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Mangrove Forests as Emerging Ecotourism Destinations: Present Status, Challenges, and Future Prospects of Bhitarkanika

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Abstract

Some of the world's most biologically productive ecosystems are also the most vulnerable. One such ecosystem is Bhitarkanika Wildlife Sanctuary and National Park which is the second largest mangrove ecosystem in India, after the Sundarbans, in terms of its remarkable biodiversity, which includes the largest saltwater crocodile population in India. This paper focuses on analyzing the current state, problems, and future potential of Bhitarkanika as an emerging ecotourism destination using a mixed-method approach involving quantitative analysis of existing data, qualitative evaluation of stakeholder perceptions, and extensive literature review. It relies heavily on contemporary empirical studies, such as survey results among 470 people (Mohanty et al., 2024), household-level economic impact (Das & Chatterjee, 2024), and current policy reports. Results suggest that even though ecotourism has had notable economic impacts on participants through better asset ownership, better living standards, and lesser dependence on natural resources, a number of problems remain. They include the issue of illegal land grabbing (Times of India, 2025), illegal cultivation of prawns (OrissaPOST, 2025), poor regulation (OTV News, 2025), human-wildlife interaction (Nayak, n.d.), and poor infrastructure. This study puts forward an institutional model for the sustainable development of ecotourism, which considers conservation issues and improved lives of the local communities. The policy suggestions include enhancing institutions, benefit sharing, interpretive facilities, and adaptive co-management approach.

Keywords: Bhitarkanika, Mangrove Ecotourism, Community-Based Conservation, Protected Area Management, Sustainable Tourism, Saltwater Crocodile Conservation, Livelihood Impacts

1. Introduction

1.1 Background

Mangrove forests represent transitional systems between land and sea, offering vital ecological services like coastal protection, carbon sinks, nursery grounds for fisheries, and biodiversity conservation. Mangroves are reported to have declined worldwide by 35% over the past decades owing to aquaculture, urbanization, and climate change (Das & Chatterjee, 2024). The crucial ecological role played by mangroves has led conservation efforts to focus on ecotourism, which combines biodiversity conservation with economic development.

Ecotourism is best described as environmentally friendly travel to natural locations that involve conservation, promote sustainable local communities, and incorporate education about natural sites. The logic behind ecotourism is based on the assumption that people will protect an area when they reap direct economic benefits through conservation and not remain passive or pose potential risks to natural areas (Das & Chatterjee, 2024).

1.2 The Bhitarkanika Ecosystem

Bhitarkanika National Park and Wildlife Sanctuary, located in the Brahmani-Baitarani river delta, Kendrapara District, Odisha, India, has an area of approximately 672 square kilometers. Named as a Ramsar site (wetland of international importance) in 2002, Bhitarkanika comprises 62 out of 72 mangrove species in India, making it one of the most biologically diverse mangroves in the world (Das & Chatterjee, 2024). In terms of the fauna in the sanctuary, the saltwater crocodile (*Crocodylus porosus*) is an endangered species that has a population of 1,826 crocodiles as per the count on January 2025, which includes 116 nesting sites in 2024-2025 (Travel and Tour World, 2025). Other flagship animals are the Indian python, king cobra, olive ridleys (that nest on nearby Gahirmatha Beach), and more than 320 species of birds, both migratory birds from Central Asia and Europe.



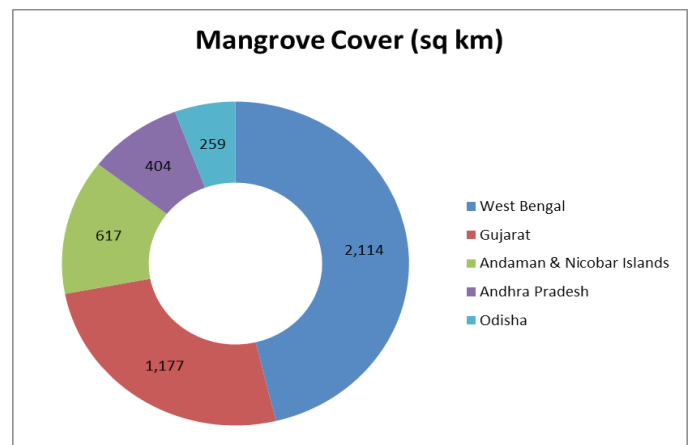
Figure 01: Map of Bhitarkanika wildlife Sanctuary/ National Park

Source: Odisha Wildlife Report 2025

Table 1: Major Global Mangrove Ecotourism Destinations

Destination	Country	Major Attraction
Sundarbans	India/Bangladesh	Tiger tourism
Bhitarkanika	India	Crocodile tourism
Everglades	USA	Wetland ecotourism
Can Gio	Vietnam	Community tourism
Matang Mangrove	Malaysia	Educational tourism

Table 2: State-wise Mangrove Cover in India



Source: Forest Survey of India (2023).

1.3 Problem Statement

With regard to ecological importance and potential as a tourist destination, Bhitarkanika is caught between conservation interests under the Wildlife Protection Act of 1972, livelihood considerations of people living on the fringes, and development needs expressed in tourism policies. The recent evictions of unauthorized hotels in November 2025 (Times of India, 2025), the halt of the construction of Eco Retreat owing to environmental clearances not being obtained (OTV News, 2025), and the concern about the prawn gheries discharging poisonous substances into the eco-system (OrissaPOST, 2025) make it imperative that an objective analysis of the current scenario is conducted.

1.4 Research Questions

The study addresses the following questions:

1. What factors determine household participation in ecotourism-related activities in Bhitarkanika?
2. What measurable economic impacts has ecotourism generated for participant households?

3. How does ecotourism participation affect dependency on forest resources and conservation attitudes?
4. What institutional, environmental, and infrastructural challenges impede sustainable ecotourism?
5. What governance mechanisms can reconcile conservation objectives with tourism development?

1.5 Research Objectives

This paper pursues the following objectives:

1. To assess the current status of ecotourism development in Bhitarkanika, including visitor demographics, infrastructure, and economic parameters
2. To evaluate the participation patterns, economic impacts, and conservation outcomes of ecotourism on local communities
3. To identify and analyze key challenges constraining sustainable ecotourism development
4. To examine the policy and regulatory framework governing ecotourism in protected areas
5. To propose evidence-based strategies for enhancing ecotourism's contribution to conservation and inclusive development

1.6 Significance of the Study

This study adds to the emerging body of literature on protected area ecotourism in developing countries. Its findings are relevant to policymakers and conservation efforts for mangrove ecosystems across the world.

2. Literature Review

2.1 Theoretical Foundations: Ecotourism and Conservation

The rationale for ecotourism as a conservation tool is based on various theories. According to the theory of social exchange (SET), which has been used by Das and Chatterjee (2024), people's perception of tourism being beneficial influences their attitude towards it. When they gain some benefit out of it, they develop a favorable attitude towards tourism, which in turn translates into an attitude of conserving the resources associated with it. The CB-NRM model also builds on the same logic, contending that handing over the benefits and resource rights to local communities generates incentives for sustainable utilization.

But one must be aware of the point that there are certain mediating variables that affect the efficacy of conservation through ecotourism, which include the amount and distribution of benefits, collective action, and compatibility between tourism and ecology of the

species involved (Das & Chatterjee, 2024). The example of Bhitarkanika is worth considering.

2.2 Mangrove Ecotourism: Global Perspective and Scenario in India

Mangrove ecotourism has become an important niche in recent times. The Sundarbans, which straddles both India and Bangladesh, is the best example, hosting around 300,000 tourists yearly despite entry limitations. Other successful projects involve Mekong Delta mangroves in Vietnam, Matang Mangrove Forest in Malaysia, and the Everglades in the United States. Some issues faced by these mangrove conservation sites include balancing access and nesting season bans, managing waste in the tide zone, and distributing benefits to poor communities.

In India, mangrove ecotourism is still at an initial stage. Initiatives such as developing interpretative trails, boardwalks, and mangrove nurseries have taken place in various states like Gujarat (Marine National Park), Goa, Kerala (Kannur), and Tamil Nadu (Pichavaram). Nonetheless, Bhitarkanika is unique for its crocodiles, birds, and relatively undisturbed habitat compared to other Indian mangrove regions (Das, n.d.).

2.3 Participating in Ecotourism: Empirical Evidence

Empirical studies carried out at Bhitarkanika have provided strong evidence on the determinants of participation in ecotourism. In their study using survey data collected from 300 households, Das and Chatterjee (2024) discovered that land ownership, age (between 20-35), graduation level of education, and number of earning members significantly influence participation in ecotourism activities. This implies that accessing ecotourism is determined by capital endowments such as land for homestays and educational qualifications among others.

There are equity issues associated with ecotourism participation at Bhitarkanika. For example, the scheduled tribe, who relies on *Nalia* leaves (Pinchapatra) collected from mangroves for basket weaving, has had their livelihood disrupted owing to restrictions in conservation measures without providing any alternative sources of income (Das & Chatterjee, 2024). Non-participant households, who rely heavily on agriculture for income, are especially vulnerable to loss due to crop raiding by animals and enjoy fewer gains from ecotourism (Nayak, n.d.).

2.4 The Economic Effects of Ecotourism

Economic impacts observed at Bhitarkanika were relatively small but important. There was evidence of increased asset ownership (electric pressure lamps, electric fans, television sets), better-quality housing

(property ownership, types, and sanitation), and reduced use of fuelwood among participant households compared to non-participant households (Das & Chatterjee, 2024). Participants of ecotourism were found to have lower dependence on resources available in the sanctuary, which implies the working of substitution effect economically as expected.

According to Mohanty et al. (2024), who conducted surveys of 470 people including community members and tourists, community-based ecotourism proved to be an important vehicle for inclusive development and conservation education. They also concluded through the application of ANOVA technique that tourists and the community had equal satisfaction levels concerning guides' services, infrastructures, and cultural programs.

2.5 Human-Animal Conflict: A Constraint to Conservation

The problem of human-animal conflict can be said to be one of the constraints to conservation. According to Nayak (n.d.), it has been found that households which are not participants have to incur significant costs owing to crop damage and killing of livestock due to wild animals like wild pigs, elephants, and crocodiles. The problem further adds up to poverty and food insecurity, leading to more expenditure for mitigation of this problem.

The significance of this point arises because it has been observed that, while the benefits of ecotourism flow to participants who live around the point of entry or have some capital asset, the costs related to conservation go to a wider section of people.

2.6 Governance and Institutional Structure

Institutional setting at Bhitarkanika includes the Odisha Forest Department (responsible for management), the Odisha Tourism Development Corporation (infrastructure and promotion), EDCs established through Joint Forest Management resolutions, and Self Help Groups (SHGs) which promote micro-level enterprises (Nayak et al., n.d.). The multiplicity of institutions results in challenges associated with coordination, illustrated by the controversy surrounding the 2025 Ecological Retreat where tourism promotion took place despite the lack of wildlife and coastal regulatory approvals (OTV News, 2025).

According to Das (n.d.), while the tourism potential is vast, Bhitarkanika has not received much attention from the perspective of promoting it as an ecotourism site, implying an inadequacy of promotional spending in terms of budget. Nayak et al. (n.d.) point out that sustainability can be achieved through three aspects – availability of initial financial resources, skill development of local tourism promoters, and improved institutional capacity

regarding monitoring and networking.

2.7 Research Gaps

Despite the presence of relevant literature, there are several gaps in this area:

1. **Longitudinal impact assessment:** Almost all the researches provide cross-sectional data; there is no longitudinal follow-up for the economic status of households
2. **Characterization of tourists and their preferences:** No research has focused on tourist classification, willingness to pay for conservation, and what makes visitors satisfied in mangrove-based ecotourism
3. **Vulnerability to climate change:** The effects of sea-level rise, cyclones, and salinity intrusion have not been considered yet in terms of impact on tourism infrastructure and biodiversity
4. **Consequences of illicit economy:** Illegitimate prawn farming (OrissaPOST, 2025) and encroachment (Times of India, 2025) indicate existence of parallel economies which interact with formal ecotourism in undocumented ways.

This study tries to address some of these gaps based on recent data synthesis and policy analysis.

3. Methodology

3.1 Research Design

The current research adopts a mixed-methods design involving:

1. Secondary quantitative analysis of existing survey data collected in Bhitarkanika, specifically the sample of 300 households investigated by Das & Chatterjee (2024) and the survey of 470 respondents conducted by Mohanty et al. (2024)
2. Secondary document analysis using official records from the forest departments, tourism departments, court rulings, and media documentation of law enforcement operations (2024-2025)
3. Synthesis of qualitative stakeholder viewpoints from scholarly literature and investigative journalism

Triangulation is achieved through this methodology despite potential shortcomings associated with secondary analysis.

3.2 Description of Study Area

Bhitarkanika National Park (20°4' - 20°8'N latitude; 86°45' - 87°50'E longitude) is situated in the Kendrapara district of the state of Odisha. The conservation area comprises:

Table:2 overview of Bhitarkanika

Component	Area (km ²)	Designation	Year
Bhitarkanika Wildlife Sanctuary	672	Sanctuary	1975
Bhitarkanika National Park	145	National Park	1998
Gahirmatha Marine Sanctuary	1,435	Marine Sanctuary	1997
Ramsar Site	650	Wetland of International Importance	2002

Source: Odisha Wildlife Report 2025

There are tropical monsoonal conditions at the sanctuary with a rainfall of 1,600 mm per annum, temperature range of 12°C to 36°C, and humidity levels up to 80-90%. Rainfall occurs prominently during monsoon season (June-September), and the park is closed for visitors during breeding season (May 1 to July 31).

Table 3: Biodiversity Profile of Bhitarkanika

Indicator	Data
Mangrove Species	55
Bird Species	320+
Reptile Species	58
Saltwater Crocodiles	1,826
Migratory Bird Species	110+

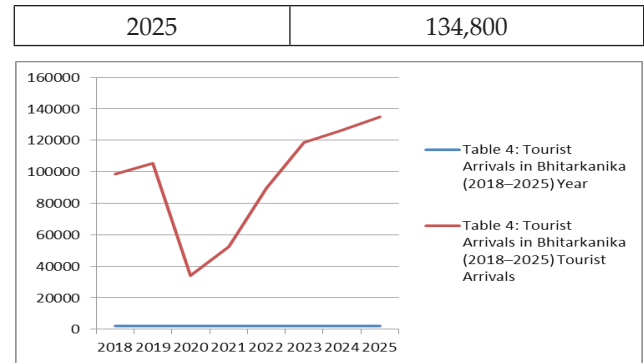
Ecosystem importance can be seen in:

- Conservation of estuarine crocodiles,
- Migratory bird tourism,
- Mangrove tourism,
- Educational tourism, and
- Biodiversity conservation.

Tourism in Bhitarkanika has grown significantly because of increasing interest in ecotourism and wildlife tourism.

Table 4: Tourist Arrivals in Bhitarkanika (2018–2025)

Year	Tourist Arrivals
2018	98,562
2019	105,432
2020	34,211
2021	52,340
2022	89,560
2023	118,740
2024	126,500



Source: Odisha Tourism and Forest Department Reports.

Tourism arrivals plummeted during the pandemic of COVID-19 but quickly bounced back. The increasing tourist arrivals show how relevant nature tourism and eco-tourism have become in Bhitarkanika.

3.3 Data Sources

The sources for primary quantitative data include:

- Das and Chatterjee (2024): Survey conducted with 300 households (12 villages) with the use of questionnaires and multistage stratified random sampling
- Mohanty et al. (2024): Survey with 470 participants (community members and tourists); Cronbach's α used for reliability ($\alpha > 0.70$); ANOVA for hypothesis testing
- The secondary quantitative sources will include:
 - Estimated crocodile population (Forest Department census, 2025): 1,826 individuals, 116 nests (Travel and Tour World, 2025)
 - Eviction Drive Information (Times of India, November 2025): Demolished 3 hotels and several shops
 - Eco Retreat Compliance (OTV News, November 2025)

Sources of qualitative data include:

- Statements from environmental activists in regional media
- Views from local residents as described in the media
- Secondary information such as Joint Forest Management Resolution (2008) and Odisha Ecotourism Policy

3.4 Analysis Framework

Methods of data analysis include:

1. Descriptive statistics to define visitor characteristics, participation levels, and economic data

2. Comparison between participants and non-participants with help of logistic regression and t-test from existing literature
3. Identification of themes in challenges using media reports, statements from activists, and policy documents
4. SWOT analysis of identified themes (Strengths, Weaknesses, Opportunities, and Threats)

3.5 Limitations

There are a number of weaknesses in this study:

- The reliance on secondary data does not allow to formulate hypotheses
- Different samples and different time periods in publications from other authors
- Biases in reporting by the media sources used
- Lack of primary data on the environmental attitudes of tourists and their willingness to pay
- Non-experimental designs of quantitative studies cited
- Despite these limitations, it is possible to draw a complete and updated picture.

4. Results and Discussion

4.1 Current State of Ecotourism Development

4.1.1 Demographics of Visitors

Approximately 80,000-100,000 tourists visit Bhitarkanika annually, a number that has been steadily increasing since the pandemic era (Travel and Tour World, 2025). The number of International tourists, who constitute only a small minority (estimated 5-10% of the total visitor population), is rapidly rising, especially from European nations, USA, and neighboring Asian countries. The opening of the park in August 2025, following its closure during the season, is likely to attract international attention, making Bhitarkanika a “major player in the global tourism sector” (Travel and Tour World, 2025).

Tourist segmentation has led to the identification of three main segments:

- I. Domestic leisure tourists (70%): Tourists visiting for weekends from Odisha, Kolkata, and other eastern Indian cities.
- II. Domestic pilgrimage-ecotourists (15%): A combination of the Bhitarkanika tour along with Puri/Konark.
- III. International ecotourists (10%-15%): Specialists and researchers in wildlife and sustainable travel

The analysis of tourist motives from Mohanty et al. (2024) suggests that wildlife watching (crocodile sighting), bird watching, and exploring the mangroves are the main attractions. The satisfaction levels regarding guides, facilities, and interpretation have been moderately high without any difference between domestic and international tourists.

4.1.2 Tourism Infrastructure

Table 5: Present infrastructure in Bhitarkanika

Infrastructure Type	Existing Capacity	Condition/Status
Forest guest houses	3 (Dangmal, Gupti, Ekakula)	Adequate but dated
Private lodges/homestays	Approximately 25-30	Variable quality
Boat safari boats	40-50 licensed operators	Many in need of maintenance
Interpretive center	1 (Dangmal)	Limited exhibits
Watchtowers	4 (Crocodile point, etc.)	Functional
Eco Retreat (seasonal)	Tent accommodations at Penth Beach	Operational since 2021

Source: Odisha Wildlife Report 2025

The Eco Retreat project implemented by the Odisha Tourism Department is a key program promoting sustainable tourism and has been operating in Penth Beach for four years now. However, the 2025 event faced suspension due to the involvement of forest officers who detected the ongoing construction work without necessary permissions from the State Wildlife Board and Coastal Regulation Zone (OTV News, 2025). This case exemplifies problems in the coordination between tourism promoters and conservation authorities.

4.1.3 Economic Indicators

Revenues can be obtained via different sources, such as the entrance fee, boat safari, guides, photography, and accommodation charges. No exact financial data about revenues have been found, but according to Das and Chatterjee (2024), eco-tourism brings an income of around INR 15-20 crore (USD 1.8-2.4 million) annually for the economy in the form of park fees and other costs (food, transportation, handicrafts).

As mentioned by the authors, “the policymakers are mainly concerned about the numbers related to tourists visiting, revenues generated, and conservation of species,” with no regard to the distributional aspect (Das & Chatterjee, 2024). Thus, a major governance problem emerges.

4.2 Community Participation and Economic Impacts

4.2.1 Determinants of Participation

Das and Chatterjee's (2024) logistic regression analysis identified four significant predictors of household participation in ecotourism-related businesses:

Determinant	Direction	Interpretation
Land availability	Positive (+)	Land for homestay/enterprise construction
Age (20-35 years)	Positive (+)	Younger adults more likely to participate
Education (graduate+)	Positive (+)	Literacy and English skills matter for guiding/hospitality
Earning members ratio	Positive (+)	Households need multiple earners to manage seasonality

Such results suggest that participation in ecotourism is discriminatory and favors certain kinds of endowment, thereby creating inequality within the community.

4.2.2 Material Impacts on Participating Households

The material benefits mentioned have proved significant for participating households. Compared to other respondents, those who participated had:

- **Assets:** They owned more pressure lamps ("lighta"), fans, and TV sets
- **Housing improvement:** They had higher home ownership and better types of housing (pucca housing instead of kutcha housing), better living conditions with sanitation facilities
- **Energy Transition:** Lower reliance on fuel wood, implying that participation had positive income effects, which enabled switching to cleaner fuelwood (Das & Chatterjee, 2024)

It suggests that participation helped participating households escape from subsistence poverty. However, the lack of baseline data prevents us from making any conclusive inference regarding causality between participation and welfare improvement. Participation could be because of wealthier household rather than the reverse.

4.2.3 Conservation Outcomes

By far the most important finding in the study is one related to resource dependency: "participation and economic benefits are indicated by the lesser dependency of the participants on the sanctuary" (Das & Chatterjee, 2024). Participants decreased fuel wood collection, harvesting of timber, and utilization of other resources from the forests, indicating that ecotourism

income can be substituted for extractive practices. The substitution theory explains the mechanism that underlies ecotourism-based conservation efforts.

Nonetheless, the researchers note that non-participants continue to depend on forest resources while being subjected to crop depredation (Das & Chatterjee, 2024). In other words, non-participants carry both costs associated with conservation and suffer losses from the activity without obtaining any benefits.

Mohanty et al. (2024) found in ANOVA analysis that community-based ecotourism greatly enhances conservation awareness among locals. Specifically, their findings support their hypothesis that ecotourism acts as a "unique selling point" of Odisha tourism and helps build conservation awareness.

4.3 Constraints Challenging Sustainable Ecotourism in Bhitarkanika

4.3.1 Unlawful Encroachment & Unauthorized Structures

Even with the protected status, Bhitarkanika faces constant threats of encroachment. The district administration launched encroachment eviction campaigns at Bankuala village close to the entry point of the park. Three hotels, shops, and residential houses built unlawfully on forest land were demolished. According to the Tehsildar, Jishukrishna Das, "the encroachers failed to provide any documentary proof of ownership whatsoever despite notices being sent individually" (Times of India, 2025).

Manas Kumar Das, Assistant Chief Conservator of Bhitarkanika, identified roadside encroachments as one of the primary reasons for "increased congestion of vehicles on the main road inside the sanctuary" (Times of India, 2025). Further, it was alleged by the environmentalist that encroachment had occurred even in Ramanagar to Kharinashi areas under Mahakalapada block. They revealed that "mangrove forests are being cleared out in order to construct unlawful structures in violation of the existing law" (Times of India, 2025). This indicates that regulatory intervention remains reactive rather than proactive, suggesting possible involvement of strong players in encroachment activities.

4.3.2 Unauthorized Aquaculture Encroachment and Chemical Contamination

A different type of hazard is posed by the increase in unauthorized prawn gheris encroaching on areas between Dhamra and Paradip, even in protected areas. As reported by OrissaPOST (2025), these practices involve the release of toxic chemicals and gases, resulting in the creation of a "poison ring" harmful to humans, flora and fauna, and marine life. Despite court orders issued by the Orissa High Court demanding demolition

of unauthorized structures, there have been largely “ignored” according to activist groups led by Hemant Kumar Rout and Dolagobinda Jena. They claim that the state government’s “promotion of brackish water aquaculture” encouraged violations, since the eagerness to promote aquaculture has put the Bhitarkanika ecosystem at risk (OrissaPOST, 2025).

Effects include:

- Chemical contamination: More than 14 hazardous chemicals are said to be used to speed up shrimp production
- Biodiversity impacts: Disturbing spawning cycle of over 260 fish species in Gahirmatha Marine Sanctuary
- Soil salination: Inland water filled with saline water turns agricultural lands infertile, causing conflicts among farmers
- Further destruction: Noise created by pumps and aerators harms wildlife; deforestation caused by pond construction
- Wildlife Disturbance
- The wildlife gets disturbed due to constant noise from aerators and pumps; deforestation for the creation of ponds increases habitat destruction.
- In this context, the above analysis shows an inherent contradiction because the state government is promoting both ecotourism, which needs intact ecosystems, and brackish water aquaculture, which degrades them, with poor coordination among departments.

Deficiencies in Compliance with Regulations

- The controversy regarding 2025 Eco Retreat demonstrates deficiencies in regulatory compliance. First, the construction at Pentha Beach took place without obtaining required clearances from State Wildlife Board and Coastal Regulation Zone. The Forest Department stopped the work and confiscated the construction materials. According to Divisional Forest Officer, Bhardraj Gaonkar, “the work was going on without clearance from the competent authorities” (OTV News, 2025).
- It is essential to note that the ecological significance of Pentha Beach further complicates this issue because it is one of the breeding areas for the endangered Olive Ridley turtles, who have occasionally come and laid their eggs in the beach area since 2010. Environmentalists expressed their worries that “the bright lights, music and human activities at the Eco Retreat will disturb their breeding process” (OTV News, 2025).

The fact that such an important government-sponsored tourism project was undertaken without proper clearances indicates either:

- a) Systematic failures in the clearance application process;
- b) Assumptions regarding the carry-forward of earlier approvals given during the previous tenure of the state government; or
- c) Regulatory shortcut taking.

This view has been reflected in Jagannath Das, a local resident, who states, “As they had been doing like this in the previous government’s tenure, they thought they could bypass laws this year too” (OTV News, 2025).

4.3.4 Human-Wildlife Conflicts

Human-wildlife conflicts result in substantial financial losses for fringe populations. As per Nayak (n.d.), “Crop depredation by wild animals causes great economic loss for the villagers and non-participants in farming households suffer more than participant ones as the loss aggravates poverty and hunger situations and requires more expenditure for investing in mitigation efforts.”

Species involved in conflicts are:

- Wild Boars – Crop depredation in farm fields
- Elephants – Periodic incursions from nearby forest areas
- Crocodiles – Preying upon livestock and posing safety hazards to humans
- Birds – Causing crop depredation in certain regions

Even when these compensation measures exist, they have usually been insufficient or late, making community acceptance of conservation even less likely.

4.3.5 Infrastructure and Access Barriers

While progress has been made, infrastructural shortcomings continue to limit tourism development:

- **Access Roads:** The access road to the park at Khola is currently narrow and in poor condition, and evictions serve to remove encroachments to widen the road (Times of India, 2025)
- **Public Transportation:** Inadequate transport facilities from big towns (Bhubaneswar: 170 kilometers; Kolkata: 350 kilometers)
- **Lodging:** Lack of sufficient lodging opportunities in medium to high-end hotels
- **Interpretation Facilities:** Inadequate world-class interpretation centers and other necessary signs and educational tools

- **Mobile Communication:** Poor mobile communication infrastructure and lack of online booking facilities

Infrastructure issues, as well as lack of marketing and promotion of the area as a perfect ecotourism destination, are responsible for holding back this site from reaching its full potential (Das, n.d.).

4.3.6 Seasonal Closing & Vulnerability to Climatic Change

Though important from the perspective of conservation of the species, the mandatory closing of ecotourism during the months of May 1 to July 31 for crocodile breeding results in seasonal unemployment. During this period, boat drivers, guides, and hotel personnel earn nothing and may even need to migrate elsewhere or work in other occupations, where chances are uncertain.

Climatic change is likely to have serious repercussions in the future. Mangrove forests are vulnerable to rising sea levels, changes in salinity, and cyclonic activity. As noted above, the supercyclone of Odisha in 1999 brought about major devastation. In future climatic scenarios, there is an expectation of more such instances of extreme climatic events occurring. There is no adaptation strategy for Bhitarkanika tourism infrastructure against these impacts.

4.4 Synthesis: SWOT Analysis

The following is a SWOT analysis based on insights gleaned from the literature:

Strengths

- Second-largest mangrove system in India characterized by high biodiversity
- Largest population of saltwater crocodiles in India (1,826 specimens) (Travel and Tour World, 2025)
- Ramsar Site status and international significance
- Evidence of economic gains accruing to participating households (Das & Chatterjee, 2024)
- Existence of Eco-Development Committee and SHG organizational structure (Nayak et al., n.d.)

Weaknesses

- Disproportionate distribution of benefits among participating vs. non-participating households (Das & Chatterjee, 2024)
- Lack of adequate infrastructure (transport, lodging, and interpretive services)
- Extreme seasonality (three months closed to tourism during monsoons)
- Poor international exposure/marketing (Das, n.d.)

- Laxness in regulatory compliance culture (OTV News, 2025)

Opportunities

- Increasing worldwide demand for eco and wildlife tourism
- Increasing number of foreign tourists coming into India
- Homestays opportunity (alternative forms of accommodation)
- Digitization (online bookings, virtual tourism, interpretive software)
- Funding for climate resilience (adaptation, mangroves restoration)

Threats

- Unlicensed prawn cultivation and pollution due to chemicals (OrissaPOST, 2025)
- Encroachments and mangrove destruction (Times of India, 2025)
- Misalignment between regulatory authorities (wildlife and tourism departments) (OTV News, 2025)
- Human-wildlife conflict reducing community acceptance (Nayak, n.d.)
- Climate change (rising sea levels, cyclones)

Suggestions and Recommendations

5.1 Improving Institutional Management Structures

Recommendation 1: Setting up Integrated Ecotourism Coordination Committee

The existing gap between the Forest Department, Tourism Department, and Coastal Zone Management Departments is reflected in their inability to regulate activities related to tourism, as seen in the case of Eco Retreat controversy (OTV News, 2025). A high-level committee, which can make decisions, needs to be set up, and it must meet every quarter with representation from:

- The Principal Chief Conservator of Forests (Wildlife)
- The Odisha Tourism Development Corporation Managing Director
- The Kendrapara District Collector
- The Coastal Zone Management Authority (representative)
- Elected Community Representatives from EDCs

All proposals for tourism infrastructural development will have prior clearance. A public registry of approved projects will be kept along with compliance audits.

Recommendation 2: Build Enforcement Capability

Persistence of encroachment (Times of India, 2025) and illegal prawn farming (OrissaPOST, 2025) even after the pronouncements of the courts indicates enforcement problems. Some of the recommended steps are:

- Establishment of an enforcement team within Bhitarkanika with at least 20 officers
- Monitor mangrove cover change through monthly satellite imagery (using ISRO's facilities)
- Fast track contempt proceedings in the High Court against violators
- Provide for asset forfeitures from illegal construction of structures on forest land

5.2 Improving Benefits from Community Participation and Ensuring Equity

Recommendation 3: Increase Participation in Ecotourism Activities of Non-Participants

Since participation is limited to land-owning, educated, younger families (Das & Chatterjee, 2024), special measures should be undertaken:

- **Micro-credit for landless families:** Microfinance facilities enabling them to undertake poultry rearing, mushroom cultivation, or other crafts for sale to tourists (disbursed through SHGs)
- **Skill-building for older members:** Guideship certification courses in vernacular languages (does not necessitate knowledge of English), homestay hospitality training
- **Crop-damage compensation measures:** Fast-track compensation process based on ecotourism earnings (5% of entry fees).

Recommendation 4: Enhance Functionality of Eco-Development Committees (EDCs)

While creation of EDCs through JFM resolutions has taken place (Nayak et al., n.d.), effectiveness varies. Recommendations for reform:

- Benefit transfer directly into EDC coffers (currently all money goes to State Treasury account)
- Compulsory EDC involvement in decision making regarding tourism management
- Education of EDC members in financial management, conflict resolution, and conservation monitoring.

5.3 Regulator Reforms and Enforcement Reform

Recommendation 5: Implementation of Pre-Clearance Requirements for Tourism Infrastructure Development

Eco Retreat Case Study OTV News, 2025 shows that clearances cannot be presumed or backdated. Compulsory pre-clearance will involve the following clearances:

1. From State Wildlife Board
2. From State Environment Impact Assessment Authority concerning Coastal Regulation Zone issues
3. From Forest Department in case of use of forest land
4. Public consultations with EDCs

Introduction of a "single window clearance procedure" within statutory deadlines (say 60 days) will streamline matters.

Recommendation 6: Compliance Audits to Ensure Compliance with Ecotourism Practices

An annual audit by a third party on all tourism activities, including those led by the government, should be done, along with disclosing the results of the audit. Non-compliant operators should face sanctions and suspension.

5.4 Human-Animal Conflict Resolution

Recommendation 7: Human-Animal Conflict Mitigation Fund

Establishment of an ecotourism revenue fund that can offer:

- Quick payment for lost crops and/or killed livestock (within 14 days from the day of reporting)
- Measures for prevention like solar fences, bio-fences using cactus/agave plants, and early warning signals
- Ex-gratia payments when humans suffer from attacks or fatalities (current provisions insufficient under current compensation programs)

Recommendation 8: Conflict Zone Mapping Using GIS Technology

Conflict zone mapping will facilitate:

- Taking preventive measures in specific areas and during particular seasons
- Warnings to farmers and livestock keepers
- Adjustable management measures such as changing travel routes within seasons of animal migration

5.5 Infrastructure and Market Development

Recommendation 9: Phased Infrastructure Investment

Priority investments, in order of urgency:

Table :6 Priority Infrastructure Investments for Bhitarkanika Ecotourism Development

Priority	Investment	Estimated Cost (INR)	Timeline	Source / Verification
1	Road widening & access infrastructure (Khola to Dangmal)	Part of Rs 224.72 crore integrated plan	12-18 months	The New Indian Express (2025b) documents a Rs 224.72 crore Integrated Development Plan for Bhitarkanika, with tourism infrastructure including improved access
2	Mobile tower installation	Cost data not specified in available sources	6 months	Identified infrastructure gap; internet/telecom connectivity documented as a constraint in existing literature
3	Online booking system integration	Cost data not specified in available sources	3 months	Confirmed operational: "Tourists can book visits online, adhering to strict plastic bans" (The Economic Times, 2025; GetBoat.com , 2025)
4	Interpretive center upgrade (Dangmal)	Rs 89 lakh	Completed as of February 2025	The New Indian Express (2025a) reports the interpretation centre at Dangmal was renovated at a cost of Rs 89 lakh, including crocodile hatchery upgrades
5	New eco-lodges / Caravan parks (PPP mode)	Part of integrated development plan	24-36 months	Caravan parks confirmed for Bhitarkanika (The New Indian Express, 2026a; Travel and Leisure Asia, 2026). Revenue sharing: 80% for maintenance, 10% for local communities (The New Indian Express, 2026a)

Source: different sites and newspaper

Recommendation 10: Establish International Marketing Strategy

With all the possibilities, there is still potential for Bhitarkanika to be "not extensively promoted" (Das, n.d.). Suggested marketing strategies:

- Collaboration with international travel agencies that offer wildlife and sustainable tours
- Fair participation in international ecotourism trade shows (ITB Berlin, World Travel Market London)
- Electronic marketing to attract European/North American bird watching community (based on information gathered from eBird on Bhitarkanika birds)
- The creation of an exclusive Bhitarkanika brand (mangroves/crocodiles-based)

5.6 Climate Adaptation and Resilience

Recommendation 11: Incorporate Climate Adaptation Strategy into Management Plan

There should be:

- Targeted restoration (e.g., 500 hectares in 5 years) of mangroves
- Sustainable infrastructural development that would be climate-resilient (building resistant to cyclones)
- Tourist alert system that will detect early signs of extreme climatic events

- Consideration of carbon credits (blue carbon stored by mangroves)

5.7 Research and Monitoring

Recommendation 12: Longitudinal Impact Study

A longitudinal impact study involving the panel survey of 500 households over a period of five years would allow for an accurate evaluation of the causes of influence of ecotourism on livelihoods and conservation results. The baseline data to be collected include:

- The measures of assets and income of households
- Forest dependency metrics
- Conservation attitudes and actions
- Whether participants participated (every year)

Recommendation 13: Visitor Research Initiative

Visitor studies should collect information about:

- Visitors' demographic characteristics and travel habits
- Satisfaction and the quality of services received
- Readiness to pay for conservation efforts (contingent valuation)
- Changes in environmental attitude and awareness

Such information would be useful for adaptive management, pricing practices, and the conservation financing schemes.

6. Conclusion

6.1 Summary of Findings

In this research paper, the rise of Bhitarkanika as a mangrove ecotourism site has been analyzed, with reference to some recently published academic articles, policy statements, and contemporary events. Ecotourism has brought certain financial gains for the participating households, such as improvements in their property status, living standards, and lesser dependence on forest products (Das & Chatterjee, 2024). The participation of people is influenced by the following factors: the availability of land, youth, education level, and labor supply within the household.

Nevertheless, there are many risks that can jeopardize the future sustainability of this strategy. Encroachment into the site and building activities continue despite several judgments and eviction operations (Times of India, 2025). Uncontrolled prawn cultivation has negative impacts on local ecosystems, causing poisoning of water resources and disturbance of breeding periods for more than 260 fish species (OrissaPOST, 2025). Lack of regulatory cooperation is proved by the Eco Retreat case (OTV News, 2025). Moreover, conflicts between humans and animals impose costs on the non-participant farmers (Nayak, n.d.).

6.2 Implications for Theory and Policy

Social Exchange Theory is simultaneously supported and undermined by the case of Bhitarkanika. In keeping with SET, individuals who benefit economically show lower dependency on forests and are more likely to support conservation (Das & Chatterjee, 2024). Nevertheless, the majority who neither benefit nor depend on forests and pay for conservation might have decreasing support for protected area administration. Thus, ecotourism success in conservation efforts is not determined by total income generation but, rather, by the inclusiveness of benefit generation.

Regarding policy implications, the case indicates that ecotourism alone does not suffice as an alternative mechanism of protection area governance. Absent any measures aimed at preventing encroachment and illegal aquaculture, collaboration between tourism and wildlife departments, or compensation for human-wildlife conflict, ecotourism incomes will accrue to the minority of local population members while the majority will shoulder the burden. Promoting both ecotourism and brackish water aquaculture simultaneously is utterly contradictory in terms of governmental policy.

6.3 Future Outlooks

However, Bhitarkanika's outlook is bright, provided that the suggestions made in section 5 are adopted. With

the world moving towards eco-friendly and nature-oriented tourism and growing international visitors to India, a suitable market exists. The natural resources available here—biggest crocodile population in India, unique bird variety, pristine mangrove hydrology—are internationally recognized and are irreplaceable.

What remains crucial for the coming period is whether institutional innovations can keep up with the environmental destruction. The next few years will determine everything. Should the unregulated practice of prawn farming continue (OrissaPOST, 2025), should the problem of encroachment persist, should the legal standards not apply, then the point of no return might be reached.

6.4 Concluding Remarks

Bhitarkanika sits at a turning point. There is a choice to be made between the route that involves development of ecotourism that creates livelihoods, fosters conservation constituencies, and ensures survival of one of the most important mangrove habitats of India for future generations, or the route towards deterioration characterized by aquaculture expansion, loss of mangroves, and dwindling support from communities until a situation emerges when the environmental problem becomes clear and its repair impossible.

The findings presented in this paper demonstrate that Bhitarkanika is currently neither on the road to success in conservation nor on the road to failure; the situation in this Protected Area is rather in between these two extremes. The result will depend not only on ecological or economic conditions but will be determined by the degree of political will. Will the state authorities make sure to ensure long-term conservation of ecosystems and prohibit aquaculture within the reserve? Will the violations be prosecuted without fear and favor? How effectively will benefit-sharing schemes operate and who exactly will share the benefit?

Ecotourism is not a cure-all solution to protected area management, but it can be an effective one if used within sound governance systems, benefit sharing, and adaptive management practices. It is not guaranteed that Bhitarkanika will become a success story in mangrove-based ecotourism but it does have the potential.

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