

# Linking Fish Biodiversity and Ecotourism in India: Potentials and Prospects

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## Introduction

Tourism is the unique industry that is recognized globally as the Ambassador of natural resource, social and cultural heritage as well as intellectual and economic status of a particular region or country. Of late tourism industry has attained a significant position in global economy contributing not only to the socio-economic upliftment, but also promoting social understanding, integration, cultural bondage, welfare, goodwill and friendship at regional, national and international level. The term 'ecotourism' emerged in the later part of the twentieth century to acknowledge global sustainable ecological tourism practices (*Diamantis, 1999*) and has been defined as 'travelling to relatively undisturbed or uncontaminated natural areas with the specific objectives of studying, admiring, and enjoying the scenery and its wild plants and animals, as well as any existing cultural manifestations (both past and present) found in these areas' (*Ceballos-Lascurain, 1996*). It differs from mass tourism or resort tourism as it causes minimum impact on the environment and needs much less infrastructure development. With worldwide increasing popularity of ecotourism there has been incorporation of ideas of responsible approach like environment friendly destination management and sustainable socio economic development of the stakeholders including local population (*Torquebiau and Taylor, 2009*).

Ecotourism, a unique subset of the tourism industry, is, focused on the enhancement or maintenance of natural systems through tourism. The term ecotourism was coined in 1983 by "Hector Ceballos Lascurain" a Mexican environmentalist, and was initially used to describe nature-based travel to relatively undisturbed areas with an emphasis on education.

The World Conservation Union (*IUCN*) which describes ecotourism as “Environmentally responsible travel and visitation to natural areas, in order to enjoy and appreciate nature that promote conservation, have a low visitor impact and provide for beneficially active socio-economic involvement of local peoples”. Fishing is an ancient practice known from the Paleolithic period that began about 40,000 years ago when man lived the life of a hunter-gatherer. The beginning of sport fishing, though a modern concept as such, could be seen in India during the 3rd century BC when the distinguished economist, Chanakya, had framed the laws for regulating fishing and conservation in the times of Emperor Ashoka.

The World Tourism and Travel Council says that the tourism industry is the largest business sector in the world economy as it employs 225 million people around the world and had generated around 9.6% of the global GDP in 2008. Tourism is the principal export for 83% of developing countries and the leading export for 1/3 of poorest countries and is the second most important source of foreign exchange, after oil, for the world's 40 poorest countries. Ecotourism is one of the most potential sectors for economic development of a country like India which is abode of natural resources and enormous biodiversity. The present contribution discussed the status, opportunities, potentials and issues for linking fish biodiversity conservation, and prompting ecotourism in India for sustainable management and revenue generation.

## Fish bio diversity of India

India with 2.4% of the world's area has over 8% of the world's biodiversity making it one of the twelve mega biodiversities of the world. The vast and diverse fishery resources of India comprising of 8000 km coastline, EEZ of 2.0 Million sq km, 197,024 km rivers and canals, 3.15 million ha reservoirs, 235 million ha ponds and tanks, 1.3 million ha oxbow lakes and derelict waters, 1.24 million ha brackish waters and 0.29 million ha estuaries (*indianfisheries.icsf. net, 2011*) is the home for rich aquatic biodiversity. The splendid water resources along with the biodiversity are the source of attraction for naturalists, scientists and tourists all over the world. According to the

updated database of fin fish biodiversity of India (*Anon 2015*), the total number of indigenous fish species of the country is 2868 belonging to 993 genera under 236 families and 45 orders. Out of the total, 877 are freshwater species, 113 are brackish water species and 1878 are marine species. The country is divided into ten bio geographic zones, subdivided into twenty-six biotic provinces each characterized with unique plant and animal biodiversity (*Rodgers et al, 2000*). Two areas of the country are recognized as ‘Biodiversity hotspots’ of the world, one is the Western Ghats and other is the North East Region of the country. The Western Ghats are a continuous hill range (1600 km length) occupying the western peninsular India, extending from Tapti river in the north to Kanyakumari in the south, almost parallel to the west coast of India, traversing the states of Gujarat, Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala. Another Hot Spot, the North East Region lies in the Himalayan foothill and is comprised of eight states Assam, Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim and Tripura. These resources offer immense potential to develop ecotourism/aqua tourism in the country as a major economically viable industry.

## Potential areas for fish biodiversity based eco-tourism:

**Sightseeing / study based ecotourism:** Among different potential areas for developing ecotourism for sightseeing and pursuing study or research on biodiversity, wetlands occupy a prime position from the view point of richness of biodiversity and importance of conservation. Wetlands are amongst the most diversified and productive ecosystem on the earth created by the impact of prolonged inundation with water and are characterised by specific soil quality, rich and diversified flora and fauna (*Ghermandi et al, 2010, Space Application Centre, 2011*). Different schools have defined wet lands differently. The international Convention of Wetlands (*Ramsar Convention Secretariat, 2016, Article 1*) uses a broad definition for wetlands. It states that wetlands are areas of marsh, fen, peat land or water body, whether natural or artificial, permanent

**Table 1:** Ramsar sites of India (As in April, 2015)

Sl. No.	Name of the Wetland	State	Area (km <sup>2</sup> )	Declaration year
1.	<i>Astamudi Wetland</i>	Kerala	614	August, 2002
2.	<i>Bhitarkanika mangroves</i>	Odisha	650	August, 2002
3.	<i>Bhoj Wetland</i>	Madhya Pradesh	32	August, 2002
4.	<i>Chandra Taal</i>	Himachal Pradesh	49	November, 2005
5.	<i>Chilika lake</i>	Odisha	1165	October, 1981
6.	<i>Deepar Beel</i>	Assam	40	August, 2002
7.	<i>East Calcutta Wetland</i>	West Bengal	125	August, 2002
8.	<i>Harika Wetland</i>	Punjab	41	March, 1990
9.	<i>Hokera Wetland</i>	Jammu & Kashmir	13.75	November, 2005
10.	<i>Kanjli Wetland</i>	Punjab	1.83	January, 2002
11.	<i>Keoladeo National park</i>	Rajasthan	28.73	October, 1981
12.	<i>Kolleru lake</i>	Andhra Pradesh	901	August, 2002
13.	<i>Loktak lake</i>	Manipur	266	March, 1990
14.	<i>Nalsarovar Bird Sanctuary</i>	Gujarat	123	September, 2012
15.	<i>Point Calimere Wildlife &amp; Bird Sanctuary</i>	Tamil Nadu	385	August, 2002
16.	<i>Pong Dam lake</i>	Himachal Pradesh	156.62	August, 2002
17.	<i>Renuka lake</i>	Himachal Pradesh	0.2	November, 2005
18.	<i>Ropar Wetland</i>	Punjab	13.65	January, 2002
19.	<i>Rudrasagar lake</i>	Tripura	2.4	November, 2005
20.	<i>Sambar lake</i>	Rajasthan	240	March, 1990
21.	<i>Sasthomkotta lake</i>	Kerala	3.73	August, 2002
22.	<i>Surinsar- Mansar lake</i>	Jammu & Kashmir	3.5	November, 2005
23.	<i>Tsomoriri</i>	Jammu & Kashmir	120	August, 2002
24.	<i>Upper Ganga River (Brijghat to Narora stretch)</i>	Uttar Pradesh	265.9	November, 2005
25.	<i>Vembanand- Kol Wetland</i>	Kerala	1512.5	August, 2002
26.	<i>Wular lake</i>	Jammu & Kashmir	189	March, 1990

or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters. India, with its varied topography, higher rainfall and diverse climatic regimes support and sustain diverse and unique wetland habitats. Natural wetlands in India comprises of the high altitude Himalayan lakes, followed by wetlands situated in the flood plains of the major river systems, saline and

temporary wetlands of the arid and semi arid regions, coastal wetlands such as lagoons, backwaters and estuaries, mangrove swamps, coral reefs, marine wetlands and so on .As per the latest inventory of Indian wetlands , the 'National Wetland Atlas' prepared by Space Application Centre(SAC), India has about 757.06 thousand wetlands with a total area of 15.3 million ha, out of which the inland wetlands cover 69% of the total area (SAC, 2011). These

wetlands, that provide numerous ecosystem goods and services, are under tremendous stress due to several natural and anthropogenic factors (Bassi *et al*, 2014). The Ramsar convention entered into force in India in 1982 and currently the country has 26 wetlands designated as Ramsar sites covering around 6,94,300 ha area ([www.ramsar.org](http://www.ramsar.org)). However, the country possesses myriads of wetlands which are important from biological and environmental point of view, but continued to be ignored and deprived of the policies and processes for bringing them under the embracement of the protection created by designating them as international Ramsar sites. Highest number of Ramsar sites in India are located in the state of Jammu & Kashmir (4 nos.) followed by Himachal Pradesh, Punjab and Kerala (3 nos. each) as shown in Table 1. Wetlands are biologically rich sensitive ecosystems that support unique aquatic flora and fauna. They play a vital role in sustaining freshwater fish biodiversity by providing shelter, feed, breeding ground and nursery to a large number of fish species. In addition, majority of these wetlands provide shelter for a good number of migratory bird species during winter creating scenic natural beauty that attracts nature lovers, researchers and other tourists. Wetlands are also hub for a large number of macrophytes used traditionally as food as well as medicines in Ayurvedic, Homeopathic and other alternative medicinal practices (Chakraborty and Jha, 2008). In addition to biodiversity conservation and production of food, these wetlands provide numerous ecological goods and services to the environment and the mankind.

## Recreation Based Ecotourism

Another area for venture is the hill streams and mountain lakes with rich sport fish species biodiversity that have potential for developing recreation based ecotourism. A good number of fish species of India are considered as sport fish for their interesting characteristics of catching bait or fly and give a fight for it. Angling or sport fishing is considered as one of the most suitable activity for recreation based eco-tourism as it has minimum adverse impact on the environment and also helps to revamp and restore the natural resources and its surroundings as well as develop secondary source of livelihood for the stakeholders in an eco friendly way.

Some of the sport fish species available in Indian waters are as follows:

*Chitala chitala*, *Raiamas bola*, *Neolissochilus hexagonolepis*, *N. hexastichus*, *Tor mosal*, *Tor putitora*, *Tor tor*, *Schizothorax progastus*, *S. richardsonii*, *Tor chelynooides*, *Labeo dero*, *Labeo dyocheilus*, *Bagarius bagarius*, *Glyptothorax pectinopterus*, *Pseudocheneis sulcatus*, *Wallago attu*, *Channa marulius*, *Channa striatus* etc.

Game and Sport Fishing, is one of the most fascinating outdoor physical activities which satisfies diverse tastes and pursuits of recreation of millions of tourists around the world. The developed countries of the world like USA, UK, Japan, Korea etc have millions of people having the hobby of angling and their numbers are increasing with each passing day. All the Western European countries as well as the countries like Japan, Korea have a very large number of sport fisherman, who move around the globe in pursuit of a good fishing sport spending millions of dollars making angling as one of the most lucrative tourism sector worldwide (Sehgal, 1987). Although the traditional angling practices for catching fish is viewed as a consumptive activity, the practice of catch and release that includes catching only for pleasure and experience and releasing again in the natural environment have lower impacts and therefore qualify as ecotourism (Weaver, 2001).

Although, the sport fishing based tourism is not yet well developed in India, there is vast potential to develop this sector as one of the economically viable and sustainable industry as the country possess vast potentialities for that. As per a survey of Indian-times.com, some of the best places for angling ecotourism in India are as follows:

1. Ramganga River, Corbett National Park
2. Pancheshwar, Mahakali River, Uttarakhand
3. Kosi River, Uttarakhand
4. Pabbar Valley Region, Himachal Pradesh.
5. Jia Bhorali River, Assam
6. River Kaveri, Karnataka (Coorg wildlife Association)



Fig. 2: An Angling camp in a hill stream site.

7. Hill Streams of Munnar and Elephant Lake, Kerala
8. Hill Streams and Lakes of Jammu and Kashmir
9. Havelock Island of Andaman for salt water fishing
10. Ranikor, Meghalaya
11. Lakshadweep
12. Tirthan valley, Himachal Pradesh

Without ignoring the poor status of over fished species, there exist many fish populations around the world that are healthy and can support small scale extraction in ways that will not diminish future population health. For the purposes of angling ecotourism, the emergence and widespread acceptance of catch-and-release recreational fishing has created an unprecedented opportunity. Advances

in angler's ethics also contribute to the potential sustainability of recreational fishing. The National Marine Fisheries Service Code of Angling Ethics, developed with the participation of both angling groups and conservationists, specifies limiting catch and size of the desired species and securing minimum harm to fish when releasing. With well planned management practices, recreational fishing ecotourism has a great potential to contribute positively to conservation and local development strategy by providing opportunities to enhance conservation activities and help in socio-economic development of local communities through alternative source for revenue generation.

The Golden Mahseer angling is the most fascinating sport fishing in India. It is comparable with Salmon of the west and said to be more thrilling than salmon in its strength and size, as stated by the



**Figure:** Local community catching fish using hook and line in cage installed in a reservoir

sport fishermen of the west. All along the foothills of the Himalayan river abounds this particular sport fish which is diminishing in its number and size, due to various natural and anthropogenic factors. Almost in the entire North Eastern Region most of the North bank rivers which flows southwardly viz. Tista, Sankus, Aie, Manas, Kamang (Jia Bhoreli), Subansiri, Siang, Dibang and Lohit and their tributaries forms some of the deep gorges and rapids which are the abode of the Golden Mahseer. The south bank rivers flowing northward to join the mighty Brahmaputra viz. Noa-Dihing, Tirap, Buri-Dihing, Dhansiri, Kopili, Kulshi and their tributaries, forming some meandering curves and deep pools with rocky bottoms, making excellent home for Mahseer population.

In Manipur, Thoubal - a beautiful rapid stream was found to have big shoals of Mahseer (*Wilson, 1873 and 1981*). In Nagaland, Dhansiri valley bordering Assam was a good fishing spot during early and late summer. However, the best Mahseer streams are in Assam-Arunachal foothills – the river Noa Dihing upto Assam border (record catch of 2008 was 14 kg), Lohit (recorded catch was 18kg in 2009) from Parshuram Kund to Sadiya in Assam are excellent fishing stretches. Kamlang river (catch record of 2009 was 16kg), Digarughat and stretch of Dibang before it forms Brahmaputra are well known for its Mahseer. The Siang river (2003 record was 22 kg at Boleng) is a

wonder river which forms the mighty Brahmaputra near the plains of Assam in Kabuchapori delta has innumerable Mahseer fishing records. Similarly, Subansiri, Jia Bhoreli, Poma (Buroi) and Manas have excellent Golden Mahseer fishing spots. However, some of these rivers are fast degrading and may become devoid of this magnificent fish in near future due to human interference and development work like hydroelectric projects, road and township building unless steps for conservation are not taken at the earliest. Meghalaya is the unique state in India where game fishing is a popular traditional activity, adopted mostly as a source of livelihood. Ranikor, Meghalaya is one of the most potential site for developing game fishing based ecotourism. The state is unique in developing and popularizing angling as revenue earning house hold activity in rural areas.

## Conclusion

The water resources suitable for recreational fisheries are mainly owned by the Ministry of Forest and Wildlife and Ministry of Water Resources/ Irrigation Departments. Therefore, for effective implementation of ecotourism in open waters, there is need to develop appropriate coordination and policy guidelines for utilization of the resources, livelihood security of the local people and biodiversity conservation. Fisheries management measure should include habitat protection, stock

enhancement, ranching etc. Policy and strategy formation at the regional as well as State level should be framed to develop sustainable eco-tourism without any adverse impact on the biodiversity and the natural resources. Strategies should be defined to promote recreational angling based eco-tourism in selected sites (*Mahanta and Tyagi, 2004*). Peoples' participation must be ensured in conservation of

aquatic biodiversity. Policy makers, administrators, scientists, students, nature lovers, NGOs should join hands in harnessing the potentiality of the aquatic biodiversity through ecotourism while protecting the environment and the resources. Need based infrastructure development, human resource development, capacity building and public awareness has to be done for sustainable fish biodiversity based eco-tourism.

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**1.6 billion people  
around the world  
depend on forests for  
their livelihoods**



**300–350 million people (half of whom are indigenous) live close to dense forests and depend almost entirely on forest biodiversity for subsistence**

**Hundreds of millions more depend on forest resources for food, construction materials, and energy**

