

## **ORIGINAL ARTICLE**



# **Evaluating the ecological and economic impact of forest ecotourism in Maharashtra**

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#### **ABSTRACT**

A comparative analysis of 59 ecotourism sites in Maharashtra has been conducted, focusing on 10 parameters classified into two major categories: infrastructure development, and financial data. Each parameter was evaluated on a scale of 1 to 10, providing a clear representation of site performance and investment efficiency. The findings reveal significant budget allocations for infrastructure development, while ecotourism—despite its sustainable growth potential—receives limited funding, indicating a need for improved resource allocation. The study identifies gaps between site potential and current rankings, highlighting untapped opportunities. Among the 59 sites, 17 were classified as high potential, 27 as medium potential, and 13 as low potential, with two sites not qualifying as ecotourism destinations. Most sites fall into the medium potential category, with a notable number classified as low potential. The balanced sanction cost, typically 50% of the total project cost, suggests opportunities for optimizing initial cost allocation. Financial assessments indicate substantial infrastructure spending, crucial for site functionality, but ecotourism initiatives remain underfunded, necessitating strategic reallocation to promote sustainability.

#### **KEY WORDS**

Ecological; Economical; Ecotourism; Sustainability; Maharashtra

#### ARTICLE HISTORY

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#### Introduction

Ecotourism is defined as responsible travel to natural areas that conserves the environment and improves local wellbeing [1]. Studies highlight its dual role in biodiversity conservation and rural economic development [2]. However, mismanagement can lead to ecological degradation [3]. In India, ecotourism has gained traction, but financial and policy barriers persist [4]. Ecotourism in India is reshaping the travel industry by promoting responsible travel practices and supporting the preservation of natural and cultural heritage. It offers travelers the opportunity to explore the country's diverse landscapes and cultures sustainably while making a positive impact on the environment and local communities [5]. Ecotourism is a form of tourism in which we undertake tourism activities to fragile, relatively unvisited areas where nature was more than favorable while distributing its beauty. The tourism activities are undertaken in a responsible manner so that the sanctity of nature's ecological balance and the culture of the people are not disturbed in unhealthy way [6]. It emerged in the 1970s and 1980s as part of the broader environmental movement, driven by growing concerns about the impact of mass tourism on fragile ecosystem [7].

Ecotourism has emerged as a key strategy for promoting sustainable development, balancing economic benefits with ecological conservation. Maharashtra, with its rich biodiversity and forested landscapes, offers significant potential for ecotourism. However, the state faces challenges in optimizing resource allocation to maximize both environmental and economic gains [8]. This study evaluates 59 ecotourism sites across Maharashtra, assessing their ecological and economic impacts through a structured comparative analysis. The scope of nature tourism in Maharashtra is large. It includes tiger reserves from the Sahyadri in the west to the tiger reserves in the east (Vidarbha). In addition, the Sanjay Gandhi National

Park in a metropolis like Mumbai, Thane Creek Sanctuary, mangroves, Lonar Lake, and even Kalsubai Peak above sea level are included in nature tourism areas. In Maharashtra, areas reserved for hunting by kings and princely states in the past, as well as old temple pilgrimage sites (Devaraya), forts and forts of the Maratha era, and high-quality nature tourism sites are also included in this. In the near future, beaches, forest parks, memorial parks, adventure sports tourism, ancient heritage sites, etc. are being included in this category and developed to provide employment to the local people [9]. It is the need of the hour to preserve the historical forts and ancient Lonar lakes of Maharashtra, to provide nature education to students and tourists, and to create a sense of belonging to this place by providing employment to the locals through nature tourism. The state of Maharashtra is very rich in natural resources, and about 20% of the total geographical area of the state is forest area. These forest areas are very rich in biodiversity and include various types of plants, wild animals, and wildlife. The state has a total of 6 tiger reserves, 6 national parks, 52 wildlife sanctuaries, and 28 conservation reserves, and a total of 86 protected areas. Also, Maharashtra has a total of 3 Ramsar Wetland sites, 5 biodiversity heritage sites, and 1 biological hotspot. There is a lot of scope for nature tourism in the forest areas of the state. [10]. Maharashtra's ecotourism initiatives, though promising, require systematic evaluation to ensure sustainability [11].

#### Research aims

The assessment aims to evaluate 59 forest sites across Maharashtra, categorizing them into various types of ecotourism, evaluated for their potential as ecotourism destinations. Each site is assessed based on its potential to support ecotourism. The primary objectives are to



identify sites that align with the principles of ecotourism sustainable practices, contribute to environmental conservation, and enhance community well-being and economic development [12].

- 1. Maharashtra's diverse landscapes and climatic variations contribute to a rich tapestry of flora and fauna. These natural resources establish the state as an ideal region for promoting ecotourism.
- 2. The assessment process incorporates a multidisciplinary approach, employing various evaluation parameters such as biodiversity richness, accessibility, infrastructure readiness, and socioeconomic impact.
- 3. Recommendations and course corrections for each site are proposed to enhance their potential in accordance with the site-specific characteristics. To achieve long-term sustainability and effective governance, the assessment emphasizes the necessity of a cohesive master plan.
- 4. This includes provisions for one-point consultancy, proactive visitor attraction strategies, and robust institutional mechanisms.
- 5. A shift in perspective through innovative taglines and logos is proposed to redefine the identity of ecotourism offerings in these regions.
- 6. Finally, an actionable framework for site selection, funding eligibility, and proposal sustainability is outlined.
- 7. This will serve as a guiding document for implementing ecotourism projects while fostering conservation, community welfare, and economic growth.

The primary aims of this assessment report are to evaluate and analyze potential sites for ecotourism development, ensuring they align with sustainable practices and contribute to environmental conservation. The evaluation aligns with the principles of ecotourism, emphasizing environmental conservation, community well-being, and sustainable economic development. This includes:

# 1. Identifying Feasible Locations

Conducting a detailed feasibility study of selected sites based on key parameters to determine their potential for ecotourism development.

# 2. Promoting Sustainable Tourism

Establishing guidelines and strategies that balance tourism growth with ecological preservation, enhancing the long-term viability of the sites.

## 3. Strategic Recommendations

Providing actionable insights and course corrections tailored to each site to optimize its potential while addressing challenges.

#### 4. Vision and Policy Alignment

Aligning the assessment with broader ecotourism policies and envisioning a cohesive approach to site management and visitor attraction.

## 5. Development of a Roadmap

Outlining a clear action plan that includes mandates for site selection, funding, and sustainability to ensure a well-governed and impactful ecotourism initiative.

## **Research objectives**

- To assess the current state of ecotourism infrastructure and funding in Maharashtra.
- To evaluate the ecological sustainability of ecotourism initiatives.
- To analyze financial efficiency and identify gaps in budget allocation.
- To categorize sites based on potential and recommend policy improvements.

## Methodology

## Study area

The study covers 59 ecotourism sites across Maharashtra, selected based on accessibility, visitor footfall, and ecological significance (Table 1) (Figure 1 and 2).



Figure 1. Sites for assessment selected under different categories of ecotourism across Maharashtra.



Figure 2. Types of site selection.

Table 1 List of eco-tourism sites

Sr.	Name of Tourism Site	District	<b>Ecotourism Site Type</b>	Level of ET Site
No.				
1.	Navegaon Nagzira Tiger project	Gondia	Wildlife Tourism	State
2.	Bor Tiger project	Wardha	Wildlife Tourism	State
3.	Umred Pavni Karhandla Wildlife Sanctuary	Nagpur	Wildlife Tourism	State



1	Sahvadri Tirar project	Kolhanur	Müldlife Termine	Chatc
4.	Sahyadri Tiger project	Kolhapur	Wildlife Tourism	State
5.	Radhanagari Wildlife Sanctuary	Kolhapur	Wildlife Tourism Wildlife Tourism	State
6.	Yaval Sanctuary	Jalgaon		State
7.	Nandur Madhmeshwar Sanctuary  Valentei Heritak de adaptada Sanctuary	Nashik	Wildlife Tourism	State
8.	Kalsubai Harishchandragarh Sanctuary	Ahilyanagar	Wildlife Tourism	State
9.	Tansa Wildlife Sanctuary	Thane-Palghar	Wildlife Tourism	State
10.	Phansad Sanctuary, Ta. Phansad, Dist. Roha & Murud	Raigad	Wildlife Tourism	State
11.	Karnala bird Sanctuary, Ta. Panwel	Raigad	Wildlife Tourism	State
12.	Andharban Wildlife tourism site, Sudhagarh, Thane	Thane	Landscape Tourism	District
13.	Sanjay Gandhi National Park (mini train), Borivali	Borivali	Wildlife Tourism	State
14.	Sanjay Gandhi National Park, Borivali	Borivali	Wildlife Tourism	State
15.	Niwali forest Park tourism, Ta. Jintur, Dist. Parbhani Aurangabad	Aurangabad	Adventure Tourism	District
16.	Ajanta Van Udhyaan, Dist. Thana, Ta. Soygaon	Aurangabad	Heritage Tourism	State
17.	Ghodazari Wildlife Sanctuary, Nature tourism, Bramhapuri, Chandrapur	Chandrapur	Wildlife Tourism	State
18.	Pakshitirtha Tabak Udyan, Ta. Panhala, Kolhapur	Kolhapur	Urban forest/Nature Park tourism	District
19.	Tadoba Andhari Tiger project, Chandrapur	Chandrapur	Wildlife Tourism	State
20.	Padmapur Gate, Tadoba Andhari Tiger Project	Chandrapur	Wildlife Tourism	State
21.	Deulgaon-Rehkuri Wildlife Sanctuary	Pune	Wildlife Tourism	State
22.	Aundha Nagnath nature tourism centre	Hingoli	Urban forest/Nature Park tourism	District
23.	Mouje. Vagarwad, Aundha Nagnath nature tourism site	Hingoli	Landscape Tourism	District
24.	Vaidyanath forest tourism, Parli vaidyanath	Aurangabad	Urban forest/Nature Park tourism	District
25.	Risangaon nature tourism centre	Nanded	Landscape Tourism	District
26.	Mouje Dharmabad, Forest Park, Nature tourism centre	Nanded	Urban forest/Nature Park tourism	District
27.	Pandit Dindayal Upadhay Biodiversity Park, Mouje Khedmakta	Chandrapur	Urban forest/Nature Park tourism	District
28.	Biodiversity Park Forest, Kinhi Village (Sindewahi forest zone)	Chandrapur	Urban forest/Nature Park tourism	District
29.	Ajaypur, Zopla Maruti Devasthan	Chandrapur	Urban forest/Nature Park tourism	District
30.	Uthalpeth Gaymukh nature tourism site, Chichpalli	Chandrapur	Urban forest/Nature Park tourism	District
31.	Varora Borgaon Forest Park, Nature tourism site	Chandrapur	Urban forest/Nature Park tourism	District
32.	Dindayal Upadhay Eco Park, Mul.		Urban forest/Nature Park tourism	District
33.	Jungle safari tourism development	Chandrapur	Landscape Tourism	State
34.	Visapur Botanical Garden	Chandrapur	Urban forest/Nature Park tourism	State
35.	Joggers Park, Forest Academy	Chandrapur	Recreational	Institutional
36.	Forest Park, Tapi river nature tourism site	Dhule	Urban forest/Nature Park tourism	District
37.	Chivti Bari waterfall, Nature tourism development, Pimplener	Dhule	Landscape Tourism	District
38.	Nitavde Donvade waterfall, Nature tourism site	Kolhapur	Landscape Tourism	District
39.	Bhudargarh fort Nature tourism site, Ta. Bhudargad	Kolhapur	Heritage Tourism	District
40.	Datta tekadi, Nature tourism site, Islampur	Sangali	Landscape Tourism	District
41.	Mahabaleshwar Nature tourism site	Satara	Landscape Tourism	District
42.	Ozarkhed, Nature tourism site, Ta. Dindori	Nashik	Landscape Tourism	District
43.	Harihargarh fort tourism development, Ta. Trimbakeshwar	Nashik	Heritage Tourism	District
44.	Kadbanwadi forest park, Group no. 36, Ta. Indapur, chinkara protection and Biodiversity Forest Park	Pune	Landscape Tourism	District
45.	Forest & Tourism Park and Wildlife Habitat Development, Village Kanheri	Pune	Urban forest/Nature Park tourism	District
46.	Pachgaon Parvati Taljai Forest Park, Forest survey no. 1	Pune	Urban forest/Nature Park tourism	District
47.	Bavdhan Nature tourism site, forest survey no. 3	Pune	Urban forest/Nature Park tourism	District
48.	Bharnewadi Forest Park, Ta. Indapur, Forest survey no. 153, Reserve Group no. 1272	Pune	Urban forest/Nature Park tourism	District
49.	Wadegaon Forest Garden, Indapur tehsil, Reserve Forest Group no 828, 830	Pune	Urban forest/Nature Park tourism	District



50.	Karjal Biodiversity Forest Park, Forest survey no. 85, Ta. Akkalkot, Pune	Pune	Landscape Tourism	District
51.	Paniv Forest Park, Group no. 219/2, Ta. Malshiras, Solapur	/2, Ta. Malshiras, Solapur Solapur Landscape Tourism Dis		District
52.	Dr. C. D. Deshmukh Biodiversity Park, Jamgaon, Ta. Roha	Roha	Landscape Tourism	District
53.	Rudraksh van, Nature tourism site, Nimbala, Vani, Yavatmal	Yavatmal	Urban forest/Nature Park tourism	District
53.	Rudraksh van, Nature tourism site, Nimbala, Vani, Yavatmal	Yavatmal	Urban forest/Nature Park tourism	District
54.	Late Prakash Dada Dahake Eco Tourism centre Karanja (laad)	Yavatmal	Urban forest/Nature Park tourism	District
55.	Wildlife sanctuaries centre & forming tiger safari	Chandrapur	Wildlife Tourism	State
56.	To build an organic compound of length 90-meter formangrove forest, Versova survey no.120 under Mhada in Mumbai Sub	Mumbai	Urban forest/Nature Park tourism	District
57.	Pench Tiger Project	Nagpur	Wildlife Tourism	State
58.	Aner Dam Sanctuary	Dhule	Wildlife Tourism	District
59.	Padmalya Forest Park, Erondel, Nature tourism site	Jalgaon	Urban forest/Nature Park tourism	District

#### **Data collection**

Primary and secondary data were collected through:

- Reports from Maharashtra Eco-Tourism Development Board, M.S. Nagpur
- Government of Maharashtra reports and budget documents.
- Field surveys assessing infrastructure, visitor management, and ecological impact.
- Interviews with forest officials and local stakeholders.

# Methods

#### Criteria for site evaluation

The detailed data for a total of 59 sites, including information on the total project costs, approved funds, and other relevant details was processed for assessment.

- 1. The objective of this assessment is to re-evaluate the potential of these sites in alignment with eco-tourism policies and vision guidelines.
- 2. The purpose is to ensure that these sites are developed in a manner that promotes eco-tourism and aligns with sustainable development goals.
- 3. The assessment process involves an in-depth evaluation of each site based on the following four primary criteria:

## Site condition assessment

Assess each site by evaluating its existing flora and fauna, current footfall, and its position within ecotourism circuits. This analysis will help determine the site's ecological value, visitor potential, and overall integration into broader eco-tourism networks, enabling us to prioritize sites for development based on their sustainability and tourism potential.

# 1. Vision guidelines compliance

Assessing each site using 10 generalized parameters derived from the vision guidelines, based on the received data, to evaluate the site's proposal.

#### 2. Financial evaluation

Analyzing the financial viability of each site, using 10 key parameters and cost breakdowns, to understand the investment required for eco-tourism factors.

## 3. Cost comparison

Comparing the total project cost with the balanced sanctioned cost to evaluate the feasibility of developing the sites and unlocking their full potential for eco-tourism.

- The thorough assessment process ensures that the sites are developed to maximize eco-tourism potential, align with sustainable practices, and adhere to the guidelines set forth by the vision and eco-tourism policies.
- By evaluating these four critical aspects, the feasibility of each site is prioritized and re-evaluated to achieve optimal eco-tourism outcomes.

## Parameters used for site potential evaluation

The sites were assessed on Ecological status - flora, fauna, footfall, and eco-tourism role, scoring each criterion out of 10. This helps prioritize sustainable, high-potential sites.

1. Ecological status - (Flora and Fauna)

- Assess the site's biodiversity, including unique or endangered species.
- Evaluate the overall health of the ecosystem, as richer biodiversity enhances eco-tourism appeal.

# 2. Footfall

- Analyze the current level of visitor traffic
- Identify the potential for further development in hightraffic sites and improvement needs for low-traffic areas.

#### 3. Eco-tourism circuit

- Determine the site's proximity to or inclusion in established eco-tourism routes.
- Assess its connectivity and ability to attract visitors through existing tourism networks.

After categorized the factors under three criteria, assigned scores out of 10 for each, and then calculated an average to determine the overall project score on a scale of 10.

### Site potential evaluations

#### Scoring System

Each criterion will be scored out of 10, leading to an overall site potential score. Based on the total score, sites will be categorized as follows:

- Low Potential: 0-3
- Medium Potential: 4-6
- High Potential: 7-10

This system helped prioritize sites with the greatest potential for eco-tourism development. The types of sites considered for selecting actual eco-tourism and non-eco-tourism locations within the ecotourism evaluation process:





## Parameters used for assessment of given site proposal

The 10 key parameters for assessment of 59 sites:

1. Cleaner public utilities and basic facilities

Ensuring well-maintained restrooms, drinking water, waste disposal, and sanitation facilities for tourists.

2. Proper guidance and information

Providing accurate and easy-to-access tourist information through brochures, maps, and digital platforms.

3. Good signage system

Clear and visible signboards for directions, landmarks, and emergency contacts to aid tourists in navigating the area.

4. Well-defined itinerary for activities

Organized schedules for tourists, outlining various activities and experiences available during their visit.

5. Development of tourism circuits

Creating interconnected routes that allow tourists to explore multiple attractions within a region efficiently.

6. Better developed and managed nics for nature awareness

Establishing well-maintained Nature Interpretation Centers (NICs) to educate tourists about local biodiversity and conservation.

## 7. Participation of local communities

Involving local residents in tourism-related activities, fostering sustainable practices, and creating employment opportunities.

8. Capacity building of local communities and forest staff

Training and empowering local populations and forest staff in tourism management, hospitality, and environmental conservation

9. Good marketing and publicity

Promoting destinations through various media channels, creating awareness, and attracting tourists to less known or emerging locations.

10. Institutional mechanism

Establishing a coordinated framework involving government bodies, tourism agencies, and local organizations to ensure effective planning, management, and implementation of tourism policies.

## **Results and Discussions**

#### **Assessment**

#### Cumulative assessment

Out of the 59 selected sites, 17 sites are identified as high potential, 27 as medium potential, and 13 as low potential, with 2sites not qualifying as eco-tourism sites at all. This indicates that the majority of sites fall into the medium potential category, with a significant number also identified as low potential (Figure 3).

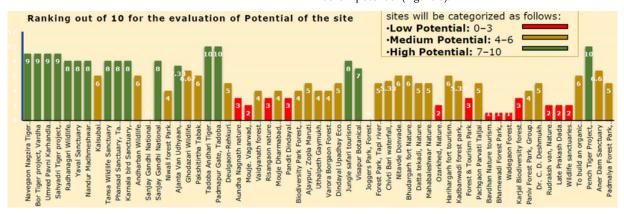


Figure 3. Potential evaluation of sites on the ranking of 10.

# Financial assessment

In recent funding initiatives for eco-tourism, a significant emphasis has been placed on infrastructural development. A larger portion of the budget has been allocated to activities such as creating and enhancing physical infrastructure to support eco-tourism. On the other hand, comparatively less funding has been directed towards other critical aspects like capacity building, involving local communities, developing

nature interpretation facilities, and creating eco-tourism circuits. These areas, while essential for sustainable ecotourism, have received limited financial support in comparison to infrastructure development. The balanced sanction cost, often 50% of the total project cost, highlights significant opportunities for optimizing initial cost allocation and sanctioning processes. Optimizing these areas can enhance financial planning and maximize resource utilization (Figure 4).

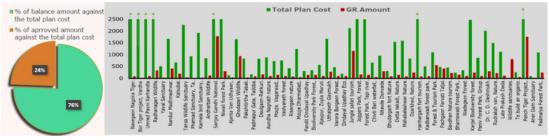


Figure 4. Site assessment based on their plan costing and GR amounts.



The success of ecotourism initiatives heavily depends on thoughtful infrastructure planning and prudent financial management. A comprehensive review of various sites reveals distinct patterns in both development and budget allocation, underscoring areas of strength and identifying opportunities for strategic improvement.

Ecotourism sites can be categorized into three performance tiers based on infrastructure quality. High-performing sites, scoring between 8 and 10, boast well-maintained trails that support sustainable foot traffic, eco-friendly lodging that minimizes environmental impact, and effective waste disposal systems. These features not only improve visitor experience but also uphold environmental integrity a key pillar of ecotourism. In contrast, medium-performing sites with scores ranging from 5 to 7 display inconsistent maintenance. While some facilities may be serviceable, the lack of regular upkeep can erode tourist satisfaction and raise concerns about long-term sustainability. Low-performing sites (scores 1 to 4) struggle with accessibility

and insufficient infrastructure, which discourages visitation and diminishes the broader ecological and economic goals of the ecotourism model.

A closer look at funding allocation reveals a potential mismatch between infrastructure spending and ecotourismspecific needs. Infrastructure development commands a significant 60-70% of total funding, reflecting the importance placed on foundational amenities. However, initiatives tailored to ecotourism such as conservation programs and guide training receive only 10-15% of the budget. This imbalance suggests that while physical development is prioritized, the human and ecological components may be underfunded.

Additionally, the average cost of sanctioned projects amounts to approximately 50% of the total project budgets. This figure points to possible inefficiencies in the planning and approval stages, where budgetary resources might be misallocated or underestimated, leading to financial constraints during execution (Figure 5) (Table 2).





Tadoba-Andhari TR



Umred-Karandala-Pawani Sanctuary

Botanical Garde, Chandrapur









Watch Tower

Shivneri Fort

Nature Interpretation Center, Amba









Sahyandri Tiger Reserve Figure 5. Images of some ecotourism sites.

Table 2. Site potential classification.

Sr. No.	<b>Potential Category</b>	No. of Sites	Key Characteristics
1	High Potential	17	Strong infrastructure, high visitor engagement, good conservation efforts
2	Medium Potential	27	Moderate infrastructure, inconsistent funding, partial community involvement
3	Low Potential	13	Poor facilities, minimal tourism activity, ecological neglect
4	Non-Qualifying	2	Lacked ecotourism criteria (e.g., no conservation focus)

Interpretation Center, STR



## Recommendations

- 1. Reallocate budgets to prioritize conservation-linked ecotourism activities.
- ${\it 2. Enhance\ community\ participation\ for\ sustainable\ tourism\ management}$
- 3. Adopt a tiered funding model, directing higher investments to high-potential sites.
- $4.\ Strengthen$  monitoring mechanisms to ensure ecological compliance.

#### **Conclusions**

The assessment reveals discrepancies between site potential and current rankings, highlighting untapped opportunities for ecotourism development. Inefficiencies in resource allocation can be addressed by identifying and addressing these discrepancies. Aligning investments with vision guidelines can improve site performance and sustainability. Maharashtra's ecotourism sector shows promise but faces imbalanced funding and infrastructural gaps. Strategic reallocation, improved policy, and stakeholder collaboration can enhance ecological and economic outcomes.

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#### **Disclosure Statement**

The authors declare no conflict of interest.

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