

Co-management Paradigm and Sociological Issues in Fishery Management Regime in the Indian Context : A Perspective on Re-invigoration

Vipinkumar V. P.

ICAR-Central Marine Fisheries Research Institute

There is a query which often becomes prominent and conspicuous, while speaking about the present fishery management system prevailing in a developing country like India. Do the fishery management regime and legal aspects in the Indian context require a reinvigoration? The answer for the question is in a way 'yes' and 'no' to be exact. It is likely to be a debatable issue highlighting both affirmative and negative sides in the strict literal sense. Rather than exploring the intricacies of the meaning of 're-invigoration' with a surgical postmortem approach, this paper is a simple and subtle effort on addressing the sociological issues by harnessing the paradigm of co-management ultimately for augmenting the fishery management perspective in the Indian context. It is a truth that, in the scenario of Indian Fisheries Management regime, the 'questions' are very tough and timid, but answers are so simple and known to everyone, though the impediment is the practical implementation part. The open access regime prevailing in the harvesting of marine fishery resources in our country warrants stronger emphasis on invoking technological innovations as well as management paradigms that reconcile livelihood issues with concerns on resource conservation. It is a truth that, innovations do not emerge in a socio-political vacuum. Definitely it is the extent of partnership between the research and the client system that decides the fate of any technology in terms of its adoption or rejection. Judicious and rational utilization of common property resources for sustainable development without endangering the environment is possible through community participation. For more than 6 million fishers and fish farmers, fisheries are a source of livelihood in India. Fisheries sector has recorded faster growth as compared to the agricultural sector in all the decades and is contributing in a significant way to the economic growth of the nation. The vast Exclusive Economic Zone of 2.02 million sq. km of ocean under the possession of India is more than two third of its land area. Marine fishing has been considered a primary livelihood option since time immemorial, for the occupants of the coastal belts of the country. The marine fishery resources of India include a coastline of 8129 km with numerous creeks and saline water areas, an Exclusive Economic Zone (EEZ) of 2.02 million km² which are suitable for capture as well as culture fisheries.

The data from CMFRI reveals that, the total marine fish landings from the mainland of India during the year 2015 were estimated as 3.40 million tonnes registering a 5.3% decline compared to 3.59 million tonnes in 2014 (CMFRI, 2016). About 3 million people are employed in the primary, secondary and tertiary sector of marine fisheries which provides livelihood security to about 18 to 20 million people (Sathiadhas, 2007). Fisheries development is a state subject in India, but, centre promotes fisheries development through state level programme planning and implementation units. The development plans for the fisheries sector have been aiming at fish production and promoting export. Though India is blessed with vast and varied fishery resources with great potential in both coastal and inland areas, fisheries production is showing a depleting trend which is adversely affecting the livelihood of fishers and making a large population vulnerable. Being the open access resource,

stock assessment and irreplaceable nature of abundance in stock, conflicts of various types become the part and parcel of the fisheries system in the country. For addressing the livelihood issue, government introduced regulatory mechanisms such as gear selectivity, seasonal area closures and regulations that control the fishing effort and catching. This is the 'top down government driven management approach' through legislation. However, government managed models of management have proved to be unsuccessful as indicated by poor compliance of action and regulations resulting in crisis and adverse effects on the livelihood of fishers.

Undoubtedly, the task of managing fisheries is very complex; however, new strategies like Community-Based Fisheries Management (CBFM) which take a more regional and integrated management approach, can be more productive than past centralized management methods. CBFM achieves such productivity by combining scientific research with community involvement and Local Ecological Knowledge (LEK) to create monitoring programs specific to local areas. What does CBFM do? Actually, CBFM moves the focus of ocean resource management to individual areas/fishing communities, rather than managing fisheries on a coast wide scale. Currently fisheries are managed in many areas by a centralized or blanket method administered by a top-down approach from external managers. This approach has little involvement of the local people that are mostly affected by the managed resource. By empowering local interests, as in CBFM, local relationships may be accentuated that, large scale management strategies might not include. These older management methods also predominantly focus on "single species modeling" while newer forms of management, such as CBFM, incorporate much more of an ecosystem based management approach. CBFM proposes that resource users (fisherman) and resource communities (coastal communities), should have the primary role in deciding how the resources of that community/area are managed. "Fishermen and coastal communities, being the most dependent on coastal and marine resources, should have a large role in deciding how these resources should be managed. This idea fits within an emerging understanding that management decisions of all sorts are often best made at the most local level possible." (Graham, *et al*, 2001)

It is a truth that, while CBFM focuses on giving primary responsibility to the local community, it is important to note that CBFM cannot take place in every scenario. It takes willingness, cooperation, involvement, and flexibility from community members to work together for the collective good. It is important that all stakeholders consider their decisions as they apply to the whole community and the health of the coastal resources. This collective responsibility for the long term well being of the natural resources depends on a type of responsible self governance, dictated not by the achievement of maximum profits or harvest, but instead by promoting a stewardship and conservation ethic. CBFM seeks the conservation and preservation of ecosystem health, combined with the sustainable use of these local resources as seen fit by the community members.

Points of focus for CBFM

Distinctly speaking, CBFM is a uniquely applied and flexible management strategy specific for every situation. It depends on open, ongoing communication within the whole community. It utilizes the large knowledge base of fishermen who already have most of the tools for good local monitoring and research. It also requires patience, working toward long term rather than short term goals. It

removes the competitive spirit out of the fisheries and focuses the community on working for sustainability.

There are a few complications also in CBFM. There are many hurdles to address when implementing new management approaches such as community based fisheries management. Procedures that are necessary for legitimacy and credit among the scientific community and higher management, can pose a barrier for fisherman who lack the quantitative “hard data” about their observations. This has limited the amount of information that fisherman feel they can bring to the table, because fishermen’s knowledge is largely qualitative. Many factors dictate the feasibility and productivity involved in integrating CBFM into specific communities. Some factors include: size of the population in that community, societal values, socioeconomic relations, scale of the fishing being done (industrial vs. inshore or [artisanal fisheries](#)), large economic incentives, different management techniques required for highly mobile species, limited funding for CBFM organizations, and governmental willingness in allowing more control to come from communities. All of these factors and many more can affect whether an idea for CBFM even gets off the ground. These complications often can bring about competitions and even conflicts. Let’s have a look into the glimpses of different types of fisheries conflicts.

Conflicts in Capture Fisheries Sector: (Marine & Inland fisheries)

With regard to conflicts in capture fisheries sector, there are marine and inland fisheries sectors to be considered. In marine sector, each country has their jurisdiction up to 200Nm towards sea. In India concept of Exclusive Economic Zone (EEZ) enacted during 1997. In dealing with management, protection and proper utilisation of living marine resources several conflicts has been raised.

Conflicts between India and neighbouring countries: Certain examples

- Primarily arises from fishermen’s violations of national jurisdiction while in the pursuit of fish. Fishermen are lacking navigational devices which can forewarn fisherman from trespassing their jurisdiction.
- Political problem between India-Pakistan and Tamil problem causing tensions between India-Sri Lanka.
- Fishermen in Okha in Gujarat accidentally trespassing Indian jurisdiction being caught by Pak navy patrols.
- Fishermen in Rameshwaram in T.N. being caught by Sri Lankan navy.
- Conflicts over marine fisheries India and Bangladesh are rather rare.

Inter-state conflicts: Some typical examples

Generally inter-state conflicts occur mainly between southwestern states and south eastern states. (Goa, Tamil Nadu, Karnataka, Kerala.) It essentially is because of differential fishing ban period during monsoon. There is no demarked boundary between states in the marine region. (Each state has their jurisdiction up to 12 nm towards sea)

Conflicts between fishermen using two levels of technology

- Large scale industrial fishing vessel and small scale fishing vessel.
- Inshore and deep sea fishing vessel.
- Trawlers and Purse-seiners.

Today there seems to be change in the direction of conflicts.

Regional conflicts between fishermen

- Between fishermen from one state to the other.
- Between fishermen from one harbour to the other.

Conflicts between fishermen and industries: Example: Mangalore coast is conspicuously noted for conflicts of fisherfolk with industries.

Inland Fisheries: accounted the conflicts in reservoir fisheries and riverine fisheries.

Culture Fisheries Sector (Aquaculture)

Social conflicts and aquaculture

- Growth of carp culture has led to the conversion of paddy fields to fish ponds.
- Affected poor people who depend on their staple food (cereal).
- Government of A.P. imposed a tax on water use for aquaculture.
- Shrimp farmer and village people.
- Effect of dykes.
- Effect of ponds around creeks.
- Salinisation problem

Conflicts between the shrimp farmers and fishermen

The shrimp farms do not provide access to the beach for traditional fishermen who have to reach the sea from the village.

A typology of fishery conflicts

In most fisheries, there appears to be little space available to increase long-term sustainable fishery benefits simply by increasing production. The fishery policy tools are generally limited to

- 1) Increasing the efficiency of harvesting and of management
- 2) Making allocation (distributing) decisions, particularly determining who has the privilege of access to the fish available for capture.

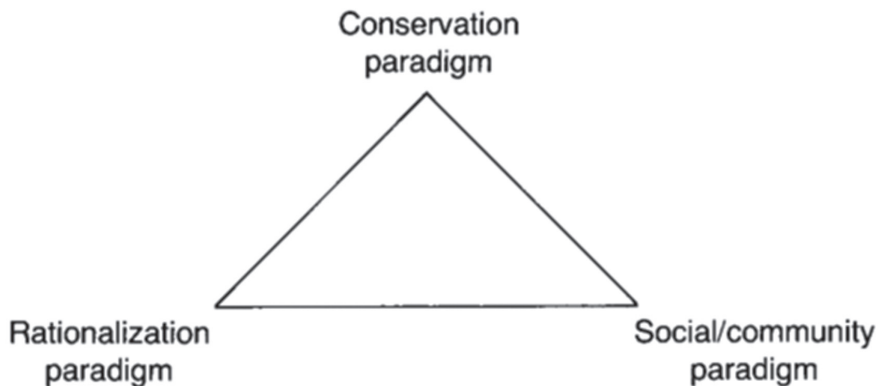
Despite superficial appearances of chaos, the wide range of fishery conflicts (of both the efficiency and allocation varieties) can be organized into a relatively small number of categories,

under for inter-related headings.

- (1) Fishery Jurisdiction: Involving fundamental conflicts over the who 'owns' the fishery, who controls, access to it, has is the optimal form of fishery management, and what should be the role played by governments in the fishery system.
- (2) Management mechanisms: concerning relatively short-term issues arising in the development and implementation of fishery management plans, typically involving fishers/governments in the fishery system.
- (3) Internal allocation: involving conflicts arising within the specific fishery system, between different user groups and rear types, as well as between fishers, processors and other players.
- (4) External allocation: incorporating the wide range of conflicts arising between internal fishery players and outsiders, including foreign fleets, aquaculturists, non-fish industries (such as tourism and forestry) and indeed the public at large.

Conflicting fishery paradigms:

While the above typology categorizes fishery conflicts, the real roots of the conflicts in the underlying systematic differences in priorities pursued by the various fisheries players are to be given prime consideration. For example, everyone wants their fishery to be efficient, but the real meaning of this pleasant-sounding goal depends entirely on the desired objectives which in turn vary widely with the philosophy and ideology of the fishery players.



The conflicts and wars related to the rights over the use of land and water have been important sociological issues throughout recorded history. Although many of us are probably more aware of wars fought over religious freedom, political ideologies and social issues, conflicts over fishing rights and resources are just as common, if less reported. Since the Exclusive Economic Zones (EEZ) were established in the 1970s, disputes have become more frequent and more violent than ever before. Due to the establishment of EEZs, access to the world's oceans has been radically reorganized and the access rights of foreign fishing vessels have been curtailed. Negotiations, international fisheries

agreements (such as those between European and African countries), and recourse to an international tribunal have sometimes succeeded in resolving conflicts.

Similarly, the conflict between Philippines and China is essentially due to over-access to territorial waters. Thousands of Indonesian fishers have been incarcerated as a result of illegal fishing in Australian waters. While sovereignty issues are generally at the root of such conflicts, they are also the manifestations of competition for access to fish stocks, in coastal waters as much as on the high seas. In addition, the use of flags of convenience serves to exacerbate the problem. The country where a boat is registered does not necessarily identify its country of origin, and this loophole enables fishing companies to flout international fishing and labor conventions with impunity.

Reinvigoration of Fishery Management Regime with a Paradigm shift in fisheries governance

In the Indian context, it would be vital for a reinvigoration of fishery management regime, with a paradigm shift in governance of fisheries which enables resource users (communities and fishers) and stakeholders' participation at all levels as effective partners in the management process. Management regimes as remedy cover Partnerships, Co-operation, Leasing (Aquaculture) and Co-management paradigms.

Partnership and co-operation through Fisheries co-operatives and Self Help Groups mobilized in marine fisheries sector do play a vital role in sustainable fisheries management. (Vipinkumar, 2012, 2017). Leasing essentially occurs with regard to aquaculture sector. Let's have a look into the policy and programmes for aquaculture development in India.

The registration of open water body farms and government leasing determines the appropriate areas for Mariculture activity, allocating the rights to use the resource and evaluation of environmental impacts based on certain principles to be considered to frame the Mariculture policy. (Mohamed and Kripa, 2010)

1. Common Property use conflicts: Policy guided by: Use of open water bodies for navigation and fishing should not be hindered by Mariculture. Similarly, Mariculture activities in open water bodies should not cause disturbances to other users. Permitted Mariculture by the state should be afforded complete protection of structure and stock kept in the open water bodies.
2. Carrying capacity: Open water bodies have limits to biological productions and such limits should be defined by the state in consultation with research institutions.
3. Environmental Protection: The polluter pays principle enacted by the CAAI should be applicable to open water bodies so as to minimise environmental impacts. Pre and Post EIA (Environmental Impact Assessment) is mandatory.
4. Conservation: Aquatic ecosystems are very sensitive to changes caused by human activities and hence all activities should take into consideration conservation of aquatic biodiversity.
5. Zonation: Since Mariculture in open water bodies is diverse and region specific, states have to draw-up zonation plans in GIS formats with the help of research institutions. Creation of Mariculture parks would be of ample scope and are to be encouraged.

Co-management and Partnership Paradigms

In Asia pacific region, there are adequate success stories where the alternative models have been able to take care of all the parameters of sustainability. One of such fisheries management approaches, as an alternative to the top down government management approach is 'co-management'. This is a partnership arrangement in which the community of local resource users (fishers), government and other stakeholders share the responsibility and authority for the management of fisheries through consultations and negotiations as regards to their roles, responsibilities and rights resulting in development of effective partnerships. This ensures sustainability of the resources as well as improving the livelihood of fishers.

Co-management for Addressing Sociological Issues in Fisheries

Fisheries co-management is defined as an arrangement where responsibility for resource management is shared between the government and user groups (Nielson *et al*, 2004). It is considered to be one solution to the growing problems of fishery resource over-exploitation. If the marine fishery management regime is both to be effective and legitimate, introducing a co-management arrangement, which can be defined as a dynamic partnership using the capacity and interest of user-groups complemented by the ability of the fisheries administration to provide enabling legislation? Co-management is also a mean to reorganizing the fisheries management system. Co-management is - from this perspective - an institutional process of integrating and reallocating management responsibilities and competence (legal power) among participants by sharing the costs deriving from fisheries management with the users. Fisheries co-management is based on the following hypothesis. The involvement and participation of user-groups create incentives for cooperation in order to formulate and implement more efficient, equal and sustainable management schemes which would benefit all parties.

In the meantime, Co-management provides some sense of ownership to the fish resources, which makes the user groups far more responsible for obtaining long-term sustainability of the fish resources. It might also be more cost-efficient in terms of administration. Enforcement than centralized systems, but administration costs may increase in a co-management system, as the process may be rather time consuming, involving several interest groups.

Fisheries Co-management is often referred to as relations between fishermen and the national administration including fisheries research institutions, mainly concerning regulation methods, quota allocation and stock assessment. However, co-management can also be perceived in relation to market activities, whereby relations between fishermen and buyers come in focus. As market dynamics become more important to fishing activities, it can be expected that coordination of market performance and fisheries management measures will be increasingly important.

Co-management is a set of institutional and organizational arrangements (rights and rules), which determine how the fisheries administration and user-groups cooperate. A co-management arrangement is not a static legal structure of rights and rules, but a dynamic process of creating new institutional structures. A co-management institution can therefore be designed as an entirely new institution or can be based on already established institutional structures. The latter might

often be the case in fisheries, where co-management institutions usually evolve as incremental user-group involvement in certain management tasks. The devolution of authority to manage the fisheries, away from the fisheries administration to user-groups, may be one of the most difficult tasks of co-management. On the one hand, the fisheries administration may be reluctant to relinquish their authority, or portions of it, and are often opposed to decentralization. On the other hand, user-groups may neither have the aspiration nor the capabilities to undertake enhanced fisheries management responsibilities.

The major advantages of approaching fisheries management as a bottom-up process versus the traditional centralized top-down system may be a high degree of acceptability and compliance with regulation measures, due to the participation of user-groups in the decision-making and implementation process. Once user groups are involved in the decision making and implementation of fisheries management, a spectrum of co-management arrangements can be identified. The figures illustrate the various types of institutional set-up for different co-management arrangements.

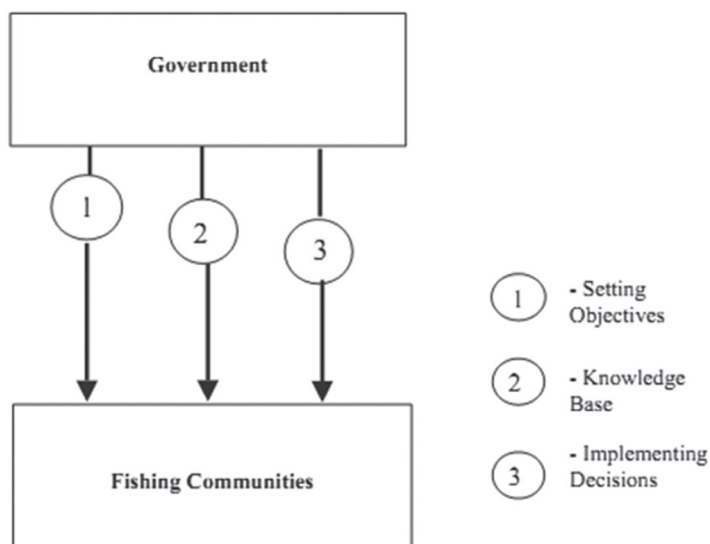


Fig. 1. Modern fisheries management

In the instructive type, it can be observed that, there is only minimal exchange of information between government and users. This type of co-management regime is only different from centralized management in the sense that the mechanisms exist for dialogue with users, but the process itself tends to be government informing users on the decisions they plan to make.

Co-management can be an innovative change to the modern fisheries management approach as it implies a power sharing arrangement between government and fishing communities to undertake fishery management. However, the practical adaptation by governments of the co-management approach has most often been limited to involving fishing communities in the implementation process—an 'instrumental co-management' approach.

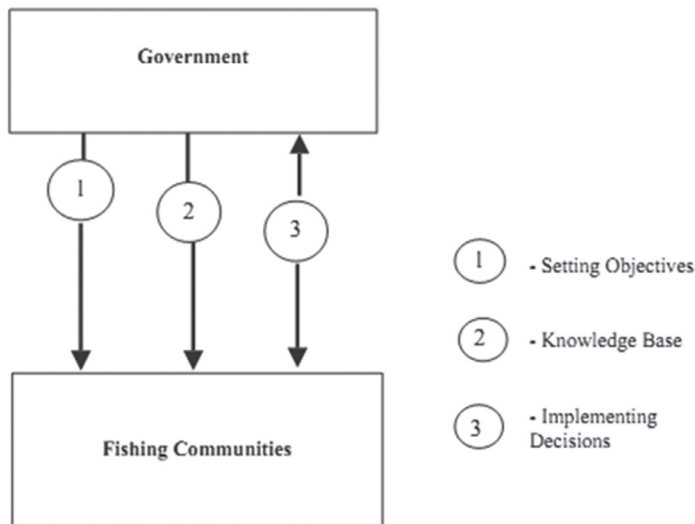


Fig. 2. Instrumental co-management

The Socio-economic considerations are likely to play a more prominent role within an empowering co-management arrangement. Empowerment of fishing communities is a mechanism to give the people within the fishing communities a chance to influence their own future in order to cope with the impact from globalization; competing use of freshwater and coastal environments; and other fisheries related issues.

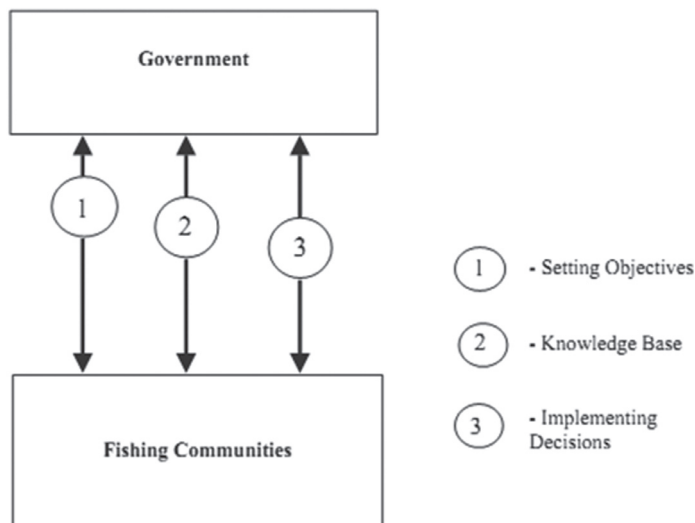


Fig. 3. Empowering fisheries co-management

The empowering co-management approach is a demanding concept, as it requires:

- A rethink of the logic for management and subsequently a change in the knowledge base for management.
- A major restructuring of the institutional and organisational arrangements supporting management.
- A substantial change in attitudes from both governments and fishing communities towards their role in such arrangements.
- Aspiration from fishing communities and government to proceed along this avenue.
- Capacity building at several levels both within government and fishing communities.

Co-management for Fisheries Conservation and Livelihood

- Competitive Fishing needs to be replaced by cooperative fishing to avoid depletion and ultimate extinction of several varieties of our marine flora and fauna.
- Fishery resources are renewable but not inexhaustible.
- Cooperative fishing minimizes capital investment vis-à-vis cost of production, sustainability of resources and maximizes the earnings and profit.
- Cooperative marketing enhances the efficiency of distribution channel and enhances the earnings of real producers.

Common property: Management issues

- Common property means, no one is having ownership: hence no –management
- The literature on property rights identifies different ideal analytical types of property rights regimes:
- State property: with sole government jurisdiction and centralized regulatory controls;
- Private property: with privatization of rights through the establishment of individual or Company- held ownership.

Fisheries Co- management: Theoretical Framework

- Co- management is a new alternative management approach with a human face.
- Co-management is an effective process for the collective governance of common property resources.
- Co-operative management or co-management of fisheries can be defined as a partnership arrangement in which the community of local resource users (fishers), government, other stakeholders (boat owners, fish traders, boat builders, business people, etc.) and external agents (non-governmental organizations (NGOs), academic and research institutions) share the responsibility and authority for the management of the fishery.

- The substance of sharing of responsibility and authority will be negotiated between community members and government and be within the boundaries of government policy.
- The term 'community' can have several meanings. Community can be defined geographically by political or resource boundaries or socially as a community of individuals with common interests.

A community is not necessarily a village, and a village is not necessarily a community. Care should also be taken not to assume that a community is a homogeneous unit, as there will often be different interests in a community, based on gender, class, ethnic and economic variations.

Co-management should be viewed not as a single strategy to solve all problems of fisheries management, but rather as a process of resource management, maturing, adjusting and adapting to changing conditions over time. A healthy co-management process will change over time in response to changes in the level of trust, credibility, legitimacy and success of the partners and the whole co-management arrangement.

- Co-management is also called participatory, joint, stakeholder, multi-party or collaborative management.
- Co-management sharing and decentralization. It attempts to overcome the distrust, corruption, involves aspects of democratization, social empowerment, power fragmentation and inefficiency of existing fisheries management arrangements through collaboration
- Partnerships, roles and responsibilities are pursued, strengthened and redefined at different times in the co-management process, depending on the needs and opportunities
- The process may include formal and or informal organizations of fishers and other stakeholders.
- Fisheries co-management can be classified into five broad types according to the roles government and fishers play (Sen and Nielsen, 1996):
 - (1) *Instructive*: There is only minimal exchange of information between government and fishers. This type of co-management regime is only different from centralized management in the sense that the mechanisms exist for dialogue with users, but the process itself tends to be government informing fishers on the decisions they plan to make.
 - (2) *Consultative*: Mechanisms exist for government to consult with fishers but all decisions are taken by government.
 - (3) *Cooperative*: This type of co-management is where government and fishers cooperate together as equal partners in decision-making.
 - (4) *Advisory*: Fishers advise government of decisions to be taken and government endorses these decisions.
 - (5) *Informative*: Government has delegated authority to make decisions to fisher groups who are responsible for informing government of these decisions.

The equity and social justice in fisheries management is sought through co-management. Equity and social justice are brought about through empowerment and active participation in the planning and implementation of fisheries co-management. The mutuality of interests and the sharing of responsibility among and between partners will help to narrow the distance between resource managers and fishers, bringing about closer compatibility of the objectives of management.

A Case study in Indian context on Co-management

There has been an interesting sharing of ideas in *SAMUDRA Report* on the experiences and principles of co-management. All over the world, fisher communities are trying desperately to safeguard their access to fish resources, while, at the same time, being driven to catch more in order to keep afloat. The fishers of the Saurashtra coast of Gujarat, one of the foremost fish-producing States of India, are no exception, as a result of the study undertaken on “The Impact of Development on Human Population Dynamics and the Ecosystem” in three locations of the west coast of India, with the help of a grant from the McArthur Foundation.

A study location was the large fishing harbour town of Veraval in Gujarat. The findings of the study were rather revealing, not only regarding the nature of the decline of the overcapitalized trawl fishery, but also the poor environmental and social indicators in a place that had a booming fishery for over 25 years through the 1980s and 1990s. In the community feedback workshops held in 2005, people were also taken aback by the findings of the study for a while and they were aware that their fishery was on the downswing, they felt challenged to realize that a large number of the children of the community were not in school, that there was a fall in the female sex ratio, and that there was a rise in the levels of morbidity and demands for dowry at marriages. As a community that is basically business-oriented and with a desire to simultaneously claim progress, they found themselves in a prisoner’s dilemma. A challenge of seeking a way out by the project authorities made them interact with them on a longer-term basis.

The fishery in the area is a trawl fishery along a 40-km coastline between the two fishing harbours of Veraval and Mangrol, which account for a third of the fish catches of Gujarat. There is also a vibrant *hodi* fishery of fiberglass-reinforced plastic (FRP) beach-landing craft, interspersed with the trawlers. Authorities got intensively involved in the fishing harbour/community of Mangrol as the community has traditionally been well organized. They were also fortunate to get a local team that the local community agreed to host. In preparation for the work, an intensive training programme was organized for the team. There were also four representatives from Mangrol and Veraval, selected by the community, who participated in the programme. They actually represented the trawl fishery.

Initiating change

Project authorities did not initially mind this fact as it was this sector that they thought had to be involved in initiating any change in resource management. The boat owners were intensely involved in the training programme and, during the subsequent period, they turned out to be the main agents of change in the community. Besides developing an analysis of the fisheries crisis, they were most intrigued by the connections made to the fall in the female sex ratio, the number of

school-age dropouts, the high morbidity rates, and the extensive pollution of water bodies, all in a context where the communities were well organized but totally in the hands of men. The inputs on gender analysis and the patriarchal development paradigm helped them to see the negative side of male-dominated communities, where women have no voice, and, as a consequence, the issues of potable water, sanitation and health receive no priority. In fact, the community organizations had seen to it that entry into the trawl fishery was limited to members of the same caste. Yet just as these caste organizations camouflaged disparities in the community, they were unable to manage the manner in which investments were made in the fishery, which, in turn, aggravated the growing disparities.

On the one hand, the fishery in the area has been kept afloat by, State subsidies on diesel and, on the other, by the opening up of export markets and the development of *surimi* plants. It is otherwise an extremely inefficiently run trawl fishery, which has also contributed to the massive pollution in the harbours. But the government has gradually begun to be less lenient on the diesel subsidies, certain export consignments have been rejected by some importing countries, and the government has begun giving greater importance to developing coastal resources other than fisheries. The fishing communities, therefore, needed to get their act together and think differently about their fishery and its future if they did continue to consider the fishery as a means of livelihood.

A couple of strategies to tackle this problem were developed at the training programme, and a plan was drawn up to set up a coastal area managing council in a year as well as push for co-management of the fisheries. The first step was to develop a general awareness in the community about the inter-relationships among the ocean, the land and the people so that people understand how these affect one another. This was done at several levels through all kinds of community programmes but the strategy in the first year was to:

- develop a forum for women where they could discuss and understand these issues and, at the same time, create a collective to gradually represent their cause and themselves in the community organization (*samaj*);
- create an awareness among the youth and children about the coast and oceans; and
- widen the understanding of the fishers themselves regarding coastal-area issues, and relate these to their fisheries-management possibilities. For this, efforts were made to also include the elected representatives of the municipality in discussions related to these issues so that they would be taken into consideration in town planning.

The interesting results were from an active group of women fish vendors who pressured the municipality and the fisheries department for a better fish market, while another group made a detailed study of the community's problems relating to water, sanitation and attendant infrastructure, which was presented to the members of the *samaj*. In both these cases, the community's men were very responsive and open to the idea that women could also be part of the co-management process.

The discussions on co-management were done separately for the fishing sectors, the community organizations and the women so that all of them could understand the issues and felt free to raise

doubts and make suggestions from the point of view of their own sectors. It was clear that there were several areas of conflict.

After the deliberations and discussions, all the representatives got together to discuss the possibility of a larger plan and who would finally meet the government and scientists to make the proposed presentation on co-management. Importantly, it was the first time that women and men from various sectors, caste and religious groupings had got together to discuss coastal and fisheries issues.

An Expert Consultation on Fisheries and Area Co-management was held in Ahmedabad, the capital of Gujarat, supported by the Fish Code Programme of the Food and Agriculture Organization of the United Nations (FAO), where the State's entire fisheries department was present, together with scientists from the Central Marine Fisheries Institute (CMFRI), the Central Institute of Fisheries Technology (CIFT) and the Fisheries Survey of India (FSI), as well as trader, processor and non-governmental organizations (NGOs) and the Marine Products Export Development Authority (MPEDA).

Community leaders first presented their ideas on co-management, which included both the need for fisheries management and coastal-area management, and articulated why they thought that this was a viable option in their particular context. They requested the government to create a framework of legislation for co-management, where both their rights to the coastal resources and the responsibilities of the government and the various stakeholders would be clearly defined. Subsequently, the experts responded, and a group discussion followed on the action that could be taken.

A heated discussion between the trawl-boat owners, the scientists and the government officials had even the women chipping in, but unfortunately the *hodi* owners remained silent. The importance of this process has to do with the fact that co-management was proposed by the community representatives from a shore-based fisheries perspective and not a fishing perspective alone. This was possible because of the data available and the focus on the fishery as a means of livelihood that has to be sustained. But this is not an easy process and it still has to be operationalized. The bank on the tremendous amount of goodwill shown by all the stakeholders, indicates that the stakes in actually managing the fisheries are high.

A case study of Kadakkody in Kerala: Conflict resolution through Sui-generis co-management:

Kadakkody: A linguistic aberration of the Malayalam word '*Kadal-kodathy*' literally meaning 'Sea Court'. It has legislative, executive and judiciary roles to play in the Araya and Dheevera communities of Hindu fishermen belonging to Kasargod district of Kerala. *Kadakkodies* make their presence felt strongly in four regions like Kasargod, Kizhoor, Kottikkulam and Bakkalam. It plays as a community based fisheries management institution. Though functional only in a few pockets of north Malabar coast of Kerala, these age old institutions are similar to many of the Caste Panchayats prevalent in rural India. (Ramchandran, 2004).

Constitution of *kadakkody*: Each *kadakkody* is an adjunct to the temple of the fishermen community in each village. Ruling deity in all these temples is *Kurumba Bhagavathy* who is considered the most worshipped 'mother goddess' (Devi) among Hindu fisherfolk. Each *kadakkody* has three

distinct bodies (1) *Sthanikan* (the permanently authorized), (2) *kadavanmar/Sahayiees* (temple messengers or assistant priest and they represent the police) and (3) Temple committee.

Sthanikans are composed for 4 separate constitutional groups namely *Karnavanmar* (4 members) *Achanmar* (6 members), *Kodakaran* (1 member) and *Anthithiriyar* (2 members). *Karnavanmar* are the high priests of the temple and they act as magistrates belonging to 4 *illams* such as *chempillam*, *kachillam*, *karillam* and *ponnillam*. *Achanmar* are six in number and are basically oracles (*velichapadan*) at the temple and are assistant magistrates. *Kadavanmar* are the messengers/police. Temple committee is a democratically elected body. The factors determining the legitimacy of *kadakkody* are divine authority, social embeddedness, systematic procedures and behavioural norms, participatory and transparent process, quick and fair judgements, functional diversity, shared sense of pride etc.

Typological differentiation of 2 forms of co-management: (Ramchandran, 2004)

Characteristics	<i>Sui- generis</i> form of CBCRM	State induced/supported CBCRM
Self Governance	High	Low
Basis of legitimacy	Divine	Legislative
Group of homogeneity	High	Medium
Compliance	High	Low
Social embeddedness	High	Low
Adaptability	High	Low
Ethos	Cosmic	Livelihood
Norms	Uncodified	Codified
Management agenda	Inclusive	Exclusive
Epistemological base	Socially embedded	Mostly officiated version
Ownership over means of production	Exclusive	Inclusive

The best method of co-management is to follow the Code of conduct for responsible fisheries. Let's look into the issues pertaining to responsible fisheries management.

Govt. Regulations for conservation

1. Regulation of fishing effort for exploiting the resources, particularly the shrimp resource which is a single critical resource and centre of most of the controversies and conflicts in the country
2. Restriction of number of fishing gears which exploit the juvenile phase in the backwaters, estuaries and shallow inshore were through licensing
3. Mesh size regulation
4. Minimum legal length for capture and
5. Closed seasons and areas

Fishing methods & Resource conservation

1. Introduction and popularization of synthetic fishing gear materials
2. Introduction of trawling in mid 1950s
3. Improvement in efficiency and diversification of trawls, purse seines, gillnets and lines, for mechanised sector,
4. Continuous improvement in size, endurance, installed engine power, winch capacities, fish-hold, freshwater and fuel capacities of mechanised vessels to enable multi-day fishing, since mid 1980s
5. Adoption of modern technologies such as eco sounder and GPS on a wider scale over the last decade, enabling precision fishing
6. Motorization of traditional fishing craft in 1980s and expansion of fishing grounds of traditional motorized fleet
7. Introduction of ring seine in commercial fishing in 1986
8. Introduction of mini trawling in mid-1987 and its subsequent proliferation
9. Introduction of ring seine with inboard engine and purse line haulers in 1999 and continuous increase in numbers

Mesh size Regulations

- A common measure for reducing the catch of juveniles and small sized non-target species in trawls and important step towards reducing the growth over fishing, rampant in Indian fisheries.
- Though 35 mm has been prescribed for trawl cod-end and incorporated in the MFR of Kerala, it has never been perfect.
- Mesh size for sardine/mackerel ring seines may be regulated at 22 mm or more in the bunt and main body and maximum dimension of the gear may be limited to <600 m hung length and <60 m hung depth, for all replacement constructions; length overall and engine horse power for propulsion may be limited to 20m or less and 65 hp respectively, for replacement constructions. Anchovy ring seine may be regulated at 12 mm & Engine horse power for propulsion may be limited to 25hp.

Responsible Fishing Methods and Practices

- Guidelines associated with use and development of fishing gear and practices delineated in the Code focus on (i) selective fishing gear and practices (ii) environment friendly fishing gears (iii) energy conservation in harvesting and iv) enhancement of resource (FAO 1995) The CCRF is purely voluntary. The best way to follow these codes will be adoption of co-management.
- Specific pointers from CCRF, in responsible fishing and practices, adaptable to Kerala include the following:

- Evolve regionalized consensus Code of Conduct for Responsible Fishing, in close participation with all stake holders (traditional, motorized and mechanised fishermen organizations) fisheries research organizations and fisheries managers
- Take measures to control open access by strict enforcement of a system of licenses (authorization to fish) in traditional motorized and mechanised sectors
- Develop ecosystem based fishery management regime, in collaboration with the union Government and neighboring maritime states sharing the same fishery-related marine eco system services
- Identify and delimit protected areas in marine and inland water ecosystems
- Periodically revalidate maximum sustainable yield of resources in the existing fishing grounds and determine fishing units in each category for sustainable harvesting of resources
- Take steps to remove excess capacity over a time schedule, with active stakeholder participation.
- Explore possibilities for a rights based regulated access system based on a strong inclusive cooperative movement of stakeholders with built-in transferable quota system and buy-back or rotational right of entry schemes for capacity management and optimization in the shelf fisheries, in collaboration with the Union Government and the neighboring states with confluent ecosystems and shared fishing grounds.
- Conduct periodic audit of fishing craft and gear combinations, their economics of operation and ecological impacts
- Standardize the capacities, dimensions and specifications of fishing units in each category, particularly in the mechanised and motorised sectors
- Evolve a system for marking fishing vessels and fishing gear (both traditional & mechanised)
- Maintain registry of all fishing vessels in waters under state jurisdiction with all essential details
- Evolve regulations and promote use of life saving, fire fighting and communication equipment for safety of fishermen
- Evolve regulations for mandatory survey of mechanised fishing vessels
- Promote selective fishing gear and practices
- optimum mesh size in trawl cod-ends
- Optimum hook size and shape for lines
- Square mesh windows in trawls
- Bycatch reduction devices in trawls
- Turtle excluder device in trawls

- Trawl designs with improved resource specificity
- Optimum mesh size for gill nets
- Optimum mesh size for purse seines
- Escape windows in fish and lobster traps
- Evolve an efficient Monitoring Control and Surveillance (MCS) system
- Promote effective use of Geographical Information System for fisheries management; monitoring and control of fishing effort and energy use
- Evolve an promote a package of practices for energy conservation in fish harvesting
- Evolve a mandatory programme of training and certification for non-motorized, motorized and mechanised fishermen in safe navigation responsible fishing, log keeping and reporting

Perspectives and Reinvigorating challenges ahead

Meticulous observations and experiences of various co-management implementations have revealed potentials and benefits of co-management, but also many unresolved sociological issues and problems that need to be addressed. There is still a long way to for harnessing the various co-management systems and examples of solutions to for addressing a varietal range of sociological issues and problems for reinvigorating the fishery management regime of a developing nation like India. Many of the problems and issues facing Fisheries can only be solved on a provincial, national or even international level. The resource systems on which fisheries rely are in most cases too large to be entirely within control of a few communities, and Fisheries management institutions must therefore be able to address problems of resource access and sharing on that level. The solution to this scale problem may be representation within nested systems, but this raises a new set of problems relating to mechanisms to ensure genuine representation and to avoid a new process of alienation between communities and management is initiated. Reconciling local and global agendas: International agreements on fisheries and environmental management are a special case of incongruence between scales. Means must be developed by which the governments can serve the double obligation of attending to international agreements while sharing power in setting objectives for fisheries management with the communities. Identifying a knowledge base for management, which is considered valid by stakeholders: The knowledge base for fisheries management should relate to the objectives of management and be considered valid by the stakeholders? A co-management system must develop mechanisms to reconcile formal scientific knowledge and fishers' knowledge about their resource system in a way that maintains scientific validity and wide acceptance. There are no shortcuts and easy solutions to this problem. One approach may be to identify indicators of the status of the resource system that are both supported by science and reflects fishers' observations. Developing approaches to manage conflicts between resource users who have acquired exclusion rights to a resource through the co-management process and those who are excluded: There is a need to understand the mechanisms and actual reasons behind the alienation process of the different user groups in order to manage these conflicts. Developing appropriate approaches for empowering local communities to participate in the setting of management objectives through institutional reform: This may require substantial change in the

way that management authorities function to provide fisheries management services and changes in perceptions of stakeholders on the roles of fisheries management agencies. These issues must be addressed in practice in practical experiments with co-management. It is however important that, such experiments are documented and the experiences communicated to others who may be in the process of establishing or developing co-management arrangements. It is therefore imperative in the Indian context that, attempts to harness co-management are associated with independent research to document and disseminate the experiences for addressing sociological conflicts and emerging issues for an effective reinvigoration of the fishery management regime.

References

- Anthony.T.Charles.1992. Fishery conflicts: A unified framework. *Marine Policy*. September 1992. pp 379-393.
- CMFRI.2016. Annual Report, CMFRI-2015-16. Central Marine Fisheries Research Institute (CMFRI), Kochi. pp 11-12.
- Dept of Animal husbandry, Dairying and Fisheries.2012. Guidelines for Fishing Operations in Indian Exclusive Economic Zone. Compendium. pp 1-5.
- Graham, Jennifer and Gaynor Tanyang. 2001. The Sustenance of Life: A Pilot Research Exploring SL in CBCRM, Tambuyog Development Centre and Coastal Resources Research Network, Dalhousie University.
- Jesper Raakjær Nielsen, Poul Degnbol, K. Kuperan Viswanathan, Mahfuzuddin Ahmed, Mafaniso Hara, Nik Mustapha Raja Abdulla.2004. Fisheries co-management—an institutional innovation? Lessons from South East Asia and Southern Africa, *Marine Policy* 28 (2004) 151–160.
- Modayil.M.J, Sathiadhas.R and Gopakumar.G. 2008. Marine Farming: Country Analysis -India, In A.Lovatelli, M.J.Phillips, J.R Arthur and K.Yamamoto (eds.) FAO/NACA Regional Workshop on the Future of Mariculture: a Regional Approach for Responsible Development in the Asia-Pacific Region, Guangzhou, China, 7-11 March 2006. *FAO Fisheries Proceedings*. No 11, Rome, FAO. 2008. pp 145-171.
- Nalini Nayak, and Vijayan.A.J. 2007. Co-management: Getting Their Act Together, Protsahan, Thiruvananthapuram, India Handbook of Fisheries Co-management from IDRC
- Radhakrishnan.E.V and Dineshababu.A.P. 2011. Cage Culture- Mariculture Technology of the Millennium in India. In *Training manual on Cage culture of marine finfish and shellfish*, Karwar Research Centre of CMFRI,p13-22.
- Ramchandran.C. 2004. Teaching Not To F(in)ish!?: A Constructivist Perspective on Reinventing a Responsible Marine Fisheries Extension System. Responsible fisheries Extension Series 6, Ventral marine Fisheries Research Institute, Kochi -18)
- Rao.G.Syda. 2011. Cage Culture -Mariculture Technology of the Millennium in India. In *Training manual on Cage culture of marine finfish and shellfish*, Karwar Research Centre of CMFRI,p1-12.
- Sathiadhas,R. 2007. Inter-Sectoral-Disparity, Increasing Poverty and Inequity among Coastal Fisherfolk in India. In book of Abstracts of 8th Asian Fisheries Forum, Asian Fisheries Society, Philippines.
- Sathiadhas, R and Narayanakumar, R and Aswathy, N (2011) *Efficiency of domestic marine fish marketing in India - a macro analysis*. Indian Journal of Fisheries, 58 (4). pp. 125-131
- Sen S, Nielsen J.R.1996. Fisheries co-management: a comparative analysis. *Marine Policy*, 20(5):405–18
- Vipinkumar.V.P.2004. Livelihood Analysis of Coastal Fisherfolk for Technological Empowerment: An Appraisal in Kerala In *Proceedings of national Seminar on Indian Society of Extension Education*, IARI, New Delhi.
- Vipinkumar V.P, Narayanakumar R, Johnson B, Swathilekshmi P.S, Ramachandran C, Shyam S.Salim, Reeta Jayasankar, Shinoj Subrammannian and Aswathy N. 2017. *Gender Mainstreaming and Impact of Self Help Groups in Marine Fisheries Sector*, Central Marine Fisheries Research Institute, Kochi, Monograph. p 235.