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Co-management - Promise of sustainable fisheries in Telangana, India through stocking of fish seed in all the water bodies

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Abstract

In Telangana, water bodies are common resources in which small-scale fisheries could be sustained mainly through community-based co-management. Co-management of fisheries is broadly defined as the involvement of users in management in various experimental forms of participation of fishermen in the management process, in advisory roles or through delegation and sharing of power. Fisheries co-management has been regarded as multi-functional, addressing different knowledge and resource management problems with varying success. Many community based co-managed fisheries around the world are well managed under limited Central and State government structure, provided communities of fishers are proactively engaged. "Community-based co-management is the only realistic solution for the majority of the World's fisheries and is an effective way to sustain aquatic resources and the livelihoods of communities depending on them." In Telangana, Fishermen Cooperative Societies are today strong and cohesive organizations, and believe that community-based management is the approach needed for the long-term sustainability and profitability of the fishery. To encourage co-management in fisheries and increase fish production in common property resources, the Telangana Government intervened by stocking 500 million of fish seed in about 11067 water bodies.

Keywords: fisheries co-management, participatory management, knowledge integration, adaptive management, sustainable resource management

Introduction

Background information

Telangana is one of the youngest Southern peninsular States in India, carved out as a 29th new State from erstwhile integrated Andhra Pradesh during 2014 with a present demography of over 36.34 million. This land locked State is located on Deccan Plateau has semi-arid climate with large dry land tracts. Most parts of the state receive low to medium monsoon rainfall. The major river catchments of State include Godavari (nearly 80%) and Krishna (about 70%) apart from several minor rivers viz., Musi, Manair, Bhima etc supporting the natural water bodies.

Inland water resource wealth

The State has inland water resource wealth of rivers and canals (1808 km) with a national share of 0.9%; reservoirs (77 with water spread area 0.17 million ha) represent 6.8 % of National resource and tanks/ponds 0.4million ha with a share of 18%. The Department of Fisheries under its jurisdiction is supporting development of fisheries in about 4,647 tanks (having > 40 ha ayacut) with TWSA of over 0.3 million ha and the village panchayats 19,465 tanks (<40 ha ayacut) of over 0.1 million ha TWSA supporting development (Figs.1-4). The other irrigation water bodies of over 0.1 million ha and private tanks 474 no. of over 781 ha where fish culture and other aquaculture related activities are being pursued. This apart, the State is also known for its rich fish biodiversity harbouring over one hundred and sixty five species of fishes in its diversified inland waters. The State is depending on species like Indian Major Carps and Exotic fish species and freshwater prawn for regular stocking natural water bodies to enhance fish production from water bodies.

Sector Contribution

Fisheries in the State are regarded as one of the promising primary sectors that contribute

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considerably for food, nutrition, and health and livelihood security of the fisher community on a continued basis. It generates substantial income and employment to rural population and provides for welfare of fishers. Among the fisher population (2.71 million), the livelihood of most of traditional fishermen and tribal's in catchment areas of natural water bodies (nearly 0.37 million active fishermen) is therefore inseparably linked to fishing and related activities and is hence critical to the lives of many in terms of their direct income and employment, socio-economic up-liftment and other tangible and intangible benefits.

On the economic contribution front, the share of sector in the State is estimated as 0.6% of GSDP and 3.47% of agriculture GSDP (2014-15). The State is ranked 3rd with 0.57 million ha of Inland water spread area accounting over 11.6% of total inland water resources of the Country and in terms of total fish production, ranks 7th with a estimated contribution of 199,000 metric tons during 2016-17. There being no coast line, the State is exclusively depend on inland water bodies to meet its fish demand.

In the State, as per property rights regimes, water bodies are government property and only government has the right to regulate utilization of these resources. During the different phases of fisheries resource development, rights on water bodies of the State have witnessed control by local water user institutions/Associations, PWD, Irrigation, Forest, Revenue department etc. The development of fisheries in all the public water bodies was later transferred to Department of Fisheries with conditions of safeguarding the irrigation sources from damage (G.O.Ms.No.879 dated 09/04/1964). Since then, the inland fisheries resources are under the ownership of the Department of Fisheries and have the right to allot resources to fishers/Fishermen cooperative Societies and regulate its utilization. In the later years, part of water bodies was also transferred to gram panchayat for development of fisheries.

The activities of fisheries are being pursued in diverse water bodies of different sizes and varied bio-physical characteristics. Considering the resource base, it is the tanks and reservoirs that form the major focus of fisheries development in the State. Hence, the present fish production, sector growth and development are driven mainly by the ongoing activities in these water bodies.

During the initial years, resource utilization was under open system and activities were pursued mainly for subsistence to meet family consumption needs. But, over the period, resource use system underwent many drastic changes. Because the sector witnessed slow growth due to indiscriminate fishing, over exploitation of natural water bodies, lack of regular fish seed stocking, absence of effective management and governance, and patronage by the department, the government brought in several policy and regulation changes in support of fisheries development and management sustainably.

Management of fisheries resources witnessed global shift in

approach and co management in development gained importance especially in the small scale fisheries (Evans et. al., 2011) [6]. The need for better institutional coordination and participation of fishers in Living aquatic resource co-management is emphasized to realize the benefits of management over a short period of time (Baird, 1994a, b; Baird, 1996; Hogan, 1997; Cunningham, 1998a,b; Baird, 1998a and b;2000) [1, 2, 4, 5, 3]. Thompson (2004) suggested empowering fishing communities, ensuring their participation and local institutional support in co-management of natural resources as important for the sustainable management of inland water bodies. In the State, water bodies are mainly common property resources in which small-scale fisheries is being pursued on community based co-management regime under the local institutional frame work of Primary Fishermen Co-operative Society (PFCS) that are legally registered under Cooperative Act. The government also enabled participation of society members in the management planning and implementation as well as delegation of management responsibilities to the local fishers' groups.

Primary Fishermen Co-operative Society (PFCS) as local institution

In pursuit of optimal use of available water bodies for the development of fisheries, formation of Fishermen Cooperatives was encouraged across the State by the Government. Both men and women fishers were organized in to Fishermen Cooperative Societies and provided access rights of water bodies in their surroundings on lease terms for equitable sharing of the usufructs/fish, better wellbeing and benefit. This shift changed the emphasis from 'top-down' centralized management regime to a 'bottom-up' decentralized regime with shared goals and efforts of both PFCS and DOF for enhancement of resource productivity and fish production in the State.

The fisheries activities in the State are traditionally linked to cooperative institutions and many of them are older societies of 20-50 yrs since registration. The average per capita in terms of owning department tanks is about 140 ha, gram panchayat tanks about 28 ha and overall average holding of 168 ha per society. The number of members at registration and of now has increased by nearly 60% over the period (increase from an average of 72 to 115 members per society). Over the years, the department also strengthened these societies and members in their livelihood and welfare activities under various schemes and programs to function as local institution with organizational framework and guidelines. In pursuance of DOF policy for sector growth, fishers/societies are also extended with subsidized supply of fishing nets, Boats, mopeds; pick up vans, of late support for cage fish farming etc. The training and capacity building, marketing support etc. are also receiving attention of the DOF in recent years to further strengthen and empower the PFCS in the state.

Description	No. of societies	No. of members	Average member/society
Primary Fishermen Coop. Societies	3538 (90%)	253994 (90%)	72
Primary Fisherwomen Coop. Societies	400 (10%)	22702 (8%)	57
Fishermen Marketing Coop. Societies	06 (0.15%)	3529 (1.25%)	588
Dist. Fishermen Coop. Societies	10 (0.25%)	2736 (0.97%)	27
Total	3954	282961	

Status of Institutional arrangement for co-management of resources in the state

Natural resource management is recognized as the key for

sustainable development of fisheries in common water bodies shared by multiple user groups for diversified activities Jentoft *et al.* (1998) [7] defined Natural resource "co-

management" as, "the collaborative and participatory process of regulatory decision making among representatives of user-groups, government agencies and research institutes." In Telangana, water bodies are common property resources in which small-scale fisheries activities are being sustained mainly through community based co-management. Communities of fishers are proactively engaged to develop aquatic resources and the livelihoods of communities. In the context of State, co management of resources is limited only to members of PFCS as user groups and the Department of Fisheries as planning and policy institution representing the State government. The new arrangement provided participatory form of fisheries management where in both shares power and authority to manage fisheries resource (Sen and Nielsen, 1996) ^[10]. In the State, co-management process is in use as ways to improve the management of fishery resources.

Importance of fishers' participation and shared decision-making in the management of fisheries is well recognized by the government and also delegated substantial power and recognition to the members of PFCS in the participatory planning, interaction, consensus building, shared decision making, collaborative management of activities for development of wide range of natural resources and such others. The government has also shared the power and authority to manage the fisheries resources through access rights and organizing periodic interactions between government and resource users for consensus building and sharing of different management roles and responsibilities.

The co-management of natural resources by members of FCS is now the government policy in the State, and there is considerable support to strengthen cooperative management systems for sustainable development of inland water resources. The DOF is also supporting Community-based living aquatic resources co-management in several ways. In pursuance of DOF policy for sector growth, fishers/societies are extended with a number of benefits like licensing of selected developed reservoirs for fishing to meet their daily livelihood, leasing of reservoirs to FCS, exclusive allotment of government tanks on lease, subsidized supply of fishing nets, boats, mopeds, pick up vans, of late support for cage fish farming, free fish seed supply etc. The training and capacity building, marketing support etc. are also receiving attention of the DOF in recent years to further strengthen and empower the PFCS in the State. Over the period, the societies of the community have become stronger and progressive as cohesive organizations that believe in community-based management as approach for the enhancement of resource productivity, fish production, profitability and long-term sustainability of the fishery activities. Witnessing the success of approach, better involvement and responsibility sharing by the fishers in the resource development, the Government in the subsequent years further strengthened community co-management, organized fishers in support of better participation for utilization of available water resources, judicious exploitation and pursue management led fisheries development.

Lack of interest and lesser involvement members of FCS on co management of resources associated with poor adoption of process, management and governance for resource development have constrained the sector growth.

Reasons for noncompliance to fish seed stocking by PFCS

Access to quality fish seed and regular stocking of resources is central for the resource development under co-management.

Limited accessibility to quality seed within the state, high seed cost (over 12-15% of operation cost) and associated transactional cost, lack of reserve funds with societies, difficulty in raising funds from the members, lack of collective commitments to build up capital base for FCS have constrained resource stocking in accordance to scientific recommendations. FCS has to make investment on fish seed in the very beginning of the fish culture activity with many unforeseen uncertainties and risk factors ahead. Hence is regarded as major cost that decides the very profitability of activity.

This has also resulted in situation of seeking support of merchants by most of the FCS for fish seed stocking and tank management against tie-up arrangement and long term commitment for supplying harvested fish at lower price. In the present practice of fish seed stocking of water bodies, in most instances, the merchants had the say and was in accordance to his advantages, skewed towards meeting his interest of growing bigger size fish that enjoy better market price and not in the interest of harnessing the productivity of water bodies and overall income to the fishers.

Realizing the importance in stocking of water bodies with fish seed of quality viz., size, variety, species combination both to enhance resource productivity and improve livelihood options to fishers, government positioned initiative of free seed supply to further strengthen the participatory resource development process under co-management. The initiative is now being pursued with all efforts and objectives of bailing out fishers from the clutches of intermediaries.

This paper briefs on the seed supply to all the water bodies in the State on 100% grant which is a initiative of the Government, highlights the process used for of mainstreaming members of FCS for the new initiative in support of co-management based fisheries development and fish production enhancement in the State.

Initiative of fish seed supply on 100% grant

Till 2015-16, the selected large reservoirs where fishing permits are issued to the fishermen residing in the surrounding villages were stocked by the State Government and fish seed stocking of leased reservoirs and tanks were carried out by the PFCS through their own funding sources or by the merchants to whom the development resources were entrusted on internal informal arrangements availing advance amount. The FCS was availing subsidy facilities of DOF up to 50% under various schemes depending on the type of FCS and the community participated in the activity. The Government was paying back end subsidy to the PFCS to an extent of Rs.12.500/- per tank (USD 192)

Realizing the gaps in stocking strategies undertaken by the PFCS, the government initiated a massive program to support stocking of all feasible natural water bodies with fish seed of Indian major carp and exotic carps mainly catla and rohu among Indian major carps and common carp and grass carp among exotic and strengthen the co-management commitment of resource development.

Free fish seed supply and stocking under Resource Co-management Systems

The initiative is implemented in all the 31 districts across the state involving PFCS with access rights of reservoirs and tanks. The initiative aimed at bringing change in resource utilization in support of scientific mode of development, ease out fishers/FCS from the hands of merchants/any other hidden

power groups within system (financers etc) wherever in practice, facilitate capital formation and strengthen savings in FCS account to meet the future financial needs in support of activity.

In the inception year, the department supported stocking 278.5 million fish seed of 80-100 size in 3939 water bodies. While in the current year, the benefit of support was extended to all water bodies that meet the feasibility norms for undertaking fish seed stocking and supplied 510 million fish seed to stock 11067 water bodies (Photos 1-6). Further to enhance income of the fishing community support is extended to stock about 10.9 million prawn juveniles (*Macrobrachium rosenbergii*) in 12 reservoirs @ 500 juvenile/ha of effective water spread area on the recommendation of the Central Inland Fisheries Research Institute. Due to prevailing deficit in seed availability within state, over 80% is being procured through a transparent mode of e-tender process from the

neighbouring state of Andhra Pradesh and others.

Pomeroy (2003)^[8] defined Co-management as a process that involves democratization and decentralization mechanisms through collaboration and power sharing between resource users and government officials. On this line, efforts were made by the State to mainstream free seed supply program on co-management process involving user groups and also includes strategic plan at different levels by the Department of Fisheries for successful implementation of scheme related activities.

Key players for implementation of co-management components of free seed supply program

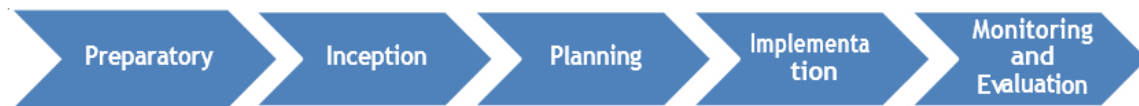
In the State, the key players of the interventions are mainly (i) Resource users (members of PFCS) and authority (Officers of Department of Fisheries). Details of role played are

Users group(Members of PFCS)	Authorities
<ul style="list-style-type: none"> ▪ Participatory identifying of issues related to community participation in the implementation of free seed supply program. ▪ Lead and mobilizing activities related to seed supply, delivery and stocking of water bodies as planned. ▪ Participate in resource management; monitoring performance of the supplied seed. ▪ Providing users opinion and feedback on the intervention that supports decision making process for effecting needed modifications and improvements to the ongoing program. 	<ul style="list-style-type: none"> ▪ Mainly represented by the Department of Fisheries functioning at Head Quarter, district and mandal levels including concerned line departments and local government (gram panchayat). ▪ Ensure community’s right to participate in a co-management Framework ▪ Develop form and process of decentralized management ▪ Social preparation of members to initiate co-management; provide technical assistance. mechanism for monitoring and evaluation based on local capacity ▪ Coordinate activities, process, support services, and such others as required for enhancing efficiency and output of the program.

Co-management processes of free seed supply initiative

The handholding and participatory process support of Department of Fisheries includes mainly

organizing/supporting/facilitating series of activities under different phases



The activities of each of these are interrelated components of the continuous process. The feed backs, perceptions and lessons learnt were also collected from nine districts and form important information support in decision making process by the department.

Activities of preparatory Phase includes mainly

(i) Development of resource data base of water bodies under different categories and ownership including details of EWSA based on available secondary data by mandal level Fisheries Officers and centralized consolidation at the district level by District Fisheries Office, (ii) quantification of seed requirement based on prescribed stocking density, species composition, ratio and size, (iii) preparation of resource proposal and seeking opinion of irrigation department based on site visit of water body, confirmation of minimum 1/3rd receipt of water by the tanks and readiness of proposed water bodies to undertake stocking, (iv) final selection of suitable water bodies for extending seed support under the program, (v) getting official permissions of the district authority and department financial sanctions for the procurement and supply of free fish seed to users group as planned and (vi) making arrangements for seed procurement of recommended species, size and number through E- tender process.

Inception stage

(i) Holding of series of interactions with the executives of selected FCS to understand the profile of FCS, ground situations of the locale in which the co-management program would be implemented and to ensure hassle free implementation, (ii) strengthening of selected FCS and awareness building of executives and members of FCS on programs / initiatives, (iii) sensitizing FCS members on the benefits of program, importance of stocking norms, species, size and quality of seed in enhancing resource productivity and production, and likely output due to effective implementation of the program.

Participatory planning

(i)Fixing roles and responsibilities to be performed by FCS members and its executives during the pre stocking phase and initial stages of implementation, (ii) participatory development of time schedules for receiving the seed supply, process of delivering including location, seed counting, and protocol of seed quality checks, (iii) back-and-forth interactions, discussions and negotiations between PFCS executives and the jurisdictional DOF officers till seed supply is executed as per agreed-upon plans in support of stocking, (iv) transparency on the intervention of free seed supply on aspects of seed source, procurement mechanisms, seed

quality, species, resource wise supply, mechanisms of delivery and protocols to be followed while stocking including checking of seed quality, accountability, post stocking management, observations to be recorded, reporting and such other details related to implementation.

The approach is mainly to ensure better understanding of the initiatives and motives of the government by the PFCS members and get familiarized. Also help in confidence building on the government initiative, develop more positive opinion about the intervention in the co- management approach and help in implementation of the program effectively during the subsequent years.

Implementation

Process adopted in stocking

(i) Distribution of fish seed of 35-40 mm size packed in oxygen filled polythene bags at pre specified common points to the members of societies or Panchayat Secretaries in support of stocking water bodies, (ii) supplying of fish seed of 80-100 mm size at tank/ reservoir sites to facilitate stocking of perennial tanks and reservoirs, and (iii) checking of seed quality viz., health, size, species supplied in accordance to specifications given in the bid.

Accountability and Transparency in stocking

Stocking Committees are constituted for each district for assessment of seed quality and number supplied against indent. The committee includes member of the society or gram panchayat. The activities includes (i) random counting of supplied seed on sampling method by the Fish Seed Certification and Stocking Committee, (2) in case of reservoirs with more than 5000 ha water spread area, the fish seed is being counted by following a combination of weighing and counting method (Photos. 1-8). Fish counting machine imported from Belgium (Fish counter – FC 6, Calitri Technology, Detection Et counting for Aquaculture Photo 5) was engaged for facilitating fish seed counting on sample basis at major reservoirs which helped in comparing the manual methods, (iii) similarly distribution and supply of freshwater prawn seed was facilitated for selected reservoirs (photos (9-10), (iv) Photographing & Video graphing of fish seed stocking process.

Logistics support

Special provisions are made for availing additional logistics support by the District Fisheries officers including engaging additional manpower, conveyance etc to monitor stocking activities.

Monitoring and Evaluation

The state adopted four-tiered monitoring and evaluation system positioned/facilitated at different levels to strengthen effectiveness of implementation in support of harnessing anticipated output of seed supply and stocking of water bodies. The government positioned Special Cell at Department head office coordinated by Deputy Director of Fisheries (Inland) for carrying out monitoring, guidance and necessary instructions that keep arising from time to time. Senior officers from Head office are also allotted to each district to monitor supplies and stocking activity.

Informal monitoring tools were extensively used to collect the feedback on the performance of stocked fish seed. Interactive approaches with the fishers involved in routine management of the resources were carried out by the Field level officers of the DOF whenever they visit the villages for implementation of different development activities of the sector and during their routine field works. Good communicative relationship of DOF field staff with the user groups was also facilitated for better understanding of the ground reality on the performance of the free fish seed supply and stocking initiative. District Fisheries Officers also monitored the performance of initiative through its own informal sources of informants located in and around the villages and feed backs obtained during the scheduled periodic interaction meetings with the executives of PFCS.

Formal Monitoring and Evaluation of performance on set indicators related to process, inputs and outputs was also facilitated by the Government through outside experts. All the findings and feed backs generated under the program supported for effecting changes / modifications to the on-going program.

Field survey findings

Field survey of selected water bodies (tanks and reservoirs) and FCS benefited under the program was carried out in nine study districts of the state to collect feedback on the initiative, benefits accrued, perception on the program, lessons learnt, anticipations on the program and suggestions for improvement.

The response from reservoir fishermen relates to 15 reservoirs in seven study districts across 11 mandals and covers 111 respondents. Similarly, field survey response was collected from 4,500 fishermen representing 708 tanks (both DPT and GPT) across all the study districts representing 78 mandals and 368 villages.

Selected Study districts	
1.	Kamareddy
2.	Karimnagar
3.	Mancherial
1.	Medak
2.	Rangareddy
3.	Wanaparthy
1.	Bhadradi Kothagudem
2.	Mahabubabad
3.	Yadari Bhuvanagiri



First external evaluation by the expert team on a macro scale was facilitated during July- Nov, 2017. The experts visited randomly selected co-managed natural water bodies supported under the program. Feed back on the importance and practical usefulness of the seed supply initiative in the fisheries co-management was collected from the user groups based on field level sampling. Fish growth performance was assessed based on 'trial- netting' carried out in cooperation and participation of users group. One-on-one interaction, interviews and focused Group Discussions were held with the users of the resources, executives of the PFCS and local DOF officers for an on-site assessment of field problems if any, collected perceptions and feedback on species performance, growth and health aspects, also on process of implementation, quality aspects of fish seed supplied, timely supply and such others; assessed effectiveness of participatory development

process in co-management of resources. During the process, approaches of participatory monitoring and evaluation methods on set indicators for performance assessment were also educated to members of PFCS.

Observations on direct impact of free seed supply policy

Majority of respondents (over 70%) informed that free seed supply is a sector relevant policy action of government and is making initial headway in providing required boost for sector growth against the backdrop of the growth slowdown. Enhancement in fish and prawn production 0.28 million metric tons with value worth Rs.34176 million during the year 2017-18 (incremental production gain of 41% against previous year). The production for the year 2018-19 as an impact of free seed supply is anticipated at 0.36 million metric tons and in value terms Rs.50916 million

Table: Fish and Prawn Production and value for 2017-18 and anticipated Projection for 2018 -19

2017-18					
Production Estimate (Tons)		Total (in tons)	Financial Target (Rs.in million)		Total (Rs. miliion)
Fish	Prawn		Fish	Prawn	
272800	7200	280000	32736	1440	34176
2018-19					
343820	15000	358820	46415.7	4500	50915.7



Fig: Promotion of Fisheries by Hon'ble Chief Minister Sri K. Chandra Shekhar Rao, Telangana

- Most of the younger generation of the PFCS responded that the initiative is bringing new hopes for their continuity in fisheries activity.
- Government is making a difference in the FCS functioning and bringing enhancement in system productivity and fish production through the initiative.

Opinion of experts

In the initial year of fish seed stocking initiative, in most instances there was double stocking both by FCS and DOF and the incidence has come down in the subsequent year. The output of seed stocking during 2016-17 is showing positive results and the early stocking initiatives undertaken during the current year 2017-18 is a good improvement and has sent positive signals of assured stocking support by the DOF. Considering the ongoing trend at the grass root level, the new initiatives is supportive in bailing out fishers from the present arrangement with merchants/any other hidden power groups within system (financers) and put on track to build on their own. Since DOF has started supporting FCS in stocking of resources with 100% subsidy, the internal arrangement with merchants is gradually getting reduced by 30-40% and the initiative has facilitated gradual weaning away from merchants and their stranglehold. Initiative of DOF is empowering for a gradual transition of fisher's society to new

dimension of self reliance and is expected to enhance collective bargaining powers of the FCS in the sector related activities.

Expectations of participating fishers

The fishermen as main stakeholders have well set expectations from Department of Fisheries that includes timely supply of quality seed; providing suitable boats and good quality nets; training & capacity building; arranging exposure visits; positioning new development schemes related to seed rearing and other fisheries related activities.

Limitations, new scope and opportunities

Limitations of interventions as emerged from the feedback of respondents includes deficit rainfall in some districts and mandals, catchment related problems including interruption of feeder channels/supply channels constraining water bodies receiving less than one third of water required for taking up stocking; difficulties in procurement of seed in required quantities; initial teething troubles behind in terms of delay supply, dependence on outsourced seed supply, quality issues in supply, administrative and procedural hurdles; transportation of seed over long distances and associated seed mortality at the time of stocking; initial lack of eagerness on the part of fishers about the initiative and influence of counter strategies of merchants spreading wrong rumours on initiative, negative comments on quality of seed and delay in supply etc.

Challenges witnessed during implementation

There were many challenges witnessed while implementing development initiatives of free seed supply by the government. As the approach of intervention was mainly on the co- management process, it warranted for organizing series of planned activities and interventions on the part of Department authorities with the members of fishers society on mutually agreed terms of involvement/participation, sharing of responsibilities in execution and such others. Similarly, in making arrangements of fish seed supply from outsourced

agencies and supply to diversified and scattered water bodies in support of stocking by the users groups.

New scope and opportunities

The implementation of initiative on co-management process where in authorities working closely with the members of societies have thrown open new scope for aligning fish seed variety, number and size in accordance to resource typology, past history and experience of PFCS on performance of fish varieties; bridging consumers demand and market demand; enhancing overall profitability of the activity and such others.

Suggested improvements for the initiative

(i) Free fish seed supply and fish seed stocking need to be based on scientific principles and ground realities of resources and practices, (ii) ensure selective/collective responsibility of FCS members in development of resources allocated to FCS through additional stimulus package of government for continuity of practice, timely supply, better seed quality – varieties, size, species ratio, density, seed health etc; (iii) increase participation of FCS in planning seed requirements, procurement process, stocking and beyond, (iv) capacity building of fishers on seed quality, seed rearing and marketing, (v) focus on modification to existing procurement process with major role play by FCS, linking them to certified panel of approved Hatcheries /seed suppliers for direct procurement based on supply indent of DOF and payment made by government directly to hatcheries/FCS account.

Strengthening members of society in both the factors of cooperative success viz., functions and management, economic factors and governance need more participatory approaches within societies are in still ownership of members in development of resources and inclusive institutional growth. The Department of Fisheries, Government of Telangana is working out a sustainable strategy for inculcating capital build up with in FCS through sharing by members, depositing part/full amount of present savings made on fish seed purchase in FCS account etc. Further there is need to consider continuation of the intervention with several suggested modifications/ improvements for a minimum period of 3- 5 years to build and enhance a feeling of “ownership” among the community members, motivate them to implement good management measures, ensure tangible outputs, local institutional level dissemination of practices within region and diffusion beyond, significant positive impacts and better outcome that ensure system and institutional level sustainability for a longer period.

Suggestions for process improvement

- Requisition of Members/FCS for availing benefits of free seed supply initiative from the department by furnishing profile of water bodies, previous stocking details and fish production and such other information.
- Strengthening of participatory process by way of creating awareness to user groups on the program, its objectives and expectations
- Obtaining undertaking by the users group on their roles and responsibilities under the program
- Ensuring participatory monitoring mechanism right from inception of the program to minimize initial issues related to distorted perceptions and associated conflicts among the resource users.

Promoting better fish seed stocking for sustainable development of water bodies

It is useful if free seed supply program for natural resource co-management programs are complimented with additional capacity building of members on aspects of selection of fish species for stocking in accordance to resource characteristics and typology, fish seed quality stocking strategies and such others. Creating awareness on *in situ* seed rearing and staggered stocking regimes, multiple stocking strategies etc. through non formal education activities at the PFCS levels need additional attention. The importance of these activities in terms of strengthening co-management systems should not be underestimated.

Lessons learnt

The lessons learnt from the initiative based on two years of implementation experience of government are (i) initiative is the first case of co-management of resources for the government under the active partnership of users group and authorities for defined intervention of fish seed stocking, (ii) program has complemented the shared goals of sector development with increased trust and cooperation between resource users groups and the fisheries authorities, (iii) implementation of the initiative was with minimal problems to officers of the Department of Fisheries wherever leadership of FCS, participation of executives of user society and the members was responsive and committed, (iv) implementation process demands appropriate cooperation between or among resource users also for the success, (v) co-management process adopted in the program has provided ways to increase the effectiveness of attaining goals of sustainable natural resource management.

Conclusion

Non compliance to regular fish seed stocking regimes of natural water bodies whose access rights for fisheries development is provided to the local primary fisheries cooperative societies is recognized as one of the reasons for low fish production and income from such resources. The limitations of finance, existing inadequacy in the internal access to quality seed, uncertainty of rainfall and other climatic aberrations, low risk bearing capacity of the fishers who are members of the society have constrained to meet the suggested fish seed stocking regimes in most instances and have driven the societies into the clutches of local merchants for exploitation. Free seed supply initiative under co-management responsibilities to address issues of resource stocking on scientific norms and economic strengthening of fishers was implemented with more involvement and ownership of user groups. Similarly, mainstreaming interventions of this nature also warrants for active participation of implementing government authorities functioning at different levels. There is need to ensure total compliance to the participatory process of co-management and the set of arrangements evolved on contextual and location specific basis both by the members of societies and the government authorities.

The success of intervention after first year of implementation in terms of enhancing overall tank productivity by nearly 20-30%, reduction in dependence of society on merchants to an extent of 45-50%, savings made on the fish seed cost, increased trust of users group on the government program has enhanced participation of FCS in the program of current year. The efficiency of the program could be further enhanced if

free seed stocking is aligned better with resource typology, past history and experience of PFCS on performance of fish varieties. Similarly, if natural resource co-management programs are further reinforced and complimented with additional capacity building of members on fish seed quality, stocking strategies, resource management and such others that are site specific. The lessons learnt from the first phase implementation of initiative are need for (i) well-structured participatory process and clearly defined action plan, (ii) active complementation, trust and cooperation between resource users groups and the fisheries authorities and (iii) additional capacity building of members on the program objectives, anticipated outputs / expectations and uptake strategies to increase the effectiveness of attaining goals of sustainable natural resource management.

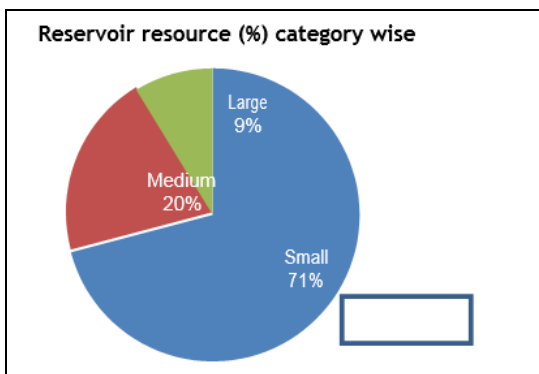


Photo 1: Counting of Fish Seed in Counting Machine



Photo 2: Distribution of Fish Seed



Photo 3: Freshwater prawn juveniles stocking



Photo 4: prawn juveniles stocking of reservoirs

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