97
2004-05	4851.2	394.14	200.99	5446.34
2013-14	17378.8	804.61	318.53	18501.94
Growth rate (Percentage per year)				
1974-75to 1994-95	8.7	7.8	6	8.5
1995-96 to 2004-05	-2.6	9.7	-0.05	-1.9
2005-06 to 2014-15	13.2	2.3	4	12.2

In the last one decade (2005-06 to 2013-14), growth rate in extension expenditure (Centre plus State governments) in fisheries sector was found to be 4%. Central government expenditure has shown a slow positive trend (0.94%) during the last decade, while expenditure by states and UTs have shown an increasing trend (2.8%). Growth rate was found to be higher (6.61%), when coastal states considered separately. As already discussed

While the fisheries sector has been exclusively under the state subject, many policies at central level have an influence. This is particularly so in case of marine fisheries in the context of sustainable fisheries. The states differ in their policy and action plans with respect to many guidelines of sustainable marine fisheries, thereby allowing loopholes in the system for circumventing the rules and regulations of any particular state. For example, while the Government of Kerala has been a front runner in implementing policies on juvenile fishing, the fishermen/ boat owners finds safe havens in less regulatory states. Also, central government agencies like MPEDA (Marine Products Export Development Authority) and centrally funded programmes like FFDA (Fish Farmers Development Agency) are involved in extension service delivery. A well coordinated extension agency can have a greater role in implementing the policies more effectively. Real-time information accessibility and effective usage of information

and communication technologies (ICTs) can enhance effectiveness of fisheries extension. There is a need to have coordinated action with other stakeholders including marine enforcement agencies. Lack of research-extension linkage mechanisms has further aggravated capacity enhancement and information dissemination. The Coastal Aquaculture Authority Act (2006) has pointed out the importance of synergy among extension personnel and other stakeholders for achieving the sustainability through interacting their technical expertise and skills.

Currently the human resources employed in the fisheries extension in public sector is quite low, and needs to be enhanced. For example, available information shows that there are around 850 and 734 fisheries extension personnel in Andhra Pradesh and West Bengal respectively, which appears to be inadequate when reckoned against the vast coastline, inland waters and fish production in those states. The state of Kerala has 200 Matsyabhavan officers and 51 matsyafed cluster officers. Qualified extension manpower is required to address the challenges across the value chain in these emerging sectors, which in turn require adequate budgetary provision.

Though fisheries sector is gaining policy level attention due to its potential contribution to national economy, fisheries extension is yet to receive adequate support at policy level through a substantial budget allocation. In Indian context fisheries extension is the weakest link in fisheries development (Rao,1988). Some researchers have argued that agricultural extension principles are applicable for the inland fisheries as the methodologies and practices are linked to land based activities. Extension for marine sector has to be different in nature given the uniqueness and complexity of the sector.

Extension for the crop sector is undergoing transformation over years. The initial top down approach has been replaced and decentralized extension system in many of the states. Agricultural Technology Management Agency (ATMA) has been set up at district levels for the coordination of extension activities in the district. Fisheries extension system is still in nascent stage and reforms are yet to be initiated. Different sub sectors viz. marine, inland, aquaculture etc. have different extension priorities and in turn demands specific mechanism to address those priorities. At present, these issues are remaining neglected. Kumaran *et al*., (2003) have pointed out the need for a committed and properly structured aquaculture extension system in order to propel the growth of the sector. The aquaculture has witnessed an influx of private extension sponsored by companies. A well-coordinated public-private extension system can target specific areas and farmer groups and issues. Further, a strong public extension system is quintessential for service as an alternative source of reliable and verified information and services.

To address the immediate challenges it is important to adapt an innovation system perspective inclusive of all the actors across the value chain. An innovation system can be defined as the network of organizations, enterprises, and individuals focused on bringing new products, new

processes, and new forms of organization into economic use, together with the institutions and policies that affect the system's behavior and performance (World Bank 2006). Research and advisory systems form its core. An innovation system platform like producer collective can facilitate the interaction of research and advisory systems with other actors of innovation system.. Public sector extension agencies have the onus to play the key role in forging such a system. The local self-governance institutions can function as a key link element in such a system, which can address much of the governance issues.

Conclusion

Fisheries sector has emerged as a sunrise sector in Indian economy. The sector has grown consistently well compared to other sectors, and has contributed to the food and nutritional security and provided livelihood for the dependent population. Further, the extension system has to tune with the changes in the fisheries sector. In view of the emergence of inland systems and its continued growth, the public extension system has to step in to address the institutional vacuum. Though India has a thriving fisheries sector, the issues like inefficient resource use, constraints in accessing real-time validated information, non-adherence to rules and regulations, non-judicious use of anti-microbial in aquaculture etc. have been hampering the advancement of the sector. The issues of marine fisheries are on entirely different plane, where the sustainable harvest and ensuring the involvement of the local communities becomes a prime concern. Technologies and policies have to be conveyed to the fishers and fish farmers for sustainably harnessing the resources. The fisheries extension systems are relatively weak in terms of manpower and budgetary allocation, and are inadequate meet the emerging challenges. Adequate policy support in terms of financial support is necessary to reinvigorate the system.

References

Ananth, P.N.2010.Marine Fisheries Extension, Discovery Publishing House, New Delhi

Cole, R. C. 1977. Fisheries extension services: Their role in rural development. *Marine Policy*, *1*(2), 132-142.

Coastal Aquaculture Authority.2006. Coastal Aquaculture Authority: compendium of act, rules, guidelines and notifications, Coastal Aquaculture Authority, Ministry of Agriculture and Farmers Welfare. (2006).

Devaraj, M. and Vivekanandan, E.1999. Marine capture fisheries of India: Challenges and Opportunities. Current Science, 76 (3): 314-332.

Gogoi, B., Kachari, A., Dutta, R., Darshan, A., & Narayan, D. 2015. Fishery based livelihood approaches and management of fishery resources in Assam, India. *Forest*, *5*(501), 2-514.

Kumar, Sujit. 2016. Fisheries India. Commissioned by the Netherlands Embassy to India, p. 1;

FAO. 2014. National Aquaculture Sector Overview India, p. 11.

Kumaran, M., Chandrasekharan,V.S and Kalaimani,N.2003. Aquaculture Extension: The Neglected Aspect In Aquaculture Development. Fishing Chimes, Vol.23,No:6, September, 2003.

Kumaran, M., Vimala, D. D., Chandrasekaran, V. S., Alagappan, M., & Raja, S. 2012. Extension approach for an effective fisheries and aquaculture extension service in India. The Journal of Agricultural Education and Extension, 18(3), 247-267.

Kurien, J. 1991.Ruining the Commons and Responses of the Commoners: Coastal Overfishing and Fishermen's Actions in Kerala State, India.United Nations Research Institute for Social Development, Geneva, Switzerland.

Kurien, J. and Achari, T. R. T. 1994.Overfishing the coastal commons: Causes and consequences. In: Social Ecology, (Ed.) R. Guha, Oxford University Press, Delhi. pp. 218-244.

NCAP 2004. Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in India. ICAR-ICLARM Project, NCAP, Pusa, New Delhi

Rao, K.M. 1988. Status of Fisheries Extension And Information Services in India. In *The First Indian Fisheries Forum, Proceedings, December* (pp. 4-8).

Sarkar, P. 2012. Verifying the statement of Gordon Scott 1954,"the Fishermen remains poor", in the context of coastal fishery in India.International Journal of Scientific & Engineering Research Volume 3, Issue 12, December-2012

Tietze, U. 1984. Marine fisheries extension services: A training and visit system for southern Asia. *Marine Policy*, *8*(4), 330-336.

Vivekanandan, E., Singh, V.V. and Kizhakudan, J.K. 2013 Carbon footprint by marine fishing boats of india. *Current Science* **105**, 361–366.

Wang, Y. 2001.A Review of National Aquaculture Development. In: Aquaculture in the Third Millennium, Technical Proceedings of the Conference on Aquaculture in the Third Millennium, Bangkok: NACA and Rome: FAO.

World Bank. 2006. Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems. Washington, DC: World Bank.