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Impact of Climate Resilient Inland Fisheries Technology for Preventing Migration of Primitive Tribals in Coastal Maharashtra

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Abstract

The *Katkari* is one of the four primitive tribes engaged in traditional fishing activities in Raigad district of Maharashtra. *Katkaris* have their own distinctive culture, because of disadvantageous socio-economic conditions they are geographically isolated. An attempt was made to induce climate-resilient fisheries production technology for socio-economic up-liftment of this tribal community. The study was undertaken by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth (DBSKKV), Dapoli in collaboration with an NGO namely, Shramjivi Janata Sahayyak Mandal (SJSM), and other 22 NGOs, Ford Foundation, Mumbai, Tata Trust, Mumbai and Department of Biotechnology, Government of India, New Delhi. The project has changed the entire lifestyle of the tribals and has stopped migration of ~70% of rural people to the metros. The implementation and other impacts of the project are detailed in this paper.

Keywords: Tribal community, *Katkari*, Inland fisheries, socio-economic transformation, migration.

Introduction

Scheduled Tribes (STs) are indigenous geographically isolated and, have their own distinctive culture, and are with low in socio-economic status (Ramaiah 1981). They are the most deprived and vulnerable community in Maharashtra as well as in India. For centuries, the tribal groups have remained outside the main stream of the general development process due to their habitation in forests and hilly tracts (Joshi 2011, Hanumantha and Grover 1979). Although certain constitutional safeguards are provided to them after independence, there has been no economic, social and political mobility across these communities (Patel 2010). According to the 2001 census, the population of STs is 84.3 million constituting 8.2 % of the total population of the country. Sixty eight per cent of the country's Scheduled Tribes population lives only in seven states *viz*., Madhya Pradesh (14.5 %) followed by Maharashtra (10.2 %), Odisha (9.7 %), Gujarat (8.9 %), Rajasthan (8.4 %), Jharkhand (8.4 %) and Chhattisgarh (7.8 %) (Masavi 1976, Trivedi 1985, Vittal 1992). High incidence of poverty in tribal areas of India has been observed. Tribal people in India suffered from neglect for long centuries until after independence when they were drawn into the mainstream of the national life (Kurane 2008).

Lack of livelihood opportunities resulted in large scale migration of tribal from rural to urban areas either temporarily or on permanent basis (Nayak and Prasad 1984). This has caused the disturbances of their traditional socio-psychological family relationship, network of neighbourly relationships, their social relations, respective role of men and women, nature of struggles with the state with regard to land issues, particularly concerned with the land in-and-around the forests. Though more than 70 per cent of tribal depend on agriculture, their employment in this sector is hardly for four months in a year (Rangacharyulu 1994). During off-season, these people remain idle without any gainful employment. By and large, they eke out their living through collection of minor forest produce, fishing, hunting and cutting of firewood between two kharif seasons (Reddy and Reddy 1991). Several approaches to the multi-dimensional development of Indian tribal-policy of isolation, policy of assimilation and policy of middle path suggested a new approach for integrated development of tribal without destroying the essential

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ethos of tribal culture (Bharati and Mamtaz 2003). Tribal community undertake farming during the monsoon as one of the livelihood options. The irregular rainfall due to climate change has adversely affected the life of tribal community. The skills available with them are limited. In addition to this they are illiterate and unaware about the recent technologies to mitigate impact of climate change. These situations may aggregate migration of tribal community in search of alternate livelihood options considerations the local conditions and skills of tribal community opportunities in fisheries were exposed to them.

Tribal Communities of Raigad district engaged in fisheries activities

The *Katkari*, *Bhoi, Aagri* and *Koli* are the traditional fishing communities residing in Raigad district who fish traditionally in freshwater (rivers and small tanks), creeks and sea waters for their livelihoods (Figure 1). The *Katkaris* and *Bhoi* generally fish in rivers and ponds, whereas, *Aagri* and *Koli* fish in brackish and saline waters along the sea shores. The sector engages 30,044 families providing employment to 69,304 individuals of Raigad district.

Fig. 1. Study area showing Shramjivi Janata Sahayyak Mandal , the tribal areas in Mahad Konkan, Maharashtra

The NGOs play an important role in the development, implementation, and reform of public health service (Lal *et al.* 1984, Raja 2005, Suresh 2008). Their activities include treatment, rehabilitation, community care, research, training and capacity building, awareness and lobbying. The NGO, Shramjivi Janata Sahayyak Mandal (SJSM) was founded in 1977 by a group of educated youth from nomadic tribes to promote development of socially and economically backward communities residing in remote villages of Maharashtra. Its approach was to motivate the people, elevate their knowledge level, establish linkages with external institutions and facilitate an equity oriented, gender-sensitive and inclusive development process.

Inland fisheries and technology intervention of DBSKKV

Socio-economic Survey

Before implementation of the project, the socio-economic survey of fisheries activity of the all 65 *Katkari* tribal hamlets was conducted by Shramjivi Janata Sahayyak Mandal, Dr. B. S. Konkan Krishi Vidyapeeth in association with Tata Institute of Social Science in Mahad block through active involvement of local youths. Twenty hamlets from each block and 20 families from each hamlet were selected for the study purpose. Two volunteers from each hamlet were given orientation for data collection. The survey forms were filled when they returned after their migration. The important outcomes of socio-economic conditions of *Katkari* are given in Table 1. Non-active members did not participate in dam fishing because of unawareness about dam fishing (40 %), not having interest in dam fishing (10 %), long distance from hamlet to dam (40 %) and group conflict (10 %).

The SJSM started the most distinguishing activity of the organization of the *Katkaris*. SJSM with the technical expertise of DBSKKV rejuvenated their livelihood options through inland fisheries. The man made resources such as reservoirs available in the nearby vicinity of tribal settlement were indentified for the development of fisheries. The tribal communities have

Table 1. Observations from socio-economic studies of Tribal

Particulars		Observations
Migration	:	Migration amongst the families in search of employment comprised of various constructions (Govt./PWD works), brick kilns, agriculture etc. nearly for six months every year.
Exploitation	:	The upper cast contractors, money lenders and farmers employ these tribal as a field labourers
Education	:	There is hardly any education concept amongst the *Katkaris* with special reference to girls and women and very few tribal youths have passed 10^{th} std.
Strong influence of customs, traditions and superstitions	:	Community believes on certain traditions related to health, festivals and life and death. *Katkaris* when fell ill still go to *Bhopa*(traditional health attendant) for treatment through *mantra-tantra* (black magic) instead of consulting doctors.
Liquor Consumption	:	Liquor Consumption is common amongst men and women. .The other habits include smoking, gambling and chewing tobacco.
Starvation and Malnutrition	:	Due to lack of availability of food, the exploitation at work place, poor quality food intake and strenuous/hard work almost 95 per cent men, women and children are anaemic and malnourished.
Lack of Savings habit	:	Tribal do not save for 'tomorrow'. The tendency is to spend what they have earned 'today'. Even food grains are not stored.
Shelter problem	:	Land is not specified for the *Katkari* community as that of non-tribal and hence most of hamlets either stay on forest lands or revenue lands
Drinking water problem	:	Most of the hamlets fetch water from wells or hand pumps and are largely dependent on village ponds or wells of non-tribal/farmers and on the water supply through water tankers by government agencies during summer months
Uncertain livelihood	:	Only 17 hamlets having *dali* land in the taluka (a common forest land given to the community by British rulers for cultivation). Very few families own the agricultural land. Some of them have encroached lands but have stopped cultivating in the past few years due to degradation of lands. Main source of livelihood is fishing in rivers or inland (ponds, reservoirs, lakes, etc.). Both the sources are seasonal and hence they migrate out in search of employment
Poor implementation of Government programmes	:	Integrated Tribal Development Programme, is hardly operational. Most of the allotted grants of these schemes either left unspent or used non-tribal under the pretext of 'members of ST'
Inactive Panchayat Raj Institute (PRIs) and lack of understanding of PRI role amongst tribal	:	There is no Panchayat Extension to Schedule Areas (PESA) applicable to this block due to paltry tribal population. Many of the families do not possess voting cards or any other identity cards such as ration cards or birth certificates and hence do not have right to vote. Although some seats are reserved, the elected tribal representatives do not have much say in the *Gram Sabha* or planning processes due to minority in number
Lack of Scientific Knowledge about fisheries	:	The *katkari*are aware only about the harvesting fishes from inland water bodies by traditional methods. They lack about the scientific knowledge of fish farming. The cooperat*ive memb*ers are very much interested in practical training programmes viz. fish seed production, cage culture, fish harvesting etc. The average level of satisfaction among the community by theoretical training programme was 15per cent while by practical training programme was 85 per cent.

Source**:** Dyanprabodhini Sanstha Report (2008-09)

inherent skill of fishing. The intervention was made to enhance the availability of fish in reservoir by stocking reservoirs with advance fingerlings. The tribal were trained to catch the fish in reservoir. This provided the tribal an option of livelihood throughout the year on background of climate change. Thus it helped to prevent migration of tribal community in search of alternate livelihood source. Total 18 tribal cooperative fisheries societies were started and 31 water-bodies were selected for fisheries development and management, benefitting 1,825 tribal families. A comprehensive hatcheries production unit was started under the technical guidance of DBSKKV and others with an annual capacity of more than 50 million fish spawn at Khaire village of Mahad block in Raigad district, Maharashtra. The quality seed thus produced was introduced into the nearby reservoirs for enhancement of fish production.

Systematic development and implementation of fisheries activities

The work was initiated since 2005 in all the hamlets of the two blocks of Raigad district, viz., Poladpur and Mahad focusing on their socio-economic empowerment and addressing their livelihood issues. One of the main livelihoods of tribal communities was the inland fisheries which possess vast potential of providing nutritious food to society in a reasonable cost and creating large employment opportunities for youths even under changing climate. The inland fishing and other related empowerment issues were promoted by SJSM under a network namely, *Konkan Katkari Development Forum* (KKDF) to ensure availability of livelihoods of more than 526 tribal members (families) who earned their livelihood through inland and river fishing in Poladpur and Mahad blocks. These cooperatives successfully bided for government water bodies (small irrigation dams) for fishing rights for a period of five years. The campaign for acquiring more water bodies was initiated. A forum of experts/representatives of Fishing Cooperatives, NGOs, Agriculture Universities and Government Departments was set up which worked on the issues related to Reservoir Fisheries Management with special reference to productivity, harvesting, storage, tools and equipment, marketing, training, legal technicalities concerning leasing out by Govt. (Figure 2).

Organisation and execution of fisheries technology to the tribals

A comprehensive hatchery production unit was established under the technical guidance of Fisheries College and others with an annual capacity of 50 million fish spawn. The financial support was extended by the Ford Foundation, Tata Trust, and Department of Biotechnology. The organogram between government and non-government organisations is depicted in Figure 3.

In the beginning at Poladpur block, SJSM and other members procured preferential allotment of fishing rights to registered cooperatives of fishing communities at the government rates through the Maharashtra Government Resolution of 2009. A total 22 NGOs have promoted 18 cooperatives and helped tribal fisherman to establish fishing rights on 31 water bodies. The process got consolidated with inputs for improved agriculture and substantial incomes from fishing activity for at least six to eight months in a year, restrained seasonal migration of *Katkari* (Figure 4).

In house hatchery in this context was created by DBSKKV and SJSM with a financial support from Ford Foundation, Tata Trust and Department of Biotechnology. In depth studies on hydro biological parameters of five different reservoirs viz.,Khaire, Kothurde, Ambavade, Warandh and Vinhare were carried out to create baseline data to find out impact of climate change and find out their suitability for fish production.

Social backup for effective implementation of technology

The male groups took responsibility by active involvement in fishing activity; while female contributed their share in marketing with a earmarking gender specific specialization. Local leadership was promoted among 215 males and 165 females among which 64 individuals received the membership in Panchayat Raj. Almost 2,910 and 8,892 families acquired Ration Cards and Caste Certificates, respectively. The benefit of the Government Gharkul Scheme was extended to 206 SHGs comprising 1421 families with 1,906 members and 75 farmers group with 620 members. More than 90 per cent children enrolled in the school.Total 1,424 houses were constructed under Indira *Awas Gharkul Yojana* (AGY), ITDP's, and Gharkul Yojana for triables Seasonal migration of 2,680 households completely stopped. The fishing cooperatives ensured maximum benefits accrue to members directly involved in the activities viz. catching the fish and selling the catch. The efforts were directed at maximum benefits to the active members rather than distribution of dividends among all members including the sleeping members of cooperatives. Transparency was maintained through regular monthly meetings of the governing body and the

annual general meets of all members. The activities and accounts described to all members in order to develop understanding of the functioning and management of the cooperative unit. Special training programmes were held for capacity building of the local governing body members and *Katkari* youths which included the effect of climate change and its role in inland fisheries.

Dissemination of technological interventions

The availability of quality spawns from in-house hatchery was ensured which helped the cooperatives to maintain greater productivity of the reservoirs on a regular basis which further assured appropriate income to members on a sustainable basis. Educated Tribal

Fig. 2. Tribal society and their upliftment: a comparison before and after technological interventions, a,b: Housing of tribal; c, d: Fishing from paddy fields, e, f: River fishing

Table 2. Quantity of fish harvested (MT) and net income reservoir fishing by cooperative members from reservoir fishing

Year	Reservoirs					Total Harvested
	Poladpur	Raigad	Ambavade	Varandha	Khaire	
2009-10	5.28	5.63	0.66	0.53	0.89	12.99
2010-11	4.38	3.96	3.71	3.23	2.91	18.18
2011-12	4.95	4.28	4.45	3.92	4.02	21.99
2012-13	6.19	5.33	4.39	4.53	6.32	26.76
2013-14	7.74	5.63	5.46	5.72	6.60	31.16
2014-15	8.12	7.05	6.24	6.32	8.12	35.88
					Total	146.57

Figure 3. Training and awareness regarding inland fisheries to the Tribal. a: Fish breeding; b: Fish harvesting; c, d: Fish brood stock; e: Fish fingerlings; f: Fish seed packing.

(*Katkari*) youths were trained in various aspects of hatchery and reservoir management. All development initiatives with *Katkari* community were implemented through young people, who helped in changing their orientation towards development and climate change. The NGO successfully linked up the technical expertise available at the Fisheries Institutes, Fisheries department and financial help from the Tata Trust, Department of Biotechnology and Ford Foundation with the ground level work by the fishing cooperatives with mutual benefits. SJSM motivated other NGOs to work for *Katkaris* with a focus on inland fisheries. These interactions resulted into a network in the form of Konkan Lokadhikar Manch with 22 NGOs as members. Ponds below the side of reservoir were developed for growing fish spawn into fingerlings. Growth of fingerlings in protected and disinfected waters with regular feeding increased the survival rate to more than 80 per cent which made the stocking more cost efficient.

Sustainable income from fisheries

The details of income and fish harvest envisaged during past six years from some of the reservoirs are presented in Table 3. Since 2009-10 till now, 146.57 t of fish were harvested by all cooperatives at all locations which contributed a mammoth income of approximately ₹ 2.05 crores. The fish production from the reservoirs enhanced from 25 kg ha^{-1} to 285 kg ha^{-1}.The enhancement of fish production per unit reservoir area resulted in active environment of 526 members out of 887 in full time fishing activity with an average income of ₹ 39,011 per member per year.

Unique achievement on reverse migration under changing climate

- The women in *Katkari* community started equally participating in decision making process in the family/community. The Village Level Committee (VLC) and Tribal Rights and Livelihood Committee (TRLPC's) were strengthened. Fifty five per cent *Katkari's* are representing Panchayat or VLC.
- Annual household income of cooperative member elevated to ₹ 42,415 by all sources with the share of fishing activity of ₹ 39,011. Earlier, before intervention, 85 per cent of the respondents were migrating for six to nine months in search of livelihood, whereas after mediating no respondents migrate for a long duration. However, still 44per cent of the respondents migrate for 3 to4 months within their own district. Twenty two tribal cooperatives with membership of 887 active men and women are developed, who have registered 31 water bodies in the location.
- Fish Hatchery has been an innovation in inland fisheries in Konkan and is fulfilling the fish fingerling requirement of the cooperatives and other private organizations.

It is first and the only circular carp hatchery in Maharashtra working on gravity-fed water supply. No electricity or standby power supply necessary for water supply which reduced the cost of operation and maintenance too. Easy in operation with 80 to 90 percent success. User friendly and can be operated by layman after a brief training of

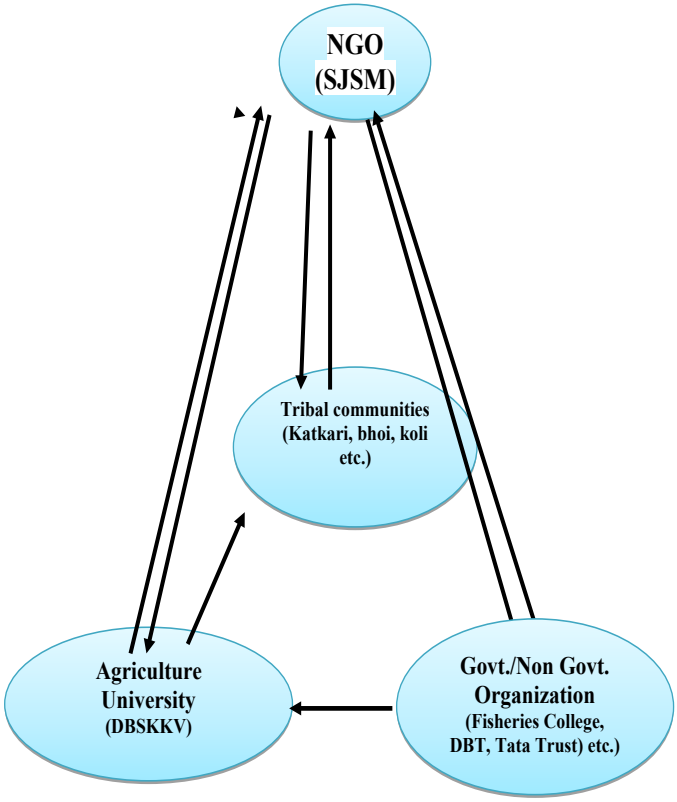

Fig. 4. Intervention through Government and Non-Government Institutes

Figure 5. Fisheries activities of Tribal after intervention. a, b:Reservoir fishing; c: Fish harvested from reservoir; d, e: Fish marketing; f: Children in school

Table 3. Net income per fisherman per year from reservoir fishing (₹)

Year	Reservoirs					Average Income
	Poladpur	Raigad	Ambavade	Varandha	Khaire	
2009-10	20130	21295	24830	45519	32114	28778
2010-11	17722	19580	29805	27117	27988	24442
2011-12	18011	18066	33199	29535	28782	25519
2012-13	34158	20918	36643	32905	34817	31888.
2013-14	352411	21720	37143	33404	35328	35410
2014-15	37580	22460	38041.	34104	36157	39011

two weeks. Simplest and cost effective design. Cost of construction is approximately ₹ 12 to 15 lakhs against the present circular hatchery construction cost of ₹ 60 to 80 lakhs. It can be adopted anywhere at the downstream of the irrigation tanks. It helps to eliminate loss of eggs and spawn during the transfer from breeding tank to incubation and harvesting tank. It can breed two species separately at the same time without hybridization and the same unit can be used both for major carps as well as common carp fishes. Only 300 m^2 area is essential for circular hatchery and laboratory purpose which economies space.

Conclusions

The Konkan region enriched in terms of small village tanks, reservoirs and irrigation tanks which could be better utilized for the large scale fish production. The implementation of the collaborative project of inland fisheries for tribal has immensely benefited them by providing an alternate source of income. This has helped in bringing some relief to the debt ridden farmers of the region. The advocacy and networking by government and non-government organizations have achieved a significant transformation of *Katkari* tribal with regard to socio-economic aspects. In doing so, the fishery factor has contributed a major share in up-lifting of this community. This sort of activity is necessary to be spread-out in Maharashtra so as to achieve the Blue Revolution.

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