



# Biodiversity and Sustainable Tourism

U.P. STATE BIODIVERSITY BOARD



National Conference on  
**BIODIVERSITY  
AND  
SUSTAINABLE TOURISM**

*Souvenir*

**International Day For Biological Diversity**  
**22<sup>nd</sup> May, 2017**


*Organized by*

**UTTAR PRADESH STATE BIODIVERSITY BOARD**

East Wing, III Floor, A-Block, PICUP Bhawan, Vibhuti Khand

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Year : 2017

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*The views presented in the papers are of the authors and not of Editors or of The UPSBB.*





## Editorial

Biodiversity, at the level of species and ecosystems, provides an important foundation for many aspects of tourism. Recognition of the great importance to tourism economies of attractive landscapes and a rich biodiversity underpins the political and economic case for biodiversity conservation. Many issues addressed under the Convention on Biological Diversity directly affect the tourism sector. A well-managed tourist sector can contribute significantly to reducing threats to, and maintain or increase, key wildlife populations and biodiversity values through tourism revenue.

This theme has been chosen to coincide with the observance of 2017 as the International Year of Sustainable Tourism for Development as proclaimed by the United Nations General Assembly in its Resolution 70/193 and for which the United Nations World Tourism Organization is providing leadership.

Tourism relates to many of the 20 Aichi Biodiversity Targets. For some Targets (for example 5, 8, 9, 10 and 12) this is primarily about ensuring greater control and management to reduce damage to biodiversity from tourism. For others (1, 11, 15, 18, and 20) this is about pursuing the positive contribution of tourism to biodiversity awareness, protected areas, habitat restoration, community engagement, and resource mobilization.

A further dimension is the better integration of biodiversity and sustainability into development policies and business models that include tourism, thereby supporting Aichi Biodiversity Targets 2 and 4. Celebration of the IDB under the theme "*Biodiversity and Sustainable Tourism*".

Uttar Pradesh State Biodiversity Board, Lucknow celebrated the International Day for Biological Diversity (IBD-2017) on 22nd May, 2017 by organizing a conference on the theme "*Biodiversity and Sustainable Tourism*".

The aim of this conference was to provide an opportunity to raise awareness and action towards the important contribution of sustainable tourism both to economic growth and to the conservation and sustainable use of biodiversity. Hopefully, the discussions during the conference will bring out good approaches for *Biodiversity and Sustainable Tourism*.



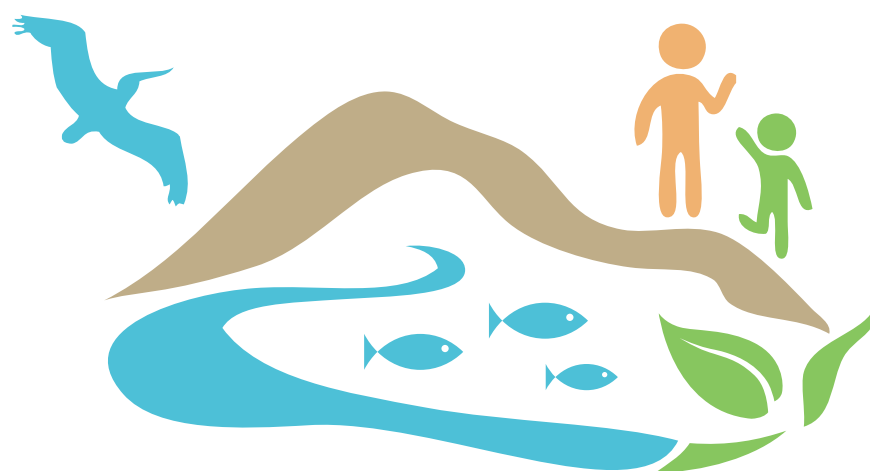
I wish to thank the National Biodiversity Authority for their financial help in organizing this conference. I would like to extend my sincere thanks to the Shri Sanjiv Saran, Chairman, U. P. State Biodiversity Board for his generous help and encouragement in organizing this conference. I am thankful to all the contributors of articles of this souvenir for sharing their ideas, work, research, experiences and pictures with us. I also thank the sponsors and contributors, who generously provided their support for the nation building cause.

The whole editorial board that has worked hard in bringing out this endeavor needs special appreciation. Dr. Somesh Gupta, Shri K. K. Tiwari and Shri Hemant Srivastava of Uttar Pradesh Biodiversity Board deserve special appreciation for their valuable help in bringing out the souvenir. I sincerely hope that you find this souvenir useful, engaging an enlightening reading experiences.

**– Editors**







22 MAY 2017

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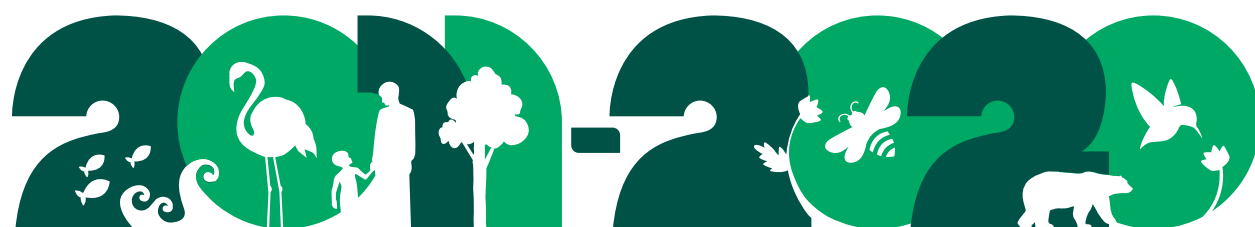
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**United Nations Decade on Biodiversity**

# Development of Ecotourism in Biodiversity Rich Religious Places of Chitrakoot

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## Introduction

Ecotourism is a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small scale alternative to standard commercial (mass) tourism. It means responsible travel to natural areas conserving the environment and improving the well-being of the local people. Its purpose may be to educate the traveler, to provide funds for ecological conservation to directly benefit the economic development and political empowerment of local communities, or to foster respect for different cultures and for human rights. Since the 1980s, ecotourism has been considered a critical endeavor by environmentalists, so that future generations may experience destinations relatively untouched by human intervention. Several university programs use this description as the working definition of ecotourism.

Generally, ecotourism deals with interaction with biotic components of the natural environments. Ecotourism focuses on socially responsible travel, personal growth, and environmental sustainability. Ecotourism typically involves travel to destinations where Flora Fauna and Cultural Heritage are the primary attractions. Ecotourism is intended to offer tourists an insight into the impact of human beings on the environment and to foster a greater appreciation of our natural habitats.

Chitrakoot means the 'Hill of many wonders' is indeed a gift of nature and the gods and located on the banks of river Paisuni (Mandikini) and falls in the northern Vindhyan range of mountains spread over the states of Uttar Pradesh and Madhya Pradesh. The Chitrakoot region is included in the District Chitrakoot of Uttar Pradesh and the District Satna of Madhya Pradesh. Chitrakoot Parvat Mala includes

Kamad Giri, Hanumaan Dhara, Lakshman Pahari, and Devangana are famous Religious Mountains. It is a town of religious, cultural, historical and archaeological importance, situated in the Bundelkhand region. The major part of Chitrakoot is situated in the northern region of Satna district of Madhya Pradesh and surrounded on north, northwest and northeast by Karwi (Chitrakoot) district of Uttar Pradesh and west by Panna District of Madhya Pradesh. It lies between 80° 52' to 80° 73' N latitude and 25° 10' to 25° 52' E longitude, covering an area of 1584 sq km. The general topography is hilly, precipitation and undulating cut off by numerous rivers and rivulets. Mandakini, Chakara and Jhuri rivers drain the region.

The Mandakini (a offshoots of the Ganga) is Holy River that is also known as Payasuni. The forest of the Chitrakoot predominantly consists of tropical dry mixed deciduous type. The climate of the Chitrakoot is dry and the maximum temperature goes up to 49-50°C in the month of May and minimum up to 5°C in the month of January. Chitrakoot is a one of the famous place of pilgrimage of Hindus in India and surrounded by lush green hills of legendary Vindhya range. Since times immemorial, it is famous for its religious importance, elegant environment and spiritual peace. Chitrakoot is also well known for its beautiful hill ranges, historical caves, perennial streams and varied flora and fauna regarded as tourist cum religious place. Therefore, the Chitrakoot has been sacred place of worship for sages and hermits since antiquity. Chitrakoot's spiritual legacy stretches back to legendary ages. It was in these deep forests that Rama, Sita and his brother Lakshmana spent eleven and half years of their fourteen years of exile. The great sage Atri, Sati Anusuya, Dattatreya, Maharshi Markandeya, Sarbhanga, Sutikshna and various other sages, seers, devotees and thinkers meditated; and here the principal trinity of the Hindu pantheon, Brahma, Vishnu and Shiva, took their incarnations.

It has been the centre of devotion, dedication and faith of devout persons of Lord Rama. Lord Rama, the most dignified and the best among the men, excels as an ideal role model in every respect and remains a

timeless source of inspiration for mankind since an eon.

The first known mention of the place is in the Valmiki Ramayana, which is believed to be the first ever Mahakavya (epic) composed by the first ever poet. As Valmiki is said to be contemporaneous with (or even earlier than) Rama and is believed to have composed the Ramayana before the birth of Rama, the antiquity of its fame can well be gauged.

Valmiki speaks of Chitrakoot as an eminently holy place inhabited by the great sages, abounding in monkeys, bears and various other kinds of fauna and flora. Both the sages Bharadwaja and Valmiki speak of Chitrakoot in glowing terms and advise Rama to make it his abode during the period of his exile. Lord Rama himself admits this bewitching impact of this place. In the 'Ramopakhyana' and descriptions of holy places at various places in the Mahabharata, Chitrakoot finds a favoured place. In 'Adhyatma Ramayana' and 'Brihat Ramayana' testify to the throbbing spiritually and natural beauty of Chitrakoot. Various Sanskrit and Hindi poets also have paid similar tributes to Chitrakoot. Mahakavi Kalidas has described this place beautifully in his epic 'Raghuvansha'. He was so much impressed with its charms that he made Chitrakoot (which he calls Ramgiri because of its time-honoured associations with lord Rama) the place of exile of his yaksha in Meghdoot.

Tulsidas, the saint-poet of Hindi has spoken very reverently of this place in all his major works-Ramcharit Manas, Kavitawali, Dohawali and Vinaya Patrika. The last-mentioned work contains many verses which show a deep personal bond between Tulsidas and Chitrakoot. He spent quite some part of his life here worshipping Rama and craving his darshan. It was here that he had what he must have considered the crowning moment of his achievements i.e. the darshan of his beloved deity Lord Ram at the intercession of Hanumanji. His eminent friend, the noted Hindi poet Rahim (i.e. Abdur Rahim Khankhana, the soldier-statesmen-saint-scholar-poet who was among the Nav-Ratnas of Akbar) also spent some time here, when he had fallen from favour

with Akbar's son Emperor Jahangir. Kamadgiri, the original Chitrakoot, is a place of prime religious significance. A forested hill, it is skirted all along its base by a chain of temples and is venerated today as the holy embodiment of Rama. Lord Rama is also known as Kamadnathji which literally means fulfiller of all wishes. The Kamadgiri (Chitrakoot hill) is a sacred grove, it is clearly mentioned in Ramcharit Manas as — all the forests of Gods existing in the universe were filled with envy at the sight of Rama's hill forest. This holy place has provided spiritual inspiration and energy to many sages and dignitaries and changed their attitude of life like Maharishi Valmiki, Goswami Tulsidas, Abdul Raheem Khankhana, Tansen and even Aurangzeb etc.

## Biodiversity in Ancient Literature

In ancient time, Chitrakoot was very rich in biodiversity. Maharishi Valmiki and Goswami Tulsidas illustrated a comprehensive account of biodiversity in their epics Ramayana and Ramcharit Manas respectively. According to Valmiki Ramayana, Chitrakoot is a beautiful and sacred place where different types of herbs, shrubs, trees and climbers bearing variety of fruits, flowers and roots are available. The richness of biodiversity of Chitrakoot is described in four chapters of Ramayana. Names of several trees found on Kamadgiri are also mentioned. He has also described varied fauna of Chitrakoot. He has mentioned the names of different variety of birds, animals and movements of elephants and deers in the forests. Goswami Tulsidas has also described similarly the beauty and diversity of flora and fauna of Chitrakoot in Ramcharit Manas — Chitrakoot hill has luxuriant vegetation of herbs, shrubs, trees and climbers. He has also mentioned the names of different variety of birds like blue jays, koels, parrots, cuckoos, kakavas, partridges, and animals like elephants, lions, monkeys, boars and deer's etc. Chitrakoot was very rich in respect of medicinal plants too. It is mentioned in Valmiki Ramayana that “Thousands of herbs of this Chitrakoot Mountain, glittering with their lovely light, are sparkling like points of fire”.

## Present Biodiversity of Chitrakoot

### A. Floral Diversity

The Chitrakoot forest survey was carried out by the author during the year 2007 and it is found that there are over 745 species of flowering plants excluding cultivated and ornamental plants found in Chitrakoot (Sikarwar, 2014). These 745 species belong to 473 genera and 118 families. The dicots represent 93 families, 362 genera and 575 species and monocots represent 25 families, 111 genera and 170 species (Table-1).

**Table-1 Distribution of family, Genera and species.**

Taxa	Dicots	Monocots	Total
Families	93	25	118
Genera	362	111	473
Species	575	170	745

The life form analysis shows that out of 745 species, trees are 119, shrubs are 73, climbers are 77 and herbs are 474 (Fig.1).

The flower colour analysis reveals that out of 743 species, 212 plants have yellow flowers, 234 have white flowers, 65 have purple flowers, 43 have blue flowers, 39 have pink flowers, 31 have red flowers, 6 have orange flowers, 91 green flowers and one has black flower (Fig.2).

The analyses of families show that, the 10 dominant families having maximum number of species of Chitrakoot region are Fabaceae (79), Poaceae (74), Asteraceae (45), Euphorbiaceae (32), Cyperaceae (28), Acanthaceae (26), Convolvulaceae (24), Scrophulariaceae (20), Malvaceae (19), Mimosaceae and Cucurbitaceae (16 each) (Fig.3).

Besides, Rubiaceae & Lamiaceae have 15 species each, Tiliaceae & Celastraceae have 14 species each, Asclepiadaceae have 13, Moraceae have 12, Solanaceae & Amaranthaceae have 11 each, Boraginaceae and Verbenaceae have 10 each, Commelinaceae have 9, Apocynaceae have 8,



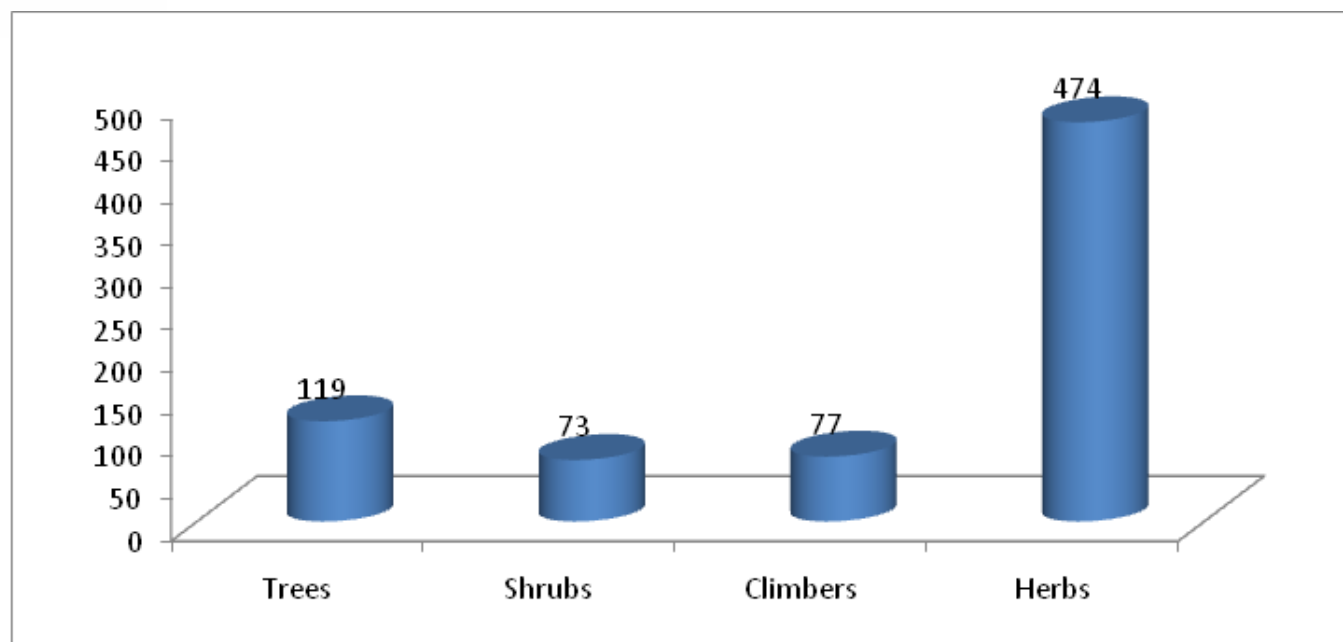


Fig.1 : Life form analysis of the plants

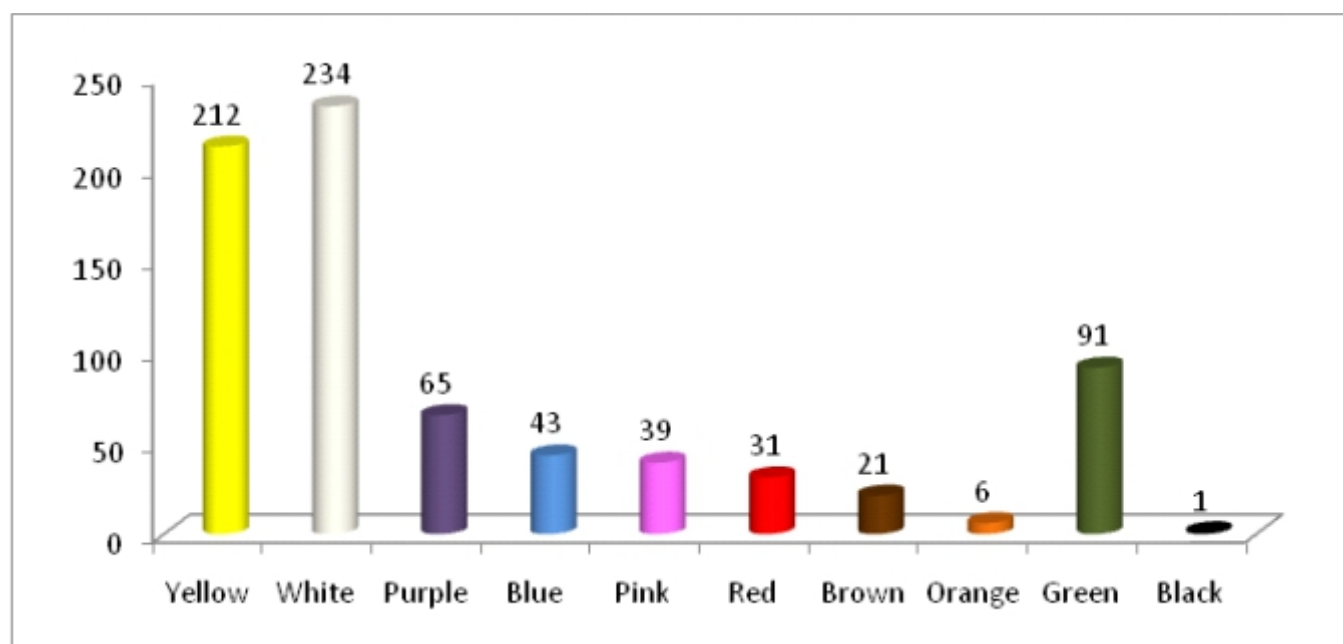


Fig. 2 : Flowers colour analysis of the plants

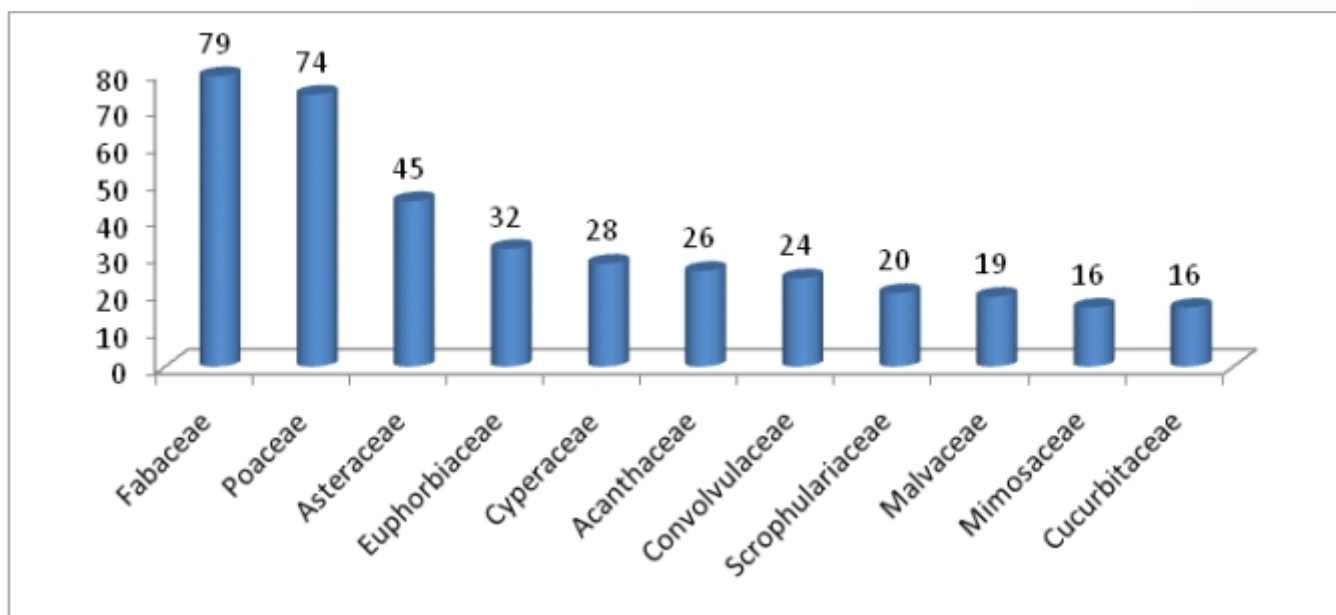


Fig. 3 : 10 dominant families of the area

Liliaceae & Araceae 7 each, Rhamnaceae, Vitaceae, Combretaceae, Gentianaceae & Orchidaceae have 6 each; Menispermaceae, Sterculiaceae, Lythraceae & Dioscoreaceae have 5 each; Oxalidaceae, Rutaceae, Celastraceae, Anacardiaceae, Onagraceae, Campanulaceae, Polygonaceae and Gingiberaceae have 4 each. Apart from this 16 families have 3 species each, 18 have 2 species each and 42 families have 1 species each.

The Generic analysis show that Indigofera L. and Ipomoea L. are the dominant genus having 11 each, followed by Ficus L. & Cyperus L. have 10 each, Euphorbia L. have 9, Crotalaria L. 7, Corchorus L., Grewia L., Alysicarpus Desv., Senna Mill., Blumea DC., Justicia L., Phyllanthus L. & Fimbristylis Vahl have 6 species each; Sida L., Ziziphus Mill., Desmodium Desv., Acacia Mill., Dioscorea L., Commelina L. & Eragrostis Wolf have 5 species each; Butea Koenig ex Roxb., Tephrosia Pers., Terminalia L., Ludwigia L., Hedyotis L., Solanum L. and Kyllinga Rottb. have 4 species each. Besides 25 genera have 3 species each, 80 have 2 species each and remaining 339 genera representing single species each.

## B. Faunal Diversity

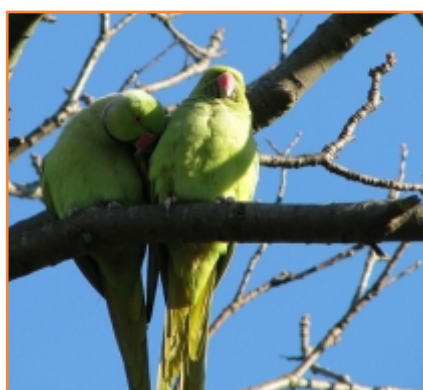
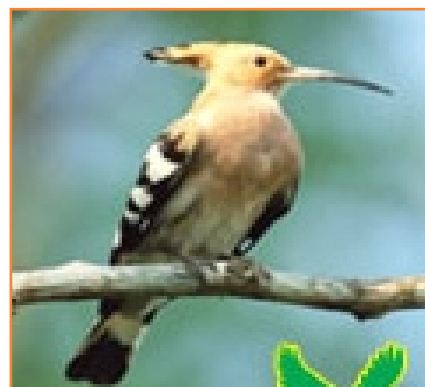
A large number of wild animals are found in Chitrakoot forests such as Tiger (*Felis tigris*), Panther (*Panthera pardus*), Spotted deer (*Cervus axis*), Indian gazelle (*Gazella benentii*), Deer (*Axis axis*), Sambhar (*Cervus unicolor*), Antelope (*Cervus duvoursali*), Hyaena (*Hyaena striata*), Jackal (*Canis aureus*) Fox (*Vulpus vulpus*), Hare (*Herpestis auropunctatus*), Sloth Bear (*Melursus ursinus*), Wild pig (*Sus scrofa*), Blue Bull (*Boselaphus tragocamelus*), Porcupine (*Hystrix indica*) Black faced Monkey (*Presbytis entellus*) Red faced Monkey (*Macaca mulatta*), Indian mongoose (*Herpestis auropunctatus*) and Squirrel (*Scillrus palmarium*) etc.

## Amphibians and Reptiles

Common frog (*Rana tigrina*), Toad (*Bufo melanostictus*), Tree frog (*Hyla hyla*), Common Karait (*Bungarus caeruleus*), Common earth snake (*Eryx johnii*), Garden lizard (*Calotes versicolor*), Monitor lizard (*Varanua monitor*), Land tortoise (*Testudo elegans*), Cobra (*Naja naja*), Common pond snake (*Tropidonotus piscator*) and Common green tree snake (*Dryophis*) etc.



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## Birds

Peacock (*Pavo cristatus*), Koel (*Eudynamus scolopacea*), Redvented Bulbul (*Pycynotus cafer*), Common Myana (*Acridotheres tristis*), Owl (*Bubo bubu*), Pandubbi (*Podiceps ruicollis*), Crow Cattle egret (*Bubulacus ibis*), Cotton teal (*Nettapus coromandelianus*), Grey quail (*Coturnix coturnix*), Pigeon (*Columba livia*), House Sparrow (*Passer domesticus*), Neelkanth (*Coriacias benghalensis*), Crow (*Corvus splendens*), Papiha (*Clamator jacabinus*), Parrot (*Psittacula krameri*), Crane (*Grus antigone*), (*Upupa epops*) Kingfisher (*Alcedo atthis*), Titihari (*Vanellus indicus*), Weaver bird (*Ploceus philippinus*) etc.

## Fishes

The most commonly found fishes are Katla, Rohu, Saur, Chitra, Margal and Kalbasu etc.

## Religious Places

The religious places which are rich in biodiversity can be developed as tourist places for more attraction of pilgrimage.

## Kamadgiri Hill

Kamadgiri is the main hill which has highest peak in Chitrakoot region and covering an area of 5 sq. km. According to Ramayana Lord Ram, Sita and Lakshman resided on this hill during 14 year of exile. The foot prints of Lord Ram and Bharat are still marked on the stones. The pilgrims perform parikrama of this entire hill without shoes with devotion, dedication and faith to Lord Ram. The Kamadgiri hill is a sacred grove, as clearly mentioned in ShriRamcharitmanas as “all the forest of Gods



existing in this universe were filled with envy at the sight of Rama's hill forest. The Kamadgiri hill is also called Ramgiri and has also been residing place of Yaksha (ademi God) of Kalidas's Meghdoot. The Yaksha sent a message through Megh (Cloud) to his beloved wife who was living at Alkapuri and Alkapuri was situated near Himalaya. Kuber (The God of Wealth and King of Alkapuri) expatriated Yaksha who was a servant of Kuber and not being regular to his duty. The richness of Kamadgiri hill has been described by Adikavi Valmiki in Ramayana. The name of 27 tree species has been described by Adikavi Valmiki. Out of which 14 species has been lost.

## Mandakini River

Mandakini is a holy river of Hindus and considered an offshoot of Ganga. It is also called Paisuni in *Shriramcharitmanas* originates from Sati Ansuiya ashram and flows from amid hills, rocks and the deep forests. The either side of the bank is very beautiful. Sadhus and mahatmas made their huts along the banks. The floral, faunal and avian biodiversity richness and beautifulness of Mandakini River have been described comprehensively in *Valmiki Ramayana*. Concrete banks have been prepared on both side and thousands of tourists have holy bath.

## Sphatic Shila

It is also one of the holy places of Chitrakoot. There is a big rock of white marble situated on the bank of River Mandakini. According to Ramayana



Lord Ram and Sita used to take rest on this rock during wandering in the forests. Once, Lord Ram was sitting with Sita on the rock. Ram plucked wild flowers, made ornaments of these flowers and garlanded Sita. Jayant, the son of Indra came here in the form of crow and attacked on Sita in her feet. Lord Ram gave an appropriate punishment to the Jayant for his misbehavior.

### Ansuiya Ashram

It is very beautiful and legendary place situated 10 km away from Chitrakoot in amid forests. It was a place of penance of hermitage sage Atri and his wife



sati Ansuiyaji. It is situated on the river Mandakini. Ansuiya ji practiced severe penance for thousand years, and by virtue of the religious merit that she had thus acquired, she created the river mandakini. Lord Ram, Lakshman, and Sita visited this place and the Sati Ansuiya gave the advice to Sita about chastity and virtuous duty of women.

### Gupt Godawari

It is 20 km away from Chitrakoot towards south. It is also a very beautiful place of Chitrakoot. There are two naturally made beautiful caves are existing in the Thar Pahad. According to Ramayana, these caves were constructed by deities for summer residence of Lord Ram. According to Hindu mythology, the latent water current of the river Godawari was appeared and flown to the service of Lord Ram. This water current are still flowing in the caves but disappear outside. Thousands of tourists visit this place daily.



### Hanuman Dhara

This place is situated in Mandakini hill range. It is 4 km away from Ramghat. There are about 300 stairs have to ascend to see this place. It is believed that, when Mahaveer Hanuman afflicted with warmth heat after combustion of Lanka, Lord Ram told to Hanuman, you go to Chitrakoot where cold water



current will fall upon your body, then you will get rid off from this warmth heat. It can be seen even today. The cold water current is still flowing on the left arm of the statue of Mahaveer Hanuman. The Panchmukhi Hanumanji is also situated near this place. Thousands of tourists/pilgrims visit this place. The place is very beautiful and rich in biodiversity. The four lane road has been constructed and rope way is being constructed by the government of Madhya Pradesh to attract the tourists.



## Janaki Kund

Janakikund is a place bathing of Mata Janaki in Mandakini River. The foot prints of Mata Sita are also visible.



Other most beautiful and biodiversity rich places found in and around Chitrakoot region, but due to the lack of proper road connectivity and heavily infestation by the dacoit problems, these places are not properly developed. While development of these places by the both states governments (M.P. & U.P.), earn krores of money per year through providing security facility to the pilgrimage. These places are-

## Dharkundi

This place is 60 km away from Chitrakoot and situated between the dense forests of Uttar Pradesh region. This is one of the most beautiful places of



Uttar Pradesh region. It can be developed as ecotourism place. One Ashram is there.

## Sarbhanga Ashram

This is also situated in amid forests. Sarbhanga muni performed penance here and Lorm Ram visited this place. The temple of Sarbhanga muni is there and perennial stream is still flowing in this Ashram. This region is rich in floral and faunal diversity.

## Sutikshana Ashram

5 km away from Sarbhanga ashram, a Sutikshana ashram is situated. Lorm Ram visited this place also.

## Mordhwaj

Mordhwaj is situated on Thar Pahad hill and 15 km away from Chitrakoot. There are 200 stairs have to ascend to see this place. Rooms (Madhis) have been made thousand years ago by cutting of hill rocks. Perennial stream is flowing. This place is very rich in biodiversity. Very beautiful place of Chitrakoot but now has become the adda of lawless elements.

## Ramsaiya

Ramsaiya is a big rock on which Lord Ram used to sleep. Marks of sleeping of Lord Ram and Sita are still marked.

## Pampapur

Pampapur is situated in Devangana Valley which is a most beautiful lush green valley of Chitrakoot falls in U.P. It is mentioned that Lord Ram gave Darshan to the wife of Jayant, the putrabadhu of Indra.

## Madpha

Madpha is about 25 km away from Chitrakoot. This is a penance place of Mandav rishi situated in Uttar Pradesh on a peak of hill in dense forests. An ancient Shiva temple still exists.

## Banke Siddh

Banke Siddh is also a very beautiful place and situated in a hill. Hanumanji temple is exists. Perennial stream is flowing. This place is also rich in biodiversity.



### Devangana Ghati

This is a valley of hills and very beautiful and dense forested. It is said that Lord Ram gave darshan to the apsaras here.

### Sabri Pripat

This place is 25 km away from Chitrakoot situated near Barua village. This is a beautiful natural fall of water of Payashwini River. It can be developed as

tourist place. Scenic beauty of this place is marvelous and rich in biodiversity and home of rare and endangered plants.

### Acknowledgement

The author is thankful to the Organizing Secretary of Deendayal Research Institute, Chitrakoot for their manifold help.

### References

Sikarwar, R.L.S. 2014. Angiosperm Diversity Assessment of Chitrakoot- The Legendary Place of Vindhyan Range, India. J. Econ. Tax. Bot. 3-4(563-619).

# Sustainable Marine Recreational Tourism in Andaman and Nicobar Islands

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## Introduction

Marine recreational tourism has become increasingly popular among the coastal countries in recent years. It is primarily associated with beaches and the sea and there have been adverse impacts from tourism on the marine and coastal environment (van't Hof, 2001). While marine recreational tourism enjoys a continued growth worldwide, concern exists that it is contributing to the degradation of the marine biodiversity as well, both biologically and aesthetically. Marine recreational tourism has both direct and indirect impacts on the coral reefs and reef associated biota. Activities with direct impacts are snorkelling, SCUBA and boating, which can cause direct physical damage to the reefs. Damage inflicted by snorkelers and SCUBA divers are one of a number of factors coral reef decline (Wielgus *et al.*, 2004). SCUBA diving and snorkeling may result in the deterioration of benthic communities, because divers can easily damage marine organisms through physical contact with their hands, body, equipment, and fins (Fig. 1). Fishing and collecting can contribute to overexploitation of reef species and threat to the survival of endangered species and regional endemics. Indirect impacts relate to the development, construction and operation of tourism infrastructure as a whole. In this era of rapid multi-scale economic, environmental and social change, the continuation of any given tourism phenomenon into the long-term future should not be taken for granted (Hillmer-Pegram, 2013). Further, it is a well established fact that excessive, unregulated marine recreational tourism can have negative impacts on coral reefs including pollution, direct contact of tourists, anchor damage and sedimentation from coastal erosion and over-development. Despite all these adverse impacts, marine recreational tourism





Fig. 1. Physical contact with marine organisms (1)

represents both a motivation and source of resources for its conservation (Diedrich, 2006).

## Marine Recreational Tourism in Andaman and Nicobar Islands

Andaman and Nicobar Islands holds a significant position in marine recreational tourism among the coastal states of India, attracting a huge influx of tourists from all over the world. The major attractions for the tourists include serene beaches with a vast expanse of coral reefs and splendid marine biota. According to the recent estimates of the **Directorate of Economics and Statistics (2016)**, a total of 3,25,818 tourists including 12,553 foreigners visited these Islands during 2015-16. The marine tourism industry in Andaman and Nicobar Islands comprise of water sports, glass bottom boat cruises, mangrove kayaking, SCUBA diving and snorkeling. The growth of marine recreational tourism in Andaman and Nicobar Islands has resulted in a paradigm shift of dependence on fishing to tourism. It offers numerous socio-economic benefits viz., increased revenue and employment. Therefore, sustaining tourism is inevitable in sustaining the economy of the state.

According to the Directorate of Economics and Statistics (2016), the number of tourists visited the Islands has been increased from 1,95,396 during 2010-11 to about 3,25,818 during 2015-16. This marked increase in the influx of visitors necessitates the need to design regionally feasible strategies in regularizing the marine tourism and in mitigating the adverse impacts in the future. It is pertinent to note that natural threats have been given focused attention and perhaps, the impacts of tourism have been seemingly overlooked over the years. Working on sustainable marine recreational tourism in these Islands, both at the policy and practice levels is imperative as continued unregulated marine recreational tourism may lead to the reef degradation (Woodland and Hooper, 1977; Kay and Liddle, 1986; Tilmant, 1987; Hawkins and Roberts, 1992, 1993).

## Research Gaps

Reports dealing with sustainable marine recreational tourism are scant except for a detailed

study from Goa (Sanjeev et al., 2016), and no study was found that explicitly addresses threats of unregulated marine recreational tourism in the Islands. Insightful examinations of the impacts of the marine recreational tourism are essential to manage the dive tourism sustainably. Further there is a very little enforcement of existing regulations. The Andaman and Nicobar Administration is focusing on the following issues viz., (i) promotion of high value low volume eco-friendly and environmentally sustainable tourism, (ii) undertaking tourism activities, which are not harmful to the ecosystem, (iii) to implement the master plan proposed by UNDP/WTO report for sustainable development of tourism in Andaman (iv) playing the role of facilitator and encouraging private sector investment in development of tourism infrastructure (v) gradual privatization of management of exiting tourism infrastructure (vi) development of new tourism activities/products (vii) marketing A & N Islands as tourist destination at national and international level. The specific research gaps in the Andaman and Nicobar Islands are as follows:

Though there are 36 beaches in the islands, marine recreational tourism is restricted to few beaches (for example, North Bay, Havelock and Neil). This leads to overcrowding of the tourism activities at few sites resulting in increased anthropogenic pressure.

Knowledge of the rare species and regional endemics among the stakeholders/tourism agents is very little. The marine fauna in the Islands has mainly been recognized for their direct use values by the rural population. This erroneous understanding has made it easier to exploit the marine fauna, undervaluing the ecological services they provide. This is strongly supplemented by the fact that many scheduled species viz., dugongs and turtles continued to be slaughtered in the islands where there is no surveillance, which could be attributed to lack of awareness amongst stakeholders and absence of strong policies to regulate marine tourism. The significance of people's participation and the



role of citizen scientists are not realized in assessing the marine biodiversity. Another important issue to be addressed is the lack of a formal management system ensuring equitable use of the marine resources. Moreover, human being tends to remain unconcerned with an environment even if it degrades around them.

## Recommendations

A comprehensive study needs to be conducted for developing a baseline data in respect of the exact species composition and the impacts of tourism on them. This shall aid in developing species-specific conservation strategies. Further, knowledge on the ecological status of the reef ecosystems at the popular dive sites is sparse and scattered, which could be damaging.

Implementation of an environment-friendly marine recreational tourism needs to be done based on regionally-feasible guidelines. Development and implementation of an effective capacity building program for all stakeholders involved in marine recreational tourism to sensitize them on good practices for sustainable marine tourism. The local communities should be sensitized through technical training and initial financial support and encouraged in establishing ecotourism ventures. This will help them in deriving economic benefits from tourism while at the same time serve as responsible stewards of local biodiversity.

Mooring buoys should be installed in coral reefs and other sensitive zones which shall reduce the anchor breakage of the coral reefs. Further, as mentioned earlier, overcrowding shall be avoided by identifying more number of dive sites and classifying the tourists to two categories viz., swimmers and non-swimmers. Non-swimmers shall be taken to the sites where there is comparatively lesser biodiversity of branching corals to reduce the direct damage to the fragile coral reefs. Further, potential recreational and scuba divers should be identified and key species/endemics monitoring should be initiated. The methodology detailed by *Lorenzo et al.* (2011) in

conserving the emblematic Mediterranean red coral in Italy shall be adopted for effective conservation of rare and keystone species. The use of threatened endemic species as flagship species to instill public awareness of their economic and ecological values as well as to harness support for conservation from tourists has been effective in promoting both in-situ and *ex-situ* conservation measures (Catibog-Sinha, 2010).

## Conclusion

To reduce the rate of biodiversity is not impossible to achieve, provided pragmatic strategies built on community needs and on a much broader interpretation of biodiversity conservation (Catibog-Sinha, 2010). Alternative sustainable tourism livelihoods are being introduced to generate support for conservation and minimize dependence on natural resources. It is evident that local communities who benefit from tourism will protect the same resources for their sustenance. Tourism and the environment are closely interconnected and planning an environment-friendly perspective tourism is highly imperative (Inskeep, 1987, Sanjeev et al., 2016) and this has been recognized throughout the world (Cohen, 1978). Sustainable tourism is not only important for scientific purposes and conservation, but also for the long-term protection of investments that go into tourism infrastructure, attractions and facilities (Inskeep, 1987). Over recent years, considerable knowledge has been acquired about the implications tourism and development may have on the environment, and some studies have included analyses of consequences that have occurred from mismanagement and lack of effective planning (Dasman et al., 1973; Wall & Wright, 1977). The best of tourism is one, which encourages environmental conservation and awareness; this is because, natural environmental features are often, if not always, the reasons for tourists to visit an area, and these natural features must be conserved in order to develop and maintain a successful tourism industry (Sanjeev et al. 2016). This includes solid support and participation from the local community and other stake holders,

strict implementation and enforcement of relevant legal measures, community education about the marine biodiversity and its utility, community participation in mangrove regeneration and dissemination of knowledge amongst stakeholders.

The success lies in basic understanding that an environment-friendly tourism is the source of significant and tangible socio-economic benefits to the Islands.

## References

- Catibog-Sinha, C. (2010). Biodiversity conservation and sustainable tourism: Philippine initiatives, *Journal of Heritage Tourism*, 5:4, 297-309, doi:10.1080/1743873X.2010.517841.
- Cohen, E. (1978). The impact of tourism on the physical environment. *Annals of Tourism Research*. 5: 215 – 237.
- Dasman, R.F., Milton, J.P., Freeman, P.H. (1973). *Ecological principals for economic development*. New York: John Wiley & Sons.
- Directorate of Economics and Statistics (2016). Andaman and Nicobar Administration. Andaman and Nicobar Islands.
- Hawkins, J.P. and Roberts, C.M. (1992). Effects of recreational SCUBA diving on fore-reef
- Hawkins, J.P. and Roberts, C.M. (1993). Effects of recreational SCUBA diving on fore-reef slope communities of coral reefs. *Biological Conservation*, 62(3):171-178.
- Hillmer-Pegram, K.C. (2013). Understanding the resilience of dive tourism to complex change. *Tourism Geographies*, <http://dx.doi.org/10.1080/14616688.2013.851268>.
- Inskeep, E. (1987). Environmental planning for tourism. *Annals of Tourism Research*. 14: 118-135.
- Kay, A.M. and Liddle, M.J. (1986). The impact of reef walking at Hardy Reef. GBRMPA report status.
- Lorenzo B., Ilaria, V., Sergio, R., Stefano, S. and Giovanna, S. (2011). Involvement of recreational scuba divers in emblematic species monitoring: The case of Mediterranean red coral (*Corallium rubrum*). *Journal for Nature Conservation* 19: 312–318
- Sanjeev, S., Jamalabad, A., Mitra, P., D'Cruz, G., Rao, M., Sutaria, D. (2016). Promoting Sustainable Marine Tourism in Goa. *World Wide Fund for Nature*, New Delhi, p53.
- Timant, J.T. (1987). Impact of recreational activities on coral reefs. In Salvat B (ed) *Human impacts on coral reefs: Facts and recommendations*. Antenne Museum E.P.H.E., French Polynesia, pp.195-214.
- van't Hof, T. (2001). *Tourism impacts on coral reefs: increasing awareness in the tourism sector*, UNEP.
- Wall, G., Wright, C. (1977). *The environmental impact of outdoor recreation*. Publication No. 11. Waterloo: University of Waterloo: Department of Geography.
- Wielgus, J., Nanette, E., Chadwick-Furman, Z.v.y. and Dubinsky. (2004). Coral cover and partial mortality on anthropogenically impacted coral reefs at Eilat, northern Red Sea. *Marine Pollution Bulletin*, 48:248-253.
- Woodland, D.J. and Hooper, J.N.A. (1977). The effect of human trampling on coral reefs. *Biological Conservation*, 11:1-4.

## Aichi Targets



Understand values



Mainstream biodiversity



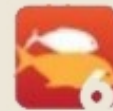
Address incentives



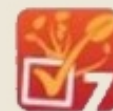
Sustainable production



Halve rate of loss



Sustainable fisheries



Manage within limits



Reduce pollution



Reduce invasive spp.



Minimize reef loss



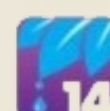
Protected areas



Prevent extinctions



Conserve gene pool



Restore ecosystems



Enhance resilience



Implement Nagoya Prot.



Revise NBSAPs



Respect and conserve TK



Improve knowledge



Mobilize resources

# Aquatic Biodiversity and Sustainable Eco-tourism: Opportunities, Impacts and Interventions

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## Introduction

Biodiversity, the variety of life on Earth, provides us with a wealth of natural resources that are extremely important for the tourism sector. Biodiversity underpins places of beauty that are so often popular tourist destinations, such as tropical forests, coast beaches and national parks, thus re-enforcing the notion that a healthy natural environment is one of the world's most important tourism attractions. Visiting nature also serves to heighten awareness of its intrinsic value for us all. Knowing and experiencing nature makes us happier, healthier and raises understanding of the importance of nature and biodiversity.

Ecosystems provide services essential to humanity, which in short can be described as supporting life, supplying materials and energy, and absorbing waste products (*Daily, 1997*). Species richness generally increases with decreasing latitude. Due to this biogeographical phenomenon, the overwhelming majority of species are located in developing countries (DCs) (*WCMC, 1992*). DCs often face problems like rapid population growth, workforce-pressure, lack of capital and foreign debts, which lead to over-exploitation of wild living resources, expansion of agriculture, forestry and aquaculture, and—with mounting pressure on the remaining habitats—to loss of biodiversity (*Burgess, 1993; Vorlauffer, 1996*). Today, human activities have contributed to an increase in species extinction, which has made the implementation of safeguarding strategies an imperative issue (*Ehrlich and Ehrlich, 1981; Wilson, 1985; Lawton and May, 1995*).

The tourism industry represents one of the main sectors in the global economy, often referred to as the world's largest single industry. Harnessing the



opportunities and dealing with the challenges of the largest ongoing migration of people in history is of utmost importance, and is particularly significant for developing countries. Ecotourism, one of the fastest growing sectors of tourism worldwide, is fast gaining the attention of developed and developing countries as a potential means to conserve natural resources and support sustainable economic progress. Particularly in areas with stagnant economies, ecotourism is being looked to as a promising means to protect wildlife and ecosystems, to maintain rural aesthetic character, to provide economic alternatives to resource extraction activities, and to gain income for local communities. Ecotourism with an ecological conscience involves visiting fragile, pristine, and relatively untouched natural areas, with the intention to support conservation efforts. One observes the flora and fauna in their natural environment and cause as little impact as possible. It is often done on a small scale and is a great alternative to the mainstream commercial tourism.

Fisheries-related tourism is developing in several countries as a product that, by linking fisheries to tourism, can be an answer both to the need to develop innovative tourism products and to the priority to find new sources of income for profitable and more sustainable fisheries. Uttar Pradesh is the fourth largest state in India with an approximate area of 2,40,928 sqkm. It is also the most populous state in the country with a population of 199.5 million (2011). Uttar Pradesh is one of the most favoured state for tourists in India with a consistent ranking amongst the top states in terms of tourist arrivals. In 2014 it was ranked 2nd in terms of total tourist arrivals, 2nd in terms of domestic tourist arrivals and 3rd in terms of foreign tourist arrivals amongst Indian states. The Tourism industry in Uttar Pradesh has a significant contribution to the state's economic growth. The contribution of tourism to employment generation both direct and indirect is of immense importance to the state. Tourism includes ecotourism which also includes fisheries; the meeting point could majorly make fishery an element of tourist attraction. Fishery is not concerned with capturing or culturing fish for human consumption only there are other areas of

human satisfaction that could be aroused. However, there is scope to utilize the resources by linking ecotourism with aquatic biodiversity through systematic involving different stakeholders in a sustainable manner.

## Elements involved in eco-tourism development

Ecotourism supposes carrying out the tourism activities in an environment with landscapes unaltered by pollution and at the same time reassuring. It represents a model of sustainable exploitation of the tourism resource, due to the minimizing of the negative effects on the environment.

The first elements involved in the ecotourism development, the respect for *the ecosystem integrity*, aims at emphasizing the importance of the environment in supporting tourism, maintaining the level of development at a small scale under the control and under the local management, using a specific local development, the compatibility of the development plan with the environment, using materials, know-how and local working force, using facilities and equipments which conserve the energy, practicing the recycling, capitalization and national use of resources, preserving vegetation, reducing the deforestations, using alternative, sustainable technologies.

*Local participation*, the second important element for developing ecotourism, aims at promoting the local participation as much as possible, creating opportunities for the host population, the transfer of property to the local community and its administration, creating opportunities for the group projects and local population as regards the control and administration of natural valuable resources, stipulating some alternative local measures, promoting the socio-cultural "pride" through the organization of programs by the local community, complying with the local ideology and inheritance, stipulating opportunities for the interaction between the local population and visitors. Regarding the third element involved in developing ecotourism, respectively *economic opportunities for the local community*, they refer to

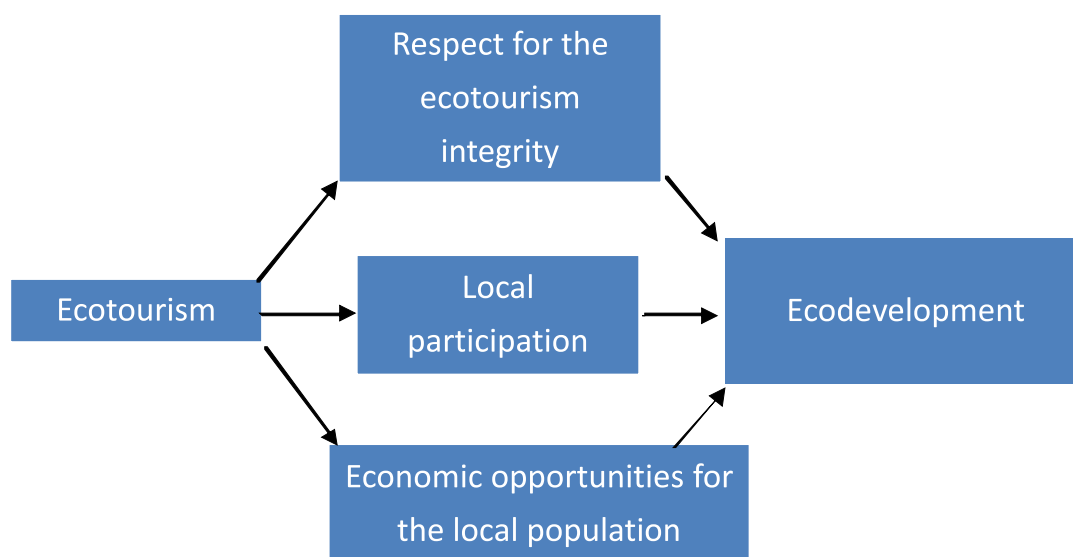


Fig. 1 : Emphasizes the elements involved in developing ecotourism.

*coordinating all the elements with the purpose of optimizing the benefits of the local economy, creating jobs for the host population, guaranteeing and protecting the local population, including the communities' ideas in the political decisions, the equitable distribution of the economic benefits, recognizing the local efforts/services, using the local materials and working force to keep the money into the local economy, keeping a decentralized management etc.*

## Aquatic Resources and biodiversity

Characterizing biodiversity is a vital and basic step in order to assure its sustainable development and conservation. The Uttar Pradesh region harbours a spectacular diversity of freshwater fish species and ecosystems. However, human uses of the region's land and water pose enormous threat to this natural treasure. Uttar Pradesh located between 23°52'-31°28'N latitude and 77°04'-84°38'E longitude is one of the largest states in India.

Uttar Pradesh being a land locked state having vast freshwater resources in lentic ecosystems such as lakes, reservoirs, ponds and tanks. The freshwater

aqua-culture resources in the country comprises 2.25 million hectares of ponds and tanks out of which Uttar Pradesh has 1,61,372 ha, 1.3 million ha of beels and derelict water, 2.09 million ha of lakhs and has 2,70,652 ha and 1.2 lakh km irrigational canal and channels. The state has 7,20,000 ha where rivers occupy 28500 km and a few lakh hectares of paddy fields, a portion of which is amenable to fish farming. In Uttar Pradesh sixty reservoirs, with an area of 1,18,103 ha, are distributed among 15 districts. The state has rich freshwater fish biodiversity contributes approximately 14.68% of the national fish biodiversity. According to a report as occurrence of 87 species from eastern part of U.P while 111 fish species have been recorded from U.P. and Bihar. In addition, some of the major tributaries of rivers in this state viz. Gomti, Ghaghara, Betwa, Ramganga, Ken and Gerua rivers also harbors a rich species spectrum of threatened, migratory and commercially important fishes with a wide distribution of species, families and genera (Sarkar *et al.*, 2010; Lakra *et al.*, 2010, Sarkar *et al.* 2013). In addition, the small indigenous fishes found in the vast inland water resources of this state, provide not only nutrition but also livelihood





Fig. 2 : The Katarniaghat wildlife sanctuary it is home to a number of endangered species including gharial, tiger, rhino, gangetic dolphin, swamp deer, hispid hare, bengal florican, the white-backed and long-billed vultures.

opportunities and income to a large number of fishers. Many of the fishes under small indigenous groups also highly important for food and nutrition, and important source of various products of pharmaceutical and other commercial value and sustain other trades like ornamental fishes. Recent studies made in the some of the major tributaries of river Ganges basin in Northern India viz. Gomti, Ghaghara, Betwa and Gerua rivers revealed the presence of exceedingly rich species spectrum of threatened, migratory and commercially important fishes with a wide distribution of species, families and genera (Sarkar *et al.*, 2013, 2012). A study based on protected areas of Uttar Pradesh it was documented that freshwater protected areas commonly result in increased fish abundances for those threatened fishes which are extremely important for biodiversity conservation and management. The study also indicated that these areas, within wildlife sanctuaries, can be used as freshwater aquatic sanctuary (FAS), if additional measures are taken to protect these aquatic resources against actual threats (Sarkar *et al.*,

2012). Several studies on the habitat attributes have been carried out (Sarkar and Bain, 2007); Dubey *et al.*, 2012).

## Inland Fisheries

Inland fisheries provide food for billions and livelihood for millions of people worldwide (FAO 2014b). The relative contribution of inland fisheries to a country's food and economic security is dependent on its level of economic development and social context and, often, this is higher in the developing world and emerging economies. Inland fisheries have a proportionally higher influence on livelihoods than marine fisheries, particularly in Asia and Africa (FAO and World Fish Center 2008; FAO 2014b). Inland fisheries contribute significantly to food security and economic security by providing primary sources of animal protein, essential nutrients, and income (Welcomme *et al.*, 2010). Inland fishes provide protein, omega-3 fatty acids, vitamin D, calcium, B vitamins, vitamin A, iron, zinc, and lysine to those where other nutritional sources are not available or

are cost-prohibitive (Thilsted *et al.*, 1997; Roos *et al.*, 2007; Youn *et al.*, 2014). Particularly in the developing world, small fish provides an important source of nutrients that are difficult to obtain through other dietary sources (Roos *et al.*, 2007). Inland fisheries resources support the livelihood of large number of fishers mainly through capture based fisheries; though culture based fisheries also contribute a good percentage of their income in many areas. Aquaculture is a section in eco-tourism that could be of great advantages if given the necessary attention. This sector has long been neglected probably due to lack of awareness of its large potentials which if wedged together with tourism their prospects are far enriching. There are great potential in developing ornamental fishery business as tourist destination, the public will understand and accept this type of tourist attraction which both excursionists and tourist can visit. It can also be used as a breeder for selling of different ornamental fishes which is very important in the world economy. Apart from this kind of income generation, inland fisheries resources can be used for revenue generation following some of the below mentioned ways:

### Recreational fishing

Recreational fishing and tourist activities, in particular, have strong economic multiplying effects for the experiential activities in addition to the market value of the fish. Recreational fisheries are a large sector of inland fish services. In industrialized countries, the economic value of recreational fisheries exceeds subsistence and commercial fisheries in inland waters (FAO, 2010a). Recreational fisheries represent the dominant fisheries sector in terms of participation targeting wild freshwater fishes, particularly in industrialized nations (Arlinghaus *et al.*, 2002). In some developing countries and emerging economies, there is also a growing interest in recreational fisheries (e.g. Argentina, Brazil, China and India) (FAO, 2010, 2012). The socio-economic benefits of recreational fisheries are numerous and substantial (Arlinghaus *et al.*, 2002; Parkkila *et al.*, 2010). Recreational fishing in fresh waters has a long tradition and is now enjoyed by

millions of people worldwide. It is defined as: “Fisheries conducted by individuals primarily for sport but with a possible secondary objective of capturing fish for domestic consumption but not for onward sale.”

### Potential fish species

In India, recreational fishing is pretty popular and number of species (popularly known as game fishes) which are having popularity for this purpose. About four dozens of game fishes, some small-sized and others rather large, have been identified from Indian waters. Several fish species have great potential as sport fish for their interesting characteristics of catching bait or fly and give a fight for it for developing recreational ecotourism are like *Chitala-chitala*, *Riamas bola*, *Tor chillinoides*, *Tor tor*, *Tor putitora*, *Tor khudree*, *Schizothorax progastus*, *S. richardsonii*, *S. esocinus*, *S. planifrons*, *Bagarius bagarius*, *Catlacatla*, *Labeocalbasu*, *Labeorohita*, *Cirrhinus mrigala*, *Wallago attu*, *Clupisomagarua*, *Silonia silonia*, *Pangasius pangasius*, *Eutropiichthys vacha* etc. (Sehgal, 1987). Recreational fishing of wild or stocked species can be used to generate revenue and can be used to support the livelihood of the local people. India earns considerable foreign exchange through tourism including fishing. Mahseer fishing is very popular among the foreign tourists and earlier it has been tried by Government to attract more foreigners for mahseer fishing. Several angling competitions have also been organized in some states to promote recreational fishing (Sehgal, 1987).

### Linking Ornamental fishes and tourism

The ornamental fish industry is considered as a sleeping giant in India. Ornamental fisheries sector is overwhelmed with aesthetic appeal and the development of recreational and ornamental fishery sector will boost the development of ecotourism project in the potential aquatic areas. Ornamental fish industries are concerned with production and marketing of live attractive or fancy fishes for the sole purpose of beautification of homes and public places. Ornamental fishery in reality of it is fun driven, games





Fig. 3: Gangetic dolphin

taking, and can be used as key attraction elements of tourism. As many people make fishing an occupation a lot of people engage in fishing as a leisure and recreational activities so, if fishing and tourism develop along that line it would be of great value. Obviously, ornamental fishes are in themselves attractive attraction basically on their unique sizes, colorations and sportish character among others. There is need to strengthen ornamental fishery business as tourist destination.

### Present status of fish based recreation

Though sport fishing and aqua tourism is well-articulated industry on the West, it does not have the same progress in India despite ample resources stretching all along the Himalayan belt from Kashmir to Arunachal Pradesh. Except for Himachal Pradesh and Kashmir Valley where the sport fisheries is a bit well-organized, it is not so in other States and needs adequate attention for sustainable development.

Therefore, there is a need for proper guidance with regard to the species potential, sizes, fishing sites, approachability, and the seasonality to fish for a particular species, infrastructure facilities of transport and accommodation, etc. While on the one hand, it is necessary to built up the populations of the sport fishes like the mahseers, goonch and trout in different streams/rivers/lakes or even tanks and reservoirs, it is equally imperative to manage the recourse scientifically. Though the law exist but the implementation is largely poor. There is good scope to develop certain lakes, small reservoirs and the like for the purpose would may draw foreign tourist as large-sized rohu, catla and some catfishes are good fighters though some may not reckon them as attractive fighter as the mahseer and goonch. Infrastructure like creation of hatcheries and the rearing of fingerling for ranching and stocking the waters deserve utmost priority

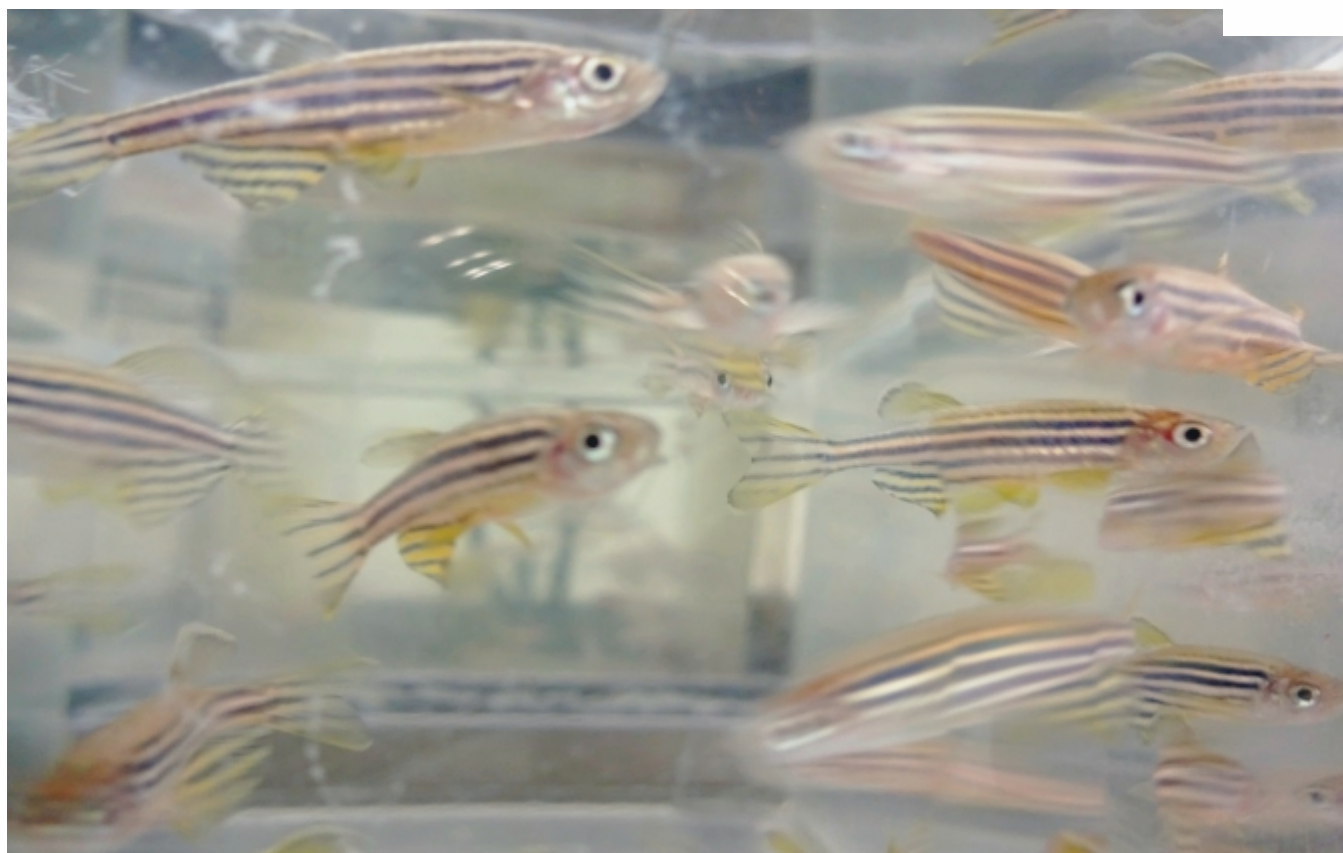


Fig. 4: Zebrafish in aquarium

### Aquarium hub

At present ornamental fishes are the most popular pet throughout the world and is the centre of attraction for all age groups. The ornamental fish industry is also largely driven by inland fish species. Over 90% of home aquarium fish trade is represented by freshwater species. Beyond economic value, the fish seen inside an aquarium's glass provides an opportunity for people to engage with the natural world. For example, aquarium visits have been shown to have a lasting impact on conservation knowledge and interest of visitors (Adelman et al., 2000). A small levy as the entry fee can be a way out for income generation for the local people there if the aquarium hub will be set up near the tourist spots. Feeding fish is a noble hobby and if inland water bodies near the tourist spots will be stocked with ornamental fish varieties like koi carp people will be attracted and this will ensure further revenue generation.

### Demonstration of culture methodologies

Small scale tourism infrastructure can be made in the inland water bodies near the tourist spots to demonstrate the culture methodologies to them. This will attract the students as well as the tourists to visit and will support further revenue generation through entry fee.

### Snorkeling

Snorkeling is the practice of swimming on or through a body of water while equipped with a diving mask, a shaped breathing tube called a snorkel and usually with swim-fins. This hobby is quite popular all through the world. In India, places like Andaman and Nicobar Islands, Lakshadweep Island, several islands of Goa are popular destinations for tourists for snorkeling and this is also a way of income generation for many of the local people.





**Featherback(Chital):** *Chitalachitala*



**Mahseer:** *Tor tor*



**Golden mahseer:** *Tor putitora*



**Goonch:** *Bagarius bagarius*



**Padhani (Parhin):** *Wallago attu*

## Angling of Sport fishes

Sport fishing has conventions, rules, licensing restrictions and laws that prohibit the use of nets. The practice of catching the fish with a hook, known as angling, requires that the fish should be returned to the water – catch and release. Angling is one of the most thrilling sports for the angler and provides employment opportunities to a large number of people. It is a method for fishing by means of an angle(hook). The rod, the line and hook are used for angling. The hook is usually attached by a line to a fishing rod. A bite indicator such as a float is sometimes used. The hook can be dressed with lures or bait. The most enjoyable season for fishing is spring. It is considered to be one of the components of

ecotourism as it minimizes the conflict between resources of tourism and livelihood of the local inhabitants.

## Conclusion

Aquatic biodiversity serves potential for sustainable tourism. It can have positive impact on ecotourism. The economic potential of ecotourism has remained largely unrealized in different parts of UP so far. Thus, successful strategies to limit tourist numbers, information and education to both visitors and local, management and control of the area efficiently requires strict intervention for development and care of sustainable biodiversity tourism.

## References

- Burgess, J.C., 1993. Timber production, timber trade and tropical deforestation. *Ambio* 22 (2–3), 136–143.
- Daily, G.C. (Ed.), 1997. *Nature's Services. Societal Dependence on Natural Ecosystems*. Island Press, Washington, DC
- Ehrlich, P., Ehrlich, A., 1981. *Extinction*. Ballantine Books, New York.
- Lakra W. S, U. K. Sarkar, R. S. Kumar, A. Pandey, V. K. Dubey, O P Gusain. 2010. Fish diversity, habitat ecology and their conservation and management issues of a tropical River in Ganga basin, India. *Environmentalist*, 30: 306-319.
- Lawton, J.H., May, R.M. (Eds.), 1995. *Extinction Rates*. Oxford University Press, New York
- Sarkar, U.K. & M.B. Bain. 2007. Priority habitats for the conservation of large river fish in the Ganges river basin. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 17:349-359.
- Sarkar, U.K., A.K. Pathak & W.S. Lakra. 2008. Conservation of freshwater fish resources of India: New approaches, assessment and challenges. *Biodivers. Conserv.* 17: 2495-2511.
- Sarkar, U.K., B.K. Gupta & W.S. Lakra. 2010. Biodiversity, ecohydrology, threat status and conservation priority of freshwater fishes of River Gomti, a tributary of River Ganga (India). *Environmentalist* 30: 3-17.
- Sarkar, U.K., D. Kapoor, S.K. Paul, A.K. Pathak, V.S. Basheer, P.K. Deepak, S.K. Srivastava & L.K. Tyagi. 2007. Fish biodiversity in the water bodies of Samaspur bird sanctuary, Uttar Pradesh: Towards developing a freshwater aquatic sanctuary. *J. Bombay Nat. Hist. Soc.* 104: 51-54.
- Vorlaufer, K., 1996. *Tourismus in Entwicklungsländern*. Wissenschaftliche Buchgesellschaft, Darmstadt, Germany
- Wilson, E.O., 1985. The biological diversity crisis. *BioScience* 35, 700–706.



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# SUSTAINABLE DEVELOPMENT GOALS



# Mahseer the fantasy of recreational fisheries and Ecotourism

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**Mahseer** a large bodied potamodromous freshwater fish endemic to Asian rivers is flagship species of considerable economic, recreational and conservation interest. Mahseer belong to three genus namely *Tor* (Gray), *Neolissochilus* (McClelland) and *Naziritor* (McClelland). However, genus *Tor* constitutes the bulk of mahseer. Mahseer is most popular game fish amongst anglers in India and known to be the toughest fighter amongst freshwater sports fish and is undisputed king of India freshwaters. Since angling was favourite pursuit of the British, Indian mahseer attracted the attention of anglers Beevan (1877), Thomas (1873,1897), Dhu (1906,1918,1923) and Nevil (1915). The lakes of Kumaon hills were stocked by the fish by Sir H. Ramsay Suring 1858 (Walker, 1888) for sport fishing. Mahseer fishery maintains its fame among anglers in Britain. In the 1970s three Englishmen travelled overland to India in search of Mahseer, fishing the water from Kashmir to Tamil Nadu for eight months until they found mahseer in waters of South Karnataka. Kulkarni and Ogale (1979) considered mahseer the noblest sport fish of India, a great favourite of anglers, both from India and overseas.

**Recreational fishing**, a popular leisure activity, also called sport fishing, is fishing for pleasure or competition, in natural and man-made water bodies. Sport fishing is one of the most sought after adventure tourism activities and has a booming international business opportunity. The most common form of recreational fishing is done with a rod, reel, line, hooks and any one of a wide range of baits. The sport fishing tourism is now developing in India, accounting for 2.7 % growth in tourism sector providing 31 million jobs in India. Today foreign tourist arrival is growing at an average of 4.5 % contributing foreign exchange earnings to the tune of INR 1,35,193 crores in 2015 (Annual Report, Ministry of





Fig. 1. An angling competition at *Jasingfaa Aqua* Tourism Resort in Assam



Fig. 2. A catch of mighty golden mahseer by angling at river Ramganga, Uttarakhand



Photograph courtesy: Mr. Ashok Vashisht

Tourism, 2015). There are three common methods for capturing mahseer: fly fishing, spoon fishing and bait fishing although recent innovations are reported:

- a. **Fly fishing:** Fly fishing or fly casting is a method where artificial fly is used to hook the fish with the help of rod-and-line.
- b. **Spoon fishing:** Spoons, like flies, are artificial metallic shining lures used basically to fish 'heavier' waters where mahseer occurs. Spoon fishing for mahseer is generally grouped into three major types, viz. heavy fishing, medium fishing and small fishing. In heavy fishing, the anglers look for big fish (above 13.5 kg). Mahseer fishing in rivers of northern India generally is of medium type. Small fishing is the most widely used angling for Mahseer as the other two methods are arduous and even risky.
- c. **Bait fishing:** Both natural and artificial lures are used in bait casting. The natural baits are earthworms, minnows and insects.

Today, recreational fishing is also coming up well with *Ecotourism* which is defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education". Since 1980s ecotourism has been considered a critical endeavor by environmentalists, so that future generations may experience destinations relatively untouched by human intervention. Ecotourism typically involves travel to destinations where pristine fauna, and cultural heritage are the primary attractions which can provide viable income-generating options for economic development for local communities. Moreover, ecotourism provides opportunity of education and activism among travelers, making them more passionate towards nature and its resources.

## Mahseer Watching : A Concept of ICAR-DCFR

Fish may be beneficial to human health not just by eating them, but also by way of watching them. Fish watching has multiple positive physiological benefits

like greater drops in blood pressure, stable better moods and relaxation etc as per reports from several researchers. Many of the upland lakes, religious and protected tanks, river streams and pools are examples of fish watching spots which not only attracts tourists but also indirectly facilitates *in-situ* conservation of the some of the endangered fishes like the mahseer. Such kinds of fish watching spots are served in many tourist places of the country. Upland lakes such as Nainital, Bhimtal, Sattal, Naukuchiatal, Khurpatal, Shyamtal, Deoriatal, Hemkund, Roopkund, Kagbhushandital, Kedartal, Sahastratal in Uttarakhand, situated at an altitude ranging from 1200 to 5050 m are some of the best spots where one can find fish to watch. Mahseer (*T. putitora*) can be best watched in the Kumaon lakes viz., Nainital, Bhimtal, Naukuchiatal and Sattal and tanks such as Nal Damayanti (Fig. 3 & 4). Similarly, the Tawang and Upper Siang districts of Arunachal Pradesh are recorded with numerous numbers of lakes which can give a multidimensional importance as angling, scenic beauty, bird watching and hill trekking etc. More number of lakes and tanks with an eco-tourism importance in Northeast region are Mehao lake (1640 m asl) and Sally lake (435 m asl) in Lower Dibang Valley district, Lake Mechuka (1829 m) in West Siang and Lake Geker Sinyi/Ganga Lake (750 m asl) in Papumpare district of Arunachal Pradesh, Ward's lake (1496 m asl) at Shillong, Dighali pukhuri (56 m asl) at Guwahati, Cole park and Padum pukhuri at (48 m asl) at Tezpur, Joysagar and Gaurisagar tanks (95 m asl) at Sibsagar, Jarain pitcher plant lake and Thadlaskein Lake near Jowai (1380 m asl). Many such lakes and tanks are scattered and may be located near the roadside and others at some trekking distance. These types of water bodies offer excellent sites for development of sport fisheries and fish watching spots together with other recreational facilities like boating, children's park, food court etc.

Mahseer eco-park concept is a new dimension to the eco-tourism where nature lovers can get to see world famous game fish in a particular place similar to the concept of bird watching, tiger watching etc. ICAR-DCFR has been promoting the concept of mahseer watching and developed several eco-park (Fig. 5 & 6) and sanctuaries in Uttarakhand (Sariyatal;





Fig. 3 & 4: A fish watching spot at Nal Damayanti tank near Bhimtal



Fig. 5: Inauguration of eco-park at Sariyatal in Uttarakhand



Fig. 6: Mahseer seed ranching at Mehao lake for promotion of eco-tourism



Fig. 7: Rods for mahseer angling

Photograph courtesy: Mr. Naushad Ali





**Fig. 8:** Fishing equipments used by anglers (Arunachal Pradesh anglers' report)

*Photograph courtesy:*  
Mr. Dorjee Sona



**Fig. 9:** Fishing gears used by anglers (Assam anglers' report)

*Photograph courtesy:*  
Mr. Naushad Ali

Lake view Resort, Kherna), in Meghalaya (Nongmahir), Arunachal Pradesh (Mehao lake) etc.

## The anglers' Gears and Equipments

Angling or sport fishing is catching fish with the use of an angle or a hook. The hook is usually attached to a fishing line, which is tied to a fishing reel and the fishing rod. The method of catch is by luring the fish with a bait on the. Baits can be of naturally alive or dead animals like worms, insects, earthworms and maggots or artificial substances simulating real bait. There are three types of angling – spinning, fly fishing and bait fishing. Mahseers take on lures and thus angling mahseer is something which requires patience as one has to sit on the bank, cast bait and wait and wait. It requires casting and retrieving the lure hundreds of time, most of the times in hot sun. The angler prepares himself for angling with a typical

setup of a spinning rod (Fig. 7) a fixed spool reel (Fig. 8), about 10-20 lbs (breaking strength), monofilament (Fig. 9) and finally a lure at the end. During operation, the angler needs to open the "bail arm" of the reel, cast far, turns the handle and the bail arm closes and starts retrieving again. Lures are chosen according to the water and the fish you target. Lure fishing covers with (a) Spoons (b) Spinners and (c) Plugs of all kind.

## Conclusion

Although there is tremendous potentiality of angling tourism in many sites in different parts of hill states, yet it has to develop to the expected level. There is an urgent need to identify the sport fishery areas in different states, policy formulation for sport fishing including development of platform for promotion.



Entrepreneurship development for promotion of fish based eco-tourism with supportive and ancillary service development which is a far cry. National and international publicity, awareness and marketing strategies for promoting angling tourism are important sectors that need immediate attention for its development. The type of ecotourism developed in the country based on mahseer angling and mahseer watch has both, as outlined, positive indirect and

direct consequences towards the conservation. It is now acclaimed by some angling societies and trusts that the population of mahseer on account of angling and recreation has not fallen below the critical level, sustaining support to recreational fisheries, ecotourism and mahseer conservation appears a viable approach through development of suitable policies and guidelines.

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*“There is enough  
on earth for  
everybody’s need  
but not for  
everybody’s greed”.*

**-Mahatma Gandhi**

# 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 chelynoideis*, *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.

## References

- Anonymous (2014. © 2015) Annual report. National Bureau of Fish Genetic Resources, Lucknow, Uttar Pradesh, India. pp. 1-93
- Bassi N, Kumar DM, Sharma A, Pardha SP (2014) Status of wetlands in India, A review of extent, ecosystem benefits, threats and management strategies. *Journal of Hydrology: Regional studies*. Vol. 2: pp1-19.
- Blamey, R.: Principles of ecotourism, In: D. Weaver (ed.), *Encyclopedia of Ecotourism*. Wallingford, UK: CAB International, 5-22 (2001).
- Borgohain, A.: Tourism Industry and North East. *The North East Review (NECCI)*, p 24-25 (2000).
- Ceballos-Lascur jin, H. (1996). Tourism, Ecotourism and Protected Areas: The State of Nature-Based Tourism around the World and Guidelines for Its Development. IUCN Publications, Cambridge, 301. <http://dx.doi.org/10.2305/iucn.ch.1996.7.en>.
- Diamantis, D. (1999). The importance of environmental auditing and environmental indicators in islands. *Eco-Mgmt. Aud.*, 6:18. © 25. doi:10.1002/(SICI)1099-0925(19993)6:1<18::AID-EM A96>3.0.CO;2-O.
- Ferrati R, Canziani GA and Moreno DR (2005) Estero del Ibero: hydrometeorological and hydrological characterization. *Ecol. Mode*. Vol. 186: pp3-15.
- Ghermandi A, Van den Bergh CJM, Brander LM, de Groot HLF and Nunes PALD (2010) Values of natural and human made wetlands: A meta-analysis. *Water Resour. Res*. Vol. 46, issue 12: pp1-12.
- Honey, M.: *Ecotourism and Certification, Setting Standards in Practice*. Washington DC: Island Press (2002).
- Honey, M. and Rome, A.: *Protecting Paradise: Certification Programs for Sustainable Tourism and Ecotourism*. Washington D.C.: Institute for Policy Studies (2001).
- Lee K.: *Trout Fishing Regulation and Guide*. Wisconsin Department of Natural Resources, PUBL-FM-302 95REV, p1-2 (1995).
- Mahanata, P.C. and Tyagi, B. C.: An Overview of Participatory Approach for Fish Biodiversity Conservation in North East India. In: *Participatory Approach for Fish Biodiversity Conservation in NE Region, NBFGR, ICAR*, p3-15 (2004).
- Prigent CE, Matthews FA and Rossow WB (2001) Remote sensing of global wetland dynamics with multiple satellite data sets. *Geophys. Res. Lett.*, Vol. 28: pp 4631. doi:10.1029/2001GL013263.
- Ramsar Secretariat (2013) The List of Wetlands of International Importance. The Secretariat of the Convention on Wetlands, Gland, Switzerland.
- Ramsar list of wetlands of International importance (2013) Ramsar Secretariat. <http://ramsar.wetlands.org> maintained by Wetland International
- Rodgers W.A. Panwar H.S. Mathur. VB (2000). Wildlife protected area network in India: a review. Wildlife Institute of India, Dehradun, India, p 44
- Sehgal, K.L.: *Sport Fisheries and Tourism*. Sport fisheries of India, ICAR Publication, p 91-101 (1987).
- Soni, V.: *Mahseer Conservation: Need, Priorities and Approach*. Participatory Approach for Fish Biodiversity Conservation in NE Region, NBFGR, ICAR, p336-339 (2004).
- Torquebiau E., Taylor R. (2009). Biodiversity and Conservation, 18 (10): p 2537-2550. Pan-African Workshop on Community-based natural resource management approaches, 2008-03-10/2008-03-17, Niamey (Niger)
- Weaver, D.: *Ecotourism*. Brisbane: John Wiley and Sons (2001).
- Wilson, A.: *Fishing Camp - Shooting in Cholera Camp*. Sports and Services in Assam and Elsewhere, United Publishers, UK, p 163-176 (1873 and 1981).



**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**



# Need for Promoting Plant Based Ecotourism in India

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## Ecotourism in India

Tourism in India is probably as old as its 5000 plus year old culture. However, tourism as it is known today began in India only after 1946, following the recommendations of the Sargent Committee. It was only after the 1980's tourism activity gained momentum in India. The country with its large treasure of natural beauty, geography, archaeological monuments and diverse culture has attained a prime position in the field of tourism. India is among world's top 50 tourist destination countries and the second largest net foreign exchange earner. As per a survey undertaken by Conde Nast Traveller Magazine India has been ranked as the 4th most favoured country for holidays, above South Africa and Switzerland. About 10.5% annual growth in overseas visitors and 7.9% growth per annum in tourism related GDP are some of the evidence for India's growing popularity in tourism sector.

Ecotourism in India has received much attention in recent years. The exotic range of flora and fauna in India is the reason behind the successful growth of ecotourism in the country. There are about 400 plus wildlife sanctuaries and 99 national parks sprawling across the country. These natural homes accommodate an estimate of over 350 species of mammals, 2100 types of birds, 350 varieties of reptiles and countless insects. Ecotourism means management of tourism and conservation of nature in a way so as to maintain a fine balance between the requirements of tourism and ecology on the one hand and needs of the local communities for jobs, new skills, income generating employment and a better status for women on the other. Ecotourism was globally identified as a means

of achieving twin goals of biodiversity conservation and sustainable development.

## Current focus of ecotourism in India

The great wealth of Indian wildlife can be imagined with the sight of the majestic elephants, the dance of the peacock, the camel's stride, the roar of the lion and tigers. The vastness of the wildlife and wilderness in India is unparalleled in the world. Ecotourism has entered an exciting phase in India, however it is mostly focused on some charismatic animals such as tiger, lion, leopard or elephant. Ecotourism in famous national parks or wildlife sanctuaries showcases one of these charismatic animals. Sometimes tour guides end up showing spotted-deer or some fox. There are few sanctuaries that are focused on conservation of other animals such as crocodiles, blackbuck, barking deer or wild ass. The birds are the next important creature on which Indian ecotourism is focused. There are several bird sanctuaries in India with talented tour guides rendering ecotourism services.

## Can plant based ecotourism possible in India?

India is a megadiversity country with about 17500 of flowering plants and 50 species of gymnosperms. Country's biodiversity is also enriched with lower group plants including algae (6500 spp.), fungi (14,500 spp.), lichen (2500 spp.), bryophytes (2500 spp.), pteridophytes (1200 spp.). Among flowering plants alone 6000 are endemic, more than 1000 species are ornamental, 130 species are primitive, about 1300 are of medicinal importance and several are insectivores, parasites or saprophytes. In addition great variation in climatic condition has given rise to variety of forest types and these forests are important in harboring the faunal biodiversity along with the glorified animals. However, these forests are given less importance in terms of disseminating their useful information to the visitors. Except for protecting these trees from cutting probably no other service is provided to the vegetation in the protected areas. But in reality any given forest area would have several interesting plants with their own story. However, both the ecotourism department and tourist guides have to

explore such possibilities. The interesting plants list may include some rare plants, endemic plants, medicinal plants, insectivorous plants, parasitic plants, orchids, plants of ethnic use, keystone species, exotic plants, ornamental plants etc. The ecotourism should start giving information on the plants of the area along with showing tigers, lions or spotted-deer. For that the tourist guides should be given proper training by the experts. Giving information on plants of the area would be a value addition to the ecotourism.

## Some plant based ecotourism areas in India

India has very few sanctuaries or national parks where plants attract the visitors. Some such protected areas are given here.

**Deorali Orchid Sanctuary:** It is situated in Gangtok, Sikkim is renowned for its rare and extensive collection of more than 200 species of orchids. The noteworthy feature of the sanctuary is the fact that the orchids in the reserve vary depending upon the change in seasons. Orchids are known for their heady and sensuous fragrance. They are lovely flowers, often found in brilliant colours and beautiful shapes. The tropical, humid climate of the north-east region of India is ideal for the growth of these orchids.

**Barsey Rhododendron Sanctuary:** It lies in the south west corner of the West Sikkim district spreading over 104 km<sup>2</sup>. The climate is wet and cold favoring the spread of the dominant genus Rhododendron. Along with the Rhododendron the sanctuary harbours faunal diversity such as Leopard cat, Himalayan Yellow Throated Marten, Himalayan Palm Civet, Himalayan Langur, Crimson Horned Pheasant, Monal Pheasant, Kaleej and many diverse species of birds. Sikkim government has an arrangement for tourists to stay on top of the hill in a forest barrack. There are now several home-stays at the entrance of Barsey Rhododendron Sanctuary as well as at Okhrey, which is a small village inhabited by mainly the Sherpa community.

Sikkim is an exceptional state which has developed ecotourism in district following sound

environmental and business principles, restrictions impeding the operation of ecotourism are eased, and the sector is well understood by all stakeholders. Ecotourism in Sikkim is strongly marketed in India and abroad, and awareness of the ecotourism opportunities available is raised in the appropriate marketplaces. Many jobs are created for the local communities, and income generation opportunities are improved and multiplied.

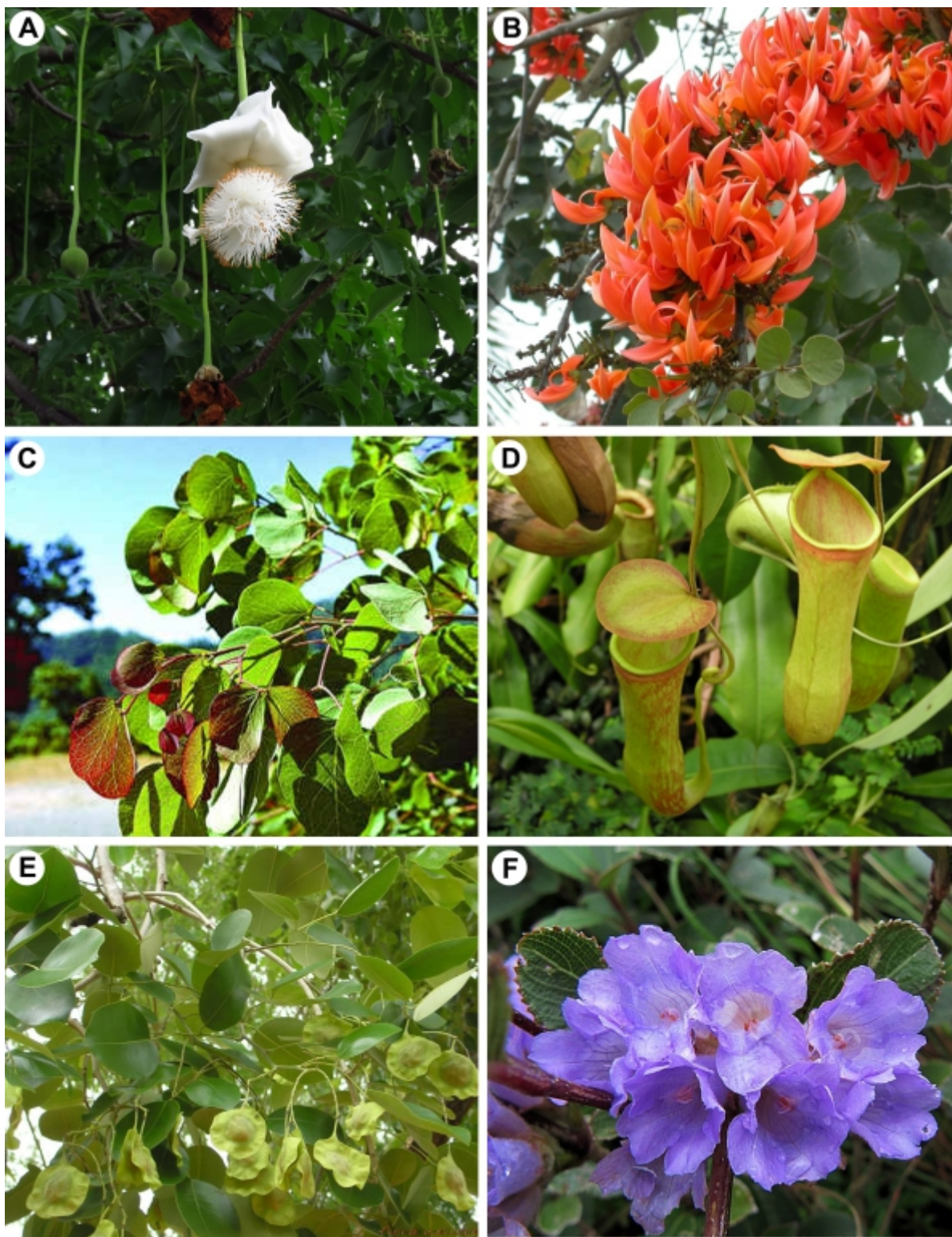
**Sessa Orchid Sanctuary:** It is a 100 km<sup>2</sup> protected area of India in the Himalayan foothills in Bhalukpong Forest Division of West Kameng District, Arunachal Pradesh. Sessa is noted for the occurrence of more than 200 orchid species. The sanctuary is unique in having 7 endemic species of saprotrophic orchids. The Government of Arunachal Pradesh in the late 1970s created a post of Orchidologist in the Forest Department and in 1989 established the Orchid Research and Development Centre at Tipi about 20 km away from the sanctuary. The centre is engaged in taxonomic study and conservation of the orchids and has discovered several new species.

**Valley of Flower National Park:** Located in West Himalaya, in the state of Uttarakhand and Valley of Flowers is known for its meadows of endemic alpine flowers and the variety of flora. It is recognized as UNESCO Heritage Site. At 3352 to 3658 meters above sea level and spread over 87.50 km<sup>2</sup> the national park harbours more than 500 flowering plants. July to August is the best season for witnessing flowering of about 200 species of plants including orchids, poppies, primulas, marigold, daisies, anemone and Rhododendron. The national park also has several endemic and medicinal plants. This richly diverse area is also home to rare and endangered animals, including the Asiatic black bear, snow leopard, musk deer, brown bear, red fox and blue sheep. Birds found in the park include Himalayan monal pheasant and other high altitude birds. The Valley of Flowers is naturally well protected due to its remoteness and limited access. However, anthropogenic disturbances have increased in the recent days due to tourism. The national park has promoted garbage-free ecotourism with the involvement of local people.

**Kaas Plateau:** It is a plateau situated 25 km west from Satara city in Maharashtra. It falls under the Sahyadri Sub Cluster of the Western Ghats and it became a part of a UNESCO World Natural Heritage Site in 2012. It is a biodiversity hotspot known for various types of seasonal wild flowers bloom and numerous species of endemic butterflies flourish in the months of August and September. The plateau is situated at an altitude of 1200 m and is approximately 10 km<sup>2</sup> area. Kaas has more than 850 different species of flowering plants of which 624 are listed on the IUCN Red Data Book. These include orchids, shrubs such as the karvy, and carnivorous plants such as *Drosera indica*. The ecotourism is well developed in the plateau which not only includes showing wild flowers, but also visiting the magnificent waterfalls, monsoon streams, sightings of animals of this area.

**Mangrove forests:** Mangroves are the other tourism attraction in India which is purely made of plants. India has few fine mangroves such as Bhitarkanika, Pichavaram, Sundarbans and Narara Marine National Park attracting the tourist for their unique biodiversity. Bhitarkanika National Park is located in Kendrapara district of Odisha in eastern India. The national park is dominated by canopy of mangroves and it is home to saltwater crocodile, white crocodile, Indian python, King Cobra, black ibis, darters and many other species of flora and fauna. The Pichavaram Mangrove Forest near Chidambaram is the world's second largest mangrove forest. The Pichavaram forest not only offers waterscape and backwater cruises but also consists of rare species of *Avicennia* and *Rhizophora* as special attraction. It supports the existence of many rare varieties of economically important shell and finfishes. The Sundarbans is located at the extreme southern part of the West Bengal in the vast river delta on the Bay of Bengal. It is the largest single block of tidal halophytic mangrove forest in the world. Sundarbans is a UNESCO World Heritage Site. Sundarbans also includes National Park, Tiger Reserve and Biosphere Reserve. It harbours a total 334 plant species mostly the members of the Rhizophoraceae, Avicenniaceae, Combretaceae, Malvaceae and Euphorbiaceae. The





**Figure 1.** Some rare or interesting plants of that can be utilized for ecotourism purpose. A. *Adansonia digitata*, B. *Butea monosperma*, C. *Indopiptadenia ouduensis*, D. *Nepenthes khasiana*, E. *Pterocarpus santalinus*, and F. *Strobilanthes kunthiana*.

Sundarbans is also popular for Royal Bengal Tigers. Narara Marine National Park is situated on the southern shore of the Gulf of Kachchh in the Jamnagar district of Gujarat state. Marine National Park of Gulf of Kutchh is a fragile ecosystem. It consists of several islands completely dominated by mangrove plants.

## Further scope for inclusion of plants in ecotourism

In order to make ecotourism more interesting and more informative the plants have to be effectively utilized. It is necessary to identify the interesting plant in an ecotourism area and educate the tourist guide who in turn educates the tourists. Some of the examples are given here.

Some rare or interesting plants of ecotourism importance: *Adansonia digitata* L. (Parijat, Fig. 1A) is a rare tree mostly found in gardens, however sometimes it is found in forest areas. Since the tree has mythological importance it is an ideal tree to be highlighted. *Butea monosperma* (Lam.) Taub. (Palash, Fig. 1B) is popularly known as flame of the forest, a common tree in plains of north India. It not only enhances the beauty of the forest but also is medicinally important. *Indopiptadenia oudhensis* (Brandis) Brenan (Hathipaula, Fig. 1C) is one of the plants that can be highlighted in ecotourism in Tarai region of India. The tree is confined to the Indo-Nepal border area in scattered populations along the Himalayan foothills between 156–908 m elevations. The genus is endemic, plant is endangered and also has several medicinal uses. *Nepenthes khasiana* Hook.f. (Pitcher plant, Fig. 1D) is found in Khasi Hills, Meghalaya. It is a popular insectivorous plant endemic, endangered and can attract huge number of tourists. *Pterocarpus santalinus* L.f. (red sanders, red sandalwood, Fig. 1E) is an endemic to the southern Eastern Ghats Mountains. This tree is valued for the rich red color of its wood and not for aroma. The tree is used for making crafts, exploited heavily and now it has become endangered. *Strobilanthes kunthiana* (Nees) T. Anderson (Kurinji or Neelakurinji, Fig. 1F) is a shrub

that is found in the shola forests of the Western Ghats in South India. Nilgiri Hills, which literally means the Blue Mountains, got their name from the purplish blue flowers of Neelakurinji that blossoms. Although the plant gregariously flowers once in 12 years, but every year one can see some plants in bloom.

Medicinal, wild edible plants and keystone species: Every forest or ecotourism area can be expected to have some medicinal plant or wild edible plants that can be introduced to the tourists' practice. Utilization of these plants by local people, tribe or ethnic groups will be an added information. For example Tharu tribes of Dudhwa National Park use a total 95 medicinal plants, 97 medicinal formulation of 45 ailments. Tharu tribes with their unique lifestyle make ecotourism an interesting aspect. A total of 83 wild plants are used for eating by tribal people residing in and around Parambikulam Wildlife Sanctuary in Kerala. *Madhuca longifolia* (L.) J.F. Macbr. known as mahwa tree is popular among villagers in Gangetic Plains for its flowers used in liquor preparation. A tourist easily gets attracted to such information exhibits his eagerness to know more about it. The ecotourism team can also identify the plants or fruit that are eaten by animals inhabiting the given area. Several species also act as keystone species in a forest area which needs to be identified. *Ficus* sp. is one such common keystone species which can be utilized for interaction purpose.

Spice gardens and home stays: Now a days spice gardens are getting popularity in south Indian states, especially in Goa and Kerala. The existing orchards or private land is converted into garden where popular spice plants of the region are planted. The visitors are given full information on the plants, parts used, harvesting, processing and cultivation. The local food also served here prepared utilizing these spices. These gardens not only generate income but also spread awareness on plants. Home stays is the other concept being popularized in the village side where guests provided local hospitality and food. The concept can also be extended for introducing local plants to the visitors.



Role of botanical garden ecotourism: Indian has numerous botanical gardens that are coming forward to provide environmental education to common people at the grass root level. The botanical gardens are of two types; open to public for recreation and others are attached to academic institutions with restricted entry. Lalbagh Garden (Bangalore), Government Botanical Garden (Ooty), Jawaharlal Nehru Memorial Botanical Garden (Srinagar) are some of the public gardens while National Botanical Garden (Lucknow), Jawaharlal Nehru Tropical Botanic Garden and Research Institute (Palode) and Indian Botanic Garden (Howrah) are some of the academic institute gardens. It is observed that both type of gardens are playing vital role in educating visitors about plants.

### Importance of plant based ecotourism

Plants are important component of biodiversity, elements that forms the vegetation or forests which in turn harbour charismatic animals. It is not enough protecting them from cutting, but there is need to value them. The visitor should not only enjoy the sight

of charismatic animal, but also go back with some information on plants of the region. This will give plant conservation a more meaning and much needed boost. The ecotourism should be evolved and facilitated with expertise in plant knowledge. The guides in the ecotourism areas should be trained and encouraged to deliver as much information as possible regarding the plant wealth of that area. Educating about plants should become a practice. The ecotourism department should print education material such as banner, booklets, posters, handbills etc. regarding the plants of the area. The department can also organize special visits, conferences and meetings related to plants. It can also market plant products, local crafts, t-shirt and bags carrying the pictures of plants of the area. The Forest Department can also declare some areas as sanctuaries of particular plant, say Palash Sanctuary or Hathipaula Sanctuary. Similar innovative ideas are needed to popularizing the plants in ecotourism. Because, in ecotourism awareness on animals should go hand in hand with plants.



# Impact of Sustainable Tourism on Biodiversity

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## Introduction

High population growth rates and demand for natural resources are posing major threats to pristine biologically rich areas. Integrating biodiversity conservation and sustainable tourism development is the need of the hour which provides a mechanism for bringing a balanced approach to development in biologically sensitive environments. Biodiversity conservation and sustainable tourism are interlinked thus the threats or challenges to biodiversity tend to impact negatively on the tourism sector and vice versa. Stakeholder participation, good governance and education and awareness are keys to successful integration. However, biodiversity is under pressure worldwide and has suffered severe losses as more and more land is converted for human use from a natural state, and as these human uses become more intensive. In 2005, the UN's Millennium Ecosystem Assessment concluded that human activities threatened the Earth's ability to sustain future generation.

## Biodiversity

Biodiversity - is the term given to the variety of life on Earth and the natural patterns of community, interaction with one another and with the air, water, and soil around them, it forms that has made Earth a uniquely habitable place for humans. The biodiversity we are endowed with today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend.

It is the variety of ecosystems such as those that occur in deserts, forests, wetlands, mountains, lakes, rivers, and agricultural landscapes.

Biodiversity provides a large number of goods and services that sustain our lives. Protecting

biodiversity is the need of the Hour. Biological resources are the pillars upon which we build civilizations. Nature's products support such a large number of industries as agriculture, cosmetics, pharmaceuticals, pulp and paper, horticulture, construction and waste treatment. The loss of biodiversity threatens our food supplies, opportunities for recreation and tourism, and sources of wood, medicines and energy.

These natural services are varied and irreplaceable.

Services provided by ecosystems include:

- Provision of food, fuel and fibre
- Provision of shelter and building materials
- Purification of air and water
- Detoxification and decomposition of wastes
- Stabilization and moderation of the Earth's climate
- Moderation of floods, droughts, temperature extremes and the forces of wind
- Generation and renewal of soil fertility, including nutrient cycling
- Pollination of plants, including many crops
- Control of pests and diseases
- Maintenance of genetic resources as key inputs to crop varieties and livestock breeds, medicines, and other products
- Cultural and aesthetic benefits
- Ability to adapt to change

## Tourism

Travelling for the pleasure of it refers to Tourism. It is encouraged by the ever-progressing globalization. With the world taking an upgrading pace, tourism is marking its importance in building the global economy largely. *Potgieter et al.* (2010), suggests the tourism industry is taking a toll in constructing a highly competitive and dynamic scenario on a global level adding to its nature are the complex features influencing its existence.

Also, tourism has vastly become a term of bilateral significance which deals its importance both with the people take part in touring and those who make provisions for the needs and services of tourists (*Butler, 1993*).

Going by the scenario of the last few decades, the convenience of spending a holiday is directly in proportion with the ease and amount of money being spent on it. Therefore, this has given rise to a sea number of holiday packages keeping in mind the budgets of varying tourists that has had a drastic impact on mass tourism. (Mowforth and Munt 1998: 82-90).

## UNWTO

The United Nations World Tourism Organization (UNWTO) is the United Nations agency responsible for the promotion of responsible, sustainable and universally accessible tourism.

## UNWTO Definition of Tourism

*"Tourism comprises the activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes."*

## Importance of Tourism

- tourism represents one of the few economic opportunities available to remote communities
- tourism provides a real opportunities to reduce poverty, create employment for disadvantaged people and stimulate regional development
- tourism has proven to revitalize cultures and traditions
- tourism can provide an economic incentive to conserve natural and cultural assets.
- tourism has been shown to foster greater understanding between peoples and a greater global consciousness

Sustainable tourism is an important issue of how best to encourage tourism while minimizing its costs

## Tourism in India

India is very diverse. We have some of the Coldest places in Kashmir, A place that has highest rainfall in world – Cherrapunji, and also one if the driest places on the Earth – The Thar Desert. More than half of Indian boundary is home to beautiful beaches. And last but not least, the Northern part of India hosts Himalayan Ranges snow capped mountains.

There are different cultures and hundreds of Languages and Dialects – A potent mix of diversity.

## Topmost Tourist places of India

- Agra
- Jaipur/Udaipur
- Goa
- Kashmir
- Kanyakumari
- Kerala
- Old Delhi
- Ajanta Ellora
- Mysore
- Leh Ladakh
- Gangtok
- Rohtang Pass

## Impact of Tourism

Keyser (2009) has derived a strategical approach in a holistic way giving the three pillars of sustainable development namely, environmental integrity, social justice and economic efficiency. All then mentioned features should be maintained and implemented in order to provide our future generation a reasonable and feasible way to lead a good life.

## Social Impact

It is necessary to develop the plethora of raising hands of friendship and optimistic attitude. It develops a sense of respect and honor for the destination country which imbibes its significance at a greater level. When a tourist visits another place or region, he/she becomes aware of the distinctive

culture and tradition of that particular place and it leads to interaction among people coming and belonging from different walks of life. This creates an ambience of psychological satisfaction. (Mirbabayev & Shagazatova, 2012.).

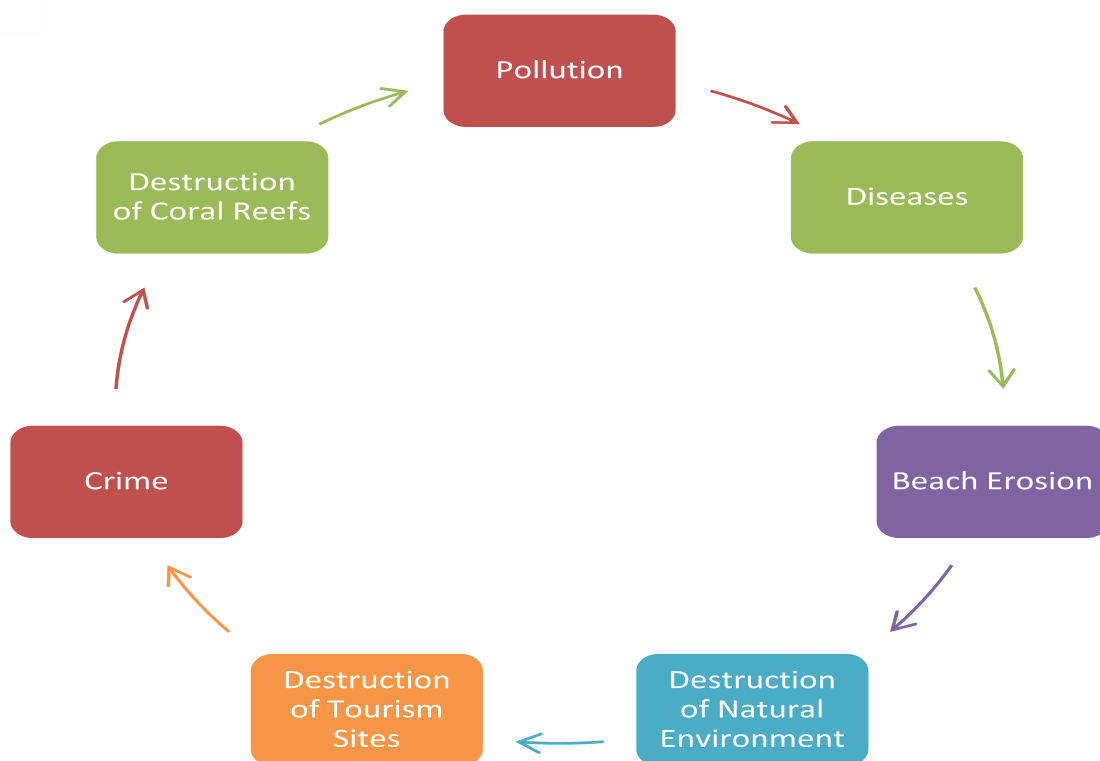
## Economic Impact

Tourism is that one industry which is immensely growing on an ever-changing and fast pace. Tourism has built large number of employments and has immensely contributed to the taxation further contributing to the economy. The capital acquired from the lodging, transportation and food has had of a great importance to the economy. Thus, directly or indirectly, tourism has generated a wide range of different jobs and has benefitted earnings from foreign exchange. Tourism industry consumes a number goods and services, food and transportation which also include taking care for the privileges and safety of tourists. Tourism encourages entrepreneurship, trade and income. Adding to this is the capital raised by the visa charges and royalty that significantly contributes to the economy (Bista 2006). Many tourists bring back to their homes things bought from the destination countries as souvenir. Exempting a few exception, overall tourism has a positive effect on the growth of a region. As stated in one of the laws of economics, “when the demand for a particular good or service increases, on the other hand it decreases the price value of that good or service” (Bista 2006).

## Environmental Impacts

The perseverance of a tourist spot can be largely maintained by maintaining its natural bounties. Elements of nature signify the attraction of many tourists. Many tourism activities have proved to be hazardous and destructive for the natural environment (Newsome *et al*, 2002). Most of this destruction is due to the setting up of roads, concrete structures, golf courses, hotels, shops and many such developments (Newsome *et al*, 2002). Whenever there is a mass emergence of people as visitors, it largely affects not just the culture and traditions of that particular region but also exploits the local resources of that region and leads to environmental





**Fig.1:** Consequences of Uncontrolled Tourism



**Fig.2:** Pollution degrading Taj Mahal



**Fig.3:** Plastic Pollution



**Fig.4:** Tourism Garbage

degradation due to water pollution, noise pollution, traffic congestion and many other similar reasons (Fig.1) (Hunter & Green, 1995; Liddle, 1997; Newsome et al., 2002; Mason, 2003, Pandey et al. 2010).

## The degradation of Taj Mahal

Agra is turning the Taj Mahal Yellow. One of the major threats to the Taj Mahal is the high level of particulate matter (PM) which is being released into air due to large scale burning of municipal solid waste (MSW) in the city. Agra is among the topmost tourist Destinations of India. Environmentalists have struggled for years to protect the Taj Mahal's white stone from turning yellow because of air pollution (Fig.2 &3). Waste from 52 open drains in the city is poisoning the river. "Industrial waste, solid waste, all this empties into the river (Fig.4).

## Challenges Imposed by Mass Tourism on Biodiversity

### Negative Impacts

1. Loss of biodiversity
2. Loss of natural beauty
3. Loss of nature and natural resources
4. Loss of water resources
5. Loss of land resources
6. Loss of local resources
7. Land degradation
8. Air pollution
9. Water pollution
10. Noise pollution
11. Thermal pollution
12. Marine pollution
13. Other pollution
14. Loss of cultural resources, social disruption
15. Natural hazards

### Positive Impacts

1. Financial Contributions
2. Improved Environmental Management and Planning
3. Environmental Awareness Raising

4. Protection and Preservation
5. Alternative employment
6. Regulatory measures

Regulatory measures can limit the negative impacts on the ecosystem and help maintain the integrity and vitality of the site.

## Sustainable Concept in Tourism Development: A tool for Biodiversity Conservation

Sustainable Tourism provides a tool for Biodiversity Conservation. It is the concept of visiting a place as a tourist and trying to make only a positive impact on the environment, society and economy. Tourism can involve primary transportation to the general location, local transportation, accommodations, entertainment, recreation, nourishment and shopping. The concept of tourism is a well-defined example of sustainable development. Tourism is one of the most active industries that are entirely dependent upon the presence of a healthy environment (Fig.6). Thus it's very important to understand and realize the importance of looking after our natural environment and preserving it not only for the purpose of greater tourism opportunities but also for our future generation which has equal right as us to cherish the gift of nature. It is the need of the hour and a matter of great concern to keep a check on the over-exploitation of resources and raising awareness for the maintenance of the natural gifts of that region especially considering the environment (Butler and Boyd 2000). It is observed in the present scenario that there exists a lack of harmony when there occurs a situation to define the appropriate meaning of sustainability or indeed, the point to relate sustainability to that with tourism (Sharpley, 2000; Tao & Wall, 2008; Wall, 1995).

Sustainable tourism can also be termed as a responsible tourism as each individual shares a portion of responsibility that includes respecting not just the local culture and norms but also going by the rules laid for the conservation of local environment. This is also helping in preserving the endangered flora and fauna of the tourism regions. It is the fundamental responsibility of the tourists to take care and judiciously use the water and other energy giving

## Sustainable Tourism



Fig.6: The flow of sustainable tourism and development



Fig.7: Pillars of Sustainable Tourism



Fig.8: Equitable Tourism

resources so that this will preserve the inherited heritage to take benefit of it further and enjoy the gifts endowed by nature in future.

There should be proper management of the resources in such a way that it not just takes care of the social, aesthetic, cultural and economic conditions of the host region but also keeps in mind the natural processes of support systems, biological diversity and ecological balance (Wight 2002).

This is a concept of equality and integrity that believes that the natural resources are not just for those who are alive but also for those who will be a part of the future generation (Seap, 2010). The concept in which environmental quality and economic status coexist, the statement of Brundt and Commission that sustainable development refers to that concept of utilizing the resources in a feasible way so that it fulfills the requirements of today without compromising the needs of the future fig.7 (Brundtland Commission for Sustainable Development 2005).

Brundtland report on sustainability was prepared by WCED which concluded that it was only due to the manifestation of the judicious use of environmental resources that a nation can achieve its target of the specified economic status (Fennel and Dowling 2003). The world conservation strategy was established and presented to people that was based on the sustainability report prepared by the Bruntland Commission along with WCED (Fig.8).

## Threat to Wildlife

Wildlife is at greater threat due to adventure tourism. Such activities are creating havoc in their environment by significantly altering their habitats. Examples of hunting are not new to us where man is brutally killing wild animals for his selfish motives let it be for tusks, skin or other kinds (Fig.9). As Coltman (1989) states that whenever there is a mass influx of tourists at a particular place it tends to disturb the natural environment of that region. This can also lead to extravagant deforestation which would in turn lead to soil erosion thus, ruining the natural beauty of that region. This would disturb the entire vegetation of that place. The influx of population in any region brings along a lot of demands such as demand for drinking water, accommodation and so on. The result is sewage litter, release of waste from fuel engines, polluting lakes and rivers which would directly impact the flora and fauna of this typical region. Fuel engines in water crafts will adversely affect the population of sea creatures and fishing and hunting will drastically disturb the ecological balance of that place (Fig. 10). Disturbance can be of various forms let it be visual, noise or immoral behaviour (Chitrakar 2009). Human communities developing in the wilderness can cause animals attacking the humans. (Eagles, McCool and Haynes 2002).



Fig.9: Hunting is brutally killing wild animals for his selfish motives let it be for tusks, skin





**Fig. 10:** Negative impacts on Wildlife



*Acid rain  
destroys fish  
life in lakes &  
streams.*

## Ecotourism: A solution

Ecotourism refers to that form of tourism which involves the green alternatives that is a form that deals with providing tourist services but considering the green phenomenon of conservation of natural resources alongside. Thus, the concept of encouraging tourism can be viewed as the consciousness to maintain the right structure of ecology and maintaining a balance in environment. Many people have tried to differentiate the two but it was, (Nagle 1999), which stated that ecotourism can be viewed as that kind of tourism which continues without damaging the environment and also invites the local communities to participate in developing measures for tourism in order to preserve their natural heritage.

Patterson (2002) mentioned certain characteristics for ecotourism business:

- Guidance for tourists in visiting the spots of attraction.
- Involvement of highly recreational yet low impact techniques.
- Local elites can be highly benefited to look for a source of income.
- Involvement of the local communities would help provide the local touch of the place and getting to learn an entirely new environment.
- A boost to the efforts of organizations involved for the conservation of nature.

- Setting a limit to the number of visitors in order to avoid rush.
- Privacy of the local elites must be respected and maintained.
- Guides a boon for this industry as they provide the natural history and environment of that place.
- To ensure not to disturb the wild life and Biodiversity of that region.

Sustainable tourism must ensure that the trip must be meaningful and should be worthy experience and must spread awareness about sustainability (WTO, 2001).

Harris et al. (2002) devised five major principles that must be the guidelines for developing any sustainable tourism namely: It must be a form of sustainable tourism that must not compromise with the basic foundation of the attraction of that spot but with keeping conservation as its objective; It must encourage participation of the local community to maintain its touch of ancient heritage; It should be awareness based tourism trip which should also take care of the services provided to the tourists as appropriate.

Although, the tourism industry will never be hundred per cent sustainable but still the guideline builders must make it in accordance with the norms of

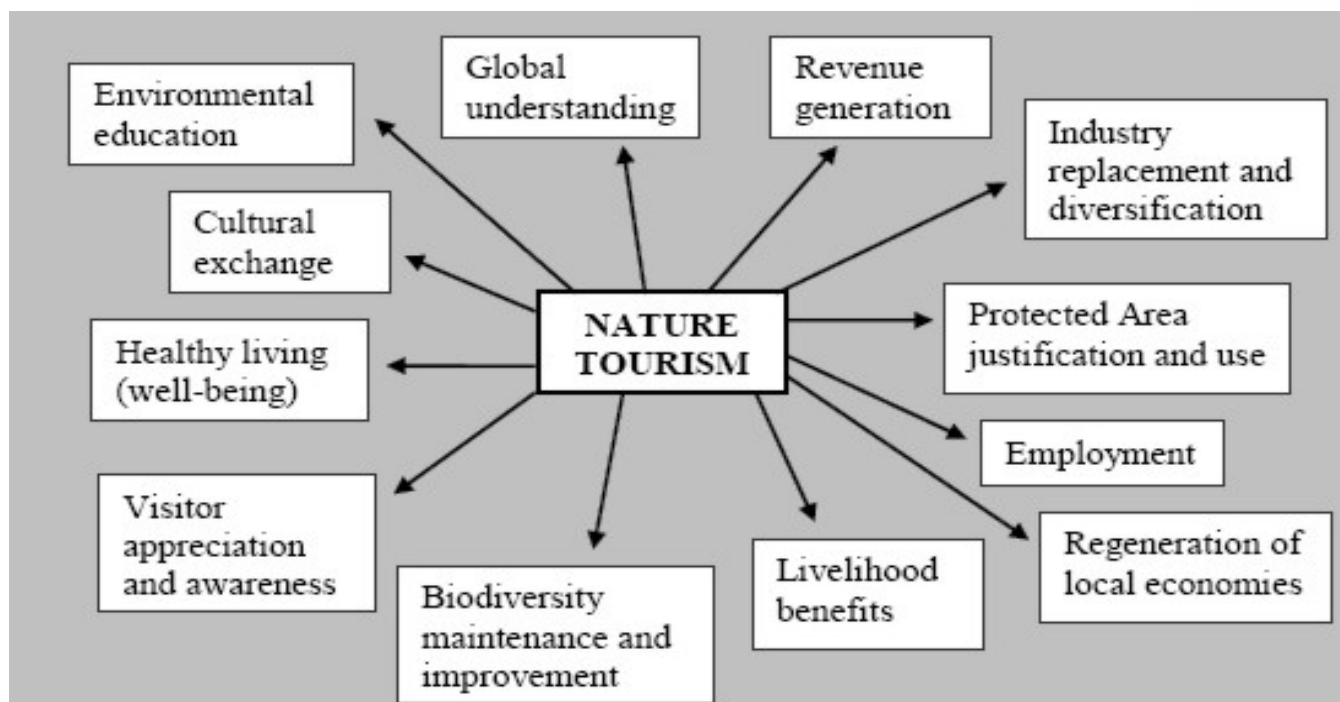


Fig.11: Components of Nature Tourism

sustainability. The impact on environment can be classified into three categories namely:

- Natural
- man-made
- cultural.

The influx of population in a serene region destroys its flora and fauna and disturbs the environment. India has a number of spots and sights for attraction of tourism such as hunting spots, national parks, wildlife sanctuaries etc. But now due to huge amount of visitations, the wild animals tend to evacuate from these places as well (Bista 2006).

Keeping in view all these adversities, a lot of new measures and indicators are in the process of development and implementation to manage the deteriorating environment and maintain sustainability (Fig.11). World Tourism Organisation has assessed and developed certain criteria and set some rules for tourism to be conducted (Collins, 1998; Schianetz, Kavanagh & Lockington, 2007; Twinning-Ward & Butler, 2002; WTO, 2004). Many researches were developed with their ideologies of developing a par-

defined manner of tourism which include Environmental Audit and Logical Footprint (Ding & Pigram, 1995; Hunter & Shaw, 2005; Schianetz et al., 2007). The Environmental Impact Assessment (Ding & Pigram, 1995), Visitor Impact Management and Tourism Impact Management (McCool & Lime, 2001; Moore et al., 2003; Newsome et al., 2002), survey based methods such as Delphi techniques (Green, Hunter and Moore, 1990), and finally, Multi Criteria Analysis regarding the effects of tourism on environment (Schianetz et al., 2007).

## Protected Areas

One way to overcome the deteriorating environment is to build protected areas. Protected areas are tourist spots which are rich in biodiversity, have an extravagant green cover of the ecosystem and fulfil the growing demands of outdoor activities (Chitrakar 2009). Construction of protection areas and conserving the natural environment to attract maximum tourists is a challenging task. As the business of nature conservation is expensive, large amount of capital in the form of revenue is needed to be generated (Fig.12).



It is the ecotourism that builds the consciousness of environment in the minds of the tourists. The progress in the concept of eco-tourism can be well realized by considering the increasing number of ecotourists. This seems to be a great opportunity for the developing nations as ecotourism can bring a great amount of economic boost. Ecotourism has also shown a way to countries to focus on their tourism industry and thus, on sustainable development with a wider prospective rather than investing in the industrial production.

A nation's development is majorly defined by its resources. Also, the concept of sustainable development is greatly rational and feasible in order to protect our heritage and riches bestowed to us by the nature so that our future generations must also extract benefit out of it and experience the wonderful bounties we are endowed with.

Developing the tourism industry of a nation would not only help in the growth of the economic, cultural and social aspects of the nation but will also conserve the natural environment.

## References

- Bista, R., 2006. Tourism Policy, Possibilities and Destination Service Quality Management in Nepal. Greece: The University of Macedonia.
- Butler, 1993. Tourism - An Evolutionary Perspective □ in Nelson, Butler and Wall (eds) Tourism and Sustainable Development, Monitoring, Planning and Managing. Waterloo: Dept. of Geography Publications, pp.27-58.



- Butler, Richard W. and Douglas Pears, 2002, Change in Tourism - People, places, processes. London: Routledge, 1995. [6].Cashmore E, Sport psychology: the key concepts. Routledge Key Guides, Routledge, New York.
- Chitrakar, R., 2009. Current State of Tourism Service Sector in Nepal and Ways Forward. Kathmandu: Satyal Publication.
- Collins, A., 1998. Tourism Development and Natural Capital. *Annals of Tourism Research*, 29 (1), pp.98-109.
- Coltman, Michael M., 1989. Introduction to Travel and Tourism. An International Approach. New York, Van Nostrand Reinhold.
- Ding, P. and Pigram, J., 1995. Environmental Audits: An Emerging Concept in Sustainable Tourism Development, *The Journal of Tourism Studies*, 6 (2), pp.2-10.
- Eagles F.J. Paul et al., 2002. Sustainable Tourism in Protected Areas: Guidelines for Planning and Management. Gland: IUCN, The World Conservation Union
- Fennell, David A. and Ross K. Dowling, 2003. Ecotourism Policy and Planning. CABI Publishing: Oxon and Cambridge.
- Green, H., Hunter, C. and Moore, B., 1990. Assessing the Environmental Impact of Tourism Development – Use of the Delphi Technique. *Tourism Management*, pp.111-122.
- Harriss R, Griffin T, Williams P, 2002. Sustainable Tourism: A Global Perspective. 2nd edn. Butterworth-Heinemann, Oxford.
- Hunter, C. and Green, H., 1995. Tourism and the Environment, A Sustainable Relationship? London: Routledge.
- Hunter, C. and Shaw, J., 2005. The Ecological Footprint as a Key Indicator of Sustainable Tourism. *Tourism Management*, 28, pp.46-57.
- Keyser H, 2009. Tourism development 2nd edn. Cape Town: Oxford University Press Southern Africa.
- Liddle, M., 1997. Recreational Ecology, The Ecological Impact of Outdoor Recreation and Ecotourism, London: Chapman & Hall, 1997.
- McCool, S. and Lime, D., 2001. Tourism Carrying Capacity: Tempting Fantasy or Useful Reality. *Journal of Sustainable Tourism*, 9, 2001, pp.372-88.
- Mirbabayev, B & Shagzatova, M., 2012. The Economic and social impact of Tourism. Available: [http://www.grips.ac.jp/alumni/UzbekistanTourism\(2\).pdf](http://www.grips.ac.jp/alumni/UzbekistanTourism(2).pdf).
- Moore, S., Smith, A. and Newsome, D., 2003. Environmental Performance Reporting for Natural Area Tourism: Contributions by Visitor Impact Management Frameworks and their Indicators. *Journal of Sustainable Tourism*, 11, 2003, pp.348-75.
- Mowforth, Martin and Ian Munt., 1998. Tourism and Sustainability, Development and new Tourism in the Third World. London: Routledge,
- Nagle, Garret, "Tourism, Leisure and Recreation". Surrey: Thomas Nelson & Sons Ltd, 1999
- Newsome, D., Moore, S. and Dowling, R., 2002. Natural Area Tourism, Ecology, Impacts and Management, Clevedon UK: Channel View Publications.
- Pandey, R.M, Chhetri, P, Kunwar, R: R., 1995. The effects of tourism on culture and environment. Available: <http://unesdoc.unesco.org/images/0012/001226/122619eo.pdf>,
- Patterson, Carol, 2002. The Business of Ecotourism. Rhinelander: Explorer's Guide Publishing.
- Potgieter M, de Jager JW, van Heerden CH., 2010. Type of tour operations versus type of information systems: South African survey. *African Journal of Business Management* 4, 2634-2643.
- Saep, 2010. Sustainable Development in South Africa.
- Schianetz, K., Kavanagh, L. and Lockington, D., 2007. Concepts and Tools for Comprehensive Sustainability Assessments for Tourism Destinations: A Comparative Review. *Journal of Sustainable Tourism*, 15 (4), pp.369-88.
- Sharpley, R., 2000. Tourism and Sustainable Development: Exploring the Theoretical Divide. *Journal of Sustainable Tourism*, 8, pp.1-18
- Sustainable Tourism. Thomas Cook. Available <http://www.thomascook.com/sustainable-tourism/>. 2011.
- Twinning-Ward, L. and Butler, R., 2002. Implementing STD on a Small Island: Development and Use of Sustainable Tourism Development Indicators in Samoa. *Journal of Sustainable Tourism*, 10 (5), pp.363-86.
- Wall G, Yang L., 2009. Ethnic tourism: A framework and an application. *Tourism Management* 30, pp.559-570.
- Wall, G., 1995. Sustainability in Tourism and Leisure: Conference Report. *Annals of Tourism Research*, 23, pp.224- 25.
- Wight, Pamela A., 2002. "Supporting the Principles of Sustainable Development in Tourism and Ecotourism: Government's Potential Role". In: *Current Issues in Tourism Vol. 5, Nos 3&4*, pp. 222-244.
- World Tourism Organisation, 2004. Indicators of Sustainable Development for Tourism Destinations: A Guidebook, Madrid: World Tourism Organisation.
- World Tourism Organisation, 2001. Indicators for sustainable development for tourism organisations: a guidebook. Madrid, Spa





22 MAY 2017  
INTERNATIONAL DAY  
FOR BIOLOGICAL DIVERSITY  
Biodiversity and Sustainable Tourism

## Tourism Economic Impact

9.8% Global GDP

Tourism employs **7x** more than the automotive industry

9.5% contribution to total employment in the World

775 bn \$ total investment worldwide



## Sustainable Tourism

Contributes directly to the conservation of sensitive areas and habitats, with government revenues and funds



Increases public appreciation and aids awareness-raising of important issues, as well as, encourages sustainable consumption



Contributes to environmental protection, conservation, and restoration of biodiversity



# Role of Green Belt/Theme Parks in Linking Biodiversity and Ecotourism

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## Introduction

Green belt development plan aims at overall improvement in the environmental conditions of the region. It can be a preventive issue of land degradation due to activities during construction phase enhancing the forest cover for increasing the biodiversity of the region; providing aesthetic value to the project area. Tourism in developing countries mainly depends upon its biodiversity. The quality of their natural environment gives many developing countries a comparative advantage in tourism. Ecotourism was globally identified as a means of achieving twin goals of bio diversity conservation and sustainable development.

Ecotourism has received much attention in recent years especially within the developing world. Ecotourism in simple terms means management of tourism and conservation of nature in a way so as to maintain a fine balance between the requirements of tourism and ecology on the one hand and needs of the local communities for jobs, new skills, income generating employment and a better status for women on the other. Ecotourism is an attempt for sustainable ecological development. India, the land of geographical diversities and wonders offers excellent options for ecotourism. No country in this world offers as much geographical varieties as India. The present plan comprises, choice of plant species for green belt development/theme parks, also religious plants development of landscape, tall tree species plantation, planting of some lesser known plants, medicinal plants etc. for linking bio-diversity with eco-tourism.

### 1. Green Belt along the boundary

Tress like Poplars, *Acacia auriculiformis* and Bamboos can be raised along the boundary of the proposed area. These plants provide windbreaks and protect the garden from dust and pollutants from outside.

## 2. Stabilization of degraded lands with Indigenous Tree Species

An integrated approach adopting both biological and mechanical measures can be adopted for stabilization of degraded land with indigenous species viz. *Ficus glomerata* (Gular), *Limonia acidissima* (Kaitha), *Tamarindus indica* (Imli), *Carissa carandas* (Karaunda), *Moringa oleifera* (Sahjan), *Aegle marmelos* (Bel) etc.

## 3. Tall tree planting

Normally in the forest department the plantations are raised with the seedlings grown in temporary nurseries, which are 6 month old, and of 2 to 3 feet height. In linear plantations it has been a challenge to raise successful plantations from the small seedlings. Thus, planting of tall seedlings, which are of more than 12 feet height is recommended for better survival of plants.

## 4. Development of Theme Gardens

Keeping in tradition with the diverse Indian culture and religious belief, following theme gardens or Vatikas can be developed as per suitability of area for biodiversity conservation :

- Dhanavantri Vatika
- Nakshtra Vatika
- Navgrah Vatika
- Panchavati
- Budh Vatika
- Tirthankar Vatika
- Masihi Vatika
- Guru Ke Bagh,
- Hari-Shankari
- Masihi Vatika
- Kurani Vriksha Vatika
- Tirthankar Vatika

## 5. Conservation Gardens (*ex-situ* conservation of rare and endangered species)

- a. Garden of Some RET species (Rare, Endangered and Threatened) Plants- There are very large number of the Indian plant species which fall under one or the other








category. The Red Data Book published by Botanical Survey of India has listed several plant species from across the different agro climatic zones as rare and endangered and some of these are on the verge of extinction. To conserve the gene pool, plant species can be selected from the Red Data Book garden to conserve biodiversity of area.

- b. Lesser Known Plants Garden (LKP) –LKP species existence is ignored because more commercial important tree species predominate in our surroundings. Some LKP plants though more viable and potential, drawn less attention in past, now needs recognition, awareness and focus for biodiversity conservation (Tomar and Kumar 2012).
- c. Wild Edible Fruit Garden - There are many forest tree species which have a great potential to be commercially utilised for their fruits although they have been neglected in this regard. Such few species are *Artocarpus lakoocha*, *Aegle marmelos*, *Averrhoa carambola*, *Annona squamosa*, *Grewia subinaequalis*, *Euphoria longan*, *Cordia myxa*, *Eugenia jambos*, *Pithecolobium dulce*, *Spondias mangifera* etc (Tomar et al., 2015).

Wild fruits species is intended to promote the preservation of these species, presently under threat. In addition to their nutritional value, the preservation of these fruits also has economical advantages. Some of these wild fruits are also known to have medicinal properties. Any scientific evidence for the health benefits of such wild fruits in addition to their nutritional value would be an added value to the plants producing such fruits.

- d. Medicinal Plants Garden – As it is an old saying that there is no-plant in the world, which does not have medicinal properties. Different medicinal plant can be planted as per suitability of area. A concept of herbal tourism can be promoted in a sustainable

**Table 1.** Some religious values plants for theme garden

Local Name	Scientific Name	Family	Religious values
Bel	<i>Aegle marmelos</i> (L.) Correa 	Rutaceae	Leaves and fruits are used in the worship of Lord Shiva. The traditional devotees write the name of Rama on its leaves by sandal paste and worship the Lord with them. It gives endless virtue on the devoted person.
Neem	<i>Azadirachta indica</i> A. Juss. 	Meliaceae	It is associated with Sheetala Mata (Cool one) - the goddess of smallpox. It is believed that the Sheetla Mata live in this tree. The leaves of this tree are used in the treatment of person who suffers from smallpox.
Anvala	<i>Phyllanthus emblica</i> L. 	Phyllanthaceae	It is worshipped by women especially in the month of Kartik (October-November) with a view to be favoured with male progeny. It is also believed that eating food under the anvala tree in the month of Kartik absolves one from the Anna doshas for a year.
Shami	<i>Prosopis cineraria</i> (L.) Druce 	Leguminosae	Shami tree represents God Sani. It is sacred to Indian culture especially by Hindus who worship it before going on a main journey and on the occasion of Dushehra festival. It is believed that Shami tree worshiping is helpful to check bad impacts of Sani.
Peepal	<i>Ficus religiosa</i> L. 	Moraceae	It is believed as the residence place of the triad ~Brahma, Vishnu and Mahesh (Shiva). Its roots, trunk and leaves represent Lord Brahma, Vishnu and Mahesh (Shiva), respectively. Women also tie thread round the trunk of Peepal tree 108 times which grants the boon to worshiper.
Bargad	<i>Ficus benghalensis</i> L. 	Moraceae	Symbolizes Lord Shiva. It also depicts the Trimurti - Brahma (roots), Vishnu (bark), and Shiva (leaves). Married women offer their worship to this tree and tying raw cotton thread around the tree
Khair	<i>Acacia catechu</i> Willd. 	Mimosaceae	Khair wood is used in the religious ceremonies at the time of havans (yagna). Wood is considered sacred and used as one of the religious plants along with Bhojpatra ( <i>Betula utilis</i> ) at the funeral ceremony. It is believed to provide mukti or moksha (peace to the heavenly soul).

(D. Pandey and V. C. pandey, 2016)



manner so that preservation of indigenous knowledge and community development may be brought about. Herbal tourism has remarkable potential for employment generation, conservation of forest biodiversity (Abraham, 2012).

- e. **Religious Tree Garden** - Tree worship is an age old practice in India as seen from the seals of Mohenjodaro and Harrapa that have impressions of sacred Peepal and willow trees. Trees are prominent in the Bagvad Gita, the Bible and the holy Kuran. During ancient times tree are associated with certain deities and are said to be abode of Gods and Goddesses. Old Buddhist and Hindu sculptures display prominently Baniyan, Peepal, Siras, Sal, Mango, Ashok, Nag Keshar, Champa, Kadamb etc. (Tomar A., 2012)

Species which are related directly or indirectly with deities or mythological figures can be planted to explore the better utilization of religious trees. The present check list of some religious trees having multiple uses has been compiled some of the striking examples are *Ficus religiosa*, *Ficus bengalensis*, *Ficus glomerata*,

*Strychnos-nux-vomica*, *Emblica officinalis*, *Eugenia jambolana*, *Acacia catechu*, *Terminalia arjuna*, *Aegle marmelos* etc.

## Conclusion

Role of green belt/theme garden concept in planting programmes can be successful if linked with ecotourism. Ecotourism in India has flourished because of the immense bio-diversity that exists nowhere else in the world. It must, however, be realized that there is immense potential still to be tapped in terms of making optimum use of the available natural resources. Well-managed ecotourism can be hugely beneficial for biodiversity. One of the most significant ways in India by which trees are regarded is through their association with religion. Van mahotsava, farm forestry, social forestry and such other programmes have been launched to motivate farmers to plant trees. However, these programmes have not been fully successful. In summation, development of Green Park for ecotourism can be a panacea for India, if it is promoted under the strict definition of eco-tourism that means making as little environmental impact as possible and helping to sustain the indigenous population and culture, thereby encouraging the preservation of biodiversity.

## References

- Abraham A. (2012). Herbal Tourism- A Swot Analysis. Scholarly Research Journal for interdisciplinary studies. 1(2) pp. 226-239.
- Pandey D & Pandey VC (2016) Sacred plants from ancient to modern era: Traditional worshipping towards plants conservation. Tropical Plant Research 3(1): 136-141
- Tomar A, Kumar D. (2012). Conservation of less known and less utilized wild fruits trees species. MFP NEWS. Vol. XXII, NO. 3. pp. 11-14.
- Tomar, A. (2012). Sacred Trees with Multiple Uses In: Landscape Fragmentation and Restoration Researches in India. (Eds: Prafulla Soni and Lal Singh. Verlag/Publisher. ISBN: 978-3-659-15849-0 pp. 447-458.
- Tomar A, Kumar A. and Dubey K. (2015). Underutilized Wild Edible Fruits of Nutritional and Medicinal Value. J. Res. Educ. Indian Med., Vol. XXI. pp. 1-8.
- www.ecotourismindia.com on May 9, 2017

# Conservation of Kalp Vriksha: *Adansonia Digitata*, as Sacred Tourism

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## Introduction

The Kalp Vriksha, also called as Parijat tree, is considered to be a divine tree, belongs to Bombacaceae family and native to Africa. It is a rare medicinally important sacred tree. In Africa it is commonly named as “Baobab” possibly from North African Arabic world bu-hibab, means fruit with many seeded. Baobab also known as dead rat tree, Ethiopian sour gourd, Judas bag, lemonade tree, monkey bread tree upside down tree. Name upside down tree points out the appearance of this tree in its leafless state, when the trunk has the form of a gigantic swollen tap root, and the sparse branches resemble roots directed to sky rather than in to the ground. Name dead rat tree has been given due to its long fuzzy fruits hanging on long stalks, look like dead rats hanging by their tails. Its name monkey-bread tree is due to its soft, dry edible fruit, generally eaten by monkey. In India it is commonly named as Parijat, kalptaru, kalp Vriksha, Gorakh imli. In Botany, the Parijat tree is named as *Adansonia digitata*. The genus name *Adansonia* commemorates French naturalist philosopher and explorer Michel Adanson (1727-1806). *Digitata* in the scientific name refers with its finger like arrangement of the leaflets on the leaves.

## Mythological Importance

The tree is considered as sacred tree and worshiped by both Hindu and Muslim religion. In Hindu the tree is considered tree of life, eternity and environment harmony. It is also known as the mythical tree that fulfills desires. It is believed that The Parijat tree was originated during the Samudra Manthan and was planted in Indralok. On the earth, this tree was brought by Lord Krishna for his wife Satyabhama after a battle from Lord Indra. In the



Fig. 1: *Adansonia digitata*; (a) flower, (b) exposed roots, (c) tree and (d) peeled of trunk.



Harivansh Puraan, the tree is referred to as a “KALP-VRAKSH”, or wish bearing tree. The tree is the symbol of our uniqueness and its potential. It has the importance not only in Hindu religion but also in the country like Indonesia. In Indonesia, Kalpataru is used as the logo of Indonesian Environment Institution. In Muslim, this tree is called as Sacred Tuba Tree which is believed to be a tree from 'Sada-Adan' garden of Heaven.

## Habitat

The trees usually grow as solitary individuals. It is very long lived tree and can live several thousand years of age (Varmah and Vaid 1978). *Adansonia digitata* (*A. digitata*) is native to African savannahs and prefers arid or semi-arid region (Rahul et al., 2015). In India, it is found in MP, Uttar Pradesh, Gujarat and Coromandel Coast and Ceylon (Sundarambal et al, 2015). It is sensitive to water logging and frost. All locations where the tree is found are. According to an American taxonomist, the sturdy seed pods of Baobab might have been swept by sea currents and reached India. According to Professor H.Y. Mohan Ram, a prominent botanist from Delhi, “This enormous tree supposedly has brought in by sailors who came to establish trade links with India; they thereafter planted them across the Indian subcontinent” (The Hindu, 2013). Thus the Baobab trees which love arid zones have been found growing as stragglers in the Indian subcontinent, including Sri Lanka (The Hindu, 2013). The trees can tolerate high temperatures and long spans of drought. All baobab trees are deciduous, losing their leaves in the dry season, and remains leafless for nine months of the year. It has white flowers (Figure 1a). It is a unisexual tree and seedling is very difficult. They can grow to between 5–25 m (16–82 ft) in height. They are in fact known both for their height and trunk's girth. The trunk tends to be bottle-shaped and can reach a diameter of 10–14 m (33–50 ft). The baobab has been said to be the most drought resistant of trees, during rains the trees swell greatly absorbing water large trees can store thousands of liters of water in their trunk for later use. Due to its huge size, *Adansonia* is regarded as the “Queen of all carbon storage trees” (Sundarambal et al, 2015).

## Medicinal Uses

The different plant parts are widely used as foods, medicines and the bark fibres are also used. The fruit, leaves, and flowers are very important in terms of their

nutritional value. Both the fruit and leaves are high in vitamin C. The seed and flower are high in protein, and the kernel contains an edible oil. The various parts of this tree are used to treat a large number of ailments. Nearly every part of the tree has traditional medicinal value. A few include: powdered bark mixed with porridge for malaria; the pulp of the fruit is mixed with honey and is used for coughing; the leaves are used for diarrhoea, fever, inflammation, kidney and bladder diseases, blood clearing, and asthma; the leaves also serve as emollients and are used to help extract guinea worm; the fruits and seeds are used for dysentery, fever, haemoptysis and diarrhoea; dry powdered roots are prepared as a mash for malaria; and gum from the bark is used for cleaning sores. *Adansonia digitata* has a particularly high antioxidant capability mainly because of its high natural vitamin C content. Hot water extract of *Adansonia digitata* fruit shows analgesic activity. Leaves are used as laxatives” (Sundarambal et al, 2015).

## Impacts of Social Negligence on Status of Kalp Vriksha in Jhansi Allahabad

A very massive, magnificent yet lonesome tree of *Adansonia digitata* is located in Jhansi Allahabad at Sangam. It is growing on the left bank of the Ganga at Prayag near ‘Uta Kila’ and ‘Samudra Koop’. Probably one of the largest and longest living trees in India, this monolithic tree has been thriving albeit precariously by sipping water at the confluence. Reportedly over 1000 years old, this Baobab tree is a living monument and a mute witness to numerous Kumbh Mela held under its branches. Though the tree has mythologically and medically important, it has been forlorn and ignored (The Hindu, 2013). Social negligence has brought this sacred and endangered tree species in danger. Recently, a team of Scientist from Centre for Social Forestry and Eco-rehabilitation (CSFER), Allahabad and Botanical Survey of India (BSI), Allahabad; and Officer from UP Forest Department, visited the tree. The team has found that since the tree is located on the slope of the river Ganga it is under threat due to soil erosion and exposure of its most of the roots. Small tunnels like structure have been created through roots. Due to its exposed roots,



it is in danger as the roots of Kalp Vriksha (*Adansonia digitata*) are not deeply rooted in the ground and due to great size of the trunk it may fall any time, especially during rainy season and flood (Figure 1b). The tree trunk was huge of nearly 50 to 60 feet in circumference with bumps and plenty of bulges (Figure 1c). It was bearing holes and susceptible to the bacterial and fungal attack. The bark of the tree was peeled off exposing the soft tissues by the local people for medicinal and religious purposes which made it more susceptible for bacterial, fungal and termite attack (Figure 1d). The tree of “immense rarity and antiquity” importance was lying unattended. Social negligence and unawareness are identified as major cause for its ruined conditions.

## Conservation Measures Proposed

It was observed that the major threats to this endangered tree species is due to exposition of its root which has made it more susceptible to pathogen attack. Therefore it has been recommended to treat the trunk and exposed roots with anti-termite, fungicide and antibiotic to prevent this rare medicinally important ancient tree from any bacterial, fungal and termite attack. Construction of a concrete base is also recommended to check the soil erosion during rainy season. Nearby area may be developed as conservation zone of some important medicinal plants. Efforts have been initiated by the Forest Department officials in technical

collaboration with the scientists from CSFER, Allahabad and BSI, Allahabad. Media representatives and youth organizations have also participated and joined the hands in the efforts for conserving this tree and for public awareness regarding this tree. This area may be developed as sacred place to promote eco-tourism.

## Conclusion

In India this tree is considered as endangered. As of April 2015 baobabs are not yet classified by the IUCN's Red List criteria, but they are a part of the “Catalogue of Life.”, 2015. Even if they are not the mythological 'Kalpa Vriksha', they are definitely very old, historical and medicinally important trees, and need proper attention. It needs urgent protection, not only from whimsies of nature and miscreants, but also from an eroding riverbank that has exposed its huge roots. Since it is endangered species and seeding is difficult, efforts have to be made for its propagation, through vegetative and micro propagation. Conservation of this ancient tree may achieve two objectives first one the conservation of endangered plant and promotion of Eco-tourism. Since it is sacred for Hindu and Muslim both, its conservation will promote secularism and sacred tourism, too.

## Acknowledgement

Mr. Dinesh Singh, Correspondent Allahabad, Zee Media, Mr. Brajendra Pratap Singh (Hindustan) and Mr. Praveen Mishra, Correspondent Allahabad, Doordarshan are acknowledged for their cooperation.

## References

- "Catalogue of Life - 18th May 2015:: Species details". catalogueoflife.org. Retrieved 17 May 2015
- Varmah, J. C.; Vaid, K. M. (1978). "Baobab - the historic African tree at Allahbad". *Indian Forester* 104 (7): 461–464.
- Rahul, J. et al. (2015) *Adansonia digitata* L. (baobab): a review of traditional information and taxonomic description. *Asian Pacific Journal of Tropical Biomedicine*. 5(1):79–84.
- Sundarambal M, et al. (2015). A review on *Adansonia digitata* Linn. *Journal of Pharmacognosy and Phytochemistry*. 4(4):12-16.
- Living monuments (2013) -The Hindu: April 7, 2013

## Web reference:

- <https://en.wikipedia.org/w/index.php?title=Special:UserLogin&returnto=Adansonia+digitata>
- <https://indiaheritagehub.org/2012/06/16/parijat-the-grand-symbol-of-indian-mythology/>

# Journey of Uttar Pradesh Biodiversity Board: An Assessment in the context of Sustainable Development Goals

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## I. Introduction

Nature has enriched the planet earth with the millions of living organism, which are essentially interrelated and interdependent to each other, and finally compose a living web on the earth. Human beings are always entirely dependent for their sustenance, health, well-being and enjoyment of life on fundamental biological systems and processes. Ecological balance has been postulate from ancient times for the better existences of life and to protect the planet. Chanakya had observed that “*the stability of an empire depends on the stability of its environment*”. The term Biological diversity encapsulates the variety of life on Earth and the natural patterns it forms. But, from the past more than two decades the man made and other human activities are placing severe pressure on the various important natural resources that leads to the degradation of habitats and loss of biodiversity in a large scale. In this regard the international environmental consciousness was developed in 1960 and finds a kind maturity only in post 1970s in the form of various conventions having sectoral approaches to arrest the problem (*Birnie Boyle 2009*). The conservation of biodiversity as global common concern deals only in 1992 at the United Nations Conference on Environment and development in particular by UN Convention on Biological Diversity (CBD) signed by a large number of states including India. Further, the intellectual property rights regime governed by the TRIPs Agreement under aegis of WTO also brings number of problem related to biodiversity management in the developing countries.

India has 8 per cent of the world's biodiversity with many species that are not found anywhere else in the world (SDGs NO.15). It is also equally rich in traditional and indigenous knowledge assets of the local communities. Keeping in view the three

objectives of the CBD and other challenges pertaining to biological resources, the Government of India has enacted the *Biological Diversity Act, 2002* and *Biological Diversity Rules, 2004*. In the said act the institutional mechanisms such as national, state and local level are available under different provisions of the Act. At the national level Biodiversity Authority has been established by the Government of India in October, 2003 at Chennai, Tamil Nadu and State Biodiversity Board have been established by the State Governments and Biodiversity Management Committees constituted by the local bodies. In this regard the Uttar Pradesh State Biodiversity Board was constituted on 28th September 2006 by the Govt. of Uttar Pradesh under the Biological Diversity Act, 2002. Under this backdrop the present paper a humble attempt to assess the role played by the Uttar Pradesh Biodiversity Board in the conservation of biodiversity for better conservation and sustainable use of biological resources for realizing the sustainable development goals in coming future.

## II. Institutional Structure

### (A) Constitution of Uttar Pradesh State Biodiversity Board under the Act

The Uttar Pradesh State Biodiversity Board (Section 3 U.P. Biodiversity Rule, 2010) was established by the state government for the purpose of the act. The board shall consist of the following members namely:

- i. Principal Secretary, Forest, Government of Uttar Pradesh, Chairperson
- ii. Nominee of the Principal Secretary/Secretary, Environment Department, Government of Uttar Pradesh
- iii. Nominee of Principal Secretary/Secretary, Horticulture Department, Government of Uttar Pradesh
- iv. Nominee of Principal Secretary/Secretary, Agriculture Department /Agriculture Education, Government of Uttar Pradesh
- v. Nominee of Principal Secretary/Secretary, Animal Husbandry Department, Government of Uttar Pradesh

vi. Principal Chief Conservator of Forest, Uttar Pradesh

vii. Five Specialist members

The State government shall be nominated the Non-official members also from amongst experts in the matters relating to conservation of biological diversity, sustainable use of biological resources and equitable sharing of benefits arising out of the use of biological resources section 4 U.P. Biodiversity Rule, 2010). Every non-official member of the Board shall hold office for a term of three years from the date of publication of his appointment in the Gazette (section 6 U.P. Biodiversity Rule, 2010). The Headquarters of the Uttar Pradesh Biodiversity Board situated at Lucknow (Section 9 U.P. Biodiversity Rule, 2010)

The State Biodiversity Board is established as body corporate which means that it has the capacity to sue or to be sued (Section 22 [3] Biodiversity Act, 2002). Whereas in relation to the Union territory the National Biodiversity Board shall exercise the power and functions of state biodiversity board and it may also delegate all its powers or functions to such persons or groups of persons as the Central Government specify (Section 22 [2] Biodiversity Act, 2002). The Chairperson and other members of the board shall hold the office for the period as may be prescribed by the State Government. He shall have the control of day to day activities of the board as well as power of general superintendence and he may also issue the directions for the management of the affairs of the board (Section 13 National Biodiversity Rules, 2004).

### (B) Function and Powers of State Biodiversity Board

Under the act the board has following powers and functions:

1. Advising the State Government, subject to any guidelines issued by the Central Government, on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of the benefits arising out of the utilization of biological resources.

2. Regulating by granting of approvals or otherwise requests for commercial utilization or bio survey and bio utilization of any biological resource by Indians.
3. Performing such other functions as may be necessary to carry out the provisions of this Act as may be prescribed by the State Government (Section 23, Biodiversity Act, 2002).

The board has the power to restrict certain activities which violating the objectives of conservation. It entrusted with following powers (Section 24, Biodiversity Act, 2002).

1. Any citizen of India or body corporate, organization or association registered in India shall give prior intimation in such form as may be prescribed by the State Government to the State Biodiversity Board, before obtaining any biological recourse for commercial utilization, or bio survey and bio utilization for commercial utilization.
2. It has the power to prohibit or restrict any kind of activity which is in its opinion as the detrimental or contrary to the objectives of conservation and sustainable use of biodiversity or equitable sharing of benefits arising out of such activity.

Besides the above power and function there are some general functions are also required to be performed by the U.P. BB (Section 13, Biodiversity Rule, 2010).

- i. To provide technical assistance and guidance to the Department of State Government.
- ii. To perform such other function as may be necessary to carry out the provision of the Act.
- iii. To identify the issues in Biodiversity conservation in Uttar Pradesh and to evolve Biodiversity strategy and Action Plan.
- iv. To release of status of Biodiversity Report of Uttar Pradesh at suitable interval and to evolve strategy and Action Plan.
- v. To frame Biodiversity Policy of the state and

establishment of Biodiversity Park.

- vi. To adopt the different method of activities for revenue generation such as fixed deposit, advertisement, sponsor, donations and such other method etc.
- vii. To award individual, or as a group or as institution for innovation and contribution to the Biodiversity conservation of the state.
- viii. Commission studies, sponsor investigation and research organize conference/ seminars/ workshop/ meetings on different fields.
- ix. To engage consultant in different fields for a specific period not exceed three years, for providing technical assistance to the Board in the effective discharge of its function provide that if it is necessary and expedient to engage any consultant beyond the period of three years, the approval of the Board shall be necessary.
- x. To collect, compile and publish technical and statistical data, manuals, codes relating to conservation of biodiversity, sustainable use of its components and fair and equitable sharing of benefits arising out of the use of biological resources and knowledge.

The Act further provides that the board shall take step to restrict or prohibit the request for access to biological resources for the following reasons (Section 17 U.P. Biodiversity Rule, 2010).

- i. The request for access is for any endangered taxa.
- ii. The request for access is for any endemic and rare species.
- iii. The request for access may likely to result in adverse effect on the livelihood of the people.
- iv. The request to access may result in adverse environment impact which may be difficult to control and mitigate.
- v. The request for access may cause genetic erosion or affecting the ecosystem function.
- vi. Use of resources for purpose contrary to National/ State interest and other related



International / National/ State agreement entered into by India and there to the State of Uttar Pradesh.

### III. Initiatives taken by Uttar Pradesh Biodiversity Board (2006 to 2017)

Since its establishment in 2006 the U.P. State Biodiversity Board to achieve its foremost aim to create awareness among people about the need for biodiversity conservation and management for sustainable use of bio resources in India, to enlightens the said object the board celebrating the International biodiversity day as biodiversity festival every year on 22nd May from the year 2007 with the different theme of Seminars/ Conferences and Workshops has been organized on different themes chosen by the United Nations for International Biodiversity decades (2010-2020). On the occasion of International Day for Biological Diversity, U.P. State Biodiversity Board, Lucknow organized, “Biodiversity Festival” from 17th May to 20th May, 2016, in collaboration with Department of Zoology, University of Lucknow and Regional Science City, Lucknow. The programme aimed at creating awareness among the youth to have a passionate heart for the biodiversity and sustainable development around us (UPSBB Biodiversity Festival report 2016).

Biodiversity Festival provides an opportunity to the youth to express their thoughts through various competitions as well as to get involved in Biodiversity conservation through various activities. During the festival, several competitions and workshops were organized.

#### (A) Committees Constituted by Board:

The State Biodiversity Board is empowered to constitute a committee to effectively deal with the agro- biodiversity and also to constitute the other committees for the efficient discharge of its duties and performance of its functions under the act (Section 13 of the Biodiversity Act, 2002). During the year 2009-2010 the board has constituted several committees (Annual Report [2009-2010] , Uttar Pradesh Biodiversity Board, at pp.3).

- Committee of scientists for Biodiversity Park guidance
- Scientist/ Expert Committee for Scientific Input
- Editorial Board for publication of e- magazine of UPSBB

#### (B) Board Meetings

For the coordinating and convening the meeting of the board the state government appoints the Additional Principal Chief Conservator of Forest (Section 10 of the U.P. Biodiversity Rule, 2010) , who shall be responsible for the maintenance of the records of the proceeding of the board. The member of the UPSBB shall met at least four times in a year normally after a period of three months at the Headquarter at Lucknow of the Board for discussing different issues related to the activities of the State Board (Section 11 of the U.P. Biodiversity Rule, 2010). In each meeting, the confirmation of the previous meeting was done first, followed by discussion on the progress and follow up actions on the directions given in the previous meetings. The third meeting of UPSBB was held on 8th December 2009 and following major decision was taken in the meeting:

- A quarterly e- News Letter is to be published by the Board and put up on the website [www.upsbdb.org](http://www.upsbdb.org)
- UPSBB may coordinate with National Bureau of Agriculturally Important Microorganisms, Mau.

#### (C) Awareness Programmes organized by the Board

- In order to biodiversity conservation the board has making various awareness programmess as it celebrated the Arbor Day on 6th September and to sensitize the students towards wildlife conservation and its signigicance, the World Wildlife Week from October 1 to 7th every year.
- To recognizing the importance of wetland and its conservation it celebrated Wetland Day on 2nd Feb.
- The diminutive house sparrow is perhaps one of the earliest birds which we can remember from

our childhood. It is a species of passerine bird of the sparrow family Passeridae. It is popularly known as “Gauraiya” in Hindi and “Chiriya” in Urdu. Unfortunately, the house sparrow is now a disappearing species, therefore to raise public awareness about the decline of the house sparrow and the problem faced by the species in its daily fight for survival the board celebrating “World Sparrow Day” every year on 20th March.

- “Village Mapping Competition” is organized by the board on the occasion of Earth Day on 20th April and Quiz Competition conduct by it for the students of Class 6th to 12th on “World Environment Day”.
- To raise awareness regarding “Amphibian Conservation” among the students through various competitions based on Amphibian topics, the board organized “Leap Day” on February 29th.
- To raise awareness regarding “Vulture” organizing “Vulture Awareness Day” on the occasion of “International Vulture Day” i.e. 1st September.
- Science Express – Biodiversity Special' (SEBS) is an innovative mobile exhibition mounted on a specially designed 16 coach AC train, traveling across India. The SEBS is a unique collaborative initiative of Department of Science & Technology and Ministry of Environment & Forest, Government of India in the year 2012.

#### (D) Formation of Biodiversity Management Committees

In the year 2004, India's Ministry of Environment and Forest officially gazette the implementing rules for the *Biological Diversity Act; 2002*. It is under the BD Act, 2002 that the idea of biodiversity management committees was introduced in the country for conservation, sustainable use, and documentation of biodiversity and chronicling of knowledge relating to biodiversity (Section 41 of the Biological Diversity act 2002). The BMC shall consist of not more than six members including a chairperson nominated by such local body, of which not less than one third should be

women and not less than 18% should belong to the Scheduled Caste/Scheduled Tribes (section 21[1] U.P. Biodiversity Rule, 2010). The tenure of the BMC shall have three years.

As per the guideline of the Biodiversity Act, 2002 and in accordance with *Uttar Pradesh Biological Diversity Rules, 2010*, Rule 21 Board formed one BMC (Saidapur Devkali) in the District of Lakhimpurkheri in the Tarai Agro climatic zone (Annual Report 2009-2010) in Nanapara Dehat (Dist Baharaich), Baihar (Dist Chitrakoot), Bhitauli Kalan (Dist, Barabanki (Annual Report 2010-2011) the biodiversity management committee of Bhauwapar (District Gorakhpur) (Annual Reprt 2011-2012), Naipalapur (Dist. Sitapur), Haresewakpur No.2 (District Gorakhpur) (Annual Report 2012-2013). The success of a State Biodiversity Board, in many instances is gauged by the number of BMC formed in the state.

#### (E) Preparation of Peoples Biodiversity Register (PBR)

The documentation of the knowledge related to the biological resource of the people of any locality is known as the People's Biodiversity Register. The Register shall contain comprehensive information on availability the knowledge of local bio-resources, their medicinal or any other use or any other traditional knowledge associated with them. The various forms of knowledge of the people that would be included in the PBR are as follows:

- a. Knowledge of Landscape
- b. Knowledge of Life cape
- c. Knowledge of Peoplescape
- d. Knowledge of Timescale

The main function of the BMC is to prepare People's Biodiversity Register in consultation with local people (Annual Report 2010-2011). The first PBR in the state was completed in the village of Saidapur Devkali, District Lakhimpur Kheri (Annual Report 2011-2012). The PBR has recorded 310 species of plants, animals, insects and fishes in kheri. About 311 species were identified in the Bhauwapar village, Gorakhpur District in the process of making the PBR (Annual

Report 2011-2012). During the 2012-2013 two PBR have been completed. First in Gram Sabha, Baihar, Distt. Chitrakoot where overall 295 species were recorded in the village and second in, Distt- Bahraich where 343 species were recorded . The PBR prepared at Village level upto 31<sup>st</sup> March 2016 is eighty six (Annual Report 2012-2013).

#### **(F) Research projects and special studies conducted by the Board**

In order to conservation of biodiversity and sustainable management the board conducted the research project from time to time. These are the following research project has been incited by the board namely, *"Germplasm exploration, assessment and documentation of Fish Biodiversity of Uttar Pradesh"*, *"Inventorization, Impact Assessment and risk communication of Invasive fish species in Uttar Pradesh"*, *"Enumeration of lichens of Uttar Pradesh, Assessment and Preparation of an Illustrated Resource Inventory of underutilized Wild Edible Plant Resources in terai region of Uttar Pradesh"*, *"Annotated and Coloured Checklist of the Amphibians and Reptiles of Uttar Pradesh"*, *"Baseline Survey and Mapping of Microbial Diversity of Kukrail Forest Lucknow"*, *"Survey, Mapping and Documentation of Floristic Diversity and Antiquity of Vegetation in Lucknow and Adjoining Areas"*.

#### **(G) Participation of UPSBB at Conference of the Parties (COP-11)**

The 11<sup>th</sup> Conference of the Parties (COP-11)- Convention on Biological Diversity was organized by the Ministry of Environment & Forest , Government of India from 8<sup>th</sup> October to 19<sup>th</sup> October 2012. It was held at Hyderabad International Convention Centre, and the conference includes a high level ministerial segment meet that was organized by India in consultation with the Bureau and Secretariat.

Mobilization of financial resources was the theme for the COP 11 summit. Finding Uttar Pradesh Biodiversity Board, since its establishment has taken various steps for the conservation and protection of biodiversity. The 11<sup>th</sup> Conference of the Parties (COP 11) - Convention on Biological Diversity was organized

by the Ministry of Environment & Forest, Government of India from 8 October to 19 October 2012. An innovative mobile exhibition bus "Prakriti" has been stated on the 2<sup>nd</sup> August 2014, by the Hon'ble State Minister, Prof Abhishek Mishra. The bus has been developed as collaborative effort of Uttar Pradesh State Biodiversity Board, Lucknow University and Centre for Environment Education (CEE). In its first phase , Bus travelled to 6 district of Uttar Pradesh covering Lucknow , Barabanki, Kannauj, Unnao, Hardoi and Sitapur district covering more than 1 Lakh visitors including students, teachers, community persons, officials media, youth etc. From August 2015 bus has started its next phase journey for motivating and sensitizing people for Biodiversity Conservation.

A training programme on **"Biodiversity: Law and Policy"** was conducted by the U.P. State Biodiversity Board, Lucknow at Forestry Training Institute, Kanpur during 19 to 29 December 2014, 5 to 6 January, 2015 for the Deputy Ranger and Foresters from the different forest division of U.P. Forest Department. A total of 19 forest officials attended this programme. An effort was made by the UPSBB to document the number of bird's species visiting Raj Bhavan for a whole year, in order to record the bird diversity of Raj Bhavan for posterity. A book entitled *"Birds of Raj Bhavan"* was released by Hon'ble Governor, Uttar Pradesh on 19<sup>th</sup> June 2015 which is a compilation of 86 birds species which were observed during the study period.

## **IV. Conclusion**

The analysis of one decade journey of the Uttar Pradesh State Biodiversity Board it is to be noted that the board has taken various steps according to their available resources for the conservation of biodiversity in regions of Uttar Pradesh from time to time and try to establish effective biodiversity governance culture from the very inception taken into consideration the notion of sustainable development. However, it is furthermore submitted that though UPSBB has played very important role in conserving biodiversity but it is facing many challenges, due to

lack of fund and expertise in modern technological developments particularly in the field of biotechnology and also lack in legal expertise for better conservation of biodiversity. Finally, it can be said that the board functioning and its role in relation

to conservation of biodiversity is satisfactory and appreciable but at the same time it is utmost essential on the part of the board to adopt a holistic approach for realizing the sustainable development goals in coming future for establishing a good biodiversity governance.

## References

- Birnie Patricia W and Boyle Alan E, 2009. International Law and the Environment, Oxford University Press, p.616.
- Abdul Haseeb Ansari, Future Directions in Conservation of Biological Diversity: An Interdisciplinary Approach, in Michael I Jaffery, Jeremy Firestone and Karen Bubna-Litic, 2008. Biodiversity Conservation Law & Livelihoods Bridging the North- South Divide, Cambridge University Press. p.132.
- <http://www.cbd.int/island/about.shtml>. access on 20.4.2017.
- <http://www.nbaindia.org/> access on 22.4.2017.
- [http://nbaindia.org/uploaded/pdf/Annual\\_Report\\_2011\\_12\\_%20Eng.pdf](http://nbaindia.org/uploaded/pdf/Annual_Report_2011_12_%20Eng.pdf). access on 22.4.2017.
- See India's Fourth National Report to the Convention on Biological Diversity, Ministry of Environment and Forests GOI, (2009) p.17.
- <http://indiatoday.intoday.in/> 18.02.2014, access on 20.04.2017.
- Cullet Philippe, 2005. Intellectual Property Protection and Sustainable Development, p.92.
- P.M. Bakshi, 2006. The Constitution of India p. 90.
- Divan Shyam, Rosencranz (2nd edition) 2001. Armin, Environmental Law and Policy in India: Cases, Materials and Statutes, pp. 41-42.
- Zafar Mahfooz Nomani, 2004. Natural Resources Law and Policy, Uppal Publication New Delhi, p.152.
- Bare Act of Intellectual Property Laws, , 2011. the Biological Diversity Act, 2002 Universal Pub New Delhi, p.384.
- Kanchi Kohli, Shalini Bhutani, Biodiversity Management Committees Lost in Numbers, Economic & Political Weekly, Vol, XLIX No.16 April 19, (2014) p.18.
- M.S.Swaminathan, 2010. Biodiversity, development, livelihoods, The Hindu, May 22, p 10.
- R.D. Gaur and Prakash C Kuniyal, "Biodiversity and Conservation: Salient Features", Mukeshkumar, Rajankumargupta et.al. (eds.), Biodiversity an overview, I.K. International publishing house pvt ltd (2011)
- D. Kaur, "Some Aspects of Environment Management" in R.K. Sapru ed., Environmental Management in India (1987). D. Kaur, "Some Aspects of Environment Management" in R.K. Sapru ed., Environmental Management in India (1987)
- Kanchi Kohil & Shalini Bhutani, "Biodiversity Management Committees Lost in Numbers" VOLXLIX NO 16 EPW, April 19, 2014.





22 MAY 2017  
INTERNATIONAL DAY  
FOR BIOLOGICAL DIVERSITY  
Biodiversity and Sustainable Tourism

While **tourism** provides opportunities for women's self-employment, women are contributing a large amount of unpaid work in tourism family businesses. Women formally employed in tourism earn 10% to 15% less than their male counterparts.



# Nawabganj Bird Sanctuary: An Emerging Ecotourism Hub

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## Introduction

Ecotourism is a new concept in tourism, which was originally idea of making harmonious co-existence with nature. Overall scenario of Ecotourism industry is changing at a fast rate to be an increasingly important source of income and employment in many countries. Ecotourism is a subset of broad nature based on tourism that includes several components like community benefits, education, sustainability and ethics (Bandaxa 2009; Buckley 2003; Fennell 1999; Honey, 2008).

According to the World Tourism Organization, ecotourism is recorded as the highest growing market in the tourism industry with an annual growth rate of 5 per cent worldwide and representing six per cent of the world's GDP and 11.4 per cent of all consumers spending (Fernando *et al.*, 2013). The purpose of Ecotourism involves visiting natural areas with the objectives of learning, studying or participating in activities that do not bring negative effects to the environment; whilst



Fig.1: Map of NBS





**Fig. 2:** Some of views of NBS

protecting and empowering the local community socially and economically. The study was performed in Nawabganj Bird Sanctuary (NBS), Unnao district during April 2012 to March 2015.

### Purpose of Study

- The objectives of study are to identify and examine the potentiality of ecotourism development in the Nawabganj Bird Sanctuary.
- To identify the issues and challenges of the ecotourism development in the Nawabganj Bird Sanctuary and wetlands of associated areas.

### Nawabganj Bird Sanctuary

The study was performed in Nawabganj Bird Sanctuary (NBS), Unnao district. Nawabganj Bird Sanctuary (NBS) is situated in Tehseel Nawabganj of District Unnao at National Highway- 25. This sanctuary got established in year 1984 under Wild Animal Protection Act 1972. NBS covers the 224.60-hectare area which provides the breeding ground to multiple populations of flora and fauna (Fig.1). There is a canal near the sanctuary which is a permanent water source for wildlife. “Moti Lake” has scenic beauty of tourists concern which further inflicts the great economic value (Fig.2).

**Methodology:** Surveys are being carried out and observations are being with the interaction with tourist, local people, sanctuary staff and interviewed them. Data has been supported with the aid of 10x50 binoculars and Canon EOS 70 D SLR camera.

**Observation and Result:** NBS and its lake are very wealthy in terms of floral diversity as well as faunal diversity. Nawabganj Bird Sanctuary is well known as popular tourist destination because of the diverse assemblage of avifauna especially migratory water birds that congregate at the Nawabganj Bird Sanctuary in winter. It is a favorable place for residential as well as migratory birds for the breeding and feeding purposes.

### Attractions of Nawabganj Bird Sanctuary

- Dear Park
- Children Park
- Migratory Water birds
- Cycle track

### Facilities at Nawabganj Bird Sanctuary

Nawabganj Bird Sanctuary is a good ecotourism destination and provide many facilities to the tourists such as boating, watch towers, interpretation centre, rest house, visitor centre, cycle path, deer park and restaurant etc. (Fig.3A, 3B,4,5,6,7,8,9,10,11 and 12).

### Biodiversity of Nawabganj Bird Sanctuary

Nawabganj Bird Sanctuary is an ideal habitat for flora and fauna and includes 150 species of birds



Fig.3 A: Rest house in NBS Fig.3 B: Boating facilities in NBS



Fig.4: Watch tower in NBS for birding



Fig.5: Visitor Centre in NBS





Fig.6 : Interpretation Centre in NBS



Fig.7: Interpretation Centre in NBS



Fig.8: Cycle Track in NBS





Fig.9: Children park in NBS



Fig.10: Ticket Counter in NBS





Fig.11: Deer Park in NBS



Fig.12: Display board depicting flora and fauna in NBS



Fig.13: Migratory birds are the main attraction of tourists.



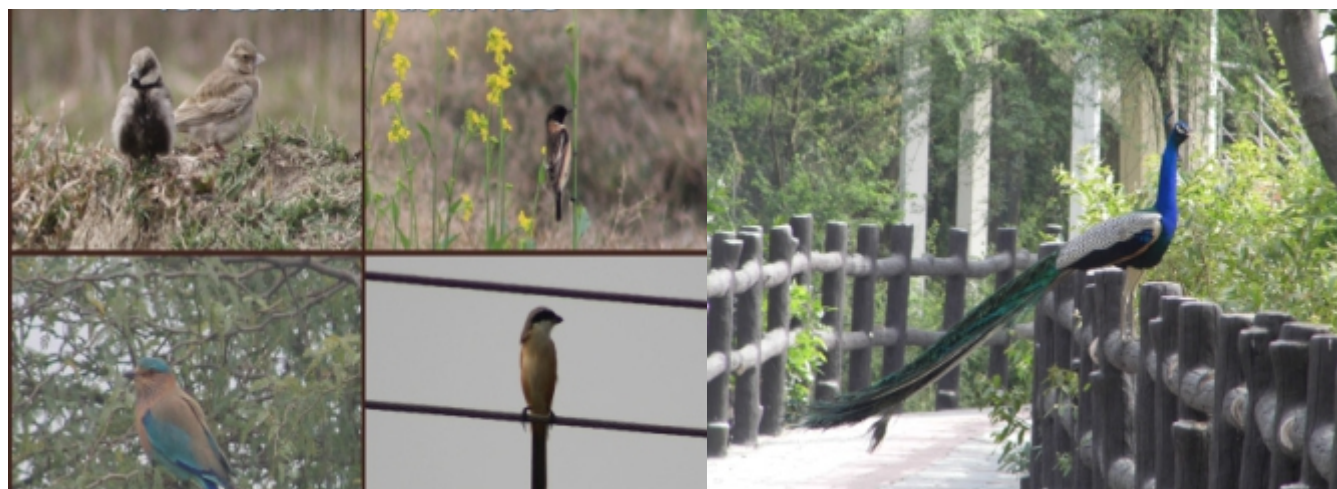


Fig. 14: Terrestrial birds in NBS



Fig. 15: Raptors in NBS



Fig. 16: Others Fauna in NBS



Fig. 17: Breeding colony of Asian open bill storks in NBS

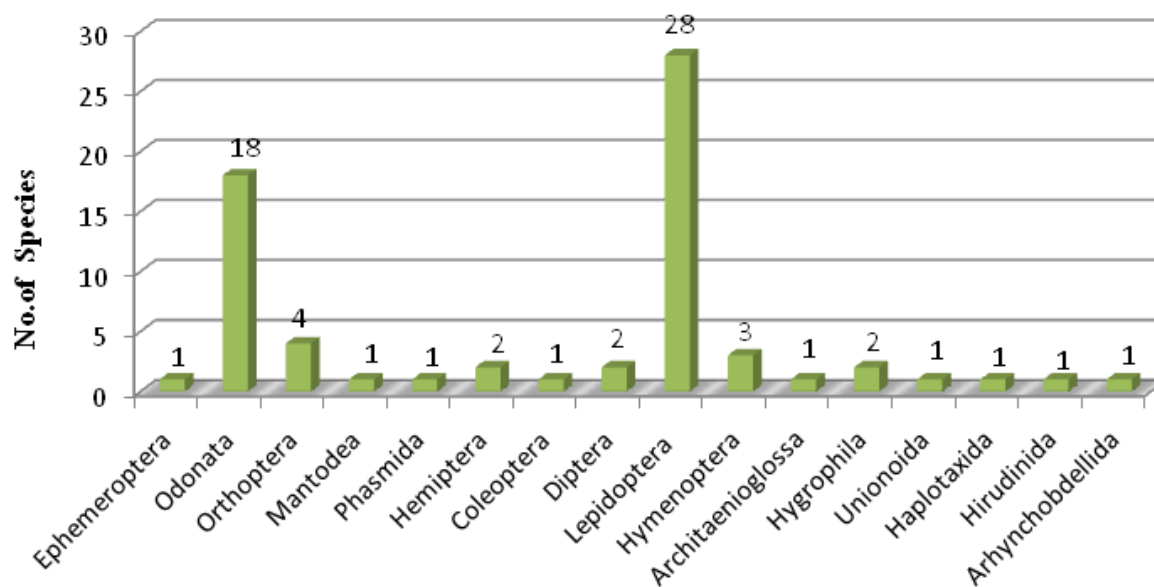


Fig.18: No. of Invertebrates species identified by order in Nawabganj Bird Sanctuary.

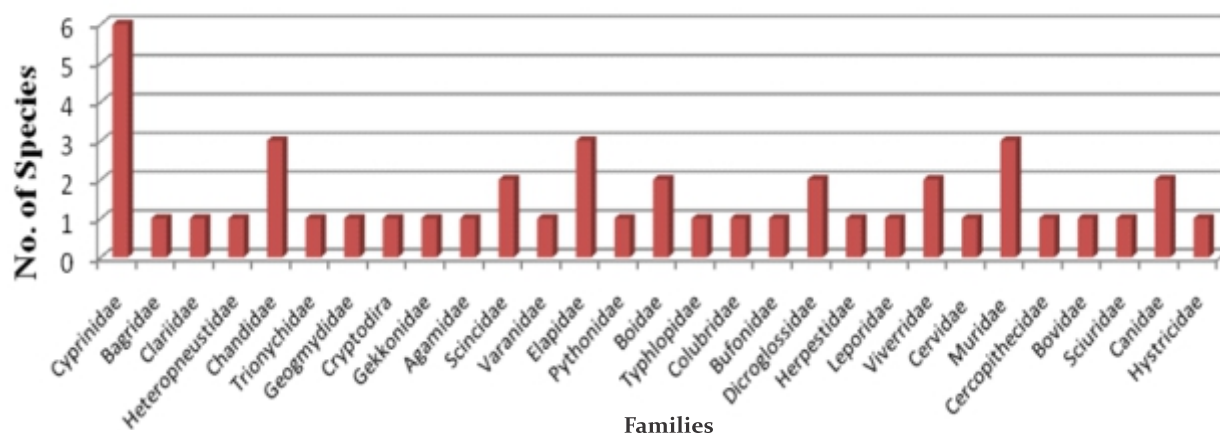


Fig.19: Family wise species composition of vertebrate in NBS.

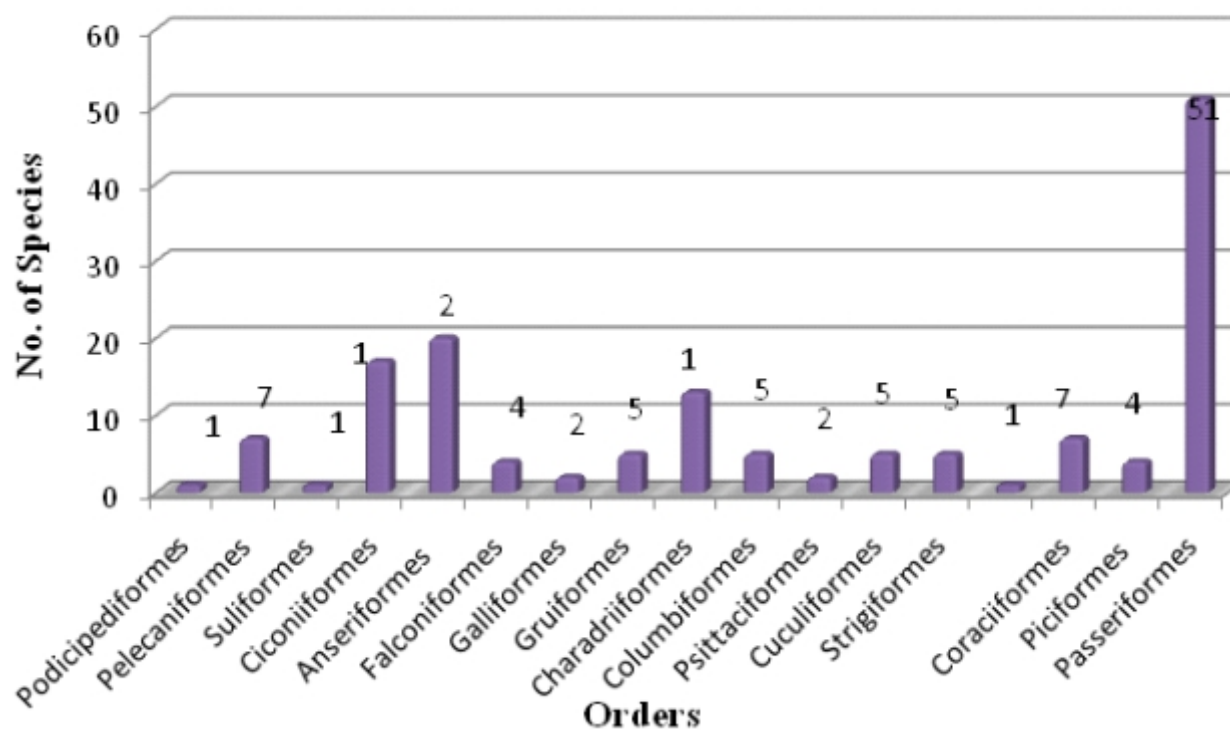


Fig. 20: Order wise species composition of birds in NBS, Unnao.



## Families

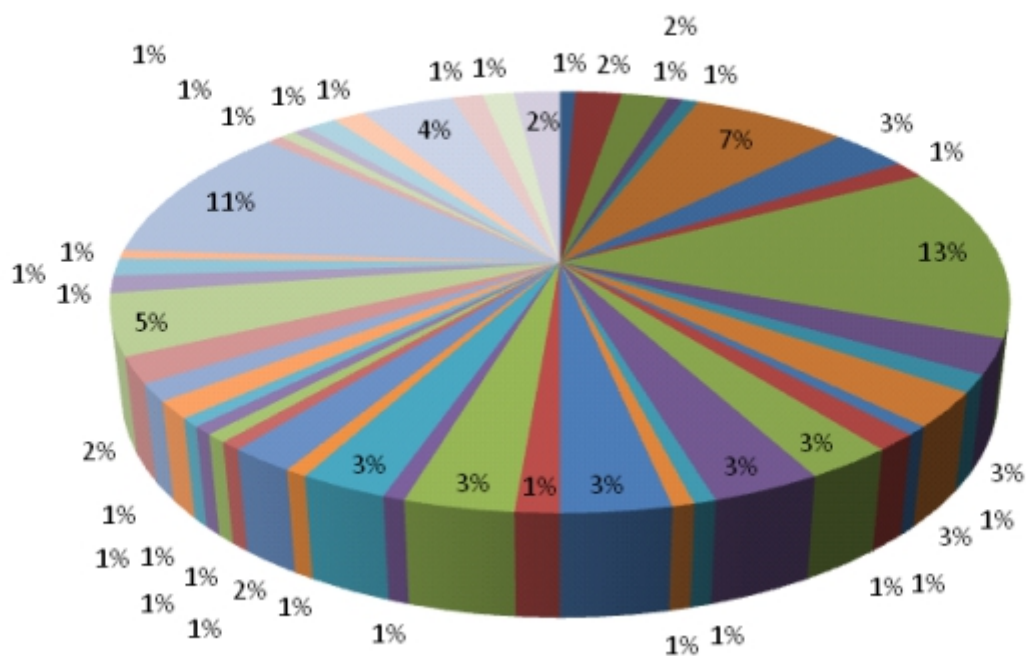


Fig .21: Family wise percentage composition of birds in NBS.

Table 1: overall scenario of domestic tourists and income during 2012-2015 at Nawabganj Bird Sanctuary						
Season	Year 2012-13		Year 2013-14		Year 2014-15	
	No. of Tourists	Income (in Rs)	No. of Tourists	Income (in Rs)	No. of Tourists	Income (in Rs)
Summer	3,040	91,200	3,311	99,330	2,892	86,760
Monsoon	3,111	93,330	2,875	86,250	3,121	93,630
Post-monsoon	4,455	1,33,650	2,771	83,130	4,003	1,20,090
Winter	5,640	1,69,200	4,306	1,29,180	5,402	1,62,060
<b>Total</b>	<b>16,246</b>	<b>4,87,380</b>	<b>13,263</b>	<b>3,97,890</b>	<b>15,418</b>	<b>4,62,540</b>

Fig. 22: Overall scenario of tourists in NBS

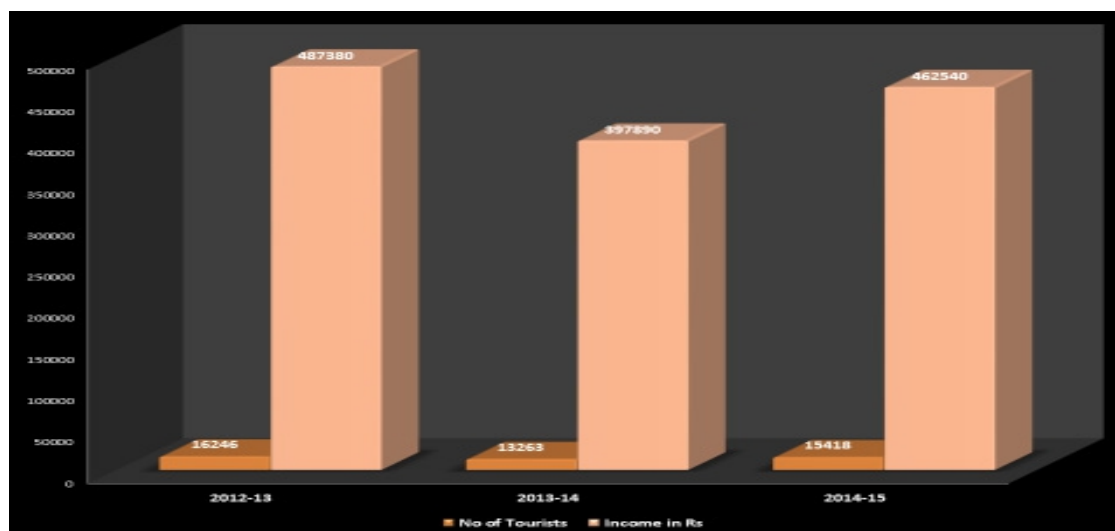


Fig. 23: Scenario of number of tourists and income in NBS



Fig. 24: Tourist enjoy the bird watching at NBS

belonging to 17 orders and 46 families, 10 orders of insects with 61 species, 12 species of fishes belonging to 5 families, 16 species of reptiles, 3 species of amphibians belonging to 14 families, 4 species of mollusks belonging to 3 orders, 3 species of annelids belonging to 3 orders and 12 species of mammals belonging to 10 families from Nawabganj Bird Sanctuary (Fig.13,14,15,16,17,18,19,20,21). All these faunal species depend on the wetland flora and fauna and nearby agriculture fields (Kanaujia et al., 2014).

The forest in NBS with Babul (*Acacia nilotica*), Safeda (*Eucalyptus*), Arjun tree (*Terminalia arjuna*), Gurhal (*Hibiscus rosa-sinensis*), Neem (*Azardiachta indica*), Jungle Jalebi (*Pithecello biumdulce*), Baugainvella, khair (*Acacia catechu*), Kadamba (*Anthocephalus cadamba*) and Bamboo. It is also infested with vegetation like Jal khumbhi (*Eichornia crassppes*), Water chest nut (*Trapa natans*), Jussiaea (*Jussiaea repens*), Water meal (*Wolfia globosa*), Sacred lotus (*Nelumbo nucifera*), Water lily (*N. pubescens*), Coon tail (*Ceratophyllum demersum*), Hydrilla (*Hydrilla verticillata*), Cyprus (*Cyperus alopecuroides*), Pond weed (*Potamogeton nodosus*), Patera cuttail (*Typha lotifolia*), Big duck weed (*Spirodela polyrhiza*), Gerga grass (*Zizania acuatica*), Water spinach (*Ipomea aquatic*) and Smart weed (*Polygonum limbatum*) are common water weeds species in Nawabganj Bird Sanctuary.

## Scenario of Ecotourism in Nawabganj Bird Sanctuary

During study period 16257, 13277 and 15424

foreign as well as domestic tourists recorded in 2012-13, 2013-14 and 2014-15 respectively. The annual income from the tourists is Rs. 491230, Rs.402790 and Rs.464640 in the year 2012-13, 2013-14 and 2014-15 respectively (Fig.22,23,24). This shows that NBS has emerged as an excellent ecotourism place and have great economic value on revenue aspect.

## Conclusion

Study reveals that NBS is an excellent ecotourism place and have great economic value on revenue aspect. The involvement of local communities in Ecotourism activities is a step in the right direction. It provides alternative sources of income to local communities, who live in and around protected areas, thus decreasing their dependency on forest resources and increasing their commitment in keeping the forests intact.

## Acknowledgement

- Head, Department of Zoology University of Lucknow, Lucknow
- Department of Forest, Uttar Pradesh Government
- Dr. Sanjay Srivastava, Coordinator, Endangered Species Project, Uttar Pradesh
- Nawabganj Bird Sanctuary Staff
- All the volunteers and Local people

## References

- Bandara R (2009) The practice of ecotourism in Sri Lanka: An assessment of operator compliance towards international ecotourism guidelines. *South Asia economic Journal* 10 (2), 471-492.
- Buckley RC (2003) Ecological indicators of tourist impact in parks. *Journal of Ecotourism* 2, 15-34.
- Fennell DA (1999) *Ecotourism: An introduction*. Routledge, New York.
- Fernando S. L. J. and Noresah Mohd Shariff (2013). Wetland ecotourism in Sri Lanka: issues and challenges. *Geografia. Malaysian Journal of Society and Space* 2013 Vol.9 No.4 pp.99-105.
- Gill M (2010) The recent trends. *The New York Times*, pp. 6-7.
- Honey M (2008) *Ecotourism and sustainable development who owns paradise?* (Second). Island Press, Washington DC.
- Kanaujia, A., Kumar, A., Kushwaha, S., Kumar, A. and Kumar, A. (2014). Blooming Faunal Diversity of Nawabganj Bird Sanctuary, Unnao, Uttar Pradesh, India. *G- Journal of Environmental Science and Technology*: 2(2), 14-24.
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