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Chapter

Development of Eco-Tourism Vis-à-Vis Conservation Measures for Protecting the Endangered Species of Flora and Fauna: A Study on Bhitarkanika National Park and Wildlife Sanctuary, Odisha, India

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Abstract

Bhitarkanika is the second largest mangrove ecosystem in India after the Sundarbans National Park and is situated in the state of Odisha. It is the home of diverse flora and fauna that are intricately linked with each other. Bhitarkanika comprises lots of endangered species of flora and fauna that needs immediate attention by different stakeholders especially the government and NGOs for conservation and preservation of these diverse resources. The present study is focused on identifying various eco-tourism resources available at this destination and also analyse various protection measures undertaken to conserve and preserve the flora and fauna inside the sanctuary. This study also examines the role of government for conservation and preservation of eco-tourism resources inside Bhitarkanika. The current study reveals that Bhitarkanika Wildlife Sanctuary have immense tourism potentials to become a perfect eco-tourism destination. However, in spite of that, this destination has not been extensively promoted and marketed as a perfect eco-tourism destination in this region. Since this area provides a huge employment opportunity for the local community, so there is an urgent need to conserve and preserve this sanctuary for a better eco-tourism destination in the years to come.

Keywords: ecosystem, flora, fauna, Ramsar sites, endangered species, mangrove Forest

1. Introduction

Bhitarkanika is one of the finest wildlife sanctuaries in Asia, the second-largest mangrove ecosystem in India after the Sundarbans National Park and is situated in the Kendrapada district of Odisha. It is also the home of diverse flora and fauna, which are intricately linked with each other and are the integral components of eco-tourism destination. The conservation and preservation of flora and fauna in

the study area show an improvement in the vegetation and increase the livelihood of the local people resulting in an increase in the tourist flow to this destination. Bhitarkanika, as an eco-tourism destination, comprises lots of endangered species of flora and fauna that needs immediate attention by different stakeholders especially the government and other stakeholders to conserve and protect. Bhitarkanika is situated in-between the river Brahmani and Baitarani and forms the deltaic region in between these two rivers. This area was originally belonging to the wrest while ruler of Kanika and a large portion of this forest land of this delta was encroached in the later phase due to expansion of agriculture in this region by the local people [1]. From tourism perspective, Bhitarkanika consists of areas including Dangmal, Bagagahan, Gahiramatha, Ekakula, Havalikhati, and mangrove forests, rivers, cricks, mudflats, mammals, reptiles, crocodiles, snakes, birds, etc. It has become a global tourist attraction due to the pride possession of white crocodile [2].

2. About Bhitarkanika National Park and Bhitarkanika wildlife sanctuary

This National Park has been declared by the Department of Forest and Environment; Government of Odisha vide Notification No.19686/F & E dated 16.9.1998 with an area Covering 145 sq. km area that is notified as Bhitarkanika National Park. The national park is popular because of its ecological significance coupled with a biological background. It mainly comprises estuarine crocodile, mangrove forest, backwaters, river creeks etc. Bhitarkanika Wildlife Sanctuary was declared vide notification No.6958/FF AH dated. 22.04.1975 with an area of 672 sq. km. of mangrove forest & wetland that provides a home to well over 215 species of birds including winter migrants from central-Asia and Europe. Giant saltwater crocodiles and a variety of other wildlife inhabitants in this ecosystem make this place unique as Asia's one of the most spectacular wildlife areas [3].

The major resources of Bhitarkanika Wildlife sanctuary are the popular mangrove forest and the endangered saltwater crocodile. Apart from the above, the mangrove forest is also a good habitat for the king cobra, Indian python and water monitored lizard. In the year 2002, the Bhitarkanika mangroves with an area of 2672 sq. km. has been declared as a *Ramsar site* being a place of having wetland international importance by Wetland International, South Asia [4].

3. The major objectives of the study

3.1 The major objectives of the studies are as follows

The first objective is to study the tourism potentials of Bhitarkanika. The second objective is to identify different flora and fauna of this place with special emphasis on conserving endangered species. The next objective is to examine the role of government in the conservation and preservation of eco-tourism resources. The last but not the least objective is to analyse how to promote and market Bhitarkanika as a perfect eco-tourism destination.

4. Scope of the study

The current study on Bhitarkanika Wildlife sanctuary and National Park does not only provide you with the scope for getting knowledge on different flora

and fauna available inside the sanctuary but also study the scope of promoting Bhitarkanika as an important eco-tourism destination in entire eastern India with special emphasis to the state of Odisha. Here in this study, the author has considered Estuarine crocodile (Salt Water Crocodile) and Olive Reedley Turtle as major endangered species inside the sanctuary in terms of conservations of fauna, which needs to be conserved and protected. However, in terms of flora, the author considers the mangrove trees as an endangered species in Bhitarkanika, which needs to be protected in order to save the sanctuary and market this destination as a perfect eco-tourism place for the state of Odisha.

5. Methodology used

For preparing this article, the author adopted a checklist and participant observation method. Sample size was restricted to 50. A total of 50 checklists were filled in by the students on their field study visit to Bhitarkanika in the year 2020. Apart from those, interactions were also made with the staff of Bhitarkanika Wildlife Sanctuary, staff of the accommodation units inside the wildlife sanctuary and the guides and boatmen including the District Forest Officer Bhitarkanika through an in-depth interview. The author also used the observation method to discuss and analyse the data. A major limitation was that the dwellers in the Sanctuary could not be contacted to elicit their perceptions/concerns. Since the District Forest Officer himself along with other government officials were present with the team inside the Sanctuary, the author could able to authenticate the information in order to arrive at specific suggestions and conclusion given in this study.

6. Tourism potentials of Bhitarkanika

Being the only state in India, the state of Odisha, one can find all the three varieties of crocodile species mainly Gharial, Mugger and the saltwater crocodile. The first crocodile project was launched in the state of Odisha.

The term Bhitarkanika is formed of two words, “Bhitar” and “Kanika”. In Odia language, Bhitar means interior and Kanika means extraordinarily beautiful. So Bhitarkanika is popularly known as the place having eternal beauty. The Odisha Tourism is developing Bhitarkanika as a destination mainly for ecotourism purposes [5]. Bhitarkanika is a hot spot of bio-diversity and home to giant saltwater crocodiles. One more place inside Bhitarkanika is the Gahiramatha, which is a very important nestling place of Olive ridley sea turtles making Bhitarkanika famous in the entire world.

Inside Bhitarkanika forest block, Bagagahan is the place where mostly as well as different migratory birds used to come and used the mangrove forest for their nestling place. Tourists can see these birds with the help of a watchtower, which can be accessed by foot getting down from the boat to the watchtower [6].

6.1 DANGMAL: saltwater crocodile project at Dangmal

The quietness and scenic atmosphere of Dangmal make it one of the most popular places for tourists where the salt water crocodile project is made. Other attractions at Dangmal include Captive breeding & Research Centre for estuarine crocodile. Here one can see a huge female white crocodile named Gauri. Tourists can see here Python and King Cobra staying together without harming each other in an enclosure. One interpretation hall is constructed in Dangmal, where film show on

Bhitarkanika is made available on demand. This beautiful place can be reached by road from Rajnagar via Khola Check gate.

The boat ride from Khola to Dangmal and return is one of the major activities for the tourists. Khola is one of the gateways into the park. This is along an artificial creek and it passes through dense mangrove forest providing a glimpse into the estuarine ecosystem and its wealth of fauna. Sightseeing facilities are provided with the help of boats that are having a valid licence from the forest department.

7. Saltwater crocodile

It is regarded as the Earth's largest living crocodile species. This variety of crocodiles is basically known as man-eater. In India apart from Bhitarkanika, one can find this variety in The Sundarbans (West Bengal) and Andaman and Nicobar Island. This variety is considered as a threatened species as per IUCN list and it is the IUCN List of Threatened Species that is included in schedule 1 of the Wildlife Protection Act of India 1972.

Saltwater crocodiles are also called Indian muggers. The saltwater crocodile, as evident by its name, can tolerate saline environments very well, that is why it is typically found in brackish water around coastal areas and rivers. The saltwater crocodile (*Crocodylus porosus*) is the largest of all crocodilians and the largest reptile in the world. Bhitarkanika is a very good place to sight the giant Saltwater Crocodile, some of them are growing to 23 feet in length. They are also known as man-eater [7].

One can find the saltwater of estuarine crocodile in the Brahmani and Baitarani River delta region popularly known as Bhitarkanika national park of Odisha. Being an endangered species, the estuarine crocodile population was sharply declined due to extreme poaching, hunting, as well as due to exploitation. So, keeping in mind the above, a conscious effort was first initiated by the forest department of Odisha in form of launching a conservation project popularly known as project Baula.

This project was mainly funded by the FAO of UNDP initially [8]. As a result of this project, several crocodiles were released and also some rare varieties of crocodiles were supplied to other projects launched in different states of India. As a result of this project, illegal trapping and killing of crocodiles were stopped.

Efforts have been made every year to count the crocodile population inside Bhitarkanika. It was also observed that night-time is considered to be the best time in comparison to the daytime for counting crocodile numbers because of hatching and yearling. The study was mainly conducted to make sure that all classes of crocodiles should be present in different places showing a better sign of variable population resulting in a positive sign of showing an increase in crocodile population.

7.1 Major objectives of crocodile conservation projects in Odisha/Bhitarkanika

To protect the remaining population of crocodilians in their natural habitat by creating sanctuaries, to rebuild natural population quickly through 'grow and release' or 'rear and release' technique that involves the following phases of operation, to promote captive breeding to increase crocodile population, to take-up research to improve management as apart of scientific study on crocodile population and their behaviour, to build up the skills of the personnel for better continuity of the project through trainings imparted at the project-sites and the Central Crocodile Breeding and Management Training Institute, in different states of India including Odisha and to involve the local people intimately to maintain ecological balance and improve economic conditions [9].

The Project aimed at maintaining the ecological disbalance caused by deaths of crocodiles in the river basins. To make this happen, three research units on crocodile conservation were established at Dangmal, Tikarpara and Nandankanan Biological parks in Odisha.

7.2 Baula project at Dangmal

In Oriya literature, Estuarine or saltwater crocodiles are popularly known as ‘Baula’. Accordingly, a Baula Crocodile Project has been introduced in Dangmal inside Bhitarkanika Wildlife sanctuary. Under this project, several tests have been conducted successfully in a phase wise manner. In this process, eggs of saltwater crocodiles were collected and kept under supervision for breeding to increase the crocodile population inside Bhitarkanika. This project was found to be successful in increasing the population but also balancing the ecological set-up inside the national park.

The Crocodile Conservation Project was launched in 1975 in different States. As a result of the programme, the estimated number of saltwater crocodiles increased from 96 in 1976 to 1640 in 2012 in India (**Table 1**) [10].

Year	No of saltwater Crocodile Population In Bhitarkanika
1975	Program introduced
1976	96
2004	1308
2012	1640
2019	1742
2020	1757
2021 Jan	1768

Source: Compiled from forest department Statistics.

Table 1.
Saltwater crocodile population in Bhitarkanika.

7.3 Gahirmatha sanctuary

Gahiratha is a popular marine sanctuary situated in the state of Odisha famous for being the world’s largest mating and nestling place for the most endangered Olive ridley turtles. Established in 1997, it covers an area of 1435 sq. km. Extending from Dhamara River from the north to Brahmani River form the south of Kendrapada districts of Odisha. Apart from Gahirmatha, one can find mass nesting and mating centres for Olive ridley turtles in Rushikulya and Devi River [11, 12].

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8. Olive Ridley turtles

This is the smallest and most abundant of all available sea turtles found in the entire world. This species is listed as one of the most vulnerable species in the IUCN Red List, Appendix 1 in CITES, and listed in schedule 1 in Wildlife Protection Act, 1972. This variety of turtle is characterised by mass nesting where thousands of

Year	No of turtle arrivals to Bhitarkanika/ Gahiramatha Marine Sanctuary (In Lakh)
2020	407,000
2019	450,000
2018	470,000
2014	400,000

Source: Compiled from Forest department statistics.

Table 2.
Arrival details of olive Radley turtles to Bhitarkanika/Gahiramatha sanctuary.

female turtles move together to specific places on a regular basis again and again to lay eggs. Normally, a female Olive Ridley Turtle lays eggs up to 100–150 eggs each generally during the night in the small pits they dig, leaving the beach after covering the holes with sand. The hatchling process starts after 45–60 days and then these small turtles crawl into the sea in the absence of their parents [13].

8.1 Major threats to turtles in Bhitarkanika are

Unfriendly turtle fishing practice by the fishermen, development of tourist activities at the nesting places especially Dangmal and Ekakula, more fishing activities in the specified route in which turtles are generally coming to Gahiramatha for laying eggs, excessive use of speed boats and trollers, development of new ports alongside the nesting ground and presence of wild animals in the nesting areas.

Role of government, especially the forest department is taking concrete measures to ensure a smooth mating period followed by laying of eggs in the Gahiramatha area. The major activities in this regard include:

The Forest Department’s intensive patrolling, including at night, had helped decrease turtle mortality especially during the mating season, banning of use of fishing and use of fishing net in the turtle route in which they are coming to lay eggs, banning the use of trawlers in the area by earmarking the route, The Forest Department also keeps a watch on fishing trawlers venturing into the area up to 10 km into the sea from different entry point to Bhitarkanika. Especially from Balasore from north side to Andhra Pradesh from the south side, The forest Department had also started fencing the beach between Gokharakuda and Bateswar, to pave the way free from predators and facilitate smooth mass nesting by the turtles. Last but not the least, the local community-based social organisations were also helping in cleaning activities by sensitising the locals as well as the tourists (Table 2).

9. Endangered flora of Bhitarkanika: mangrove ecosystem

No doubt, the Saltwater Crocodile Conservation Programme has ensured the survival of crocodiles in the Bhitarkanika Sanctuary that has been in operation for more than four decades but the major issue to give a new lease of life, the possibilities lie in managing the area as a Biosphere Reserve containing the mangrove ecosystem.

Recent studies show that the mangrove forest is diminishing due to lack of freshwater supply in the mangrove areas and anthropogenic pressures from the surrounding areas including illegal encroachment for shrimp culture, agricultural activity etc. Another important issue that is responsible for reducing the mangrove forest is due to regular occurrence of cyclones in the state of Odisha. Because of its adjacent proximity to the sea, most of the times the cyclones are

hitting this area especially causing devastating the mangrove forest ecosystem and as a result, it is also observed that the migratory bird populations are also reducing slowly to these areas because of loss of mangrove trees inside the biosphere reserve.

Bhitarkanika wildlife sanctuary has become a floristic composition, nature of distribution, sociability, rarity present in this region for better tourism. Natural area tourism has a major effect on the economy of the country since it provides direct and indirect employment opportunities to raise the standard of living of the host population. In view of this fact, it is felt that there is an urgent need to conserve this sanctuary for a better tourism point of view [14].

10. Conservation measures by government

Mangrove plantation and Nalia grass (*Myriostachya wigstiana*) plantation has been taken up under this programme on riverside of 5 km. as a pilot programme in Bhitarkanika Ramsar site to prevent soil erosion and also natural conservation with livelihood enhancement.

The women are the most vulnerable during disasters for collecting drinking water and sanitation. So, the platforms of 150 nos. Existing tube wells have been raised to the high flood level to avail the drinking water facility during flood. For better sanitation management during the time of flood, 850 nos. of high raised plinth toilets have been installed in coastal flood-affected villages. To manage the ecosystem in water logged areas, proper drainage facility has been created. The creeks of 8 km have been renovated as a pilot programme to release the flood water fast from the project villages.

The government is now encouraging participation in the implementation of Govt. owned programmes, the community has been capacitated by providing training as well as facilitating the action in the field. The Govt. programmes like sanitation, insurance, MGNREGS, horticulture, agriculture, fishery, forest, child welfare etc. has been included in the project villages through convergence.

A massive awareness program has been undertaken by the district administration supplemented with the formation of an anti-poaching camp at different strategic points to stop the poachers away from poaching. To encourage eco-tourism, training camps for eco-tourism guides and boat-man associations are being organised in a regular time interval.

Ministry of Environment and Forest, Government of India provides funds related to digging, plantation programs, including renovation of creeks and ponds to improve habitat inside the sanctuary.

11. Management strategy for conservation program to protect the biodiversity

Several measures have been taken care of by the state government as well as the Ministry of Environment and Forest, Government of India for conservation and preservation of unique bio-diversity of Bhitarkanika. The most important measures to create database regarding the destination, implementation conservation program for saltwater crocodiles, control to protect the water bodies from weeds, control poaching of migratory birds and other animals, sensitising the local community regarding the importance of wetlands and mangrove forest, awareness about the community participation and the need of capacity building program for promotion and development of eco-tourism in the study area i.e., Bhitarkanika.

12. Major findings at different tourist destinations inside Bhitarkanika

- a. The interpretation centre is found to be very small with limited facilities.
- b. Basic amenities like adequate, safe and pure drinking water is not available inside.
- c. No provision of refreshments and food facilities either at the entrance or inside the sanctuary, causing highly inconvenience to the visitors/tourists.
- d. The waste bins/cans are not installed at the entrance and inside the park premises.
- e. Accommodation units both outside and inside the park are found to be inadequate.
- f. The watchtowers are not in sufficient number and are also not sufficient in height.
- g. Many trails were noticed on both sides of the itinerary inside the park.
- h. The guides are mainly locals and less trained but found to be inadequately conversant with languages other than Oriya and Bengali.

Some general findings are as follows:

- Production of a large number of captive stocks without adequate suitable places for release causes ecological imbalance inside the sanctuary.
- Due to an increase in population in and around the sanctuary, resulting in reduction in undisturbed habitats for released crocodilians back in the wild.
- The Financial assistance received from both the state, central and other international organisations is found to be insufficient and irregular causing hindrance in the conservation process.
- During the study, it was also revealed that international organisations like FAO/UNDP that were earlier associated with this project have stopped giving funds to this project.
- Increased and unplanned encroachment by the fishermen to establish Gheris for prawn culture is found to be one of the major threats to the destination.
- It was worthy to mention that the number of nesting grounds for crocodiles is declining every year due to floods and cyclones, which are occurring almost every year.
- Transportation cost for the tourist from the nearest railway station to the entry point of Bhitarkanika is found to be substantially high.

13. Suggestions and recommendations

The suggestions proposed in this study are purely based on observations inside park during the field visit and taking into the theoretical considerations. However,

these suggestions are quite relevant and can consider as important values for sustained growth of ecotourism in Bhitarkanika.

The tourism potentials, as well as tourism resources of Bhitarkanika, are beyond doubt and they can attract mainly the eco-tourists from different parts of the country as well as from the world. The strengths of the park are relatively easy accessibility and abundance of natural resources including its beauty and tranquillity and natural set-up.

Considering the diverse nature of tourism resources of Bhitarkanika, the authorities should think of introducing nature-based tourism activities like bird-watching, crocodile breeding, health tourism, camping and trekking etc., which can be planned in a sustainable manner to provide a variety of tourism resources to the tourist.

A major strength of Bhitarkanika is the abundance of medicinal plant varieties. This, combined with the rich ayurvedic tradition of Odisha, the author suggests that health tourism should be considered as a priority segment for future development. The State of Odisha can certainly be benefited in future if planned in a proper manner.

The interpretation centre, which is constructed inside the sanctuary, is ill-equipped and is found to be inadequate for sensitising the tourist about the park and the significance of nature tourism to their life. There should be provisions for audio-visual systems so that short films and documentary films can be shown to the tourist for sensitization and better education related to their behaviour and movement inside the sanctuary.

Provision of dustbins and bio-degradable carry bags inside the sanctuary especially different entry points at the destinations must be introduced to avoid an unhealthy and uncleaned environment.

Being an eco-tourist destination, special experienced tourist guides, particularly from the local trained youth should be introduced inside the destination for a better visitor management system inside the destination.

Keeping in pace with the tourist traffic, few restaurants including a few refreshment centres should be opened inside the parks mainly at the entrance and terminal point of important tourist points.

Provision of watchtowers inside the park are found to be inadequate in number and are not above the tree line. So, a greater number of watchtowers with bigger heights should be constructed to see the wild animals, especially at night.

The tourist points should be properly planned and built in a synchronised way so that the tourist can enjoy the destination based on a specific time frame with a proper visitor management facility.

Provision for fresh and pure drinking water must be provided for the tourists in specific destinations inside the sanctuary. This will help in discouraging the tourists from carrying bottled water, a potential source of plastic pollution.

The vehicle movements inside the park should be restricted and monitored. Caution needs to be taken about the colour and speed of the vehicles moving inside the park including the sound pollution made by the vehicles for avoiding disturbance to animals.

To optimise the benefits of eco-tourism as well conservation of the sanctuary the people living in both the core and buffer areas may be sensitised properly. The local government shall come up with a suitable agenda for providing better employment opportunities and also create entrepreneurial skills. Different schemes associated with the development of eco-tourism projects like start-up grants, poverty alleviation programs, rural employment opportunities guarantee schemes etc. should be implemented properly to maximise the benefits to the local community.

A proper mechanism for calculating the number of tourist arrivals inside the destination including their demographic profiles and purpose of visit should be made. Occasional surveys must be carried out to find out the activities undertaken

inside the park, their expectations and levels of satisfaction. This will help the facility development/improvement, regulation and monitoring activities inside the park.

Modern boating facilities with proper safety management facilities must be ensured while providing boating service to the tourists. Strict law enforcement is necessary to prevent unauthorised entry into Bhitarkanika and handle armed criminals, especially for hunting. The exact and scientific reasons for declining trends of nestling ground for crocodiles must be examined and thoroughly studied to know the accurate fact.

14. Conclusion

As the name suggests the destination Bhitarkanika is definitely having eternal beauty for which a large number of tourists are now visiting this destination every year. No doubt the Bhitarkanika Wildlife Sanctuary and National Park is a paradise for all the wildlife lovers with its rich bio-diversity, but due to the lack of certain facilities and amenities, the flow of tourists to this spot is not so encouraging in comparison to its tourism resources. If the following points to be taken care of seriously like: facilitating the development of conservation measures both for flora and fauna inside the sanctuary, creation of more employment opportunities through tourism development inside the study area, use of local agricultural and household products including marketing of local handicrafts and souvenir to the tourists who are coming to visit the destination and encouragement of use local facilities like catering, transport, guides, fishing etc.

Then, the place can be very easily marketed as a perfect eco-tourism place of the state of Odisha. If the sanctuary is developed according to the biological and physical tolerance level by maintaining the carrying capacity, then a day will come when this sanctuary will become the main attraction for the tourists of National and International level of the global tourists' market. It is also worthy here to mention that in the year 2001, Bhitarkanika has been identified as the most unexplored eco-tourism destination of India. The scope for marketing Bhitarkanika as an eco-tourism destination is very high. What the destination presently needs is proper marketing, development of infrastructure, especially setting up of accommodation units inside the sanctuary, enhancing the conservation projects for better survival of endangered species, better promotion, maintaining the carrying capacity of the destination and above all planning for a better visitor management system with highest monitoring facilities will definitely make Bhitarkanika a world-class eco-tourism destination in the state of Odisha.

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