CHAPTER 7

ENVIRONMENT, SOCIETY AND SUSTAINABLE DEVELOPMENT: ANALYSIS OF THE COMMON PROPERTY RESOURCES

The chapter brings out the findings of the study and concludes the discussions undertaken on the nexus of environment, society and sustainable development in the context of common property resources. Titled as "Sustainable Fishing Practices and Fishing Communities in Barak Valley: A Sociological Study" the study basically deals with sociological understanding of sustainability of the fishing practices among the fishing communities in Barak Valley of Assam and thoroughly examines cultural ecology, property resources and fishing practices, changing environment, adaptive strategies of the communities and sustainability of emerging out of the interplay between the natural environment the fishing communities in the given setting. Societies are constantly interacting with their environment to acquire various means of livelihood and they strive to exploit and change the environment. They innovate techniques and strategies to enhance their capacity and efficiency to exploit various natural resources from the environment and by using these they bring various modifications in the environment. But, in course of the interactions, the environment also exerts its influence upon the societies by shaping their economic, cultural and social life, i.e., occupations, values and institutions carry strong impact of various factors of environment. Thus, there emerges a dynamic system of society-environment interactions which contains
the patterns of occupational practices, cultural values and social institutional arrangement, lived by people. As the environment is always changing under the impact of natural as well as human factors the societies also keep on adapting to changing environment. The process of reciprocities where societies adapt to environment and receive means of their livelihood, it leads harmonious relationship between the two; that is, the societies develop and the environment is allowed to regenerate. This relationship sustains development of occupations, cultures and institutions by their working in harmony with the environment. Looking from this perspective the study has focused upon fishing practices as the product of a dynamic system of interactions between fishing communities and natural fisheries (common property resource), as well as their adaptations to the changing environment of the fisheries.

THE CONTEXT

The study has been placed in the context of the three traditional fishing communities; viz., the Kaivartya, the Patni and the Mahimal, inhabiting one village, each, under the two natural fisheries; namely, the Shonebeel in Karimganj district and the Barak river in Cachar district of Barak valley. In the valley, there are three main fish resources; namely, wetlands, water bodies and private ponds. As the study focuses on sustainability of development of fishing practices shaped through the interactions between fishing communities and natural fisheries, it have been conducted in the Shonebeel, a wetland, and the Barak river, a natural water body. Besides, 12 private ponds have been also studied to derive the understanding in sustainability of development in the private resource, Of the ponds 6 ponds have been taken from the urban centres, 2 each, of the three districts; viz., Silchar, Karimganj and Hailakandi
and 6 ponds have been selected from the villages, 2 each, of the three districts. The data have been collected from 6 villages of the fishing communities, one each, under the two fisheries. The Patni, the Kaivartya and the Mahimal inhabited Devadwar, Kalyanpur and Belala and Netaji Nagar, Radha Nagar and Balighat under the Shonebeel fishery and the Barak river fishery respectively. Although there are good climatic conditions for the growth of fish, yet the fish production in the natural fisheries (common property resource) is depleting whereas the capture pond fisheries (nurtured by private interests) show increase in production.

The Shonebeel, spread over 3,179.24 acres, turns into a huge reservoir of water, during the monsoon, flowing in from various sources, of which the River Shingia is very important. It is a low-lying area with a fen type of topography. The average rainfall, humidity and other environmental components are quite favourable to the growth of the fish in such kind of water reservoirs. During the floods the Shoneebl area becomes a good niche of different schools/varieties of fish. The villagers are depending on the beel for livelihood, directly or indirectly. The natural resources available in the Shonebeel in general and in Devadwar, Belala and Kalyanpur in particular are land and water. The land is the most important component of natural resources in the villages. In the villages all the households are having the land for residence and cultivation. Devadwar and Belala are situated on the lower side of the beel and water is logged in there for longer time and therefore the villagers practice fishing more than agriculture. Boro (traditional) varieties of rice are grown on the fields in the monsoons. But in winter they produce cash crops of the vegetables like cucumber, pumpkin, cashew nut, etc. On the other
hand, in Kalyanpur which is located in the beel's higher side the villagers cultivate early maturing (85 – 90 days) boro varieties (coarse grains) like bosi and tupa as well as high yield varieties (HYV) of sali like swarna sali, akri sali, chaiyamora, ranjit-68 etc., even during the monsoon floods. Besides, they grow fruits like mango, jackfruit and black berry and vegetables like sweet potato, cumcumber, lai, dekhi, raddish, etc. in their kitchen gardens.

The land is thus used as private property but once the harvesting is over the land turns into a common property resource and the animals like cows, goats and buffaloes graze there freely. Further, during the monsoons the flood water submerges the lands and then the villagers, marooned on the numerous uplands called tillas (PPR) commute in motored and paddled boats on the water and catch fish in the flood water converting the area into the CPR. The fish comes with the flood water from the tributaries like Shingla and feeder streams like Doloogang and Ekshingi. After the monsoon the water recedes, the households resume fish cultivation in their own ponds as the PPR. There also remain some natural pond fisheries in the beel's bed which are leased out by a Cooperative Society to groups individuals by inviting tenders in the last part of the monsoon, who rear the fish in the winter. The owners of the private ponds buy spawn, fingerlings to cultivate fish and catch all the fish before the flood water inundates the ponds. On the other hand, in summer different schools of fish enter the Shonebeel, which is exploited as CPR by the fishing communities under the control of the Shonebeel Fishermen Co-operative Society Limited (SFCSL). The trees and the bushes on the privately owned land are considered as private property, while those on the common land or in common water source belong to common property resource. Thus, in the
Shonebeel there is a regular pattern of conversion from PPR to CPR and vice versa.

Barak riverine fishery is the CPR round the year. The entire river is divided into several part fisheries/Jalkar Fisheries. Each part fisheries exploited by the fishermen under some arrangement made by the Government of Assam through fishermen’s cooperative society or an individual lessee, generally for one year. The society or individual taking the part fishery on lease, controls fishing and collects revenue fixed on the basis of the nets used by the fishermen for fishing. In the monsoon the Barak river receives various species from different tributaries and from various fisheries whereas in the winter also it retains a good stock of fishes. In the Barak river fishery also, the villagers; namely, the Patni in Netaji Nagar, the Kaivartya in Radha Nagar and the Mahimal in Balighat grow boro and sali varieties of rice and grow vegetables and fruits.

Briefly, the Shonebeel fishery is a dynamic property resource converting from PPR to CPR and vice versa in the monsoon and in the winter respectively whereas the Barak river fishery remains only CPR round the year. Both the fisheries have institutional arrangements to manage the fishing activity. The private ponds are absolutely the PPR managed by individual or a small group of individuals, indicating way of efficient management for the CPR in the changing environment of fishing practices.

THE METHODS

In the study there have been used to two types of data; namely, qualitative and quantitative. Qualitative data pertain to the relation between the
environment and society, resource management, environmental changes, various new adaptive strategies due to the impact of environmental changes. All these data, collected from the fishermen of the Shonebeel and the Barak river villages. The quantitative data pertain to population, rainfall, epidemiology, landholding, income, expenditure and energy utilization. These data also collected from the fishermen of the two fishery villages and also from the Office of the Tea Research Association, Tocklai, Silcoorie, Revenue Records of the Office of the Deputy Director of Economics and Statistics, Govt. of Assam. The oral and documentary, both, data also collected from the field of the study.

The universe of the study comprises, the Shonebeel fishery and the Barak river fishery. The data, however, have been collected from the 6 villages, 3 each, of the same fishing communities; name, the Patni, the Kaivartya and the Mahimal, each from the two fisheries. Besides, 12 cases of private pond owners, six each from the villages and town areas of three districts of the valley have been studied to examine sustainability of fishing practices in the valley.

Households was taken as the unit of data collection in the study. As the villages choosen for study is homogeneous, from both the fishery, purposive sampling was applied to collect data from 50 households, each, of the villages, in all making 300 households, i.e., 150 households, each, from the Shonebeel and Barak river villages.

The data from the households were collected by administering a structured interview schedule to the fishermen of the selected households and
also by making observations of their fishing activities. The data were collected for the study during January 2005 to December 2006.

THE SIGNIFICANCE

Fish being one of the main sources of sustenance of the fishing communities a study of this kind on fishing practices and sustainable development of fisheries has a practical value for addressing the problems of common property resource utilization and socio economic development of the people. Besides, the study examines various models of institutional arrangements for fishing in CPR fisheries; viz., Hardin's model, private property rights theory, Oakerson model and Tawa model to highlight that no model is perfectly applicable to CPR fisheries because these fisheries are of various types such as reservoir fishery, riverine fishery, pond fishery and so on. Each one requires a particular regime. But elements of different regimes are present in one another with difference of emphasis. Moreover, the study of the fisheries like Shonebeel clearly indicates that in the dynamic as well changing environment the property regime is also dynamic and changing, and, as such, it incorporates elements of both the property regimes, CPR and PPR, simultaneously. It signifies that the dynamic and changing state of the property resources make them more complex and therefore an integrated model derived from various existing models can be used to understand the situation. The existing models explain relatively stable of simple situations of property resources.

THE FINDINGS

The major finding of the study have been drawn from the cultural ecology, fishing practices, adaptive strategies and sustainability of development
prevalent among three fishing communities of the two natural fisheries (CPR) and 12 case studies of pond fisheries (PPR). Discussion of the findings is as follows:

I. Cultural Ecology of the Fishing Communities

The existing cultural ecology of the fishing communities in the two natural fisheries reflects profound impact of the environment (fish, land and forest) on their cultural life as well as capabilities and strategies that the communities have used to constantly bring changes in the environment. The pattern of the interactions between the communities and the natural resources is revealed in various aspects of the cultural ecology of the three communities as given below:

(i) The material culture of the communities has traditionally been in a fine tuning with their environment and every material trait was shaped by various factors in their immediate environment. The houses, their walls, roofs, doors and windows, made of the material available from forests or fields such as mud, bamboo, hay, wood, etc. The household items such as sitting stool or chair and table, almirahs for keeping clothes, containers for storing gains, etc. are also procured from the environment and make it a part of their life. However, some changes introduced through exogamous sources such as the houses allotted under Indira Awas Yojana and tin sheets, plastic furniture, steel utensils and agricultural implements supplied from the urban markets are significantly affecting their traditional material culture.
(ii) The fishing tools and agricultural implements as well as practices were traditionally designed out of the natural material and in harmony with the environment of the communities. Various nets (*jals*), hooks, canoes and boats, made out of the natural material never disturbed or destroyed regenerative cycle of the fisheries. Similarly the agricultural implements and inputs such as plough, animals, chemical fertilizers, etc. have been natural components, not destroying the quality of soil or water. However, increasing use of technologically improved fishing tools and chemical inputs in agriculture have set in motion the process of destroying fish niche and soil quality.

(iii) The communities have derived their food, dress, diet and associate practices from their occupations and resources. The entire material need structure has been determined in the context of the environmental factors. The improved techniques of resource exploitation and involvement of market forces have no doubt created ripples in the traditional way of living of the communities.

(iv) Not only the material life of the communities has been shaped by the natural resources and occupational practices but also their non-material cultural elements such as marriage, rituals and religious ceremonies, etc. have been patterned by the environment in its interactions with the communities. The marriages in the communities were arranged during the winter, a lean season from the viewpoint of fishing, and were largely village endogamous, solemnized in their small world of the village. Now, with their reducing dependency on the
natural resources and increasing occupational diversification the world too is widening and village exogamy has largely come into practice.

II. Fishing Practices of the Fishing Communities

(i) The fishing practices in the two common resource fisheries have traditionally been determined in the interactions of the fishing communities with the environment. For long there has been harmony of the fishing practices with the natural resource environment. The fishing practices did not exploit the resource recklessly and allowed it to regenerate from time to time. On the other hand, the nature of the resource and its regenerative cycle decided the nature of the fishing practices. The fishermen used such nets and other tools as catching big fishes and sparing seeds and spawn for growth and fish regeneration. But as a result of overpopulation in relation to the resource and its marketisation there is going on overexploitation in both the fisheries and fish resource is depleting. The Kaivartya in Kalyanpur in the upper portion of the Shonebeel are using small mesh nets, while the Patni of Devadwar and the Mahimal of Beiala are using relatively big mesh nets in fishing. This is happening because the water recedes faster in Kalyanpur and thus they want to catch maximum in a short period of water stagnation, while the water retains for longer period in the lower part of the beel where the Patni of Devadwar and the Mahimal of Belala uses relatively large mesh nets for exploiting the CPR fish long duration. Thus, the people on both the sides, are exploiting
the resource in rational way from their own stand point and none of them takes into account the finiteness of the resource. The rationality itself is fragmented among the communities. Thus, competitive and unrestrained exploitation by using small nets is depleting even the seeds and spawns of fish, making it unsustainable.

(ii) Traditionally the communities observed ban of fishing during the breeding period for regeneration of fish and after regeneration they received plenty of fish. But in these days such ban is violated and fish regeneration is not allowed. Even now, the ban is imposed by the Government of Assam and the respective cooperative Societies or the individual lessees. But fishing goes on in both the fisheries even during the ban period and institutional arrangement fails to manage the fishing in sustainable manner.

(iii) The communities preserved the fish niche in the past and fish regenerated, reproduced and grew there. But in the changing fishing practices, the fishermen cut down the small bushes, which were available in 1970s, where the fish took shelter as well bred comfortably. Besides, the hijol trees which sheltered migratory Siberian birds were also cut down for smooth fishing. The trees provided the birds' excreta as good feed to the fishes. But the deforestation has now destroyed the fish niche and the fish resource is depleting fast. Then, chemical fertilizers used in the fields on the beel's upper side and on the banks of the Barak river
as well as continuous siltation by Shingla river into the beel and by the fields into the Barak river is further accelerating the process of depletion or destruction of the fish resources. Motor boating in Shonebeel is another factor destroying the fish niche by creating sound and wave disturbances in laying of eggs by the fish.

(iv) Traditionally the fishermen exploited the fish and sold them directly to the consumers. By this, they received sufficient returns and did not require to exploit the resource recklessly and allowed it to regenerate continuously. But now the fish marketing is a chain of intermediary traders between the fishermen and the consumers. They have emerged in the wake of decline of production and rising demand of the growing population. The fishermen catch fish and sell to the traders even on their boats. Other traders also remain ready for exchange of profits. Thus, the fishermen always remain engaged in fishing in the resource.

(v) Traditionally the fishing rules were imposed and abided by the communities. As a result, the communities and the natural resource both flourished and sustained. But now when Government and its lessees like cooperative societies or individual are manifestly present to manage the fishing affair. But the fishing managements are found inefficient in the changing environment not only from within it but also from its outside.

Thus, traditionally all the fishing practices like catching, breeding, conserving, managing and marketing of the communities were in total harmony with the fish
resource. That equilibrium has been destroyed by introducing new techniques of fishing, marketing and managing which are not sustaining the resource.

III. Adaptive Strategies of the Fishing Communities in the Changing Environment

(i) In view of the changing environment the fishing communities have adapted strategies for sustenance. The environment is changing as a result of decline in rainfall, deforestation, chemical fertilizers, siltation, etc. Increasing rate of siltation and declining rainfall have led to decline in the water logging capacity of the beel and raising the bed in the Barak river, which affects the good niche of varieties of fish in the two fisheries. Besides, deforestation and chemical fertilizers have destroyed fish niche. Thereby it causes low fish production. This phenomenon has compelled the fishing communities to adopt alternative occupations such as rickshaw pulling, mason work, motor mechanics, goldsmithery, etc. For taking up such occupations the people of the Shonebeel are migrating to urban or urbanizing areas. The people of Devadwar, on the lower side area, are emigrating as the fish is depleting and the fields remain flooded. Kalyanpur, on the upper side, has the scope for both agriculture and fishing and therefore people are immigrating there. In the Barak river also, Netaji Nagar is witnessing emigration of Patnis as it is far off the river, a low lying flooded area, allowing less agriculture.

(ii) The people of Kalyanpur use their uplands for agriculture and have introduced new implements like power tillers, HYV seeds of
rice and chemical fertilizers for cultivation. In the Barak river Radha Nagar is also an upland used for agriculture, unaffected from floods. Therefore, there are also new implements and inputs being used. Besides, vegetables and fruit trees are also grown in these villages now.

(iii) For PPR fishing all the villages in Shonebeel use a new technique to retain the flood water in their own land for long period by constructing some trenches called *gatas*. In the trenches they release some specific varieties of fish seeds and then the fish seeds are allowed to grow for 2 to 3 months and they catch and sell the fish.

IV. Sustainable Development of the Fishing and the Fishing Communities

The two fisheries, the Shonebeel fishery and the Barak river, have immense impact on the structure of socio-economic activities of the fisherfolk and the changes in it lead to occupational and cultural changes. From the viewpoint of sustainability various aspects of development of the fisheries and the fishing communities are found as follows:

(i) Fishing technology enhances technical capacity for exploitation of fish resource and the same may be used for overexploitation of the CPR fish. Prior to 1980, in the Shonebeel fishery there were a good number of fish varieties with their huge stock. But overexploitation, by use of improved techniques and by an increasing number of fishermen is the very obvious act that has destroyed the fish in the beel. The fishermen have begun to use
Micro Filament Yarn (MFY) nets which can catch even the small spawns and fingerlings. Thus, the very source of fish development is being destroyed under the combined work of overfishing and seed destruction and it will deplete the resource in the beel fast. The SFCSL as well as the Department of Fisheries, Government of Assam, has banned the use of small mesh nets like mosquito nets, current jal, etc. But some fishermen are illegally using such nets owing to poor control of the SFCSL over these fishermen. The Patni of Devadwar and the Mahimal of Belala inhabiting the lower portion of the beel use large mesh nets as the lower portion of the beel retains the water for a long period and they want to catch fishes during the entire period. But the Kaivartya of Kalyanpur inhabiting the upper portion of the beel use small mesh nets as the flood water recedes fast and retains for a short period, and they want to exploit the fish as much as possible during the period and thereafter they immediately shift to cultivation of paddy. Thus, as far as fishing practice is concerned, the former practice is sustaining the fish resource as no reckless exploitation of fish or fish seeds takes place by using the large mesh nets while the latter one is unsustaining the resource by exploiting recklessly the fish and the fish seeds, by using MFY nets. It indicates that there are two different fishing patterns available on the two sides of the beel. On the upper side the villagers get a longer period of time for agriculture and shorter period for CPR fishing while, on the lower side, the other people have a longer period of fishing and a
shorter one of cultivation in a year. The villagers on both the
sides deal rationally with the fishing or agriculture in their own
means-end frame. The short duration crops grown on the lower
portion are not harmful to the fish resource until harmful
chemicals etc. run off to the beel but the reckless fishing in the
upper portion during this short period of water recession is going
to make the fish resource unsustainable. However, it seems that
agriculture is sustainable activity on the upper portion and fishing
is sustainable on the lower portion of the beel. If the agriculture is
developed on the upper portion to engage a significant
population, then, over fishing and reckless fishing may be
contained and rule enforcement among the people having
common interests will be easier.

(ii) The Mahimal of Belala are mostly using traps in the river Kachua
and the river Kakra. They mostly place dori traps and pharong
traps on the strategic points of the flowing water in the rivers and
in various channels as most of the channels and rivers are found
in Belala. Dori and pharang traps are also placed in the channels
of the Devadwar village. Besides, the fishermen of Devadwar
and Belala in particular catch the fish by Panichanda technique in
which two fishermen stand deep in the water of 3 ft or more and
start whirling it to catch the fishes drawn into the whirl. The using
of traps and the techniques of Panichanda, both are the
sustainable aspects as such techniques can trap only big fishes
and do not exhaust spawns. These techniques are common
among the villagers on both the sides of the beel. Construction of *Kathibandh* (bamboo fencing) is another technique contributing to sustainability of fish in the beel. Just after the inundation of the beel, the *Kathibandh* at the strategic points of the rivers, Kachua and Kakra in Belala, prevents the fish from moving out of the beel area and retains them within the beel for longer period. Thus, large nets, traps and *kathibandh* techniques be may improved for sustained fishing activity in the beel area. To offset the pressure of overfishing and reckless fishing the agriculture has to be developed as sustaining activity on the upper portion.

(iii) In the Shonebeel fishery both CPR and PPR type of fishing is practiced depending upon the environmental condition. But overfishing is a rampant practice in CPR while balanced fishing is a feature of PPR. In CPR fishing, there occurs an intensive competition among the fishermen to maximize fish catch from the common resource. The competitiveness is the outcome of increased number of the fishermen and rising demand of fish in the market, in view of the recent growth of population in the area. However, in PPR type of fishery, owner decides when and how much fish is to be caught from the given (private) fish resource. Thus, PPR management mode of fishing is more sustainable while CPR mode of fishing leads to overexploitation. It is because of relatively open access to CPR vis-à-vis PPR. Hence, the nature of resource leads to its unsustainability in the changing environment and population. Such a resource undergoing the
increased pressure needs to be managed by the method similar to those of PPR sustaining practices. Finite resource cannot sustain under the ever increasing pressure and practices of overexploitation.

(iv) The local institutions crafted for management of the CPR are not capable enough to prevent illegal overfishing. Though the Shonebeel Fishermen Co-operative Society Limited (SFCSL) takes care of the fishing by its members only, it does not exert control over the members due to some vested interests and corruption in its management. It is believed that in the Shonebeel, every year, a huge trade exchange takes place but the SFCSL records a little amount. Thus, on the one hand, the government is deprived of the revenue earning and, on the other hand, the funds of the SFCSL also remain meagre. Rather, it is learnt that the illegal amount (bribe) is distributed among the members of the committee of the SFCSL. Thus, SFCSL can not perform any remarkable job for the welfare of the fishery community which is practically the prime goal of the SFCSL. The Government also acts passively through the SFCSL. Due to such reasons the SFCSL has also lost its holds over its members’ activities. Besides, due to lack of massive awareness there is always a wide gap between the executive members of the SFCSL and the ordinary members. The committee management is lacking full enforcement of norms of the SFCSL upon the members. Consequently, the fishermen are using mosquito nets,
current jals and small mesh nets without any penalty from the SFCSL. These are causing a gradual depletion of the fish resources in the beel. The SFCSL and the Government of Assam have already imposed restrictions on fishing from the 1st March to 15th July as it is the high breeding time of the fishes. Yet, the fishermen are catching the fish by violating the ban. This mainly causes depletion of fishes. If the rules banning all the fishing activity during the breeding period are enforced strictly the Shonebeel fishery will sustain enough quantity of fishes and meet adequately the existing demand in the valley and also help the fish stocks to regenerate in the beel reservoir. In managing the beel fishery, both, the Government and the local institutions (SFCSL) are working together but their efforts are not enough to manage it sustainably. To improve its management, at the local level, in the event of the failure on the part of the SFCSL and the Government, a skilled NGO (Non-Government Organization) or the like may be involved to manage the affairs with the participation of the people; or skilled managers and professionals may be hired under the SFCSL to haul up its affairs. And then only the beel can be saved from the illegal and over fishing. The Government will earn the actual revenue accrued and the fishing members will earn by sustaining the fish and enhance their socio-economic conditions. Such experiments made in the dairy co-operative movement at Anand have paid the people in real sense.
The type of fishing practices in the CPR is responsible for destroying the fish niche. Before 1980 the beel covered with lush green bushes of different varieties provided the fish safe shelter for breeding and rest during the winter. Many Siberian migratory birds also visited the beel in the period. On the other hand, their excreta was a good nutrient for fishes. But, for the sake of smooth fishing, the fishermen cut down the bushes which were the birds' shelters and now the birds are not coming. This indirectly destroyed the fish niche. Besides, the plying of motor boats for transportation in the area is also responsible for the destruction of specific variety of the fishes which generally stay in the upper layer of water as the sound and waves prevent the fishes from laying eggs (Trivedi 1986). Plying of motor boats creates heavy sound and waves. Therefore, for sustaining the fish staying in the top water layer in the beel, the plying of motor boats must be restricted to specific routes. Besides, the natural vegetation in the beel also must be conserved for sustaining the fish resources in the beel. The dyke constructed in the 1960s on the river Shingla to control floods in the beels periphery has been causing siltation in the beel's bed and thereby hampering its water logging capacity, which adversely affects the fish niche as well. Therefore, de-siltation of the beel should be regularly done. The beel must be dredged and the dredged out silt may be sold to the farmers for fertility of the paddy lands. However, the de-siltation is also related to the management of the resources. The
management component appears to be most important one in case of such a complex fishery system as the Shonebeel.

Thus, proper maintenance of the beel through plantation, dredging and de-silting and promoting of appropriate fishing techniques and fish culture (gata and paddy fish culture) can sustain the CPR fish. This is possible through effective management of the beel.

(vi) In the Barak river also, the CPR fish has a common access of the members. And for the non-members also there is open access to the channels and flooded areas during the monsoons. The same competitiveness as well as absence of property rights as or operative property rights in the Shonebeel's CPR fish is perceived here also. The absence of property rights means the members under jurisdiction of the particular part of river can exploit the fishes as much as they desire. During the exploitation of fish resources they maintain only the area of operation. Although there is an official ban for catching fish by small mesh nets like MFY nets. Yet or mosquito nets, the fishermen are using such small mesh without any restriction. Besides, during the breeding season also the fishermen are catching fish by violating the ban imposed by the co-operative society, under which the fishermen are registered to catch the fish, as well as that by the Government of Assam. If the ban on fishing during breeding period and use of small mesh nets is strictly enforced then the Barak river will produce enough fish to meet the existing demand of the fish in the valley. The CPR fish in the Barak river also face the same problem related to fishery technology,
nature of fish resources and management of the resource as the Shonebeel fishery. Thus, in both the fisheries the co-operative society is working through the Government of Assam. The problem related to vested interests crop up from both the structures, i.e., the Government as well as the localized co-operative society. The controlling / managing system itself becomes like open access and thereby ineffective. Therefore, some professional management input needs to be given by using neutral elements into the local participatory management to run the fishery like efficient production unit.

(vii) In the Barak river, due to various types of chemicals and waste disposals, the pollution factor hinders the growth of fish stocks. The chemical fertilizers used in the paddy field contain nitrogenous substances which are drained by the rain water to the river. They produce eutrophication which leads to grow phytoplankton and causes the imbalances into the Dissolved Oxygen of the river water. If the level of pollution can be checked properly, then the niche of the fishes in the river can be conserved. The maintenance of niche is also directly related to management.

(viii) In the three villages of the Barak river basin; viz., the Netaji Nagar (Patni), Radha Nagar (Kaivartya) and Balighat (Mahimal) the villagers are practicing PPR fish on their own ponds as well. In the river fishery, the villagers are exploiting the fishes through out the year for which the quantity and per capita fish catching, both,
are decreasing. Therefore, all the three villagers have now begun to practise fishing privately on their own lands. Particularly, the villagers of Radha Nagar have dug ponds of small and medium size while some of them have large fisheries from which they earn good returns. As there is decline in CPR fish, many of the villagers have adopted new occupations like motor mechanics, carpentry, mason works, gold smithy, etc. of these occupations motor mechanics and gold smiths are observed to be more sustainable as the scope of these services is growing even in the villages. Therefore, the emerging service sectors may be promoted to scale down the pressure on the natural fisheries. In view of the increased pressure of the population and overexploitation of the CPR fish in both the fisheries, the private fisheries on several lands are coming up. In these fisheries there seems to be a ray of hope for indirect contribution to sustainable development of the communities and reduction of the pressure. Thus, a systematic development of the PPR along with the CPR will provide the way out for sustainable development of the fishing communities by offsetting the pressure already built upon the CPR fish. The clue for development of fisheries systems on the PPR line development is received from the new private fisheries in the three districts of the valley. The private fisheries are being managed by the fishing and non-fishing communities in a sustainable manner. This trend may be promoted by the Government to bring down the pressure on the common property fisheries.
CONCLUSION

Sustainable development of common property resources in the two natural fisheries is basically a problem of managing them in the changing natural environment and human environment as well. The resources are being pressed by the factors from within and without of their environment. The various models of institutional management for exploitation of common fish resources suggest solution of the management problem variously. The game theory explains how the strategy of each player is designed and used by taking cognizance of that of the other player and ultimately each player neutralizes the other one in exploitation of natural resources. This happens because of open access to natural resources and local people cannot crafts institutions to control the resource exploitation. Hardin calls it "Tragedy of the Commons". For management of the resources a third party, Government or private interest, has to intervene in the situation. The property rights school asserts that the third party instituted through private rights in the resources is the best way to manage and sustain the resources. The revisionist approach, developed as a reaction to the property rights school, actually propounds to refute Hardin's Tragedy of the Commons'. All the revisionists try to fit their explorations within a common framework, Oakerson model, mainly to deal with common property resource management and to take into account four factors of interaction mainly responsible for exploiting common property resources; namely, (i) physical and technological attributes, (ii) patterns of interaction, (iii) decision making arrangements and (iv) outcomes. The factors are correlated to each other. If one factor is shaken then it will shake the others. Thus, all the four factors create equilibrium in the common property regimes. While explaining
the working of these factors Acheson, a strong proponent of the revisionist approach, refuted all the basic axioms of Hardin’s model comprising open access to common property, existence of a level of technical capacity, inability of the local institutions for management of the resources and necessary intervention of private agency or Government.

It seems that no model is capable to explain the management for all variety of common property resources; viz., wetland, reservoir and reverine as well as to explain adequately the management for any of the common property resources. Firstly, the different resources require different institutional regimes determined by the nature of the four factors suggested by revisionists. Secondly, the nature of each resources has to be assumed as dynamic whereas all the models suggests a dynamic equilibrium of interactions between the static resource and the static community. In a reservoir of static and limited nature a local property regime may be instituted. But when the resource is vast and dynamic it needs to be managed by several local regimes where overlapping of resource further creates problems of management as in the case of the resources like Shonebeel and Barak river. Here, presence of a third party is necessitated. The third party is the Government of Assam represented by the Cooperative Societies or individual lessees. But still the regime fails to maintain efficiency, equity and sustainability in exploitation of the resources. Their failure lies in understanding the nature of the resources. Barak river passes through three districts in the valley and the fishing is managed by the agencies of the respective district. Even in Cachar district the river is divided into nine Jalkar (part) Fisheries being managed by a Cooperative Society or individual lessee. Here, the resource stock is practically fluid and overlapping in the running river. Hence, it gives rise to immense
competition among the fishermen within and without their respective fishery for maximum exploitation as there is enormous pressure of exploiters upon the finite resource within the nine fisheries, which is already changing as a result of various factors working upon it. Then, the institutional arrangement of each fishery wants to raise its revenue by showing lax in rule enforcing for resource exploitation. As a result, the riverine fish is exploited unsustainably. For well management an integrated institutional arrangement right from a jalkar fishery to the group of the three districts through individual district is required. It will manage the river fishery in an integral manner within and across the jalkar fisheries and districts in the valley. Along with this, the areas in the vicinity of the river fishery have to be developed for agriculture or other occupations. This will offset the unbearable pressure of exploiters on the fishery. Thus, the institutional arrangement for fishing has to be integrated with the development of other sectors of occupations. Such integrated model can maintain efficiency, equity and sustainability in the riverine fisheries and the Government as third party is essentially involved there as no other party can achieve the three criteria (efficiency, equity and sustainability) of managing the common property resources.

The Shonebeel is also a dynamic property resource, regularly converting from CPR to PPR and vice versa in a year and these changes the regimes of control from one period to another. The beel as a whole is influenced by changes in its environment from within and without. When the regime of the resource has to change after a period the fishermen and management, both, want to exploit maximum for fish and revenue respectively. Thus, there is unrestrained competition between the two regimes as well as the fishermen within the CPR regime. Further, differential advantages of lands located in the
beel’s vicinity also differentiate the interests of the fishermen within the CPR regime. The fishermen of the upland side exploit unsustainably to get maximum before withdrawal of water and starting of agriculture while those of the lower side want to sustain the resource, till the water retains, comparatively for a longer period. Thus, it needs an institutional mechanism to integrate the PPR and the CPR fishing as well as to develop the agriculture and the service sector for offsetting the excess pressure of people on the beel. Here also, the agency like the Government is essentially involved but a bureaucratic regime has to be kept at bay and therefore the people’s participation at every level has to be ensured in the integrated models of institutional arrangements.

To sum up, the Shonebeel and the Barak river are the dynamic fisheries in their structures and environments and therefore none of the existing models of institutional arrangement is capable to explain their resource exploitation. They require integrative model of management which integrates not only various organs or regimes of the resources but also the various property resources in a region for sustainable development. In the model the Government and the people are essentially involved. In the modern societies of complex nature, non-involvement of both of these cannot be afforded.