*Indian Journal of Extension Education*
*Vol. 52, No. 3 & 4, 2016 (40-46)*

# Partnership with Aqua Consultants – A Pragmatic Approach for an Effective Aquaculture Extension Service

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**ABSTRACT**

Aquaculture contributes substantially for the socio-economic progress of small scale fish farmers. Aquaculture extension service is the *'facilitative force'* for the farmers to access technical and managerial skills, information on quality inputs and premium market and mobilizing them for collective compliance of regulatory guidelines and better management practices. The private extension service providers known as *'aqua-consultants'* were found to be the actual extension workers in aquaculture due to the ineffective multi-constrained public funded extension departments. An inclusive partnership approach involving these private extension service operators for on-farm research and extension out reach would rather be beneficial to the system than trying to excluding them. With this understanding a study was conducted with private extension service providers in two aquaculture dominant states of India to assess their profile characteristics and operational particulars, identify the criteria for registration of the private extension service provider, identify potential areas for collaboration and to suggest a strategy and framework to build the partnership with aqua-consultants for an effective aquaculture extension service. The results indicated that the private extension service providers were technically qualified professionals, many of them were farmers themselves, had adequate field experience, good hold-on group of farmers and their perceived success rate was more than 80 per cent. They updated mostly through their own practical experiences but preferred to have interaction with researchers. Based on this a brainstorming workshop was held with them wherein the researchers, aqua-consultants, aquaculture planners, credit institutions and government agencies have jointly evolved a partnership strategy by identifying the criteria for registration of these private extension service providers, potential areas of collaboration, roles of various development institutions and a framework to concretize this approach. This public-private partnership, a win-win approach would give a synergistic push for aquaculture extension service and eventually lead to sustainable aquaculture in India.

**Key words:** Aquaculture extension service, farmers' perception; public-private partnership, win-win strategy.

## INTRODUCTION

Coastal aquaculture of shrimps and fishes in brackishwater provides livelihoods to around one million people across the coastal states of India. Coastal aquaculture is synonymous with farming shrimps especially pacific white shrimp (*Litopenaeus vannamei*) and tiger shrimp (*Penaeus monodon*). Presently, shrimp farming is being practiced in about 1, 90,000 ha with a production of 2.5 lakh tonnes and around 70-75 per cent of seafood export earnings are provided. Shrimp farming has been totally export market driven though most of the producers are small scale farmers holding 2-3 ha of water spread area (Umesh *et al*.2009). Shrimp farming is technology driven and due to on-farm and off-farm necessities aquaculture production practices are constantly getting improved to deal with the emerging scenarios.

Asian countries have demonstrated that sustainable aquaculture development largely depends on extension education services that operate at field level and effectively transfer culture technologies to fish farmers (Maguswi *et al*.2004; Omoyeni and Yisa, 2005; Udo *et al* 2005;). In India, fisheries being the state subject, the maritime states have the major responsibility in providing this key support. However, studies have clearly indicated that, aqua input companies and independent aqua consultants are the actual technical advisors immediately available at the field level and frequently contacted by the farmers vis-à-vis the public funded Departments of Fisheries (DoF) and other agencies who have the mandate to provide farm advisory service. State Fisheries Departments are normally tuned for development and welfare work and lack orientation for technical extension service. Hence their role is restricted mostly towards regulation of aquaculture through farm registrations and monitoring the compliance of guidelines. The Government of India in its agriculture extension reforms draft policy amply stated that “States have barely been able to pay the salaries of extension personnel. Less than 10 percent of the budget is available for operational expenses, which has practically immobilized the service with scarcely any technology dissemination in the field”

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(GOI, 2000). In the era of privatization and outsourcing it is inappropriate to expect the governments would make huge investments in organizational restructuring and manpower recruitment to revamp and re-orient the fisheries departments (Krishna, 2000; Birner and Anderson, 2007 and Dilip Kumar and Ananthan, 2009).

**Public-Private Partnership the pragmatic approach:** Farmers felt that aqua professionals of aqua inputs companies and consultants are the real extension service providers in the field due to their easy accessibility, sound subject matter skills, individual contact, frequent farm visits, familiarity, and credibility, facilitation for accessing quality inputs, market and services (Box-2). Private extension service providers play a major role in technical counseling as a marketing strategy to market their inputs and farm machinery (Katz, 2006;). Therefore, dissemination of research outputs and development of aquaculture can best be achieved by providing an enabling environment that promotes stronger partnership between public and private sectors Kumaran *et al*.2008; Wetengere *et.al*. 2008; Chandrasekara, 2001; Inês Signorini, 2001; Zhang Tiedao *et al*.2001**;** MANAGE. 2003; Nancy Contreras Moreno. 2004).

It is pertinent to note that the Government of India in its farm extension policy guidelines also viewed that "para-technicians in farm extension should be encouraged for organizing demand driven production systems and efforts are needed to enable them to serve not only the farmers but the entire country better, thereby strengthening the extension system". Hence, the need of the hour is a "hybrid sector" of public and private alliances' involving aquaculture researchers and aqua-consultants, who are delivering the things in the field (Govt. of India, 2000; Chandrasekara, 2001; Anderson, 2004; Rivera, 2005 and Kumaran 2007). The Government of India's current efforts in reforming extension services also emphasized that "encouraging Public Private Partnership (PPP) in various modes/forms can provide synergistic approach in the extension efforts". It further added that "Cost effectiveness may be improved by relying on fewer but better qualified (graduate or post-graduate) field advisers who interact directly with researchers for subject matter advice and then multiply their impact in the field by working with farmer groups rather than individual contact farmers" however it requires a "transparent, laid out procedure" and "strict monitoring and evaluation process" (Government of India, 2000 and 2002). Sensitizing the stakeholders on the objective of public-private partnership and developing a workable framework for an effective dissemination of research outputs to users is very crucial to carry forward this approach. Keeping this in mind, the present study was conducted to assess the profile characteristics of field level aqua-professionals / consultants, to identify the potential areas and criteria for partnership and suggest a framework to build the partnership with aqua-consultants for an effective aquaculture extension service.

## METHODOLOGY

The methodology for this investigation comprises of two parts *viz.*, (i) Survey among the aqua-consultants and (ii) a stakeholder workshop for data triangulation and identification of potential partnership areas, develop a strategy and partnership framework. Questionnaire survey was carried out in the Thanjavur and Pudukottai districts of Tamil Nadu (TN) and Nellore and Ongole districts of Andra Pradesh (AP) states based on number of aqua consultants currently found operating at the time of survey. Independent field level aqua-consultants, not attached to any aqua-business company constituted the population for the study. Considering the relatively smaller population a sample of 60 independent aqua consultants was chosen purposively for collecting primary data. Data on the profile characteristics *viz.*, age, education, occupation, registration, nature and mode of consultancy, consultant experience, area coverage, perceived success rate, frequency of consultations, knowledge updation, online access and training need were collected by means of personal interview with consultants using a pre-tested questionnaire. Descriptive statistics were used to analyze and interpret the data. Subsequently, a brainstorming workshop on" Partnership with aqua consultants for on-farm research and extension out reach" was conducted in Ongole (headquarters of one study district in AP) wherein about 60 aqua-consultants/professionals and 30 other major stakeholders participated to delineate partnership domains and develop the framework.

## RESULTS AND DISCUSSION

### Profile Characteristics of Aquaculture Consultants

The profile characteristics of the respondents presented in the Table-1 showed that majority (73%) of the consultants were relatively young below 40 years of age. Majority of them (85%) were post graduates (PG) in Zoology/Marine Biology/Aquaculture/Fisheries and among them, 15 per cent were doctorate holders. The data revealed that one-third (33%) of them were full time consultants and another one-third (33%) of them had their own farms or were partners in their own clients' farms. However, they spent 70 per cent of their time for consultancy and remaining 30 per cent alone for farming in their own farms. About 18 per cent and 15per cent of them were involved respectively in marketing their own

inputs and analytical service-testing of soil, water, seed and other inputs respectively. In such cases the consultancy was given only to those farmers who had used their inputs or come for analyses. Majority (64%) of them had worked more than five years in a farm or input company before they became independent consultants and most of them (78%) had more than five years of consultancy experience out of which 42 per cent had more than 10 years of consultancy experience. About half (52%) of the respondents each had a hold of more than 50 ha under their consultancy. Majority of the consultants (70%) visited each of their client farms twice a week, monitored the pond conditions and advised the farmers in writing. The respondents were of the view that their client farmers followed their advice fully. However, they felt that the farmers could have cross checked their advice with fellow farmers but it was never revealed to the consultants.

In TN, all the consultants had their own farm level technicians in each of their client farms, paid by the farmer to carry out the farming operations as per the advice of the consultants. In TN, the consultancy was for a single species tiger shrimp, where as in A.P, consultancy was given for shrimp, freshwater prawn and carps. The consultancy was for the whole crop period from pond preparation to marketing of shrimps.

The consultants operating in TN did not have access to online (internet) while in AP, majority of the consultants had access and were consulting online literature. About 55 per cent of the consultants hailed from their area of operation and more than 50 per cent of the consultants operating in AP belonged to TN State.

While consultants in TN were paid monthly consultancy in addition to production incentive which was collected after harvest as per the sale price, cost of production and size at harvest. But in A.P, many farms were of bigger size and the consultancy was charged mostly after harvest on volume basis and as percentage in the profit.

Eighty per cent of them claimed that their success rate was 80 per cent which they felt this success rate facilitated their continued acceptance in the occupation. Majority of them (82 %) were not registered as consultants and felt that certification/registration is essential to regulate consultants in general and also expressed that the minimum qualification for a consultant should be graduation with 5 years or PG (post graduation)with 3 years of field experience.

**Table 1: Profile characteristics of aquaculture consultants n=60**

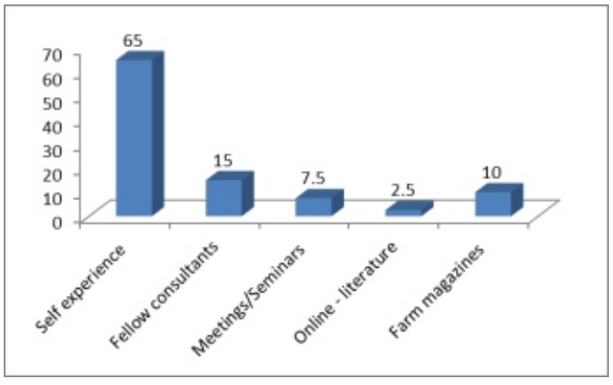
| Attribute | % response |
|---|---|
| **Age in years** | |
| Up to 40 years | 73 |
| Above 40 years | 27 |
| **Education** | |
| Ph.D | 15 |
| M.F.Sc/ M.Phil | 15 |
| M.Sc/ B.Sc., PGDA | 55 |
| B.FSc | 12 |
| B.Sc/D.FSc | 3 |
| **Occupation** | |
| Consultancy alone | 33 |
| Consultancy + farming | 33 |
| Consultancy + Inputs | 18 |
| Consultancy + Lab | 16 |
| **Pre-consultancy Experience in years** | |
| Below 5 years | 36 |
| Above 5years | 64 |
| **Consultant Experience** | |
| Below 5 years | 21 |
| -10 years | 36 |
| Above 10 years | 43 |
| **Total Area covered in ha** | |
| Less than 25 ha. | 21 |
| 25-50 ha | 27 |
| Above 50 ha | 52 |
| **Mode of counseling** (Oral, Written & Demonstration) | 100 |
| **Frequency of visit** | |
| Twice a week | 70 |
| Weekly | 30 |
| **Consultancy Range** | |
| One species (Shrimp alone) | 67 |
| Two Species Shrimp + Scampi | 15 |
| Three Species Shrimp+Scampi+carps | 18 |
| **Knowledge updation*** | |
| Purely practical experience | 63 |
| Interaction with fellow consultants/inputs agencies/scientists | 15 |
| Meetings/Seminars | 9 |
| Online - literature | 3 |
| Farm magazines | 10 |
| **Online proficiency** | |
| Access to online | 58 |
| In access to online | 42 |
| **Nativity** | |
| Native of clients | 45 |
| Hailing from out side | 55 |
| **Perceived success rate so far** | |
| Between 70-80% | 79 |
| Above 80% | 21 |
| **Mode of consultancy payment** | |
| Monthly per pond | 33 |
| Based on production & price harvest | 49 |
| % in profit | 18 |
| **Registration** | |
| Registered with MPEDA | 18 |
| Not - registered | 82 |

## Knowledge updation and training need assessment

Constant updation of knowledge and skill on the subject matter is fundamental for a consultant. The modes of capacity enhancement by the respondents given in the Fig-1 showed that their knowledge and capacity building

were mostly through self-learning by doing (practical experience) (65%), followed by interaction with fellow consultants/inputs agencies/scientists (15%), meetings/seminars (9%), consulting farm magazines (10%) and online literature (3%). Further, the respondents expressed that shrimp seed production process, seed screening techniques and shrimp pond management were the areas they felt that they need capacity strengthening. The respondents opined that months of December and January were the lean period and ideal time for conducting training courses for them.

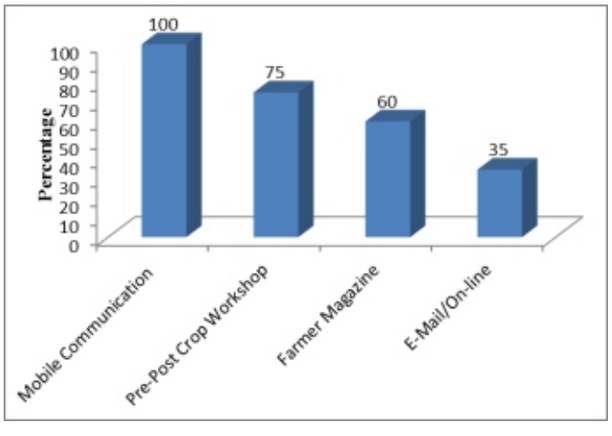
**Fig-1. Present capacity enhancement mechanisms of Aqua-consultants**




**Consultants preferred modes interaction with research**

The consultants were of the view that two-way communication link between consultants and researchers is required for mutual strengthening and demand based technology development. The consultants perceived that regular contact through mobile phones (100%), e-mail/on-line (35%), bimonthly aqua newsletter (60%) and annual workshops for consultants (70%) are the mechanisms of interactions between research institutions and consultants to get field feedback from them on regular basis (Fig-2).

**Fig 2: Preferred mode of interaction with Aqua-consultants**




**Partnership with Aqua-Consultants: Potential areas of Partnership:** Potential areas of collaboration between the researchers and aqua-consultants were jointly arrived at in the discussion is given in the Table2.

**Conducting on- farm trials for technology validation:** Verified research findings that come out of the systematic scientific enquiry need to be validated at the farmer's ponds to understand the relative advantage over existing practice, compatibility with local environment and complexities the farmers may face while adopting the new techniques. Given the lack of linkage between the central research institutions and state level extension agencies, the field level consultants who have the scientific background and access to farmers ponds do play a crucial role in validating the research findings or any input product developed by scientists and could provide reliable data to the scientists for refinement. Similarly, extension scientists and economists require large scale primary and secondary data for their studies. Group of aqua-consultants who have considerable client farmers can facilitate data collection from the farmers or other target groups and collaborate with the social scientists. The scientists should give due to credit to those consultants who helped in on-field research and data collection.

**Technology transfer:** Aqua-consultants can collaborate with research institutions for transfer of proven technology to the end users by conducting demonstrations, off-campus training camps and awareness campaigns. As indicated earlier, taking advantage of their accessibility to the farming community, they can practically conduct the on farm demonstrations and trials at farmers' ponds with technical inputs and supervision from the scientists. Awareness campaigns on the topics of immediate interest/concern can be taken up by the consultants using the content provided by the scientists.

**Joint monitoring of water bodies:** water quality monitoring of source water bodies could be undertaken by research institutions and consultants for various water quality parameters and also to sensitize the farmers regularly through consultants for making necessary precautions to safeguard their crops.

**Disease surveillance:** Disease is the major threat to shrimp aquaculture. A collaborative programme on disease surveillance *i.e* pathogen entry and its method of spreading can be closely monitored by the consultants' in their operational area, required advice can be obtained from the scientists and necessary preventive measures can be taken up to minimize the damage.

**Education:** Mass education on the subject of concerns among the farming community is another area for collaboration. Aqua-consultant as an extension agent with the involvement of researchers can take up the role of educating the farming community on any topic of relevance. Registration of farms, regulatory guidelines, better farm management practices, farm bio-security protocols, food safety issues, technology for farming of alternative species and schemes of development agencies for farmers were some of the areas need large scale education. The fishery research and development institutions need to provide the relevant extension literature and audio-visuals to conduct educative programmes, trainings and campaigns.

**Data sharing:** Over the years aqua-consultants have generated huge amount of data on various aspects of seed production and farming which they can share with the research institutions to analyse, arrive at specific conclusions and provide feedback information to the field consultants for making informed decisions.

**Criteria for identification and registration of consultants**

Identification of a qualified consultant is the first step in forging this partnership. This issue was discussed in detail and the criteria have been evolved by consensus (Table-2). Nevertheless, registration with the Coastal Aquaculture Authority (CAA) which is the regulatory institution for coastal aquaculture is mandatory for partnership. It was decided that the registration authority may fix a combination of more than one criterion for registration of consultants.

**Suggested strategy for partnership with aqua-consultants**

The aqua consultants expressed their willingness to collaborate for on-farm validation of research findings and organizing technology transfer programmes like creating awareness, conducting campaigns, trials and demonstrations. In-turn, they expected that research institutions ought to provide them new information or innovative methods, free access to seminars, conferences of research institutions, sharing of information and field queries received from other areas and successful cases of circumventing field problems to make the consultants aware of the field scenarios elsewhere. Majority of them felt that they should be recognized as collaborators taking care of field research experiments with guidance and monitoring by researchers. The working strategy as given in Table-2 was arrived to initiate the partnership. It was evident from the data and discussions that aqua consultants were willing to collaborate for delivering efficient aquaculture extension services. Nevertheless, to take it further, we need to evolve a participatory strategy through which the Coastal Aquaculture Authority (CAA), National Fisheries Development Board (NFDB), Central Institute of Brackishwater Aquaculture (CIBA) and State Departments of Fisheries (DoF) are to work in tandem to have synergy in this partnership (Fig-3). The process should start with identification of potential consultants by the DoF in respective states. The CAA has to formulate a scheme for registering these consultants using more than one criterion as indicated earlier. The CIBA could support these registered consultants in capacity building by offering trainings and extension materials. The NFDB could support this capacity building monetarily and may evolve a scheme similar to that of agri-clinics scheme of Government of India to facilitate them to avail bank assistance for establishing their analytical lab cum extension service centres. Once this link is established the research institutions and the DoF could collaborate with these registered consultants for technology validation and extension work respectively in the identified areas. Similar kind of public-private partnership models existed in agricultural advisory services, where a private company/consultant and a public agency jointly finance and provide advisory services in India (Sulaiman, 2003). Globally, a general reform trend can be seen in moving away from pure public sector models of providing and financing advisory services towards contracting out or privatization (Rivera and Zijp, 2002; Neuchâtel group., 2006). In such circumstances the state can take on the role of facilitator for the many other actors involved in farm advisory services (Gautam, 2000; McMillan, Hussain and Sanders, 2001).

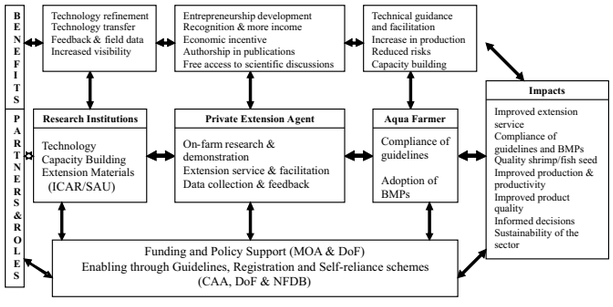
**Table 2: Mechanisms for partnership with aqua-consultants**

| | |
|---|---|
| Potential areas of partnership | ❖ On-farm research for validation of research findings, products and primary data collection for social sciences research<br>❖ Technology transfer through demonstrations, field trainings and awareness campaigns<br>❖ Regular monitoring of water bodies for various water quality parameters and sensitizing the farmers<br>❖ Aquatic disease surveillance, monitoring and management in an identified locality<br>❖ Education of farming community<br>❖ Sharing the shrimp culture database of aqua-consultants |
| Criteria for identification and registration of consultants | ❖ Minimum Qualification : Bachelor of Fishery Sciences or Masters in Aquaculture/Marine Biology/Zoology<br>❖ Field Experience: Five years of continued consultancy experience<br>❖ No. of farmers getting consultancy/ Area (ha) under consultancy<br>❖ Maintenance of proper records on culture details of all the client farms<br>❖ Eagerness to provide/share field data<br>❖ Publications/articles on the experiences of consultancy<br>❖ Innovative and modifi ed field level applications developed and implemented<br>❖ No. of continuous successes achieved in such implementations<br>❖ Willingness to spend time for collaborative work with R & D |
| Strategy for Developing PPP in Aquaculture Extension Service | ❖ Identification of potential aqua consultants through respective DoFs.<br>❖ Registration of consultants adopting more than one criterion as indicated earlier.<br>❖ Capacity enhancement by CIBA on technical aspects, enterprise building and management<br>❖ Evolve an aqua -clinics and aqua bus iness development scheme by NFDB for their self-reliance<br>❖ Workout a standard Memorandum of Understanding (MOU) for partnership with suitable aqua-consultants.<br>❖ Monitoring and evaluation of mechanism to evaluate the partnership |

**BoX-1. Perception of farmers on Public and Private Extension Services (Kumaran et al, 2007)**

| Attributes | Public Extension | Private Extension |
|---|---|---|
| Accessibility | Difficult, Need based | Easy and Any time |
| Frequency of contact | Occasional | At least Weekly once |
| Timeliness | Not in time | Timely |
| Practical relevance of the advise | Not so relevant | Practical ,field specific |
| Topics of discussion | Registration of farms, regulations, Awareness creation on banned antibiotics | All aspects of farming including inputs, services and market intelligence & arrangement (Seed to Shrimp) |
| Follow up | Rarely | Regularly during the next visit |
| Extension Approach | Mass and Group contact | Individual Face to Face Contact |
| Perceived subject matter skill | Poor; not up to date | Very Good & Updating regularly |
| Personality | Conservative, bureaucratic and skeptical | Young & Energetic |
| Effectiveness | Needs Improvement | Effective |

**Fig.4. Framework for Public-Private Partnership with Aqua-consultants for Aquaculture Extension Service**




## CONCLUSION

The study has indicated that public-private partnership in aquaculture extension service is a pragmatic alternative extension approach considering the fact that the reach of the Government extension machinery to the field level has been limited due to many constraints. The findings of the study also indicated that aqua-consultants are highly qualified and possess rich experience with strong field presence. Further, they have also expressed their willingness to collaborate with the research and development institutions for on-farm research and extension work. Hence, partnership between aqua-consultants and public funded institutions and farmers could be a win-win extension strategy. Qualified aqua-consultants who have been working with the farmers have proved their role in providing effective aquaculture extension service. They could better-fit as collaborators for on-farm technology validation and extension outreach activities.

Appropriate facilitative mechanisms and framework like a standard MOU of resource sharing, work commitment and default penalties are to be evolved in developing a sustainable P-P partnership. Once established this public private partnership initiative will bridge the gaps between the major partners and take care of the technical aspects of aquaculture in the identified areas.

*Paper received on : April 24, 2016*
*Accepted on : May 10,2016*

## REFERENCES

Anderson, J.R. 2004. Agricultural Extension: Good Intentions and Hard Realities, *the World Bank Research Observer, vol. 19, no. 1 (2004),* 41-60 pp

Anderson, J.R. 2007. *Agricultural advisory services.* Background paper for *World Development Report 2008, Agriculture for Development*. Washington, D.C.: World Bank.

Anna Knox and Nina Lilja. 2004. Collective Action And Property Rights For Sustainable Development- Farmer Research And Extension, Focus 11, IFRI Brief 14 of 16.

Birner.R, Kristin Davis, John Pender, Ephraim.N, Anandajayasekeram.P, Javier Ekboir, Adiel Mbabu, David Spielman, Daniela Horna, Samuel Benin and W.K.Mugerwa.2006. From "Best Practice" to "Best Fit". A Framework for Designing and Analyzing Pluralistic Agricultural Advisory Services, International Food Policy Research Institute, Washington, DC, USA.

Gautam, M. 2000. *Agricultural extension: The Kenya Experience. An impact evaluation*. Government of India, Ministry of Agriculture, Department of Agriculture and Cooperation, Extension Division.2000. *Policy framework for agricultural extension*. http://agricoop.nic.in / policy_framework.htm

Government of India, Planning Commission. 2002. *10th Five-Year Plan (20022007).*

Inês Signorini. 2001. Literacy and communicative (in)flexibility: interactional failure in Brazilian programs of diffusion of knowledge, *Journal of Pragmatics,* 33, (7), July 2001, 969-997.

Katz, E. 2006. Agricultural Services Current State of the Policy Debate. In: Rural Development News, 2006/1, pp. 8-13, online at: http://www.lbl.ch/internat/services/publ/bn/2006/01/agricultural_services_current.pdf

Krishna. S. 2000. Experiences in Aquaculture: Some Lessons for Extension: in Krishnan and Birthal (Ed.) *Proc. Aquaculture Development in India: Problems and Prospects,* Series no.7, NCAP, New Delhi, 87-97 pp.

Kumar.D and Ananthan.P.S.2009. Opportunities for Improving the Livelihoods and Nutritional Security,

Through Aquaculture, Indian Fish FestivalINFISH,2009, 11-13th July,2009, National Fisheries development Board, Hyderabad, India Souvenir,62-66 pp

Kumaran.M, Alagappan.M, Raja.S, D.D.Vimala, C.Sarada, V.S.Chandrasekaran and N.Kalaimani. 2006. Extension methodologies Used by Private Extension Personnel in Coastal Aquaculture, *Indian Journal of Extension Education*, 42(3&4): 19-23 pp.

Kumaran.M, M. Krishnan and P.Ravichandran.2007. 'Extension Services in Coastal Aquacultrure: Need For a Public and Private Partnership', *Indian Journal Fish*, 54(1):75-83.

Kumaran.M, Ponnusamy.K and M.Krishnan. 2004.Utilization of Information Sources by shrimp farmers, *Indian Journal of Extension Education*, Vol. XXXX (1&2): 63-66 pp.

Maguswi, CT; Brummett, RE; Pouomogne, V. 2004. Aquaculture extension in Zambia, In Coche, AG (Ed.,) Aquaculture extension in sub-Saharan Africa. no. 1002, FAO Fish. Circ, pp. 43-48

MANAGE. 2003. A One-year Diploma Course in Agricultural Extension Services for Input Dealers (DAESI) - The First Ever Programme in the Country, *Manage Bulletin,* 1 (1) July-Aug. 2003. MPEDA. 2014. www.mpeda.org.

Nancy Contreras Moreno. 2004. Agricultural Technology Transfer Experiences in Mexico: Lessons and Options, UNU-IAS Working Paper No. 107.

Neuchâtel Group 2006. Demand-Driven Agricultural Advisory Services. Lindau.

Omoyeni, BA and Yisa, JJ. 2005. Enhancement of fish production in Borno State with Extension services: In Araoye, PA (ed.,) Proceedings of the Annual Conference of the Fisheries Society of Nigeria (FISON). pp. 658-662. 2005.

Rivera, W. M. and W. Zijp, Eds. 2002. *Contracting for Agricultural Extension: International Case Studies and Emerging Practices*. Oxon, New York: CABI Publishing.

Rivera.W.M. 2005.Transforming Agricultural Extension: Emergence of "Hybrid Sector" Alliances Between the Public and Private Sectors, Journal of extension Systems, 21(1): 83-95.

Udo, MT; Okon, AO; Lebo, PE; Ikpe, GB. 2005. Improving aquaculture through increased fisheries extension research, In: Araoye, PA (ed.,) Proceedings of the 19th Annual conference of the Fisheries Society of Nigeria. pp. 54-57.

Umesh N.R, A.B.C. Mohan, G. Ravibabu, P.A. Padiyar, M.J. Phillips, C.V. Mohan, and B.V. Bhat .2009. Shrimp farmers in India: Empowering small-scale farmers through a cluster-based approach. In: S.S. De Silva and F.B. Davy (eds.), *Success Stories in Asian Aquaculture,* © Springer Science and Business Media B.V. 2009.

Wetengere. Kitojo, John Moehl, Ritha Maly and Matthias Halwart. 2008. Stretegic Review of Aquaculture Extension in Tanzania, FAO Aquaculture Newsletter No.41, 36-38 pp.

Wolfensohn, J., and Bourguignon, F. 2004. Development and poverty reduction: Looking back, looking ahead. Paper prepared for the 2004 meetings of the World Bank and IMF, October 2004, Washington, D.C. The World Bank

Zhang Tiedao, Xing Hui, Sun Mengxia and Wang Yan. 2001. Disseminating New Technologies through Vocational Education for Rural Change in China, *Journal of Educational Change*, 2 (3): 223-238.