

Institutions and Collective action for enhancing livelihoods in inland fisheries – Role of Governance in Telangana

1. Introduction

Fisheries is an important sector which contributes to livelihoods of fishermen and those involved in marketing fish. Fisheries sector as a livelihood also contributes to food and nutritional security apart from sustaining the fresh water ecosystem. Inland fisheries contribute significantly to food security and economic security by providing primary sources of animal protein, essential nutrients and income (Welcomme et al 2010). Inland fisheries in Telangana have been mostly confined to capture fisheries in reservoirs and tanks under lease/license system. The utilization of surface water commons (reservoirs, tanks etc) owned by the government optimally is imperative to the growth of the sector for improving the production and productivity in Telangana. With focus on enhancing irrigation and drinking water facilities in the form of irrigation projects in Krishna and Godavari river systems and Mission Kakatiya, a renewed focus is laid on improving the water storage capacity of water bodies and increasing the water spread area.

2. Fisheries, livelihoods, policy and collective action

Fishers' organizations, both formal and informal, provide a platform through which small scale fisheries stakeholders exercise their right to organize, participate in development and decision-making processes and influence fisheries management outcomes (Jentoft 1986). There is an overwhelming impression that fishermen are members of low status and marginalized households (Lawrence ED Smith et al 2000) and fisheries is most often equated to poverty (Bene 2003).

There is a need to organize around a purpose that transcends the interests of every stakeholder in fisheries community (Adger et al 2005). In a cross-regional analysis of 130 fisheries, Gutierrez et al (2011) found not one but a combination of key factors that explain the positive performance of community-based co-management in ecological, social and economic terms. These include strong local leadership, robust social capital, individual or community quotas, and community-based protected areas, as well as effective enforcement mechanisms, long-term management policies, and fishers' influence in local markets. Olivier Joffre and Natasia Sheriff (2011) stated that past experience of collective action showed that lack of social cohesion was reflected in some cases in communication problem, issues of trust

and in others in the desire to work individually in Vietnam and Cambodia while in Bangladesh, past experiences of collective action in certain sectors including fisheries had actually facilitated introduction of community-based fish culture. They also stated that the individualistic behaviour clearly brought little social cohesion and effective management could be seen where strong social ties were there.

The pace of our collective progress at understanding and catalysing governance reforms in support of small-scale fisheries development depends on the collaborative efforts of researchers, policy officials, and development practitioners well beyond the traditional domain of the fisheries sector (Blake D Ratner & Edward H Allison 2012). External environmental pressures like dam construction, land use changes, water abstraction for irrigation purpose, pollution, urbanization etc and policy measures like fishing rights, subsidies, and access to markets are important factors in fisheries management (Stephen J Hall et al 2013). Key sources of conflict include destructive and illegal fishing practices, competing uses of land and water, and overlapping resource claims. Addressing these challenges requires collective action by all key actors: local fishers, the private sector, civil society, development partners, and government from the local to the national level (Blake D. Ratner et al 2017).

3. Water Resources for fisheries in Telangana

Telangana with a water spread area of 562 818 ha (includes area under upcoming irrigation projects) ranks third in India in inland water resources. Telangana State is blessed with 4 324 tanks which constitute 40.94% of water spread area over an area of 230 403 ha and 74 reservoirs spread over 177 607 ha are another important water source available for fisheries sector as they constitute 31.56% of the water spread area. About 19 476 small tanks (mostly seasonal) spread across the state covering surface area of 154 808 ha constituting 27.51% of the total water spread area as per Telangana State Fisheries Department (TSFD 2019).

4. Table Fish & fresh water prawn production

Table 1: Fish Production-Targets and Achievements for the years 2011-12 to 2018-19

Year	Fish production (tonnes)	Prawn production (tonnes)	Total (tonnes)
2011-12	133 587	2 206	135 793
2012-13	214 591	5 037	219 628
2013-14	243 037	6 596	249 633
2014-15	260 010	8 352	268 362
2015-16	228 185	8 567	236 752
2016-17	193 732	5 189	198 920
2017-18	262 252	7 783	270 035
2018-19	284 211	9 998	294 209

Source: TSFD, 2019

Production during 2015-16 got on a downward trend due to severe drought during 2014-15. On the whole, about 109 native species of carps, murrel, and catfish are available in Telangana water bodies. The value of fisheries produce was estimated to be approximately \$ 322 mi, \$ 516 mi and \$ 573 mi during 2016-17, 2017-18 and 2018-19 respectively.

Table 2: Species wise fish & prawn Production in tonnes from 2016-17 to 2018-19

Sl. No.	Name of the Fish	2016-17	2017-18	2018-19
1	Barbus (Puntius species)	3 041	0	1 363
2	Carps (Catla catla, Labeo rohita, Cirrhinus mrigala, Cyprinus carpio etc..)	123 436	181 801	178 938
3	Cat Fish (Wallagoattu, Mystus species)	10 839	27 499	18 168
4	Murrels/snake heads (Channa striata, Channa marulius, Channa punctata)	20 794	26 359	30 265
5	Miscellaneous (Anguilla bengalensis, Anguilla bicolor etc..)	35 621	26 593	55 477
<i>Sub-Total</i>		<i>193 732</i>	<i>262 252</i>	<i>284 211</i>
6	Prawn (Macrobrachium rosenbergii, Macrobrachium malcolmsonii etc..)	5 189	7 783	9 998
Grand Total		198 920	270 035	294 209

Source: TSFD, 2019

5. Fishermen population

Telangana has fishermen population of 1.9 mi. There exists a three tier fishermen societies cooperative structure in the state. There are 3 765 primary fishermen Cooperative societies (PFCS) and 49 Fishing License Holders Primary Marketing Cooperative Societies (FLPMCS) involved in fish capture, culture and marketing. The distribution of different cooperative societies is provided in Table 3. There are 11 Fishermen Marketing Cooperative Societies

(FMCS) with a membership of 2 102 and 485 Fisherwomen Coop. Societies, members of which are involved in value addition/marketing the fish. The primary fishermen and marketing cooperative societies are federated into 10 District Fishermen Cooperative Societies (DFCS) which again are federated into TSFCOF (Telangana state Fishermen Cooperative Societies Federation Ltd) at state level.

Table 3: *Distribution of Cooperative societies involved with Fish Farming and Marketing*

S. No.	Fisheries Cooperative Societies as on 30 th April, 2019	Nos	Membership
1	Fishermen Coop. Societies	3 765	264 875
2	Fisherwomen Coop. Societies	485	31 312
3	Fisheries Marketing Coop. Societies	11	2 102
4	Fishing License Holders Primary Marketing Coop. Societies	49	2 995
5	District Fishermen Cooperative Societies	10	2 736

Source: TSFD, 2019

6. Cooperative Societies formation:

As per the government orders, primary fishermen cooperative societies which operate for managing and capturing fish from the water bodies can be formed only with the people belonging to 30 communities declared as fishermen communities (GOAP 1964), subject to clearing the skill tests conducted by the departmental officials (GOAP 2011). The skill tests conducted by a three men committee consisting of district cooperative officer, president of respective District Fishermen Cooperative Society and district fisheries officer include;

- (i) operation of the cast net in knee deep water with at least 60% gear efficiency (when the net is cast, it should form a circle to the extent of 60%)
- (ii) operation of the drag net by a group of the fishermen in such a way that fish do not escape under the foot rope
- (iii) operation of the gill net and coracle (the applicant's ability to shoot/thread the net in such a way that the head rope and foot rope are spread out vertically to achieve maximum gilling of the fish)
- (iv) test to confirm swimming ability (to be able to swim at least 100 m in a single stretch)
- (v) net mending

7. Regulation and Management of fishing in the water bodies

7.1. Fishing rights: fishing rights are issued by the fisheries department to the societies for the next fasli year (a period of 12 months from July to June) from first July every year based on the viability i.e., at least one acre Water Spread Area (WSA) of a water body to each member in case of perennial/canal fed water sources and two acres WSA to each member in case of rainfed/seasonal sources (GOTS 2016). Total Water Spread Area (TWSA) is the total area submerged in hectares when the tank is filled up to full tank level and Effective Water Spread Area (EWSA) is the average area covered in hectares with water during the year. While 75% of the TWSA is being considered as EWSA in respect of perennial water bodies, 50% of the TWSA is being considered as EWSA in respect of seasonal water bodies for the seed stocking purpose. Members' main occupation must be fishing and they should be residing within the area of operation. However, for forming marketing societies, separate set of rules apply where there is no necessity for passing the skill tests and viability does not come into picture. Older participants (above age 70 years) are excluded from PFCS which are issued fishing rights. Women have never been members of these PFCSs since one family is represented by an eligible male member of the family. Seed stocking, night watch and harvesting are done by these societies.

7.2. Lease system: Under the lease system, water bodies are leased out to the societies and these societies pool up financial resources from the members or borrow collectively and incur expenditure for fisheries management. The fishing is done collectively and the dividends are distributed equally among all members after deducting borrowings, lease, watch and ward. Sub leasing of the water bodies is prohibited. As on date, the leasing of water bodies accords high priority to traditional fishing communities and fishermen cooperative societies since nominal lease amounts are collected from the societies. As on date, 4 647 water bodies are under lease system. Lease amount is nominal and it varies from \$ 0.6 per ha to \$ 4.7 per ha for seasonal tanks and \$ 8.0 per ha for perennial tanks depending on the size of the tank, nature of fisheries wealth etc. As per orders in force, there is no enhancement in lease amount till June 2019 (GOTS 2014) and as per devolution of powers to local bodies, the lease amount so collected has to be apportioned in 50:30:30 ratio among water user associations, Gram Panchayats and Fisheries department respectively.

7.3. Licensing system: Under licensing system, licenses are issued by the department directly to the individual fishermen living in the villages within a radius of 10 kms from the reservoir as per the existing regulations of fishing. The licenses are not be transferable. License fee is

nominal (\$ 3 per person per annum). No person shall fish with nets with mesh size below 25 mm from knot to knot when it is net of any basket trap whose slivers are below 25 mm apart and fish catch with less than 200 mm length of the five species specified (Catla catla, Labeo frimbriatus, Labeo rohita, Cirrhinus mrigala & Cyprinus carpio) if caught, should be released alive in to the water. The licensee should not operate any net of more than 400 feet of length. No fishing of any sort shall be made in the waters lying within 10 meters from the reservoir or on either side of the reservoir during the entire year. No fishing shall be conducted within the 100 meters below the sluice gates or regulators in the canals or distributaries of reservoirs. Closed season for two months from 1st July to 31st day of August [both days inclusive] of the year has to be observed in the reservoirs and their channels up to 5 kms in its upstream (GOAP 1995). Initially, 12 reservoirs in the state were brought under licensing system. As on date, 27 water bodies are under license system.

7.4. Lease system vs Licensing system: In majority of the cases, lease and licensing systems are mutually exclusive. However, in few cases as seen in case of some reservoirs under licensing system, societies are still functional (eg: Pocharam reservoir of Medak and Palair reservoir of Khammam Districts) as they were existing prior to the introduction of licensing system. But licenses are given to all eligible persons irrespective of having membership in societies or not, as per the rules applicable for issuing licenses. Where there are societies, they regulate fishing by fixing dates for fishing, mesh size of nets to be used, and sometimes mobilize funds for incurring expenditure toward fish seed, stocking prawn juveniles etc. In such cases, the licensees who are not part of society are not under obligation to adhere to the rules framed and resolutions passed by the society. Sometimes, this kind of arrangement leads to conflicts among the stakeholders.

7.5. Auctioning the fish by Gram Panchayats: In water bodies (usually smaller tanks) where the ownership rests with Gram Panchayats (GPs) which are local government bodies of the one or more villages, as per devolution of powers vested with them, fisheries department has nothing to do with issuing fisheries rights and GPs can either lease out the water bodies to existing societies in respective villages or auction the fishing rights at any part of the season to fetch income to the GP as per the existing Regulation (73rd Constitutional amendment of Panchayati Raj Act 1992). As on date 19 465 water bodies are under GP ownership.

8. Fishermen Cooperative Societies –Performance

A baseline study commissioned by the TSFD and conducted by AFCI (Agriculture Finance Commission of India) over 405 villages across 81 clusters in 9 districts spread across three strata during 2017-2018, gave the following observations.

8.1. Membership: A number of the societies PFCS studied were older societies which had been existing for over 50 years since registration. Number of members at registration and when the study was conducted had shown that there was nearly 60% increase over a period with the society average increasing from 72 to 115 members on the whole. Average holding of water spread area of FCSs in terms of departmental tanks was about 140 ha, Gram Panchayat tanks was about 28 ha with overall average holding of 169 ha of Water Spread Area. In case of women Matsya Mitra Groups, membership at start was 675 (38 per group) which increased to 869 (48 per group) showing an increase of 30% in membership. Their activities included; dry fish production and marketing, retailing of fish (nearly 70%), door to door vending and post-sale services like fish cleaning, helping members in obtaining loans, and procurement of the fish mainly from tank fishermen (50%) followed by reservoirs (30%), & the balance from others like aggregators. The number of days of trading varied from 180-300 days in a year and majority of the members shared the profits among them depending on their contribution. Some groups involved themselves in arranging fishing equipment and net mending.

8.2. Gaps in FCS organizational functioning: It was observed that there were two sets of societies i.e., homogenous and heterogeneous. The first category societies were dominated by single or two major communities where the leader wielded good power and controlled the rest. In respect of second category where members were drawn from different communities and villages, the situation was very disturbing with disputes, differences, power groups etc. The FCSs had been admitting/associating some of their community men as an obligation and with a view to helping them to get benefits from schemes and provide income. Most of these societies had not built any reserves and had fragile financial status since the annual income from the water bodies allotted to them was distributed among the members (in some cases non-members and community members). Most of them claimed to be financially weak and in majority of cases, reported losses in their reports. It is difficult to cross-check the authenticity of their claims. Maintenance of secrecy in operations and dealings, and inadequacy in sharing right information by the FCS limited the conclusive observations on working of the institutions. Poor in-house mechanisms for resolving conflicts within group; high cost on purchase of fish seed and nets; Problems of storage and marketing resulting in distressed sale for lower prices; lack of access to finance and absence of institutional finance services are also limiting the better

functioning of FCS. Better functioning of societies was seen wherever the leaders (president/executives) were educated with better group management skills and dynamism.

No major issues were observed in the working of the Women Mastya Mitra Groups, and they were handling substantial volume of fish for marketing and actively facilitating channelization of fish from producer to consumer. On an average, a fish marketing woman sold anywhere between 25 to 40 kgs of fish per day if it is a semi-urban market while this quantity went up in metros where average sale was up to 50 kg/day. However, they experienced financial crunch for expanding their operations.

The involvement of DFCS and State Federation for the welfare of society members was minimal. DFCS were operating on low key and their presence/ activities in terms of outreach and extending guidance to its member societies, formation of new FCSs, marketing of fish collected from FCSs, liaison between line departments and FCSs was not visible. Interactions with PFCS also showed that they did not see any reason or benefit in joining the DFCS. There is both visible and operational disconnect between these institutions.

8.3. External influence: Some societies were controlled by merchants or market intermediaries. This has resulted in less organizational powers for members in the societies, lack of ownership in development of resources both by the FCS or its members, high level of absenteeism and lack of involvement by members, lack of participatory functioning, lack of transparency and poor entrepreneurial leadership. Theft and plundering of fisheries wealth by non-members were seen in few cases, especially when the people belonging to the same village or neighbouring villages are not in friendly terms with the societies or where anti-social elements come together to loot the wealth.

Similarly, political affiliations also played a role in creating conflicts. Diseases/excessive heat coupled with reduction in water levels during summer leading to mass casualties of fish also impacted the functioning of the societies. However, functioning of FCSs was good wherever association of FCSs with TSFD was better.

8.4. Social conflicts related to resource access and sharing: Conflicts in access to resource, sharing of water for crop activities, non-maintenance of dead storage level (sluice gate) in tanks for animal drinking and fisheries activities, different form of resource sharing/different scale of partnerships by colluding with merchants etc., have limited the segment growth to a considerable extent and constrained harnessing optimum production in these resources, on which state is mainly banking on for the sector growth. The conflicts were arising between GPs and societies with respect to lease related issues when GPs refuse to lease out the water bodies

to the PFCS existing in the villages and instead go for auctioning the water bodies to raise revenue for GP.

8.5. Constraints: Lack of knowledge on resource productivity potentials, new technologies, process, and management tools & approaches to harness potentials; huge deficit in social preparation of members through trainings, technology mainstreaming, managerial capacity building on leadership, operational efficiency, and compliance to regulations etc are the constraints noticed. Scarcity of multi-skilled man power in FCS for pursuing diversified activities of the sector using the available resources, and vulnerability to illegal fishing as evidenced by rise in incidences of theft / pilferage of fish (apparently due to rivalry between villagers and communities on issues of resource sharing, conflicts with other users and social problems)/entering into constant litigation are the other main constraints. Pollution of the water bodies due to industrialization and heavy urbanization, increasing age of the present members and younger generation leaving to urban areas for better opportunities are other constraints observed to be beyond the Fisheries department's control. It has become difficult to construct wholesale and retail markets due to non-availability of the land and resistance from people living near the locations identified for construction of the markets.

9. Key challenges for TSFD

Declining productivity and profitability are working as disincentives for the younger generation of the PFCS resulting in change of profession and migration to semi-urban/ urban areas in pursuit of new avenues. Most of the Societies were not maintaining transparency in their dealings and many Societies do not feel the necessity to keep contact with the department except on matters relating to subsidies and benefits. Many unhealthy practices within the societies go unchecked and the TSFD has technically/ legally/ administratively no control over them except when the societies are found at fault (which seldom comes to the notice). Hence, ensuring decent income to the members of FCS for the efforts and investment put in and strengthening of PFCS in terms of cooperative success viz., functions and management are found to be key challenges. Further, the weighted average fish consumption among rural consumers was 9.66 kg. per capita per annum while in case of urban consumers, it was 4.88 kg per capita per annum among fish eating population (TSFD 2017) while recommendation of ICMR (Indian Council of Medical Research) is 12 kg fish per capita per annum.

10. Gaps identified:

Acute shortage of professional staff hampering extension and water resource development activities, poor data availability on water resources, yield potential of water resources, status

of utilization, inputs utilized, actual fish harvest (production) and market arrivals making the monitoring of development interventions difficult, severe shortage in supply of quality fish seed and reliance on other states for procuring fish seed during the season, unorganized marketing systems forcing the fishermen to dispose of produce to intermediaries on site at lower price, lack of training facilities for technical staff and population engaged in fishing to improve the knowledge in modern fishing technologies and developments in the sector globally and nationally, poor infrastructure facilities, post-harvest losses and lack of disease diagnostic facilities in case of disease occurrence were identified to be major gaps.

11. Government Initiatives:

Enhancement of resource productivity and fish production in the state can happen only with shared goals and efforts of the TSDF and PFCS. The state's entire fish production activities are dominated by the PFCS by virtue of the Government of Telangana's policy of leasing the water bodies only to them. Although this system of leasing resources entirely to FCS for fisheries development is conducive from the point of equitable distribution of wealth and welfare, it has led to monopoly with no accountability, no data records and sharing over time. In the above context, Government has taken up several measures with the following goals in mind; achieving year-round fishing activity & self-sufficiency in fish seed production, adoption of saturation approach in fish culture in water bodies (Minor, Medium & Major Reservoirs), diversification of fish culture activity by giving impetus to cage culture, pond culture & prawn culture etc., improving economic status of every practicing fisherman and woman, and encouraging fisherwomen's participation in entire value chain & establishing infrastructure for seed production, harvesting, processing, value addition & marketing in association with cooperatives and private entrepreneurs.

11.1. Seed production: Existing seed farms were strengthened by allocating funds for carrying out major repairs. Private hatcheries (17 no.) and rearing ponds (65 ha) were encouraged to be established under Blue Revolution Scheme. Three government seed farms were privatized on 10 years lease agreement to encourage private investment and bring in latest technologies. As per the latest order issued by the government, rules have been simplified for registration of hatcheries, rearing ponds, RAS, Intensive Pond Aquaculture System (IPAT) etc (GOTS 2019).

11.2. Fish seed stocking: In order to strengthen the fisheries sector by improving the production and productivity of the water bodies and to minimize the migration of fisheries dependent communities from rural areas by providing sustainable livelihoods, the government started supply of fish seed on 100% grant basis to all the water bodies where fisheries is

possible. As part of this initiative, 278.5 mi fish seed was stocked in 3 939 number of departmental tanks during 2016. During 2017-18, it was decided to stock water bodies owned by the GPs also, hence 510 mi fish seed was stocked in 11 067 water bodies. For the first time, 10.9 mi hatchery reared Fresh Water Prawn Juveniles were stocked on pilot basis in 11 reservoirs. Both counting and weighing methods were followed for stocking the fish seed. Stocking Committees with FCS members, GP members (where relevant) and departmental staff were constituted for assessment of quality and number of the fish seed.

Table 4: *Fish seed stocking density, size and species composition*

category of water body	size of fish	stocking density per ha. of EWSA	species and their ratios
seasonal water bodies	35-40 mm	3,000	35% - Catla 35% - Rohu 30% - Common carp
perennial water bodies including reservoirs			40% - Catla 50% - Rohu 10% - Mrigala
up to 1 000 ha	80 -100 mm	2,000	
from 1 001 to 5 000 ha		1,000	
above 5 000 ha		500	

Source: TSDF, 2019

This initiative contributed to 30-40% of production enhancement in the water bodies where fish seed stocking was done during the first year of its implementation (2016-17) itself.

11.3. Joint reservoir management: It was noticed that development, management and conservation of three interstate projects such as Nagarjuna Sagar, Srisailem and Pulichintala between the states of Telangana and Andhra Pradesh did not receive proper attention to enhance productivity, take up conservancy measures and solve the conflicts that arose sporadically between fishermen of both sides. Hence, Government of Telangana took initiative in organizing coordination meetings between respective senior officials of both the states and certain major decisions were taken for; Stocking of 80 – 100 mm fish seed of three species of Indian major carps every year in the ratio of 40% catla, 50% rohu and 10% mrigala @ 500 / ha. of effective water spread area by both the states simultaneously in the months of November or December in proportion to the number of fishermen that obtained licenses during that fasli year (July 1st to June 30th), ensuring enforcement of conservancy measures such as observance of ban period and ban on use of alivi (shore seine) nets and regulation of mesh size of the nets through coordinated efforts.

11.4. Blue revolution Scheme: There are different components under this Government of India sponsored scheme, out of which hatcheries, rearing ponds and cage culture components are

directly relevant to the management of the fisheries commons. During the past three financial years, funds to the tune of \$ 8 mi were allocated under those components.

11.5. Integrated Fisheries Development Scheme (IFDS): Integrated Fisheries Development Scheme (IFDS) was launched by the Government through the Telangana State Fishermen Cooperative Societies Federation Ltd., (TSFCOF) with an out lay of \$ 143 mi which includes \$ 21 mi from the beneficiaries (the members of the primary fishermen/fisherwomen /marketing societies) toward their share and the subsidy ranged from 75% to 90% based on the components. Fish seed stocking was carried out on 100% subsidy basis. For certain components individual fishermen and women are eligible, for some components groups of fishermen/women are eligible, for others primary fishermen/ fisherwomen/marketing societies or DFCSs or TSFCOF are eligible. The fund allocation toward various components laid strong emphasis on enhancing table fish production (21.6%), enhancing seed production (3.2%), harvesting support (9.5%), marketing Support (56.9%), infrastructure development (6.36%), innovative projects (1.44%) and capacity building (1.00%). Totally, 194 147 beneficiaries were estimated to be directly/indirectly benefited from these interventions. However, fish seed stocking is estimated to cover more than 3 lakh households directly or indirectly, adding partial income to the households.

As part of the scheme, stocking of fish seed and prawn juveniles, vending units with two and four wheelers, insulated vehicles, nets and crafts, kiosks, culture ponds, fish seed farms, ice plants, feed plants, construction of wholesale and retail markets, landing centres, skill development etc., were given to the fishermen for their benefit. The components which are to be approved at state level are; establishment of freshwater fish seed hatcheries, construction of new fish seed farms, strengthening of fish seed farms, re-circulatory aquaculture system, insulated trucks, construction of wholesale fish markets, establishment of ice plants, establishment of fish feed mills, establishment of large formulated pellet feed plants, net mending and putti fabrication units, fish processing units, establishment of ornamental fish units, aqua tourism units, and any innovative schemes.

11.6. Cage culture: Cage Culture in reservoirs is another important activity with 80% subsidy to the fishing communities. Pangasius & Tilapia are the suitable species as of now and market is slowly picking up. About 670 cage units were established across the reservoirs under BRS by involving the members of the FCSs by imparting training to them and providing assistance for procuring the cage material and Pangasius/Tilapia fish seed. The government issued an

order for promoting cage culture up to 1% in the earmarked 5% of the EWSA in the reservoirs, projects and tanks with more than 200 ha WSA (GOTS 2017). The dept has also taken up collaborative project funded under IFDS with Central Inland Fisheries Research Institute (CIFRI) on “Fish seed rearing in cages and diversification of species for cage culture” which is in progress. As part of this, species like jayanti rohu, murrel and scampi prawn are also being tried out since these species fetch better market compared to Pangasius and Tilapia in the local markets.

11.7. Murrel project by involving Society members: Murrel (snake head) has been declared as state fish 2016 and there is huge demand from the consumers. The natural reserves are fast depleting, hence necessitating adoption of relevant protocol/techniques (which have not yet been mastered in India at field level for the native *Channa* species) by involving communities which helps in faster learning at field level. Hence, an action research project on “Technology support for breeding and hatchery production of striped murrel, *Channa striatus*” in collaboration with Central Institute for Freshwater Aquaculture (CIFA) was initiated in Paleir reservoir by involving the local society members to demonstrate captive breeding & seed production of striped murrel, *Channa striata*.

11.8. Community halls & Markets: Government has also given equal importance for the welfare of the fishing communities by sanctioning over 500 community halls costing roughly \$7 mi to societies having membership of above 50 on 90% grant basis. Already 272 community halls have been constructed and the balance are under progress. This initiative helped the members of the societies to conduct their meetings & discussions besides storing their nets and other fisheries activities related equipment in these buildings. The facility is also being used for conducting trainings & awareness camps to fishermen and social functions of the community besides being of use as shelter during calamities, venue for organizing community health education etc. About 99 retail markets were sanctioned on 100% grant basis out of which 45 have been completed and others are under various stages of construction. The unit cost varied based on the land availability and other requirements. General observation is that availability of land for construction of markets is a problem since suitable land is not available or people in the vicinity of identified land are opposing the construction of fish market there. Hence, the concept of mobile markets also caught up.

11.9. Insurance: Under Pradhan Mantri Suraksha Bhima Yojana (PMSBY), an assured amount of \$ 2 857 in the death/ total permanent disability and \$ 1 428 for partial permanent disability is provided to the deceased eligible fishermen falling under 18 to 70 age group. Totally 326

154 fishermen are covered under the scheme. The premium amount of \$ 0.05 mi is being paid every year to the Insurance company on 50:50 sharing basis by the central and state governments. In addition to PMSBY, Central Government recently introduced PMJJBY (Pradhan Mantri Jeevan Jyoti Bhima Yojana) where premium is shared by state & central governments on 50:50 basis covering 150 000 members of FCSs falling under 18 to 50 years age group members are covered under this. Here also, sum assured to the member in the event of death (irrespective of any reason) is \$ 2 857 besides the scholarship provision of for two children of deceased fishermen towards education from 9th to 12th classes. Totally, \$ 0.32 mi is released during 2018-19 toward this scheme to FISHCOFED (The National Federation of Fishers Cooperatives Ltd) which is a national level federation and coordinating authority. Apart from insurance under PMSBY, state government has been paying ex-gratia of \$ 5 714 to the dependent family with effect from 21/4/2017.

11.10. Institutional strengthening in fisheries department: A Project Management Unit (PMU) was established to monitor and evaluate the schemes and projects of department of fisheries, Government of Telangana. The main objective of the PMU is to build systems and processes to collect and compile data from the field, liaise with the departments and relevant professional bodies at the national level, build resource database & strong MIS and take up monitoring on regular basis. About 205 field level officials (Fisheries Field officers, Fisheries Assistants, Fishermen and data entry operators) were recruited and every district fisheries officer was provided with a four-wheeler. District offices were given IT infrastructure and software modules were provided which immensely helped in effective implementation of various schemes.

11.11. Training and capacity building: Lot of emphasis was made on introducing and enhancing the skills of fishermen in fisheries activities besides imparting knowledge and introducing new technologies like cage culture in the reservoirs. Reservoir fishermen were given training on importance of conservancy measures, reservoir management for handling any disease occurrence, using proper nets and boats, identifying and destroying the banned species in the waterbodies, not destroying or wasting small commercially unviable species from market point of view but very valuable from bio-diversity point of view, marketing aspects etc with the financial assistance from National Fisheries Development Board (NFDB).

The existing research/training institutions like Paleir research station, four KVKs (Krishi Vigyan Kendras) which are Agriculture knowledge research & extension centres, NIRD (National Institute of Rural Development), CIFRI, CIFA etc were utilized for imparting

technical trainings with IFDS funding. Since management of cooperatives is an important aspect for laying focus on collective action, services of ICM (Institute of Cooperative Management) were taken for conducting trainings on cooperative matters for the members of cooperative societies. The Government has organized aqua expo during 2017-18 & 2018-19 to encourage spread of new technologies & to encourage investment of aqua entrepreneurs in this sector. Members from societies across the state were actively involved in visiting the expo and learning about new technologies.

11.12. Encouraging women and their groups: Every eligible matsya mitra group was extended revolving fund for encouraging marketing and value addition activities. The fund ranged from \$ 4 300 to \$ 5 714 (for groups with less than & more than 100 members respectively), depending on the membership in the group. As per the available information, 75 groups who have submitted audited statements have received revolving fund. A number of training and capacity building activities were held to the women for making the functioning of the groups effective (maintenance of registers & accounts, getting the audit done, utilizing the revolving fund effectively etc), enhancing their skills and capabilities (trainings and exposure visits to know the best technologies, learning a variety of fish value added products and culinary preparations for fish based cooking), marketing aspects, and increasing awareness about fish based diet among the consumers. Fish festivals were organized with the help of NFDB to encourage more consumer awareness and members of matsya mitra groups actively participated in these.

11.13. Database development & soft-ware based monitoring: Database was developed for the societies, individual members of the societies, water bodies and infrastructure. MIS reports are developed for fish seed stocking, all activities of IFDS, and infrastructure development and kept open in the e-laabh portal in Public domain. This web- based benefit management system and won the “Award of Appreciation” of CSI Nihilent e-Governance awards 2018 for Fisheries Benefit Monitoring System developed in collaboration with NIC. Further, development of modules for insurance, applying for registration of hatcheries, RAS (Recirculatory Aquaculture System) etc., are under development.

12. Outcomes

The above initiatives resulted in increased fish seed production from 80 mi in 2016-17 to 290 mi in 2018-19 and about 30% increase in fish production due to seed stocking and thereby enhancing the income levels of the fishers. Good database was developed for all major

activities of the fisheries sector, hence making monitoring of the cooperative societies and departmental activities more effective. Additional staff to the tune of 250 officials were recruited at various levels, got trained & positioned and IT infrastructure was also improved in the district offices to a great extent which strengthened the department very much. Exposure to new technologies like cage culture, fish processing, pen culture, RAS etc., motivated the departmental officials as well as the society members to adopt the same with confidence. Construction of community halls, introduction of insurance products & ex-gratia, training & capacity building, providing a number of individual and group assets to the members of the societies created enthusiasm in the sector and even younger people are not shying away from the profession to fetch livelihoods from the fisheries sector. Providing mobile market outlets and custom-made two-wheeler and four-wheeler vending units, portable & stationary fish kiosks, ice boxes, weighing scales, plastic crates improved the marketing infrastructure compensating the slow pace of construction of wholesale and retail markets. The incomes of the individual and group beneficiaries improved significantly as per the case studies available with TSFD & TSFCOF.

12. Future course of action

TSFCOF has to develop an integrated approach in bringing FCSs together for collective action resulting in effective resource utilisation, better post-harvest handling, transportation, storage and marketing network. The efforts of the fisheries department have to continue to bring more eligible fishermen and women under cooperative fold and build their capacities. There is a necessity for more marketing societies also since marketing is a grey area and a strong society can certainly assess the market situation better to go for timely and efficient harvesting and getting better market price through networking and also take up processing and value addition related activities. More exposure visits have to be organized for motivating the members of the societies in taking up new technologies. Special focus has to be laid on enhancing the capabilities of women matsya mitra groups and their members and on mainstreaming the gender considerations in departmental activities. There is a necessity for a state level institution for training & capacity building, small scale research facilities, and fully equipped laboratory for disease diagnostic facilities. Certain measures like use of waterlogged areas for aquaculture, feed based fish farming in capture resources for increasing per hectare productivity, achieving self- sufficiency in production of fish seed by encouraging the establishment of hatcheries and rearing ponds, diversification of fish rearing activity (cage culture, pond culture, RAS, pen culture), and improving marketing infrastructure should be given priority by TSFD.

13. Conclusion

Inland capture fisheries have proven to be an important sector for providing livelihoods to the dependent communities in Telangana and cooperative institutions have been found to be effective in utilizing the common water resources available in enhancing the incomes of the fishermen and women. Hence, cooperative institutions have to be strengthened at all levels by laying continuous focus on them for improving their functioning by constant monitoring of their activities, giving financial assistance wherever required, maintaining records properly, conducting elections on time, carrying out auditing of the expenditure and operations of the societies regularly, and imparting knowledge and skills to the members based on the requirement. Government has to continue to provide budgetary support so that the fisheries sector gets required fillip to reap the fisheries wealth to the maximum possible to benefit the FCSs. The initiatives which have been taken up by TSFD so far have yielded promising results and they have to be continued and meanwhile, new areas for development have to be explored to improve fisheries production and productivity in the state.

References:

- Adger, W. N., K. Brown, and E. L. Tompkins. (2005). *The political economy of cross-scale networks in resource co-management*. Ecology and Society.10(2): 9. [online] URL: <http://www.ecologyandsociety.org/vol10/iss2/art9/>
- Béné, C. (2003). *When fishery rhymes with poverty: a first step beyond the old paradigm on poverty in small-scale fisheries*. World Development, 31(6), 949 – 975.
- Blake D Ratner and Edward H Allison. (2012). *Wealth, Rights and Resilience: An agenda for governance reforms in small scale fisheries*, Development policy review:2012, 30 (4):371-398
- Blake D. Ratner, Sovannarith So, Kosal Mam, Il Oeur & Sour Kim. (2017). *Conflict and collective action in Tonle Sap fisheries: adapting governance to support community livelihoods*. <https://doi.org/10.1111/1477-8947.12120>.
- Gutierrez, N. L., Hilborn, R. and Defeo, O. (2011) *Leadership, Social Capital and Incentives Promote Successful Fisheries*, Nature 470: 386-9.
- GOAP. (1964). *listing of communities eligible for forming primary fishermen cooperative societies*, GO Ms NO 98 of Fisheries (FII), Department of Revenue of dated 21/01/1964, Government of Andhra Pradesh.
- GOAP. (1995). *Fishing rights in water resources in the state -implementation of licensing system in 12 reservoirs-introduction of special draft rules*, GO Ms NO 186 dated 25/11/95, AH & F department, Government of Andhra Pradesh.
- GOAP. (2011). *conducting skill tests for giving membership in societies*, GO Ms NO 74 of Fisheries (FII) of AH & F department dated 21/10/2011, Government of Andhra Pradesh.
- GOTS. (2014). *Fisheries-leasing out of fishing rights in respect of departmental tanks without enforcement of rentals for a period of five years commencing from Fasli:1424 (1/7/2014) to Fasli 1428 (30/6/19)-orders-issued*, GO RT No.41 dated 24/10/2014, AH, DD & F department, Government of Telangana.
- GOTS. (2016). *viability for issuing fishing rights*, GO Ms NO 6 of Animal Husbandry, Dairy Development and Fisheries (V&F) department dated 24/03/2016, Government of Telangana.

GOTS. (2017). *Blue revolution-promotion of cage culture in the earmarked area in Reservoirs, Projects and Tanks with more than 200 hectares water spread area – Guidelines - Issued*. G.O.Rt No. 144 dated 28/10/17, Animal Husbandry, Dairy Development & Fisheries (V&F) Department, Government of Telangana.

GOTS. (2019). *regulation of fresh water aquaculture–exemption of hatcheries, fish seed rearing farms, re-circulatory aquaculture system and intensive pond aquaculture technique/in pond raceway system from the purview of the district level committee – amendment to the existing guidelines*. G.O.Ms. No. 3 dated 24/5/19, Animal Husbandry, Dairy Development & Fisheries (V&F) Department, Government of Telangana.

Lawrence ED, Smith S, Nguyen Khoa S and Lorenzen K. (2005). *Livelihood function of inland fisheries: policy implications in developing countries*, Water Policy, 7, pp 359–383

Jentoft, S. (1986). *Fisheries cooperatives: lessons drawn from international experiences*. Canadian Journal of Developmental Studies. Vol VII, No. 2: pp 197-209.

Joffre O, Sheriff N. (2011): *Conditions for collective action: understanding factors supporting and constraining community-based fish culture in Bangladesh, Cambodia and Vietnam*. Studies & Reviews: 2011-21, The World Fish Centre, Penang, Malaysia, p 46.

Olivier Joffre and Natasia Sheriff. (2011). Conditions for collective action: understanding factors supporting and constraining community-based fish culture in Bangladesh, Cambodia and Vietnam. CGIAR Challenge Program on water & food. studies and reviews 2011-21. World fish centre. Pp 12-13.

Stephen J. Hall, Ray Hilborn, Neil L. Andrew, and Edward H. Allison. (2013). *Innovations in capture fisheries are an imperative for nutrition security in the developing world*PNAS May 21, 2013 110 (21) 8393-8398; <https://doi.org/10.1073/pnas.1208067110>, Edited by Jeffrey Sayer, James Cook University, Cairns, Australia and accepted by the Editorial Board November 27, 2012 (received for review June 7, 2012)

TSFD. (2017). *Baseline study for development of fisheries and aquaculture in Telangana*. pp 7-50 and pp 87-245.

Welcomme, R.L., Cowx, I.G., Coates, D., Béné, C., Funge-Smith, S., Halls, A., and Lorenzen, K. (2010). *Inland capture fisheries*. Phil. Trans. R. Soc. Lond. Ser. B, Biol. Sci. **365**(1554): pp 2881–2896. doi:10.1098/rstb.2010.0168.

Abbreviations:

AFCI	: Agriculture Finance Corporation India
BRS	: Blue Revolution Scheme
CIFA	: Central Institute for Freshwater Aquaculture
CIFRI	: Central Inland Fisheries Research Institute
CSI	: Computer Society of India
DFCS	: District Fishermen Cooperative Societies
DOF	: Department of Fisheries
EWSA	: Effective Water Spread Area
FAO	: Food and Agriculture Organization of the United Nations
FCS	: Fishermen Cooperative Society
FISHCOFED	: The National Federation of Fishers Cooperatives Ltd
FLPMCS	: Fishing License Holders Primary Marketing Cooperative Societies
FMCS	: Fishermen Marketing Cooperative Societies
GP	: Gram Panchayat

GO : Government Order
GOTS : Government of Telangana State
ICM : Institute for Cooperative Management
ICMR : Indian Council of Medical research
IFDS : Integrated Fisheries Development Scheme
IPAT : Intensive Pond Aquaculture System
IT : Information Technology
KVK : Krishi Vigyan Kendras
MIS : Management Information System
NCDC : National Cooperative Development Federation
NFDB : National Fisheries Development Board
NIC: National Informatics Centre
NIRD : National Institute for Rural Development
PFCS : Primary Fishermen Cooperative Societies
PMJJBY : Pradhan Mantri Jeevan Jyoti Bhima Yojana
PMSBY : Pradhan Mantri Suraksha Bhima Yojana
PMU : Project Management Unit
RAS : Recirculatory Aquaculture system
TSFCOF : Telangana state Fishermen Cooperative Societies Federation Ltd
TSFD : Telangana State Fisheries Department
TWSA : Total Water Spread Area
WSA : Water Spread Area