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Conservation of Environment and Protection of Marginalized Fishing Communities of Lake Chilika in Orissa, India

Sarmistha Pattanaik

Centre for Interdisciplinary Studies in Environment and Development (CISED), ISEC Campus, Nagarabhavi, Bangalore 560 072, Karnataka, India
Telephone: 91-80-23217013-extn-27
E-mail: spattanaik2@yahoo.co.uk, spattanaik@isec.ac.in

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ABSTRACT Situated in the coastal belt of Orissa in India, Lake Chilika has been designated under the Ramsar Convention as a Wetland of International importance (IUCN) especially as water fowl Habitat (Iran, 1981). But, during the last few years the Lake has developed serious environmental problems so much so that the Bureau of Ramsar convention has placed it on its red list. Among those problems, the siltation at the Mugger Mukh (one of the openings of the Lake to the sea) and consequent reduction in tidal waves, decrease in the depth of water level, decreasing salinity, shrinkage of Lake area, deterioration of the condition of the Nalabana Bird Sanctuary situated in the Lake have been cited as the major ones. While various natural factors have been attributed to such an environmental degradation, an artificial factor i.e. shrimp aquaculture practiced by a few economic elites of the state and also a group of businessmen has been cited as a potential cause. The economically marginalized and environmentally conscious fishing community living near the Lake have thus started a very powerful movement supported by various other sections of the state. Since the Lake ecology and sustainability of the marginalized fishing masses are interrelated in this case, the paper attempts to focus on the artificial problem that has substantially contributed to the environmental degradation and analyze the socio-economic problems that have evolved in a sociological context.

INTRODUCTION

Conservation of natural resources or their sustainable use has often been regarded as a characteristic of many traditional Asian cultures (Kalland and Persoon, 1998). However, all Asian civilizations have often been instances of various ways of exploitation of the wealth of their natural resources. The environmental destruction has destroyed the conditions of production of peasants, fisher-folk, haunters and gatherers in many parts of Asia in many ways; it has also affected their production itself, not merely the quality of their daily lives (Omvedt, 1993). Among various forms of natural resource exploitation, a more recent element in the causal chain of environmental degradation has been the introduction of new technology which made it possible to exploit resources at an unprecedented level. For example, the introduction of prawn farming or aquaculture project called as "Blue Revolution"- in brackish water ponds in tropical zones of Asia, especially in India, has induced processes of social dislocation, ecological change and environmental destruction that are arguably worse than from many earlier Green Revolution technologies (Stonich, unpublished draft paper). Moreover, this disproportionate growth of shrimp culture in the vast coastal regions of South and Southeast Asia and specifically in India, has given rise to several conflicts in the micro as well as macro spheres of shrimp industry chain. To put it in more explicit terms, Stonich argues that (1998) while 99% of cultured shrimps are raised in Third World, virtually all are exported to industrial countries primarily to the U.S.A, Europe and Japan raising serious doubts about its capacity to improve nutritional status among the poor. The primary motives are profits for producers and input suppliers and export earnings for natural treasuries. India is thus following the export policy of prawns basically for its interest in earning foreign exchange.

In India, the intensive method of shrimp culture and shrimp pond pollution has contaminated local drinking water supplies, forcing women to walk long distances for water (quoted in Stonich, 1998). Moreover, the way of life of the local coastal inhabitants has changed abruptly with the introduction of this intensive shrimp culture in many parts of India and at the same time they have been deprived of their means of livelihood and therefore, forced to find other sources of livelihood. This has compelled the local people to wage relentless battles against injustice and therefore, these processes, in long

run, have stemmed into conflicts over the use of natural resources and rise of grassroots resistance by the deprived community. Against this backdrop, the present paper is written. The paper focuses on the practice of shrimp culture in Chilika Lake in the coastal belt of Orissa, in India, and how it has caused several ecological problems as well as has made the life of the poor local people untenable. The local people are caught in between two grinding stones: the Lake's deterioration on the one hand; the arrival of entrepreneurs and commercial interests on the other (Bogaert 1992:1). This non-traditional agricultural exports (in Stonich's terminology, 1991) in the coastal areas of Orissa, in Chilika Lake area, has resulted in the associated patterns of capital accumulation, the growing rural impoverishment and the serious problems of environmental degradation in the coastal areas. It illustrates how national, corporate forces have evolved and affected both people and the natural environment and how, in turn, local people are attempting to such powerful systems through these environmental protests.

BRIEF HISTORY AND GEOGRAPHICAL FEATURES OF THE LAKE ECOLOGY

Chilika is the Pride of our nation as Asia's biggest brackish water Lake of about five thousand years old. Situated on the Bay of Bengal, it is the second largest in the world (after Victoria Lake in South Africa).

It is a pear shaped Lake. It was formerly a bed of the sea. With the passage of time, it was eventually separated from the sea by a group of islands formed by silt deposits and sandy ridges less than 200 metres in width. It is situated in the eastern coast of Orissa between the latitudes of $19^0 28'$ to $19^0 54'$ North and of $85^0 5'$ to $85^0 38'$ East longitude. It extends from south west corner of Puri and Khurda districts to the adjoining Ganjam districts of Orissa state. Well-connected by Air, Rail and Roads, it is 100 kms from Balugaon railway station. Based on its rich biodiversity and socio-economic importance, Chilika Lake was designated as a Ramsar site in 1981 under the convention of Wetlands of International Importance popularly known as

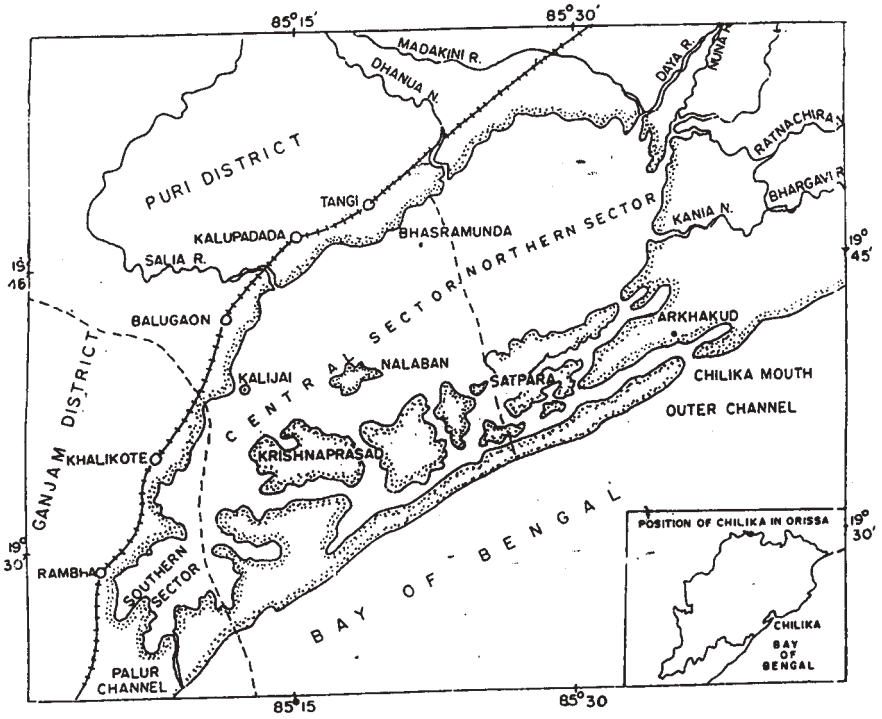

Fig. 1. Location of Chilika Lake in Orissa and its Natural Division

Ramsar Convention, especially water-fowl habitat (Chilika: A living Lagoon, 2003). It was also included in the list of Wetlands selected for intensive conservation and management by the Ministry of Environment and Forests, Government of India. Moreover the Lake was identified as a priority site for conservation and management by the Committee on National Wetlands, Mangroves and Coral Reefs instituted by the Government of India.

The average water spreads area is 790 sq. km.s according to remote sensing data (1986), though according to government records the area covered by the Lake is around 1,055 sq.km which swells to 1,165 sq.km during the rainy season and gradually shrinks to 906 sq.km during summer. The average depth of the Lake varies from 1.73 to 3.7 metres during rainy seasons and 0.93 to 2.6 metres during summer. The number of mouths of the Lake at present are three, one is called *Muggar Mukh* near the village Arakhakuda, the other is *Palur Muhana* and the third one is the opening up of the *new mouth* opposite of village Sipakuda by CDA (Chilika Development Authority) in Septmber 2000. The lagoon itself is broadly divided into four natural sectors based on the ecological characters: the Southern zone, Central zone, Northern zone and the Outer channel. A number of islands are present in the lagoon, prominent among which are Nalabana, Kalijai, Somola, Honeymoon, Breakfast and Birds islands. The length of the outer channel is 35 kms. The total area of islands inside it is 223 sq.kms. And the total number of rivers and nallas is 10. The rivers like Daya, Nuna, Ratnachira, Bhargavi, Malguni, Dhanu and Salia fall in it. The salinity of the Lake varies from 0.1 to 30.6 ppt. The total fishermen population is 1, 22,339 out of which 36,540 are male, 31, 588, are female and 54,211 are children (Directorate of Fisheries Statistics, 2000-2001). Every new hand born goes to Chilika from its very childhood.

Problem of the Study

Chilika has been under constant threats from both natural as well as artificial problems. These problems resulted in the degradation of the Lake's ecosystem in such a way that the Lake was included in the Montreux Record of threatened list of Ramsar Sites in 1993. Some of those problems are:

1. According to Zoological Survey of India (ZSI) about 40 percent of brackish fish species recorded in 1920, have vanished. Meanwhile, between 1920 to 1993, about 393 square kilometers of area has emerged as landmass on all sides of the fringe of the Lake. Between Bhusandpur and Balugaon of Khurda didtrict, the total land mass created during this period is about 46 square kilometers. The ZSI also recorded that about 69 species of fish are available in the Lake as against 126 species recorded in 1920 (Das, 1996).
2. Area of the Lake is shrinking gradually and the depth of its water level is constantly decreasing during the last few years. Now the maximum depth of water in some places is hardly 4 meters and the average depth of water in the Lake is 1.6 meter in the summer and 2 meters in the rainy season. In 1922, the average was 3 meters in summer.
3. The Lake has been facing a great problem of acute siltation. It is attributed as one of the most detrimental factor for degradation of the Lake ecosystem (CDA, 2004). Northern portion of the Lake is heavily silted and it is gradually shifting in the direction of the south.
4. The nature of the Lake water is undergoing a change for which the number of brackish water species including fish, shrimp and crabs are dwindling severely. According to official statistics within a period of ten years, it has been reduced to one-third approximately. Fish catch was 8872 million tones in 1986-87 and the official statistics record that in 1991-92 it got reduced to 4623 million tones.
5. The immediate problem is to save the Lake by allowing free flow of siltladen flood water into the sea, for which all the obstructions (like prawn gheri (embank-ments) inside the Lake is to be removed.
6. Along with these short-term and long-term problems, the outer channel (mouth to the sea) Mugger Mukh, which is chocking up and gradually shifting northward due to littoral drift is to be deepened and maintained properly for out-flow of flood water and in-flow of tidal water. This is urgent to maintain the salinity and water quality of the Lake.
7. Because of the all round deterioration of the Lake, the *Nalabana Bird Sanctuary* in it, which houses the migratory birds of North Asia beyond the Himalayas (Tibet, Mangolia, Manassarobar, Caspian Seas and Siberia) in the winter, is facing the danger of degradation.

8. The most important problem is that the overall ecological degradation of the Lake has brought about the socio-economic deterioration of a large chunk of traditional fishing community dependent on the Lake. Since this problem is inter-related to all the above problems, it has become the crux of the discussion of the present paper. Because it is these fishing community who have been experiencing so many social problems like deprivation, marginalization, alienation, child labour, migration, occupational displacement and many others. Ironically all these problems grew due to the environmental problems in the Lake. In a substantial sense, they have been associated with the larger environmental problems of the Lake as these people live a life embedded in nature and derive their sustenance from this environment (natural resources) for their survival.

ANALYSIS AND DISCUSSION

While the problems have been widely acknowledged, the various committees instituted under various government reports have also suggested various measures for the conservation of the Lake ecology.

Chilika Lease Policy

Till the year 1991, there was no distinction between capture and culture sources, though culture was going on illegally in Chilika both by the fishermen and non-fishermen. The government of Orissa laid down some guidelines to regulate settlement of Chilika fisheries with effect from January 1, 1992. This is popularly known as "1991 lease policy" over which there was a hue and cry and which divided the whole fishing sources of the Lake into 'Capture' and 'Culture' and allowed the non-fishermen of the locality to involve themselves in 'Shrimp Culture' in the Lake. The landmass was earmarked for culture by non-fishermen (Pattanaik, unpublished and Samal, 2002).

It seems that after the introduction of shrimp culture in Chilika Lake, illegally during 1980s and legally during 1990s, fish captured from the Lake has been declining gradually. The reverse has been the case in Culture. Moreover, with the lease policy of 1991, the export of shrimps from culture sources has steadily increased and reverse has been the case in capture. Tables 1 and 2 emphasize this trend.

Note: From the above table it is seen that from 2001-2004 there is an increase in the landing of fish, shrimp and crab. This is due to the opening of a new mouth opposite to village Sipakuda of Puri district by CDA in sept-2004.Due to this dredge of new channels there was improvement in the water exchange and salinity flux which helps the migration of the fish and other economic species into the lagoon and vice-versa (as per the report of CDA,2004).

In addition to that, in later years, the Orissa High Court received some guidelines[1] to regulate the settlement of Chilika Fishery with effect from 1st January 1994 which is called as 1994 lease policy of Chilika Lake by Government of Orissa.

The guidelines of 1994 are related to non-fishing zone, capture sources and culture sources. It gives a definition of both 'capture' and 'culture' sources and a role to Fishery Department. It reduced the lease value by Rs. 50 and fixed a maximum limit of area to be allotted to a PFCS (Primary Fishermen Co-operative Society) for culture. According to the 1994 lease policy.

- all capture sources like Jano, Dian, Uthapani and Bahani may be leased out to Orissa State

Table 1: Annual fish, shrimp and crab landing from capture fishing in Chilika Lake

Year	*Annual Landing in metric tones*			
	Fish	*Shrimp (Fish+Shrimp)*	*Total*	*Crab Landing*
1985-86	7446	1174	8620	79
1986-87	7283	1589	8872	54
1987-88	6863	1241	8104	39
1988-89	5211	917	6128	44
1989-90	5493	1177	6670	36
1990-91	3792	481	4273	24
1991-92	3680	876	4556	30
1992-93	3207	951	4158	15
1993-94	2799	686	3458	11
1994-95	1239	176	1415	3
1995-96	1056	213	1269	5
1996-97	1352	281	1633	12
1997-98	1492	150	1642	10
1998-99	1565	137	1702	9
1999-2000	1565.32	180.4	1736.72	9.032
2000-01	3592.95	1296.26	4889.21	93.54
2001-02	9530.03	2347.78	11877.81	111.07
2002-03	8265.16	2478.82	10743.98	149.81
2003-04*	7927.15	2857.65	10784.80	107.82

Sources: IGovernment of Orissa, 1997, *Directorate of Fisheries, Handbook on Fisheries Statistics, Orissa, 1996-97*, Cuttack. P-48.

II. Achievement Report, 2004, Chilika Development Authority (CDA), Government of Orissa, Bhubaneswar, page-22.

Table 2: Foreign export of shrimps from Chilika Lake area (Quantity in metric Tonnes), (Value in Million Indian Rs.)

Year	*Capture sources*	*Culture sources*	*Total Quantity*	*Percentage to total export from the State (%)*	*Total Value*
1986-87	1021.4	528	1549.4	25.87	66.10
1987-88	816.3	724.4	1540.7	29.81	66.30
1988-89	610.0	953.4	1563.4	23.86	75.32
1989-90	870.7	1595.9	2421.6	25.98	94.74
1990-91	356.9	1498.6	1855.6	20.21	120.00
1991-92	586.4	1190.5	1776.9	19.39	140.00
1992-93	615.6	1679.7	2295.3	19.22	174.04
1993-94	597.3	1871.1	2468.4	22.00	248.40
1994-95	181.5	2037.7	2219.2	14.50	233.26
1995-96	228.0	2105.4	2333.4	13.00	229.39
1996-97	170.0	533.1	703.1	2.88	81.16
1997-98	-	-	N.A	-	-
1998-99	-	-	N.A	-	-
1999-2000	-		N.A	-	-
2000-2001	575.0	-	N.A	-	-
2001-2002	1177.0	-	N.A	-	-
2002-2003	1240.0	-	N.A	-	-
2003-2004	1589.0	-	N.A	-	-

Source: I Government of Orissa, 1996-97 *Directorate of Fisheries, Handbook on Fisheries Statistics, Orissa,* Cuttack. P-55.
Note: Data from 2001-2004 is not published by Government of Orissa, but only calculated informally which are based upon some random figures also.
N.A.: Not Available

Fishermen's Co-operative Federation Ltd., which in turn shall sublease them to the affiliated PFCSs.

- the capture fishery may be divided into convenient operational size in the interest of better management. In no case, the size should exceed 1,000 acres.
- annual lease value shall be fixed at by adding 10 per cent over the previous year's lease value.
- the area for shrimp culture shall be identified in fringe area of Chilika Lake and shall be demarcated in consultation with Fisheries Department subject to revive in every three years.
- the area of each culture fishery sources to be allotted to PFCSs shall not be less than 100 acres but no exceeding 500 acres.

Thus the 1994 lease policy did not make any significant change over 1991 lease policy. It was just a window dressing keeping the High Court decision in view. Culture sources were not identified for the villages in the Western bank of Chilika, such as Bhimpur, Galua, Baulabandha, Nairi, Sorana, Bhusandapur, Balipatpur, Mangaljodi, etc. No role is assigned to the Co-operative Department and Department of Forest and Environment for identification of culture source, though Fishery Department is to be consulted.

In addition to that the first and second NEERI (National Environmental Engineering Research Institute, Nagpur) report of 1995 recommended that:

i. No installation of aquatic culture farms based on brackish water on indent brackish water bodies,
ii. Prohibition of wild seed collection
iii. Abandonment of commercial shrimp farms in Chilika Lake
iv. Removal of deposited silt in Chilika
v. Immediate attention to 35 kms of the channel mount of the Lake
vi. Prohibition on conversion of agriculture lands and salt farms into commercial aquaculture farms.
vii. No permission of withdrawal of ground water for shrimp culture.

The Alagarswamy report also indicated that the demand for shrimp seed is growing with the expansion of shrimp culture and hatchery production was unable to meet it. Exploitation of natural seed resources is growing unabated, particularly in West Bengal, Orissa, and Andhra Pradesh. Large quantity of fry by-catch (the very small fish fingerlings) are discarded by the fry collectors because their value is insignificant. The report states "elimination of fry in the fry-by-catch is not only detrimental to the predictor thriving on them, but it also creates an ecological imbalance". Moreover, the report noticed

agitations by the environmentally conscious people of the costal areas against polluting aquaculture technologies. People in general have become aware of the environmental issues related to aquaculture. A current case in point is the agitation against a large commercial firm coming up in Chilika Lake (Orissa). The Alagarswamy report further states that paddy fields are being converted to shrimp farms and some paddy lands along the fringe of Chilika Lake have been lost in shrimp farming (AIR, 1997).

The Supreme Court also noted that normal traditional life and vocational activities of the local population of the coastal areas was seriously hampered by intensive aquaculture and held that the coast and beaches are a gift of nature. Any activity polluting the same cannot be permitted. Having taken cognizance of the reports of experts (NEERI, Central Board for Prevention and Control of Water Pollution, Dr. K. Alagarswamy report) the Court held that the intensified shrimp farming culture by modern methods is violative of constitutional provisions and central acts, especially the Environment Protection Act. Therefore it cannot be permitted to operate. However, traditional shrimp farming is pollution free (Supreme Court case finder, 2000).

On the basis of the recommendations of the Supreme Court, the government of India has also constituted an Aquaculture Authority of India under the Ministry of Agriculture's Co-operation Department. Accordingly the government of Orissa has constituted state level and district level aquaculture committees. Thus the House committee on prawn culture constituted by the Orissa legislative assembly on 28.06.1997 constituted a sub-committee to look at shrimp culture in Chilika Lake. The committee arrived at the conclusion that the practice of leasing out some portions of Chilika Lake for prawn culture has encouraged people to indiscriminately encroach inside Chilika Lake using their affluence and influence. (House committee primary report, 1999). The draft report of the sub-committee[2] of the shrimp culture suggested:

i. Stopping all leases of any portion of the Lake for shrimp culture.
ii. The eviction of shrimp culturists in and around Chilika.
iii. The prohibition of conversion of private agricultural land into shrimp ponds.
iv. The proper excavating of the outer channel and clearance of gheris (bamboo embankments) and artificial obstructions to enable shrimp and fish juveniles to enter Chilika Lake from the sea.[3]

The Orissa High Court in its decision (in 1994) had allowed only traditional extensive shrimp culture in Chilika only in the fringe areas of *dian* and *uthapani* by pen culture. The Supreme Court of India in its decision dated Dec.11.1996 also directed that

i) no construction/set up of aquaculture industry/shrimp culture industry/shrimp culture ponds within 1000 metres of Chilika Lake,
ii) no use or conversion of agriculture land, salt pen land for shrimp ponds,
iii) Shrimp ponds may be constructed outside 1000 metres of Chilika Lake with the prior approval of the Authority as constituted by the Supreme Court.

The Sub-Committee of House Committee of Orissa Legislative Assembly, 1997 also suggested:

i) the eviction of Shrimp culturist in and around Chilika
ii) stopping lease on any portion of the Lake to anybody for shrimp culture,
iii) proper excavating of outer channel and its clearance of *Gheries* and artificial obstruction to enable shrimp and fish juveniles to enter with Chilika Lake from the sea.

However, it should be noted in this present study that Lake Chilika is the life support system for more than one lakh people whose main livelihood is fishery. For ages, this Lake has been their resource base for living (Das, 1996). Prawns form the bulk of fishery catches at Chilika.

There is, at present, rapid growth of fishermen population in Chilika. Fishing techniques have also changed due to the introduction of motorized boats, nylon nets and other modern methods primarily because shrimp business has been highly lucrative in the markets both inside and outside. The total number of active fishermen in Chilika went up from only 8,060 in 1957 to 27,200 by 1986 (Mohanty and Das, unpublished). However, the number of active fishermen in Chilika today is probably closer to 70,000 while the total population of fishermen is about 1,22,339. The reason of such over growth was attributed to that the non-fisher caste who had hitherto looked down upon fishing as an "unclean" occupation, were drawn to it as prawn became a marketable and profitable

commodity. The lease policy of the government of Orissa for shrimp culture in Chilika introduced in 1991 has been accused as the main cause behind the deterioration of Lake ecology as well as the deterioration of the socio-economic condition of the large-scale traditional fishermen who have faced a scenario of multiple problems.

Shrimp Ponds: It's Impact on the Lake Environment

Shrimp culture using high protein feed, particularly in 'shrimp ponds' is a highly polluting activity. It has several adverse effects on the surrounding areas as mentioned by Alagarswami's Report, FAO Report, First and Second NEERI (National Environmental Engineering Research Institute, Nagpur) Reports, Suresh Committee Report, UN Report and others[4].

Shrimp firms use both salt and fresh water to replenish their ponds. Due to commercial shrimp ponds, fresh water is insufficient to meet the customary needs for irrigation, drinking, washing and other households and livestock related uses (UN Report 1995). The overdose of fertilizer, therapeutants and drugs pollute the water. Due to earthen embankment of shrimp ponds, there is obstruction of natural drainage of flood water leading to water logging in the hinterland village, because in many cases, the shrimp ponds farm areas are the natural drainage areas of flood (according to Alagarswami's report and FAO report).

Since Chilika is a brackish water Lake, the salt/brackish water is the primary medium of growth of the dominant species of shrimp culture – the tiger shrimp. Hence, salt water is taken into ponds and kept for 120-150 days with periodic replacement. Salt water remaining in the ponds for a long period seep into the neighboring cultivable land and salinises the soil which lose their productivity for crops. Thus, it deteriorates the soil quality in the adjoining areas (quoted in Samal and Meher Report, 1999).

Intensive shrimp ponds have a maximum life of only 5-10 years. Abandoned shrimp ponds can no longer be used for shrimp culture and there are few known alternatives uses for them except some other type of aquaculture. Apparently, they can seldom be economically rehabilitated to other uses such as crop land.

The demand for shrimp seedling is growing with the expansion of shrimp culture (both for 'shrimp ponds' and net enclosure / pen culture). The hatchery production is unable to meet the increasing demand. This leads to growing exploitation of natural seedling resources particularly in Orissa, Andhra Pradesh and West Bengal. Large quantity of fry-by-catch (bag net) are discarded by the fry collectors because their value is insignificant. Seedling collection of tiger shrimp (Panaeus monodon) by children is a regular practice. During the collection of seedling, the children pick only tiger shrimp seedling and throw away all other shrimp and fish seeds, thus, depleting the estuarine and coastal fishery resources. Algarswami report states that "elimination of fry in the 'fry-by-catch' is not only detrimental to the predators thriving on them but it also creates an ecological imbalance".

Net Enclosure / Pen Culture/ Shrimp Gheri

Shrimp gheri or bamboo embankments disrupt tidal flushing and reduce the level of oxygen and salinity. This leads to reduction in the natural growth of fish and creates problems for traditional method of fishing by the fishermen. Shrimp gheris reduce the fish stock in the Lake. Because, in a shrimp gheri, no other seedlings grow. So, the quantity of seedlings in gheries measuring more than 22 thousand acres in the leased area and around 20 thousand acres of encroached area in Chilika Lake has become negligible (as mentioned in Samal and Meher report, 1999). So also is the fish catch of the fishermen. There is also obstacle to '*bahani'*. In time of cyclone and heavy rain, the fishermen are unable to come easily to the bank of Chilika while fishing.

The prawn culture[5] or shrimp gheries in Chilika cause:

- hindrance to free flow of water, tide migration,
- hindrance to free migration of shrimps and fish juveniles,
- loss of grazing grounds for the juveniles,
- act as silt trap and accelerate the process of silting of marginal areas of the Lake (as per Das Committee Report, 1993).

Cage culture / pen culture in Chilika reduce the mixing of Lake water with the water either in cage or pen enclosure, or in pond in the shore and create uneven pattern of salinity reducing output of shrimp. Also, over the years, the use of traditional fishing gears has declined for

fishing in the Lake today due to the substitute use of nylon nets like *zero nets*[6] and *disco nets*.

Environmental Degradation of Chilika

Extensive prawn culture on the fringes of Chilika is said to have a serious impact on the ecology of the Lake. Massive excavations and gheribandhas (large embankments) have been made in such peripheral areas areas of Chilika, which were originally flooded during the monsoon period. After the conversion of such areas into brackish water culture ponds, the shallow and grass covered juvenile nursery grounds have been lost for good and this leads to a sharp decline in the juvenile population. Extensive implementation of brackish water ponds have resulted in serious obstructions for the flood water movement and sedimentation rate near the pond embankments which have led to eutrophication of the Lake (Das Committee Report, 1993).

NEERI's second Report (July 10, 1995) with reference to Chilika has mentioned the followings:

- deposits carried out by the two rivers such as Daya and Bhargavi gets deposited in the Lake,
- there is little exchange of water from the sea because the mouth of the Lake (35 meter long outer channel) has been blocked by 3 factors such as silt, improper mixing and large cluster of shrimp farms hindering the passage of water into/out of the Lake,
- the bird sanctuary at Nalabana has also been affected by siltation and shrimp firming activities.
- The other causes of concern are decline in fish yield, shrinkage of Lake area decreasing by 1.45 to 1.6 sq. km per year, decreasing salinity, shifting of the Lake mouth, siltation at Mugger Mukh, and consequent reduction in the tidal impact, forest destruction around the Lake and on estuaries of rivers causing heavy soil-erosion leading ultimately to siltation of the Lake.

Socio-Economic Impact of Shrimp Culture on the Lake Ecology and upon the Community

The impoverishment of the Lake has meant the communities who depend on the natural base for sustenance have been deprived of their resourses. This alienation cannot be adequately described in terms of the loss of a material livelihood alone; it is most profoundly a wider loss of cultural autonomy, knowledge and power. In the name of development, people have been pushed off the land, their forests and water have been taken over by the state and the market, so that they have been deprived of everything except their labour power. Just as nature has become a commodity, so has human labour. This is a contradiction of capitalism that labour works with nature (Baviskar, 1995). It is quite applicable in case of Lake Chilika.

Lake Chilika is the life support system for more than 12,000 fishermen households (more than one lakh people). Since a large area (around 14,000 acres) (according to Samal and Meher, 2002) has been allotted for shrimp culture to the non-fishermen (because of the liberalization policy), it has reduced drastically the share of the fishermen in their fish capture activity. Along with this, encroachment of around 20,000 acres mostly by the non-fishermen has also affected the economic condition of the fishermen. Poor fishermen feel that their livelihood is threatened due to the entry of the non-fishermen, mostly from upper caste and upper class background, who have emerged as their strong competitors. Therefore, a psychology of insecurity now prevails among most of the fishermen. It was also noticed that some of the fishermen have started shifting to other places in search of livelihood which is alarming. It can be a case of potential occupational displacement in future.

Fishermen's Agitation: Its Nature and Growth

However, in the meantime, a protest movement in the name of *Chilika Bachao Andolan* (CBA) or Save Chilika Movement was started by a large mass of local traditional fishermen. It was also supported by various other groups to save not only the Lake ecology but also the livelihood of a large mass of local fishermen. The protest became a movement in due course due to its nature and provided an alternative model of sustainable development as against the dominant and destructive model of development by the state.

The people (fishermen) started the protest in September 1991 when the proposed integrated shrimp farm project of Chilika Aquatic Farm (a

joint project by OMCAD of government of Orissa and Tata) was being implemented (Ram et al., 1994). Because of the support of intellectuals and environmentalists who extended their solidarity to this protest and gave a new twist to it by adding environmental fall out of the project by raising the issue of Ramsar Convention and CRZ[7] (Coastal Regulation Zone) Notification, the protest was transformed to an environment protection movement. As a result, it compelled the Tata to withdraw from the proposed project. But, unfortunately, after Tata had left, the same site has been used by the 'mafias' and 'outsiders'[8] for shrimp culture. The fishermen started a "Do or Die" movement in 1999 demanding for total prohibition of shrimp culture in the Lake with allied eight other demands. However, this movement led to a bloody fight between the fishermen of '*Sorana*' village of Khurda district on one side and the state police on the other side than amounts to four deaths.

The Chilika movement organized by the marginalized fishing communities falls under the category of 'lower class resistance' which supports a kind of conflict situation over the use of resources. Because major works of conflicts have shown that at times, a more intensive resource use or mode of exploitation brings people in conflict which other group (see Kalland and Persoon, 1988). Here, conflicts are between the authorities in need of foreign exchange and local people fighting for their physical, economic, ecological as well as for their cultural survival. It is a kind of conflict between people who look upon the environment as a resource to be exploited for profit and those who defined themselves essentially as being part of the nature. Amita Baviskar in her work. "In the Belly of the River" (1995) explains how the changes brought by the independent state have created conflicts over competing claims to environment and how these conflicts range from the incessant battles between the forest department and local communities. She also explains how the attempts of elite to exploit the nature in the name of development have been challenged and collectively resisted by the very people whom they have sought to marginalize. It is absolutely applicable in case of Lake Chilika.

Conservation for Chilika?

"Save Chilika Movement", which was a grassroots movement of the marginalized fishing community at the beginning, has become a people's movement. It has become organized and broad based in due course. The poor, marginalized group of Chilika have expanded their consciousness with their association with intelligentsia and carried forward their struggle in an organized way. From a simple grassroots movement of the marginalized it became a movement of the people and became broad based and organized. After the last agitation of people in December 2001 against the illegal and unauthorized shrimp culture in the Lake, the Orissa fishing in Chilika (regulation) Bill, 2002 by the Assembly has been passed out and it was expected that the Bill would put an end to intensive cultural fishing in the Lake area (The Pioneer, 2.4.2002). The proposed legislation sought to protect the rights of the traditional fishing community in tune with the recommendation made by various government appointed committees in the past. However it has not any such protection in reality.

The committees recommended complete ban on culture fishing through a comprehensive piece of legislation. The immediate purpose of the Bill is to eliminate culture fishing and protect the interest of traditional fishing community. The Bill, however, promised to be a revolutionary piece of legislation, but its efficiency would depend upon its proper implementation.

In spite of various other measures by different sources, there are several issues which still haunt our mind. The most serious problem affecting Chilika today is the complete control of fisheries by the "mafia"[9]. They have no consideration for the environmental and natural balance of the Lake. Their quest for rapid profits have spoiled and polluted Chilika heavily. Therefore, there must be a suitable plan and solutions which should be designed to protect the Lake as well as the interest of the traditional fishing community and prevent subletting illegal encroachment and mafia-raj. The 'Save Chilika Movement' is, therefore, sending the same message to the people concerned for the survival of such as ecological heritage.

CONCLUSION

Since the problems are complicated and interrelated, the solutions are also not in isolation. There are competing economic and social

demands on Chilika. The families of local fishermen are poor and mostly belonging to the schedule caste (low caste) depending on Chilika for their sustenance and livelihood. For them Chilika needs to be developed. Total ban on illegal and unauthorized shrimp culture will increase the level of income source for fishermen of Chilika. At this crucial hour, it is all the more important not to think only the economic consi-derations but also there is a need to harmonize the social as well as ecological imperatives. Here are some of the suggestions offered by the respondents of the field survey for saving Chilika from degradation and deterioration and consequent improvement in their living conditions.

i) digging and dredging at the mouths of Chilika at '*Arakhakuda'* and '*Chilika Canal'* (see the map in figure 1) as well as in the Lake for proper exchange of water between 'Bay of Bengal and Chilika to check siltation and to allow free movement of fish and shrimp juveniles.
ii) abolition of shrimp culture and demolition of shrimp 'gheris' (net enclosures) – which disrupt the tidal flushing, reduced the level of salinity, squeeze grazing ground for juveniles and accelerate the process silting of marginal areas of the Lake.
iii) complete ban on the collection of the wild shrimp seedlings in the mouth of the Lake as these activities deplete the Lake's fishing resources.
iv) restrictions on mechanized boats in Chilika as they pollute the water and hamper the growth of surface fish.
v) ban on 'zero net' as it destroys seedlings of various fish, shrimp and crab and thus reduce its stock.
vi) ban on fishing by trawlers in the Bay of Bengal near Chilika since they obstruct the entry of fish and shrimp from sea to Lake and
vii) removal of floating aquatic weeds particularly in the western and northern sources of Chilika as they increase siltation and obstruct movement of boats (Samal and Meher,2003).

All these factors can increase the fish production substantially along with the improvement of the socio-economic conditions of the poor fishermen. But the most important question now seems to be how soon this will happen?

Apart from these proposed solutions, at present an important question worries fishing community today – is Chilika a Common Property Resource (CPR)? Who should have control over the water bodies of Chilika – the external agency like the state, the business interest or the local village people who should have access to CPR?

The answer is in the affirmative. CPR subsumes a set of social conventions, norms, legally enforceable rules and procedures for regulating its use. If Chilika is a CPR, then its control should be in the hands of independent, autonomous, co-operative societies of fishermen operating in the Chilika Lake region. But the local system may be helped by the government by providing a legal framework and technical assistance to the local village people or people who use the Lake for their sustenance as they are the best managers of the natural resources like Chilika than anyone else. Because they use the nature with low intensity to meet their basic needs and do not completely over use the nature. In case of Chilika the resource utilization by the traditional fishing communities can maintain its regenerative capacities.

Environmentalism is not simply concerned with nature *per se* but with the sustainable use of nature (see Guha and Gadgil, 1992, 1995, Guha and Alier,1998). Lake Chilika has its own ecological, cultural, social, economic and physiological balance. To develop the Lake and the beneficiaries around it, the inbuilt balance should be well understood. For this sustainable development of natural resources and ecological subsistence, its ecosystem must be maintained and conserved. Proper steps must be taken to save its ecology from deterioration and environmental degradation. Chilika Lake must not be used for 'culture fishing'. The interest of the poor and the marginalized section (fishing communities) who are its inhabitants since centuries must be taken into consideration. They must have the right to capture fish in Chilika as their livelihood/profession i.e. fishing (to sell the products) as Chilika is a CPR. Chilika (as it is a CPR) should be managed by local collective action through an autonomous body in which the fishermen community must have the majority. To conclude, Chilika – its fish, the fishermen, the fishing operation, and the social practices – all are well related on account of which to ensure ecological balance this para-mount link must be preserved besides conservation of land and water.

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NOTES

1. Government of Orissa Order No. 23240/R.dated 23.05.1994.
2. Orissa, Legislative Assembly.
3. House Committee Report, 1999, 2-4).
4. These reports have been extensively cited by the Supreme Court Judgment on Dec 11, 1996. The Second NEERI Report has also devoted to Orissa.
5. The prawn culturing methods may be divided into 4 types, such as traditional extensive culture, semi-intensive, intensive and supra- intensive or ultra-intensive culture. Extensive culture fisheries by way of land-based ponds, pen culture or cage culture, in the Lake will reduce the mixing of Lake water with the water either in the pond, cage or in pen enclosure and will thereby create uneven pattern of salinity reducing the output of prawn. The use of cages and pens to rear the fish in large water bodies is an increasingly popular method of fish culture.. Among cage and pen culture, when compared, a cage is totally closed on all sides or all but the top, where as in the pen culture the floor of the Lake of the sea is taken as the bottom. Thus pens are more close to the ecosystem than the fixed or floating net cages… like any other system of culture, cage and pen culture are also classified as traditional, semi-intensive, and intensive, depending on the degree of supplementary feeding in highly productive ecosystem, such as that of the Chilika Lake, pen culture without any supplementary feeding can be attempted with greater success (see Das Committee Report, 1993).
6. Zero nets are fine- mesh nylon nets which can catch very small fish seedlings in the Lake.
7. According to the CRZ-1 it is proposed that (Supreme Court in its verdict dated 11.12.1996) the shrimp culture industry / shrimp culture ponds cannot be permitted to set up anywhere in the Coastal Regulation Zone under CRZ notification 1991 (AIR 1997: 811). Because under the Environment Protection Act prawn culture ponds should be constructed either in the prohibited zone between High Tide Line and Low Tide Line or within 500 metres of High Tide Line for which prior permission is needed.
8. By 'outsiders' I mean both the people from among politicians and their relatives, top bureaucrats and shrimp merchants .
9. Mafias are usually outsiders from among politicians and their relatives, top bureaucrats and shrimp merchants and their agents (for more details see Pattanaik, 2003)

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