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Co-Management of Common Property Resources: A Case Study of Supra-National, National and Sub-National Institutions in Fisheries Management around Chilika Lake in Orissa, India.

Abstract

Allover the world, local commons are facing more and more complex situations due to changing socio-economic, political, ecological and cultural conditions of their livelihood. Institutions governing the livelihood issues have emerged as crucial agents of sustainability. Institution is defined as a set of rules, eligibility criteria, decision-making arrangements, punishment structures, and action assignments (E.Ostrom, 1990). Sustainable commons are strongly related to the capacity of the stakeholders to design and share institutions that are enforced and continuously adapted in face of evolving conditions. In the context of alternative development paradigms, multiple-use common property resources have come under consumptive pressures from local, regional, national and international stakeholders. With the advent of open market economy and globalization, pressure on the common property resources will be more obvious. This paper analyses the role of management institutions on common property resources as development drivers and safety net providers. Particularly, the role of Supra-National, National and Sub-National institutions in fisheries management around Chilika Lake (largest brackish water lagoon in Asia- A Ramsar Site) in Orissa, India will be studied closely. Chilika lake presents a complex ecosystem with multiple stake holders. With a 64 kilometer length, 20 kilometer width, average water spread area of 1065 square kilometer and a catchments area of 4406 square kilometer it provides livelihood to 190 villages i.e. approximately 0.2 million fisher folk. The lake presents a classic case of conflict between the traditional fishing rights vis-à-vis commercial fishing by outsiders. Shrimp mafias have captured almost the entire lake for commercial exploitation of *tiger prawn*, a shrimp specie very popular in East Asian countries. Unauthorized encroachments for shrimp culture are rampant. Mostly the mafias running the trade involve local people to gain legitimacy. The local fisher folk which have been depending on the lake's resources for generations are easily deprived of its basic livelihood. In order to bring a controlled management for fishing the local Government have brought a number of legislations. A number of fisheries co-operatives are working. A high power autonomous body (Chilika Development Authority) is looking after the issues involving development, conflict resolution, peaceful settlement, eco-management etc. Legitimate stakeholders, particularly local communities and indigenous people are being strongly encouraged to

take an active role in planning in these management institutions. **Supra-national institutions** (Wetland International, Ramsar Centre-Japan, JFGE-Japan, Danish Embassy, New Delhi, World Bank etc.), **National institutions** (Ministry of Environment and Forest/Water Resources/Agriculture, National Bank for Agriculture and Rural Development etc.), **Provincial Government institutions** (Department of Fisheries and Animal Resources/Agriculture/Revenue/Forest, Remote Sensing Application Centre etc.), **Non-Government Organisations** (Wild Orissa, Pallishree, Centre for Environment Education, Campaign for Conservation of Chilika Lagoon etc.), **Research institutions** (Utkal University, Botanical Survey of India, Central Inland Fishery Research Institute, Bombay Natural History Society, National Institute of Oceanography- Goa etc.) and **Local Community institutions** (Fish Co-operatives, Watershed Committees, Self Help Groups, Self Help Co-operatives, Migratory Bird Protection Committee etc.) play active role in management of the common property resources of Chilika lake. With the intervention of these management institutions there is a visible change in production of fish and shrimp, conservation of ecosystem, livelihood protection of the depending fish folk population, conflict resolution etc. This sort of co-management between the Government and other supportive agencies has not only created a space for development but also has given a platform for the affected population. However, the insights gained into the ongoing struggles, conflicts, negotiation, mediation and adaptations of stakeholders, major learning points are identified to be replicated to the extent to which institutions can be better designed for governing the local commons.

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Co-Management of Common Property Resources: A Case Study of Supra-National, National and Sub-National Institutions in Fisheries Management around Chilika Lake in Orissa, India.

The Concept of Common Property Resources:

Renewable resources which are not produce but, extensively harvested, are mostly used as Common Property Resources (CPR).

The theoretical outcome of the rule is that, wherever common pool resources are concerned, the resource and/ or the benefits derived from the resource cannot be dissociated from its non-commercial final usage. The social control over final usage of resource is a salient feature of the customary regulation systems. Converse to the ownership-based regulation system of standard economics, the nature of the final usage is as of much importance as the right of resource disposal. This is the rural-based source of social legitimacy on governing the use of resources.

The concept has been used to explain overexploitation of forests and fisheries, overgrazing, air and water pollution, abuse of public lands, population problems, extinction of species, and other problem of resource misallocation. When property rights to natural resources are absent and unenforced i.e. when there is open access, no individual bears the full cost of resource degradation. The result is 'free riding' and over exploitation, what Hardin termed the 'Tragedy of the Commons' (Hardin, 1968). It was thought that a resource held under a common property resource (CPR) regime is

inherently inefficient since individuals do not get proper incentives to act in a socially efficient way. The main goal of managing natural resources is to maximize the long-term economic rent. Until recently many scholars believed that community-based management generates little or no rent due to absent of proper management. As a consequence scholars have long questioned the incentive for efficient use of common pool resources under CPR regime (Gordon, 1954; Scott, 1955; Hardin, 1968) and solutions have been proposed, such as state control and management (Hardin, 1968) or privatisation of the commons (Demsetz, 1964). The property rights school argues that private property is the most efficient way to internalise the externalities that arise in former cases. It also makes the contention that private property rights will spontaneously emerge in reality to increase efficiency (Demsetz, 1967).

An increasing number of scholars, however, advocate that decentralized collective management of CPRs by their users could be an appropriate system for overrating the 'tragedy of commons' (Berkes, 1989; Wade, 1989; Jodha, 1986; Chopra et al. 1989; Ostrom, 1990, 1994). More careful analysis of the foundation of CPR regimes in developing countries have shown that local institutional arrangements including customs and social conventions designed to induce cooperative solutions can overcome the collective action problem and help achieve efficiency in the use of such resources. (Gibbs and Bromley, 1989; Ostrom, 1990). Scholarship on the commons argued that Hardin confused common property with open access, failing to distinguish between collective property and no property (Ciriacy-Wantrup and Bishop, 1975). Even the common grazing lands in Hardin's classic 'Tragedies of the Commons' were well looked after for many centuries, before they declined for reasons unrelated to any inherent flaw in the commons system (Cox, 1985). The tragedy tends to be related to the breakdown of existing commons systems due to disruptions that have originated externally to the community (Berkes, 1989). Hardin's tragedy of the commons often results, not from any inherent failure of common property, but from institutional failure to control access to resources, and to make and enforce internal decision for collective use. Institutional failure could be due to internal reasons, such as the inability of the users to manage themselves, or it could be due to external reasons, for example an incursion of outsiders (Dove, 1993; Berkes and Folke, 1998). Failure could also occur as a result of factors such as population growth, state intervention, market penetration and introduction of new technology. Notwithstanding different views and debates on the efficiency of resource utilisation under common property rights regimes, it is generally agreed that resource management under common property institutions is the most viable option for a long term economic and ecological sustainability of the commons.

The facilities managed by groups of irrigation users are common pool resources the primary characteristic of which is that it is costly to develop institutions to exclude beneficiaries from them (Ostrom, 1994:2). The reasons for individual inclination to free ride or not contribute could be several. Whatever the motives may be, individuals will hesitate to participate in collective efforts when they do not have assurances about what others will do. Individuals are likely to work collectively when they expect significant benefits and they also have assurances that others will also contribute (Runge, 1986:629). Therefore, the challenge for members of groups wishing to build and maintain common properties is to offer themselves assurances about the behavior of each other.

Common properties are those in which a number of individuals are coequal in their rights (Ciriacy-Wantrup and Bishop, 1975:714). The definition of a property as common is based on institutions; that is common properties are associated with customs and rules for behavior that provide a set of incentives and disincentives for individuals (North, 1986:5&281). Institutions are constraints that individuals place on themselves; they facilitate coordination between people by making it possible for individuals to reasonably predict how others will behave. The basis for building and maintaining common properties is the development and enforcement of these rules.

Collective effort frequently results in creation or redistribution of rights (White and Runge, 1966:1685). Converting open access resources into common properties may result in reallocation of de facto rights as efforts to reorganize rights do not bring uniform benefits to participants (Libecap, 1989:6). Individuals will work to establish new rights or reallocate existing rights only if the benefits from doing so exceed costs (Libecap, 1989:2). How the benefits will be redistributed has bearing on whether there will be a significant coalition which is interested in collective action.

Farmers may be able to expect significant benefits from working together to improve irrigation supplies or to establish new sources of supply. They suffer considerable losses from unreliable irrigation and unnecessary efforts devoted to capture water in public irrigation systems. Potential users can benefit from converting such "open access" water flows into, and developing new sources of irrigation as, common properties. Though farmers in public irrigation systems have de jure rights, the agency which supplies the water is usually not in a position to protect the rights. They can expect to protect their rights by developing common property institutions. Members of common properties honor the rights of each other or the rights of members are "protected collectively".

Organizational costs - mostly transactional - are incurred in group effort to build consensus among potential members, to develop an organization and to maintain it. These can be termed as consensus building, organizing and maintaining costs. Consensus building is necessary to make potential members agree that an improvement in the current situation is possible and desirable, and that the means proposed to achieve it are appropriate. This is akin to White and Runge's challenge to status quo (1996:1685). Organizing involves developing rules for working together and obtaining the required recognition to function as an organization. Maintaining involves all the day-to-day activities of an organization. Consensus building and organizing are largely one-time activities. Maintaining is a recurrent activity involving consensus building and organizing to a limited extent.

Individuals make decisions on the basis of their subjective assessment of the benefits they are likely to receive and the costs they are likely to bear over a reasonable period of time. These subjective assessments are likely to vary considerably among potential members. In addition to differences among individuals in their expectations of benefits and costs, the benefits and costs are also likely to change over time. Individuals may lower their cost expectations with increasing willingness of others to join group effort. Situations in which the expected organizational costs are likely to be low or one or two individuals are likely to absorb much of the costs, thereby reducing the expected costs for others, have a higher chance of resulting in group effort. The presence of leaders or assistance from external agents is one such situation.

From a legal perspective, common property refers to a distribution of property rights in a resource where a well-defined set of users has a set of well-defined rights to use the resources, while all potential users not belonging to the group are excluded (Samal and Meher: 1999). Common property resources subsumes a set of social conventions, norms, legally enforceable rules and procedure for regulating its use. In the above sense, CPR is different from 'open access' which is not owned by any one or whose use is governed by any rules, regulations and conventions. In most cases, it is difficult to distinguish between CPR and open access. However, to formulate an appropriate resource management policy, it is important to differentiate between the two. It is to be noted that a CPR is subject to individual use but not to individual possession.

Common Property Resources can be classified as:

- i. Global Common (such as open sea) and
- ii. Local common (such as village pond)

However, the problem of the former is totally different from the latter. The local commons are in society open for use by all. They are open to only those having historical rights through kinship ties, community membership and so on.

CPR and South Asian Experience:

The recognition of community-based resource management leads to the devolution of natural resources from centralized government management to local user groups in South Asian countries. The Government has been issuing policy initiative for encouraging participation of rural households to strengthen community-based institutions for the control and sustainable management of local forest resource. FUGs are granted with usufruct rights to forest through legal enactment. User groups are being encouraged to become independent and self-governing organization, and be fully involved in preparing plans, harvesting, and sharing the benefits.

Although local control over natural resources is now regarded as a win-win solution for government, local people and the environment, the empirical evidence regarding the impact of common property institutions is rather thin. There is still insufficient solid empirical knowledge about the evolution and functioning of local NRM institutions and how government and donor interventions can shape the process (Heltberg, 2001).

A common property regime would not have the need for extensive records on boundaries and sales, but instead require meetings and discussions where the co-owners decided their strategies for the coming period (Bromley, 1991) which constitute a significant portion of management costs. Most of the recent literature on heterogeneity and collective action presume that socio-economic differentiation and group heterogeneity makes cooperative arrangements more difficult and innovation of local management institutions becomes impossible due to high transaction cost.

North (1990) pointed out that not all institutions are efficient and powerful groups to serve their particular interests can capture institutions of collective action. In addition, it may be the richer members of the community that dominate local politics and organizations as found in JFM in India where benefits from the system goes to certain sectors of the community (Saxena, 1989).

The facilities managed by groups of irrigation users are common pool resources the primary characteristic of which is that it is costly to develop institutions to exclude beneficiaries from them (Ostrom, 1994:2). The reasons for individual inclination to free ride or not contribute could be several. Whatever the motives may be, individuals will hesitate to participate in collective efforts when they do not have assurances about what others will do. Individuals are likely to work collectively when they expect significant benefits and they also have assurances that others will also contribute (Runge, 1986:629). Therefore, the challenge for members of groups wishing to build and maintain common properties is to offer themselves assurances about the behavior of each other.

Exploited Commons:

Erosion of CPR base (i.e. demand for the benefits of a CPR exceeding its supply) can come about in the wake of (i) shifting population, (ii) rising population, (iii) technological progress such as development and availability of new technologies for exploiting the CPR and for processing, transporting. And marketing its product, (iv) unreflective public policies, (v) predatory government, (vi) thieving aristocracies, (vii) discovery of new market, (viii) increase in animal population and others.

There is degradation of CPRs due to destructive competition among the users when a group of users are unable to control the use of its CPR under changing circumstances. That is when co-owners of a CPR usually failed to co-operate in using the CPR optimally, the problem non-cooperation arises. There is an underlying logic of this tragedy.

1. Each rational user of a CPR is motivated to use more and more of the resource till the resource is completely degraded as a result of collective and uncoordinated use by all individuals in the community. Thus individual rationality leads to collective irrationality.
2. When individuals feel that their own contribution to the collective goal is miniscule and would not be missed if withheld because others will continue contributing, enabling them easily to free ride on the contribution of others, and
3. When individuals have no assurance or certainty that the other members of the group will make their contributions and that their lone contribution to the effort would be sufficient to produce the desired result.

Reasons for degradation of CPRs in India can be attributed to;

- a. Though control of CPRs is vested with the State after independence the colonial institutional framework for CPR led to deprivation of many poor people.
- b. Lack of appropriate environment policies and ineffective enforcement of existing policies have led to degradation of CPRs.
- c. The international trade and aid policies generally tend to promote free market, privatization, entrepreneurship and export-led growth all of which led to overexploitation of CPRs for commercial purpose.

Co-management:

The literature on co-management is largely an extension of the common property literature, a literature that involves three major conceptual approaches. The first approach is grounded in the "new institutionalist" extension of neoclassical economics and game theory (Ostrom 1990, Bromley 1992), the second in cultural ecology (McKay and Acheson 1987), and a third in political economy (Roberts and Emel 1992). In the first two approaches, common property studies tend to focus on communities that are reasonably free of the influence of significant externally-induced change. However, local autonomy has broadly declined, largely because of interactions with the state (e.g. regarding land tenure, resource management policy, or development policy) and market integration. These external interactions bring changes that, directly or indirectly, undermine common property systems and weaken the possibility for collective action (Baland and Platteau 1996, Jodha 1992a & b, Richards 1997, Swallow and Bromley 1994).

Co-management involves a partnership between the state and a local group of resource managers. I see two types of approach to co-management. The first assumes mutual interests and complementary of abilities between the state and local resource users, and the second approach considers divergent interests and conflict.

Swallow and Bromley (1994) provide an example of the first approach by modeling (and finding feasible under certain conditions) a form of co-management in which the state acts as the external protector of a locally-defined common property regime. Baland and Platteau (1996) make the broader case that co-management is a possible solution to a resource management problem where private property is prohibitively costly or inequitable, direct state control is ineffectual, and where externally-induced changes, particularly those related to state policy and market integration, have weakened the possibility for local collective action (346-47). They argue that the managerial rationale for co-management lies in the fact the strengths and weaknesses of the state in resource management are complementary to those of local communities or user groups.

One shortcoming of such studies is that they cannot account very well for the way that co-management systems often emerge and evolve through conflict between the state and civil society. Pinkerton's work in British Columbia on "social dramas" enacted by indigenous fisher people (1987), and on social movements for co-management of forests (1993) are two examples of processes of struggle around co-management. Her conceptualization of co-management as generally involving "genuine power sharing between community-based managers and government agencies, so that each can check the potential excesses of the other" (1993: 37) highlights conflicts of interest between the state and the community-based managers rather than cooperation among entities with complementary abilities. However, this approach to co-management raises several issues as well. One is the need to conceptualize heterogeneity and conflict within both the state and the community. A second is how to create a system that involves genuine power sharing. Such issues are the concern of political economy.

Gupta (1986) showed how local differences in livelihood strategy based on caste or class differences are also important sources of conflict within or failure of common property regimes. By contrast to these micro-scale political economy approaches, Roberts

and Emel (1992) emphasize the importance of macro-scale political-economic processes of uneven development. These macro-scale processes create a dynamic resource base that, in turn, leads to struggles over who appropriates gains and who shares the losses. In such a context, "resource dynamics are such that no property scheme can hope to impose social harmony: efforts to protect property often deliver windfall gains to elites" (267-68). While Roberts and Emel's approach may go too far in obliterating the agency of resource-using people, most of the other approaches cited above have not gone far enough in conceptualizing the dynamic restructuring that takes place through the articulation of local micro-processes and structures with broader processes and structures.

Many studies indicate that privatisation of local CPR can have disastrous distributional consequences, disenfranchising entire class of people from economic citizenship. There are different views for the management of common property resources:

Private Property: One view argues that full private property rights over the CPR are necessary conditions for avoiding its overexploitation.

External Agency: The State: According to the other view, full authority to an external agency, usually the State, to regulate the CPR is essential. It is argued that rational, self-interested individuals will not act to achieve their common or group interest unless coercion or some other special device is applied to make individuals act in their common interest. As demand rises, the CPR will be overexploited. So, it is further argued that to prevent such over exploitation private ownership or state regulation is better.

Local Collective Action: A third view emphasizes the ability of villages to sustain local rules of restrain access to CPR. In many cases CPR is managed collectively by villagers for long period. Generally, collective action is more likely to succeed with small homogenous groups that with large heterogeneous ones. The success of CPR managed by collective action also depends on the characteristics of the resources, the users' group and group-state relation.

Capability of Common Property Management Organizations:

As successful common property institutions share certain features (Ostrom, 1990 & 1992), a common framework can be adopted to compare disparate organizations engaged in developing and maintaining common properties. The success organizations have in achieving their objectives is a good indicator of the performance of organizations, but outcome based assessments are feasible only after the organizations have been working for sufficiently long periods. For organizations engaged in the management of natural resources, performance should be judged both on whether organizational objectives are met and on the impact on the resource as the two objectives may not be always consistent. These impacts can only be assessed after the organizations have functioned for some time. As many of the features of successful collective organizations are related to management processes, an examination of these processes is a useful way to assess organizational effectiveness.

The key to effectiveness of collective organizations is to have institutions or rules-in-use which encourage members to contribute to group effort and discourage abuses. Rules are statements that define situations and determine the terms of interaction in those situations. They also determine the domain or boundary of coordinated interactions as they separate group activities from the individual. In other words, they define the space over which individuals choose to constrain themselves with group norms. They guide the interactions of interdependent individuals because they provide a basis for predicting how others will behave. Therefore, the capability of collective organizations to develop appropriate rules and to enforce them while keeping the level of conflict low is the core of organizational effectiveness.

In a general sense, rules can be judged for their appropriateness considering the needs, opportunities and circumstances of different groups. The extent to which the rules facilitate effective provision of collective goods while keeping transaction costs low is one aspect of appropriateness. The care with which a boundary has been set for group effort to meet the needs of the members or to take advantage of the opportunities while maintaining group cohesiveness is another. Community organizations carefully determine the scope of their collective effort to maintain cohesiveness (Wade,1988a). The domain or scope is relevant for “enterprise” reasons too; including certain related activities may make the primary enterprise more viable.

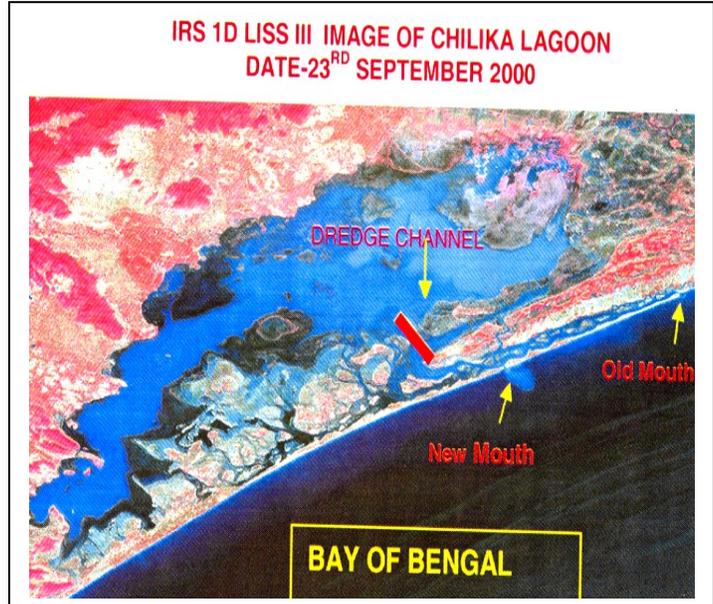
In our analysis of collective action with regard to irrigation, we judged the capability of the users’ association on the basis of the effectiveness of key rules, the manner in which problems are dealt with on a day-to-day basis, and the long term response of groups to problems and opportunities faced by them. Overall capability is evaluated on a combination of their performance in rule making, rule enforcement, and conflict resolution.

We examined rules for water distribution, maintenance and fee collection. The aspects of rule enforcement examined were: monitoring mechanisms used, the means used to enforce rules, and the effectiveness of rule enforcement. We also examined resolution of conflicts among members. The performance of groups in terms of rule making, rule enforcement and conflict resolution were rated by a group of researchers on the basis of information collected on the organizations through process documentation. These ratings were then combined for a single rating for water user association capability.

Introducing Chilika Lake:

The Lake Chilika, Asia’s biggest salt water lake in the eastern coast of India has a long history spanning over more than five thousand years. It has inspired the philosophers, poets and naturalists for its picturesque beauty of vast water spread area with a panoramic view of hills as a part of the Eastern Ghats in its background. The Lake once a part of Bay of Bengal provided excellent port facilities in the past. Commercial boats used to sail off from the lake to distant lands of Cambodia and Indonesia. To this day the villagers around Chilika Lake observes an annual festival called “Bali Yatra” (Journey to Bali in Indonesia). A place called Manikpatna is considered the site of this ancient port.

The Chilika Lake is well known to the bird lovers for winter bird congregation migrating from distant lands; more than 100 of 211 species recorded from Chilika are intercontinental migrants flying of from Caspian Sea, Lake Baikal, Aral Sea and other remote parts of Russia, Kirghiz steppes of Mongolia, Central and Southeast Asia.

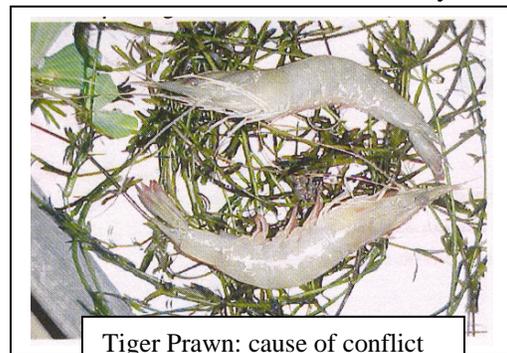


Geographical Features:

The Chilika Lake, ($19^{\circ} 28'$ – $19^{\circ} 54'$ N latitude and $85^{\circ} 05'$ – $85^{\circ} 38'E$ longitude), located in the east coast of state of Orissa, India is the largest lagoon in Asia. It is separated from Bay of Bengal by a sand bar whose width varies between 100 m to 1.5 km; a long outer channel stretching of 32 km connects the main lagoon with the Bay of Bengal near a village name Arakhukuda. Spread over three coastal districts of the state viz., Puri, Khurda and Ganjam, the lake covers an area of 1165 sq. Km., in monsoon and 906 sq. Km in summer. The pear shaped lake has a maximum linear axis of 64.3 km with average mean width of 20.1 km. The lake receives freshwater from a series of more than 32 channels.

Political and Socio-Economic Features:

The Chilika lagoon remains a vital life line for more than 200,000 people in 141 villages who live in around the lagoon. The complex mix of resources in and around the lagoon (water, fish, land, forests and fauna) has an interrelated effect on community life. The geographical area, within the catchment limit constitutes the boundary for the resource management plan for the lagoon. More specifically, the land use practices in the catchment affects the lagoon ecosystem. The farmland, mostly paddy fields, is spread all around the lagoon and the run off from the crop



Tiger Prawn: cause of conflict

field laden with pesticides and chemicals from fertilizers finds its way into the lagoon. Three distinct communities can be identified as having crucial linkages to the lagoon and its resource management:

- i) the fishermen (traditional and non-traditional);
- ii) the farmers who live around the lagoon, and;
- iii) those who depend on the forest resources of the lagoon catchment area for both their livelihood and to meet their fuel/timber requirements.

Thus communities, with very different socio-economic backgrounds, are linked to resources in and around the lagoon.

The historical records indicate the use of the lagoon system for capture fisheries through formation of 92 primary fishery cooperatives. Six different types of traditional fishing methods were used. The steady fish landing records provide evidence of a sustainable fishing strategy, using ecological zones, different contraptions and traditional experience. A new licensing arrangement introduced by the Revenue department in early 1990's effectively change the traditional rights, handing it over to the investors in prawn farming. The introduction of prawn culture, *gheri* or bund fishery in 1991 has led the process of changes in the hydrology and sediment transport. This was largely due to the use of split bamboo and zero-mesh net, encircling the culture area, which prevented free sediment flow. The inflow of heavy discharge of silt through 16 major channels of a total of 52 freshwater channels, contributed to the changing lake-bed and rapid growth of macrophytes. Macrophytes proliferated due to declining salinity, nutrient flow from the catchment, blockage of the outlet to Bay of Bengal and additional nutrient load originating from prawn culture practices in the lagoon. The economic return from the lagoon to the traditional fishermen reached an all time low. Discontent finally led to protest march to the Secretariat, and angry fishermen demolishing *gheri* (bund) structure. Police firing led to death of four fishermen. The Chilika story became a National Press item.

The community in the local drainage basin mainly subsist on agricultural practices but the villagers around the lagoon area depend on prawn culture (started after a Court verdict) and capture fisheries. Prawn trap traditionally involved bamboo nets or 'khanda', which allows free interchange of water; no fertilizer or antibiotic was used for such a process and it simply allowed prawn-catching from November every year; the trap method also allowed the juveniles to escape. But the entire system changed in "*gheri*" or "bund fishery" where 'o' mesh nets are used encircling water areas with a supportive bamboo structure.

The fish landing data collected by State fisheries department showed an average annual yield of 6000-8000 mt during 1970-1990 but it sharply declined to 1270 - 1630 mt in 1990-1997 period.

The history of fishery rights is summarized in Table below:

Period	System
Zamindar & Jagirdary period (British colonial rule)	Royalty to Raja of Purikud, Raja of Kalikote, Jagirdars
Anchal Adhikari of Chilika (1953-1959)	Open auction lease mostly to fishermen
CFCMS (1959-1988)	Lease out to Primary Fishermen Co-operative Societies Limited; access to Non-fishermen
Policy Change December 31st 1991-92 vide Policy 1991	Rights to non-fishermen; prawn culture in the shore of Chilika at Sunamuhi under ERRP and IRDP scheme Forcible occupation of PFC areas

[Source: Ghosh, 1999 b , Final Technical Report for Chilika,]

As a result of changed fishery policy, in spite of increase of number of boats, including mechanized boats only seven Primary Fishermen Cooperative Societies remained functional (out of 92) in the year 1998.

Institutional and Managerial Features

The Government of India is signatory to the Ramsar Convention, and has appointed the Ministry of Environment and Forests of the Government of India to formulate the Wetland Committee that monitors and provide funding for restoration and conservation projects.

At the State level the “Wetland Steering Committee”, is the key authority responsible for all major wetland management decisions. It is chaired by the Chief Minister and comprises of experts, scientists, secretaries from the key departments and representatives from the Government of India, and fishermen federations. The Environment Division of the Department of Forest and Environment has administrative responsibility for wetland programmes. But the two most important departments that affect sustainable wetland management are the Department of Revenue which is responsible for all land and resource tenure administration, local government taxation and law and order, and the Department of Fisheries and Animal Resource Development which oversees fisheries data collection, fisheries management and research and fisheries cooperatives and training programmes.

The management of Chilika Lake was basically related to the activities of two major stakeholder departments till 1992, viz., the State Fisheries and the State Tourism Departments, besides the State Forest (Wildlife) Division entrusted to look after the Nalabana Sanctuary within Chilika. The concept of a Chilika Development Authority (CDA) emerged in 1992 with the following objectives:

- i) to protect the lake ecosystem and its genetic biodiversity;
- ii) to survey, plan and prepare a proposal for integrated resource management in and around the lake;
- iii) to understand multi-dimensional and multi-disciplinary development activities; and
- iv) to cooperate and collaborate with other institutions for development of the lake.

The Chief Minister of the state is the chair person of the CDA , this institutional structure facilitated the integration and co- ordination between the stakeholder departments and organizations. It is an autonomous body borne under the administrative control of Environment Department. The executive body of the Authority is delegated with adequate financial power to take quick decision.

However in spite of a creation of a nodal agency under the Chairmanship of the Chief Minister of the State, CDA did not play any significant role in any major policy making activities on Chilika. The Fishing Policy in Chilika was largely dictated by the Revenue Department. The institutional framework of CDA could cater the basic requirements but with inadequate budgetary allocation, its impact on lake management could not be felt till 1997.

The change of Chief Executive Officer in 1996-97 and the crisis situation facing Chilika led to first effective action but that too within limited scope of a political system. The need to change the fishing policy, the clash of interest between traditional fishermen and investors in shrimp culture could never be resolved by CDA.

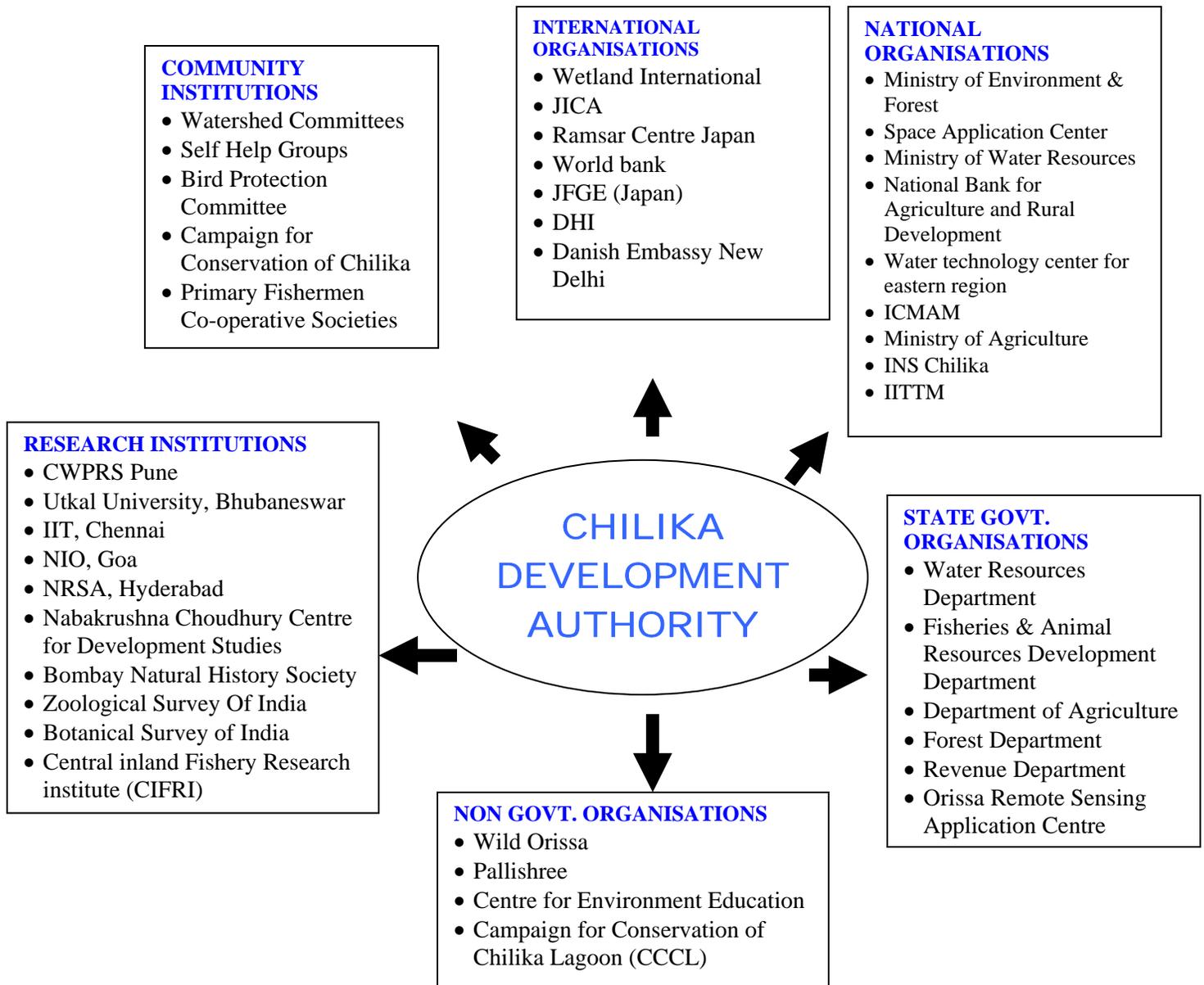
The institutional development was noted with additional funding support received from the 10th and 11th Finance Commission. The capacity building exercises and limited action for restoration of Chilika became evident in 1998. Chilika Development Authority developed linkages with more than forty institutions, stakeholders departments, agencies etc., for restoration of the lagoon.

Historically, the political scenario in the State of Orissa changed during 1980's. The real stakeholders were driven back or out; the first clash with fishermen in 1986 resulted in five deaths. The introduction of prawn farming within the lake in 1990's led to further unrest. The State government failed to recognize the Supreme Court's order of treating 1000 meter from HTL as 'No Activity Zone' in the lake; this itself could have stopped all prawn culture activities. The repetitive failure of local politician to understand the real root-causes led to firing in 29 May, 1999 resulting in the death of 4 fishermen.

The fishermen had organized themselves under the banner of 'The Chilika Matsyajibi Mahasangh' (Fishermen Confederation), which spearheaded the movement in 1999. In summary, repetitive administrative failure in arriving at a firm policy decision, alleged nexus between politicians and prawn culturists and denial of rights to the traditional fishermen community for their livelihood sustenance dominated the Chilika scenario till end of 20th century.

While the net per capita income from fishing has been calculated at Rs. 500/- per month (i.e., 12 million per year) the actual turnover appears to be much higher. A rough calculation shows that at the current market price (of average fish landing at @8000 mt/pa), the economic return (turnover) at primary retail market amount to more than \$100 million. Obviously the total turnover-benefit is shared by a number of beneficiaries starting from bulk purchasers to boat and net owners besides the working fishermen. The annual income of the fisher folk improved by 1200 US \$ per family per annum after the hydrological intervention.

Strategic Partnership



Lake and Drainage Basin Resource Conflicts:

In the lagoon area itself, conflict started with the changing basic policy entitling non-fishermen community to use water spread area for traditional culture fishery. Major conflict started with big investment pouring in from other parts of the state or even from outside the state. The functioning of Primary Fishermen Co-operative Societies gradually slowed down and almost ceased to work. The agitated fishermen made writ petition, submitted memoranda and went to the Secretariat demanding abolition of unauthorized shrimp culture within the water spread area of the lagoon. Two incidence of police firing

leading to loss of life (the last one in May 1999) led the Government to issue an executive instruction to ban all kinds of culture fishery in the lagoon. During this period, (in early 1990's), the house of Tata's, one of the top three industrial houses had proposed a large aquaculture project but local agitation forced the government and the investor to withdraw. The conversion of capture fishery (locally JANO) in fringe area of the lagoon in Puri district during 1988-92 led to 61 new culture ponds.; the district administration in Puri allowed 40% of the area to be changed in culture fisheries, which also fuelled agitation by traditional fishermen.

Management Endeavours:

Improved Capacity Building of Stakeholders:

The fisher community after facing a decade long period of lake degradation due to faulty policy of prawn culture by *gheri* fishery, which was imposed up on by the government policy maker, showed a keen awareness about wise use of lake. This was triggered by increase in fishery resource after 2001. A self adopted good practice like regulation of mesh size, discouraging juvenile catches propagated by the fisher community with public address system was remarkable. A better linkage has been established between CDA and fisher community following implementation of action plan. The stakeholders have also formed a federation of NGO's and CBO's, called 'Campaign for Conservation of Chilika Lagoon' (CCCL) who are working in close tandem with CDA for common issues in and around the Chilika lake. Activities of a very effective out reach programme run by an NGO, 'Pallishree' can also be cited as an excellent example. The NGO has formed 10 'Centre for Environment Awareness and Education' (CEAE) around 40 villages of Chilika with support from Japan fund for Global Environment, Ramsar Centre Japan – Asia and CDA; this programme is going on since 2000 with the help of 10 trained facilitators. They provide both non-formal education on Chilika lagoon and also formal education through school level text books in local language on Environment of Chilika Lagoon, Birds of Chilika, Fishes of Chilika and Plants of Chilika. Each centre has a small museum, a small library, audio-visual material, facilities for environmental games etc. This out reach programme, according to CDA has become very effective during last three years (2000-2003). A quarterly news letter in local language is also published regularly, most of the articles are contributed by the local stake holders.

The Critical Policy and Institutional Framework for Management:

The Chilika Development Authority (CDA) established in 1992 remains under administrative control of State Environment Department. CDA is headed by a Chief Executive Officer (CEO) nominated by the authorities for a fixed term period; current CEO is on deputation from State Forest Department serving in the position for last six years.

CDA is supported by funding from both State and the Central Government. The entire issue of better lagoon management and the restoration programme was initiated after receiving 270 million INR special problem area grant as per the recommendation of the 10th Finance Commission and further assistance of 300 million INR approved by the 11th Finance Commission. Table below lists the activities carried out by CDA during 1996-97 to 2002-2003.

Activities of CDA in collaboration with other Organizations

Sl. No.	ACTIVITY	AGENCY ENGAGED
1	Improvement of water exchange and Salinity gradient by dredging with support of mathematical model and bathymetry data	CWPRS, Pune, ,Ocean Engineering Center, IIT Chennai, CDA
2	Environmental Impact Assessment of Chilika Lake for dredging of outer channel by water and sediment quantity study, eco-biological quality study and circulation of siltation process	NIO, Goa, CDA
3	Weed Management and Eutrophication study	RRL (CSIR), Bhubaneswar
4	Catchment area afforestation and soil conservation	State Forest Department, Soil Conservation Department, Watershed associations
5	Public Awareness, Eco development in the peripheral areas	CDA./ CEE, Community Based organisations, NGO's
6	Research and training	CDA
7	Fisheries development	Fisheries Department, stake holder, CIFRI
8	Bird Sanctuary Management	Forest Department, Bombay Natural History Society

It may be noted that CDA is a coordinating agency and has no statutory power to control work of other state agencies, which may have direct impact on Lake Chilika. Empowering CDA in an appropriate manner may be more effective.

The State Revenue Department on the other hand has complete administrative control on land area including wetland area of the State. The lease policy of Revenue Department has direct bearing on fishery policy in Chilika Lake as was noted earlier.

Governing Acts and Policies:

Te 1991 lease policy for Chilika (further modified in 1994) for the first time, allowed shrimp culture for both fishermen and non-fishermen in Chilika. The Supreme Court of India in its judgement dated 11.12.1996 have also issued direction relating to Chilika that:

- (i) No aquaculture industry/ shrimp culture ponds shall be constructed/ set up within 1000 meter of Chilika Lake.
- (ii) These must be set up / constructed outside 1000 meter of Chilika Lake with prior approval of the Authority as constituted by the Supreme Court.

On the basis of the recommendation of the Supreme court of India, the Government of India has constituted Aquaculture authority of India under the Ministry of Agriculture, Department of Animal Husbandry, dairying & Fisheries. Accordingly, the Govt. of Orissa has constituted the State level and District level Aquaculture Committee.

The institutional framework for Chilika is based on a principle of multi sectoral collaboration with CDA playing the role of central coordinating authority. The earlier problem of overlapping areas of authority and the conflict arising thereof will further be

overcome with the newly drafted bill of Government of Orissa – “The Orissa Fishing in Chilika (Regulation) Bill, 2002”. The bill while admitting the right of the District Collector to grant lease in respect of the entire leasable area to the Orissa State Fishermen Cooperative Federation Ltd., has also made it mandatory to communicate the details of such lease or sub-lease to CDA. The bill has admitted CDA as the central authority for all other matter empowering it to make regular inspection, demolish illegal structures, to search and seize any article of objection and to seek help of the police department wherever needed. The present activities of CDA show a clear perception about the importance of functioning with civil society organizations both in the basin and in the lake area. This ensures a positive role of CDA as an institution.

The policies and laws enforced in Chilika are :

- Indian Wildlife Protection Act, 1972
- Water Act, 1974
- Forest (Conservation) Act, 1980
- Coastal Zone Regulation Rules, 1991
- National Water Policy, 2002
- The Biological Diversity Act, 2003 and
- Coastal Aquaculture Authority Act. 2005

These federal acts and policies along with the State Marine Fisheries Act and Fishing in Chilika Bill, 2002 provide a strong foundation for implementing a process of conservation and sustainable use.

Lake Management Programme:

While the present day programme of lagoon management largely caters to the general need for good management practices, areas of work programme, which are supposed to be implemented by other stakeholder departments may not provide a desirable update. Some examples may be given:

- The measures suggested to the State Pollution Control Board to control agricultural, industrial, domestic pollution discharge into the lake still remain to be undertaken.

On the other hand, due to a well designed programme of CDA under SAP, data on lake water quality and lake ecosystem status are regularly compiled on CDA database. In summary, programmes directly undertaken by CDA can be better monitored and documented than by other stakeholder departments, except for State Fishery Department, which usually work in close tandem with CDA.

Opening of a new mouth:

Based on the findings of the numerical model studies, the Central Water and Power Research Station (CWPRS) concluded that the salinity flux and tidal flux into the lagoon would not improve unless the location of the opening of the inlet is brought closer to the lagoon. The main objective was to restore the salinity gradient of the lagoon to the same level, as it used to be in 1950. Following the recommendations of the CWPRS, an artificial mouth was opened on 23 September 2000, which reduced the outflow channel

length by 18 km. Desiltation of the lead channel was completed before opening the new mouth.

The environment impact assessment of this activity was carried out by the National Institute of Oceanography, NIO, and after the opening of the mouth, the salinity gradient in the lagoon was regularly monitored. Monitoring results indicated that there was a marked change in the water quality of the lagoon, and that the salinity flux has improved by 40% and the tidal flux by 45%. However, this has been objected to by the local fisher folks who say that salinity of the lake is increasing which is unsuitable for shrimp in the adjoining area near the new mouth consisting of around seven villages.

The other restoration measures under the programme included the community-based treatment of the western catchment on a micro watershed basis, restoration of Nalabana bird Sanctuary and improvement of bird habitats with the active participation of the community. Awareness campaign and environmental education, development of a visitor centre, improvement of communication network and a research centre on wetland management are the other activities that were undertaken by CDA.

Stakeholder involvement:

The State agencies were not well organized for community involvement until 1998-99 when Orissa Water Resource Consolidation Project (OWRCP) provided an opportunity.

However, the level of understanding on the part of the state authorities deserved much to be improved. The improvement of livelihood of the community around Chilika Lake is intimately connected with fish-productivity and through a system of benefit sharing. The revival of Primary Fishery Co-operative Societies (PFCS) may help in such a process. Currently the apex body of PFCS, Fishfed is looking after the process of leasing out potential fishing areas from the revenue department. On the other hand, peoples' expectation for better communication, education and healthcare system are justifiable as a part of Lake Management but these are yet to be achieved at the desired level.

The strength of present authorities lies in the level of communication that has been established with the stakeholders while weakness can be noted in not being able to meet some basic demand. The state Government are coming up with a new legislation on the regulation of the fishery activities in Chilika . The legislation completely ban culture fishery and there is penal provision for the detrimental activities like unauthorized shrimp culture. Statutory powers are also delegated within the frame work of the above legislation to CDA to deal with the violation of the provision under the Act.

Linkages with other programmes:

During preparation of SAP under OWRCP was linkage with other investment programmes of (i) Agriculture Department, (ii) Soil Conservation Department, (iii) Forest Department, (iv) Fisheries Department, (v) Department of Water Resources, (vi) Bhubaneswar Development Authority, (vii) Orissa State Pollution Control Board and (viii) Tourism Department was proposed focusing specific areas which demand such linkages. These are:

- Functioning of Agricultural Intensification Programme in Chilika Basin and its possible impact on Lake environment
- Soil treatment project in Chilika Basin (Mahanadi river basin; Agriculture Department)
- Afforestation programme in Khurda Division (Forest Department)
- Monitoring Fish landing data and fishing practices (Fishery Department)
- Impact of Naraj Barrage project (yet to be operational) and monitoring Operational Rules for Controlling Freshwater Discharge and silt discharge into Chilika (DoWR)
- Treatment of wastewater monitoring from Capital City before being discharge into Chilika drainage basin (OPCB)
- Implementation of eco-tourism project in Chilika (Tourism Department)
- Conservation and monitoring of Bird Sanctuary (Annual Waterfowl Census) and Dolphin population near Puri (Wildlife Division, Forest Department)

All these programmes were accepted in principle by the concerned departments but the prevailing budgetary allocation hardly allowed provision for effective implementation unless CDA offered lateral funding support. With some financial constraints, CDA has been effectively coordinating all these activities so that they jointly contribute towards meeting the goals of the management programme.

The interest of drainage basin inhabitants (in the delta), specially the agricultural farmers apparently have no linkage with lake related resource management, other than the peripheral villages which used to suffer from inundation specially in the Kanas and Bramhagri Development Block areas, leading to crop loss of over more than 50,000 hectares of paddy. The newly restored hydrological system led to quick discharge of freshwater through new mouth; as a result peripheral and island villages were not affected by flood after 2001. The current efforts to involve NGO's (e.g., "Campaign for conservation of Chilika Lagoon" and Pallishree) may help motivating upstream people to adopt sustainable agriculture.



New Artificial Mouth of the Lake

Role of Ramsar Centre:

The Ramsar Convention gives special attention to assisting Contracting Parties in the management of wetlands included in the List of Wetlands of International Importance (Ramsar sites), so that Parties can comply with the requirement of Article 3.1 of the Convention, which established that "The Contracting Parties shall formulate their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory."



The Ramsar Information Sheet (RIS) highlights the importance of the Chilika Lake Ramsar site for its biodiversity and its economic importance to the local people. While visiting the Lake the delegates of Ramsar Advisory Mission (9 to 13 December 2001) have stated in favour of Local communities' participatory management. They have stated that the participatory management practices outlined and demonstrated to the Ramsar Advisory Mission should be continued and extended as practicable. The Ramsar Guidelines on local community and indigenous people's participation in the management of wetlands (Resolution VII.8; Ramsar Wise Use Handbook 5) should assist in further developing this aspect of the management procedures for the lake.

The role of Ramsar in removing Chilika Lake from the Montreux Record is commendable and it has given a boost to the conservation steps.

Co-operative Societies of Fishermen :

The purpose of formation of the co-operative societies in Chilika was to reduce the monopoly of merchants who were exploiting the poor fishermen. During the early 1950s, around 14 co-operative societies were functioning in Chilika.(Mitra and Mohapatra: 1957). Under the Chilika Reorganisation Scheme in 1959, a dual co-operative structure was introduced to improve the socio-economic conditions of the fishermen of Chilika. The co-operative structure was implemented with a number of Primary Fishermen Co-operative Societies (PFCSs) at the grass root level and an apex body at the top know as Central Fishermen Co-operative Marketing Society Ltd (CFCMS).

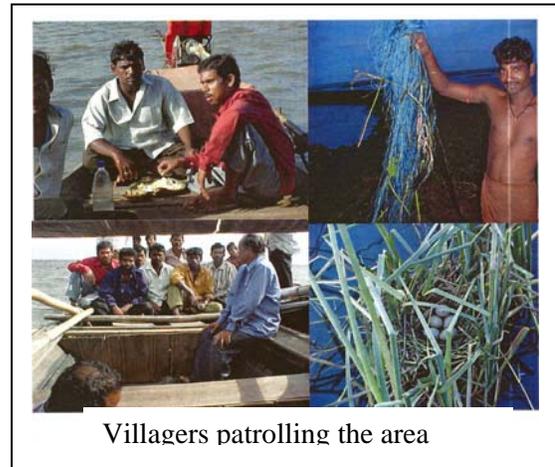
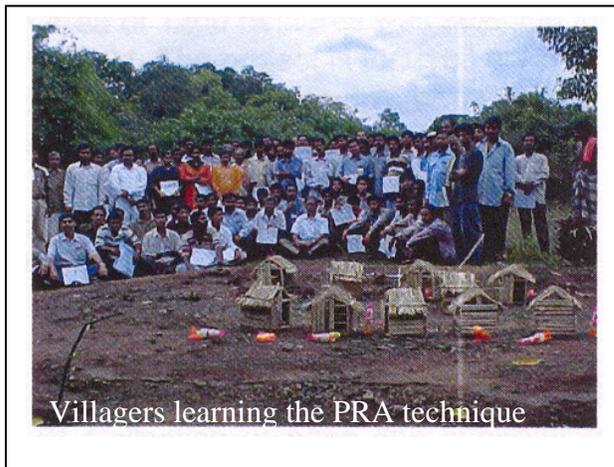
In 1989-90, to advance loan to PFCSs and finance for infrastructure development and training Orissa State Fishermen's Co-operative Federation Ltd (OSFCF) popularly known as FISHFED was formed. The federation started functioning from 16th September 1991. However, the PFCSs have not been successful in delivering. Most of the PFCSs are now defunct, sick and debt ridden. Some of the reasons for their failure are given below:

- a. Lack of adequate funds of PFCS and consequent inadequate credit facilities
- b. Unauthorised occupation of leased areas of the Society by others
- c. Failure of the PFCSs in marketing the products (Fish, Shrimp, Crab)
- d. Disunity among its members
- e. Unhelpful attitude of the State Govt.
- f. Inefficient administration
- g. Political interference
- h. Dominance of tout/rural lords and others
- i. Fishermen taking loan from middlemen/agents/traders

Therefore it is envisaged that the PFCSs should act as effective rural financial institution and they should be relatively independent from the clutches of State Govt.

Conclusion:

Co-management of CPR is a complex task. The numerous stakeholders generally claim their right over the products of CPR yet it is the State which has to come forward and distribute the resources equitably keeping in view the preservation/regeneration of the resources. The issue of sustainability is also vital as over exploitation of CPR will certainly degrade it and it may take decades to repair, keeping the livelihood of the depending population at stake. The role of management institutions in conflict management and acting as pressure groups has been recognized all over the world. This is true in case of Chilika as well where a complex network of institutions have been striving for restoration, regeneration, conflict management and growth. Chilika is a burning example as how the International Community, Federal Government, State Govt., NGOs, Research Organisations and Community Groups come hand in hand for a common cause i.e. to save the Commons.



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