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Leveraging Geospatial Insights for Enhancing Tourism Planning: A Locational Perspective on India's Tourism Schemes

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Abstract

India's tourism landscape has undergone significant transformation over the past two decades, driven by a range of national schemes and missions initiated by the Ministry of Tourism. From the iconic "Incredible India" campaign launched in 2002 to the more recent "Dekho Apna Desh" initiative in 2023, these programs reflect a strategic convergence of policy, technology, and cultural preservation aimed at diversifying and decentralizing the country's tourism potential. The "State Specific" campaign (2004–2005) emphasized regional branding by promoting unique state-level tourism identities such as "Goa 365 days" and "Discover Karnataka." Simultaneously, schemes like PRASAD- Pilgrimage Rejuvenation and Spiritual Augmentation Drive and Swadesh Darshan (2014–15) focused on the spatial integration of pilgrimage and thematic circuits, fostering connectivity and infrastructure in culturally significant yet geographically dispersed regions (Ministry of Tourism, Government of India, 2002–2024). More than 76 projects across multiple states were sanctioned under Swadesh Darshan, emphasizing regional development. In 2022, the National Strategy for Sustainable Tourism and STCI indicators- the Sustainable Tourism Criteria for India introduced a locational lens to sustainability by advocating for low-emission zones, circular resource use, and preservation of fragile landscapes. Additionally, initiatives like "HRIDAY"- Heritage City Development and Augmentation Yojana and "Innovative Approaches" have focused on enhancing heritage towns and exploring niche tourism types—many of which are highly place-specific, such as adventure tourism in the Himalayas or wellness tourism in Kerala (Ministry of Tourism, Government of India, 2022a; 2022b). This abstract presents a partial outcome from ongoing research. It includes a comprehensive locational analysis of these schemes, using geospatial technology, highlighting the spatial dynamics, spatial-temporal analysis and visualization of these schemes with a specific emphasis on respective geographical coverage, implementation impact, tourism clusters, mapping and identifying circuit-level connectivity, monitoring infrastructure development, evaluating performance indicators and derivation of future tourism planning potential. This ongoing study reveals an Integrating geospatial insight into tourism policy would enhance visitor experience, supports regional development.

1. Introduction

1.1 Indian Tourism scenario

India's tourism sector, a cornerstone of its socio-economic framework, has witnessed a paradigm shift over the last two decades. Catalysed by central government initiatives, this shift is deeply entrenched in the evolving role of spatial thinking and geospatial intelligence in public policy. From branding campaigns like Incredible India to strategic interventions like Swadesh Darshan, India's approach to tourism has gradually embraced regional distinctiveness, circuit-level planning, and sustainable development.

This paper explores the integration of geospatial technologies into tourism planning, critically assessing the spatial distribution, thematic focus, and regional impacts of tourism schemes. It underscores the locational characteristics of tourism growth while mapping trajectories for future sustainable tourism through geospatial performance indicators and spatial data analysis. This paper examines the evolution of tourism policy frameworks in India, focusing on the increasing integration of geospatial technologies to achieve sustainable and spatially equitable development objectives. The paper aims at exploring how geospatial technologies can guide sustainable and spatially equitable tourism development.

1.2 Evolution of Tourism Schemes in India- Policy review

1.2.1 Early Campaigns and Branding (2002–2005)

Between 2002 and 2005, India witnessed the initiation of strategic branding efforts aimed at transforming its image as a global tourist destination. The landmark "Incredible India" campaign, launched in 2002 by the Ministry of Tourism, marked a pivotal shift in the country's tourism narrative. Its core objective was to rebrand India as a premium, world-class travel destination through a cohesive national media outreach strategy that included digital marketing, international advertising, and targeted infrastructural enhancements at iconic heritage sites such as the Taj Mahal, Jaipur, and other locations across Rajasthan, Delhi, and Uttar Pradesh. These efforts had a strong locational focus, concentrating on heritage-rich northern and western states to reinforce India's cultural and architectural legacy on the global stage. Following this, state-specific branding initiatives gained momentum between 2004 and 2005, as individual states began to craft and promote their distinct tourism identities. Campaigns such as "God's Own Country" (Kerala), "Unforgettable Himachal", and "Goa 365 Days" exemplified this approach. These state-level initiatives strategically leveraged the unique geospatial attributes of each region—be it Kerala's lush backwaters, Himachal Pradesh's Himalayan landscapes, or Goa's coastal vibrancy—to attract niche tourist segments. Collectively, these early branding

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campaigns laid the foundation for geospatially-informed tourism planning by aligning marketing narratives with locational strengths and cultural specificity.

1.2.2 Circuit-Based Development (2014–2015)

The launch of the Circuit-Based Development strategy under the Ministry of Tourism during 2014–2015 marked a significant shift towards holistic and thematic regional tourism planning in India. Two flagship schemes—PRASAD (Pilgrimage Rejuvenation and Spiritual Augmentation Drive) and Swadesh Darshan—were introduced to enhance religious and cultural tourism and promote equitable development across regions.

PRASAD focused on the integrated development of identified pilgrimage destinations by upgrading infrastructure such as approach roads, illumination, parking, waiting rooms, sanitation, and solid waste management. Cities like Varanasi (Uttar Pradesh), Amritsar (Punjab), Puri (Odisha), and Ajmer (Rajasthan) received substantial investment for rejuvenation of temple precincts, ghats, and heritage structures, enabling a smoother experience for pilgrims and boosting local economies.

Swadesh Darshan, meanwhile, took a circuit-based approach, identifying and developing tourism circuits around specific themes such as Buddhist Circuit (Uttar Pradesh, Bihar, Madhya Pradesh), Desert Circuit (Rajasthan), North-East India Circuit (Arunachal Pradesh, Assam, Meghalaya, Manipur, Nagaland, Tripura), Tribal Circuit (Chhattisgarh, Odisha), Eco Circuit (Kerala, Uttarakhand, Madhya Pradesh), and Coastal Circuit (Andhra Pradesh, Tamil Nadu, Goa), among others. Over 76 projects were sanctioned across 30+ states and Union Territories, with a focus on creating high-quality tourism infrastructure, including interpretation centres, last-mile connectivity, accommodation facilities, signage, and landscaping.

The objective was to connect lesser-known destinations—such as Kapilvastu (U.P.), Srisailam (Andhra Pradesh), and Majuli (Assam)—to mainstream tourism through targeted marketing and spatially balanced development. The schemes emphasized convergence with other central and state-level infrastructure programs like AMRUT, Smart Cities, and Bharatmala to ensure sustainability and better visitor experience, thereby positioning tourism as a driver for regional economic growth, employment, and cultural preservation.

1.2.3 Locational Sustainability and Strategic Integration (2020 Onwards)

In the evolving landscape of tourism planning post-2020, India has placed increasing emphasis on locational sustainability and strategic integration through several flagship initiatives. The National Strategy for Sustainable Tourism (2022) introduced the Sustainable Tourism Criteria for India (STCI), aiming to evaluate and guide tourism development with a strong focus on environmental integrity, socio-cultural authenticity, and economic viability. These criteria incorporate location-specific impact assessments, especially in ecologically sensitive zones like the Western Ghats, Himalayan states (Himachal Pradesh, Uttarakhand, and parts of Jammu & Kashmir), and coastal belts of Goa, Kerala, and the Andaman & Nicobar Islands. Simultaneously, the HRIDAY (Heritage City Development and Augmentation Yojana) targeted twelve cities of cultural significance—including Varanasi, Amritsar, Puri, Ajmer, and Warangal—by enhancing urban infrastructure such as pedestrian pathways, heritage illumination, interpretation centres, and public amenities. These spatially grounded interventions supported both conservation and tourism through improved connectivity and place-making strategies. Moreover, the Dekho Apna Desh initiative (2020–2023), launched amid the COVID-19 pandemic, encouraged domestic tourism by promoting experiential and location-specific circuits such as the North-East tribal trails, Buddhist circuit in Bihar and Uttar Pradesh, coastal trails in Tamil Nadu and Odisha, and desert heritage routes in Rajasthan. The initiative leveraged digital campaigns and virtual experiences to highlight underexplored destinations, fostering regional tourism economies and strengthening local infrastructure such as roads, accommodations, and interpretation facilities. Collectively, these programs reflect an integrated approach to tourism planning, rooted in geospatial awareness, heritage conservation, and sustainable regional development.

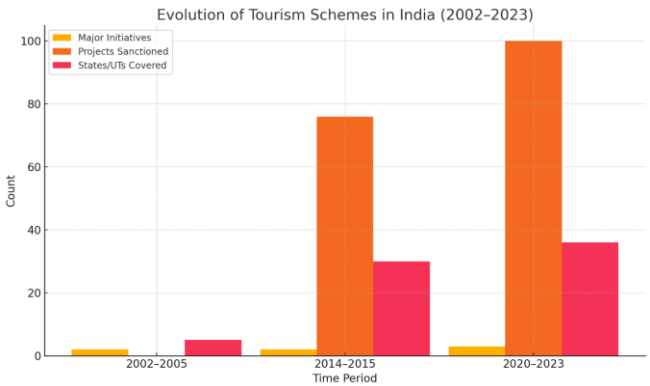

Figure 1: Evolution of Tourism Schemes in India (2002-2023)

Time Period	Major Policy Focus	Geo-Strategic Implication
2002–2005	Global branding, iconic destinations	Selective locational focus; heritage-centric
2014–2015	Thematic circuits, infrastructural investment	Wide locational spread; regional integration
2020–2023	Sustainability, heritage urbanism, domestic push	GIS-enabled, experiential, location-tailored interventions

Table 1: Tourism policy focus and implications

2. Locational analysis of National tourism schemes

2.1 Methodology

The study adopts a mixed-method approach to analyse the locational dimensions of national tourism schemes in India by integrating both qualitative and quantitative data sources. Secondary data forms the foundation for the macro-level understanding and is sourced from authentic government repositories such as the Ministry of Tourism reports (including Annual Reports and Market Research publications), official scheme websites (e.g., Swadesh Darshan, PRASHAD), and guidelines published under the Sustainable Tourism Criteria for India (STCI). This is supplemented by primary data, which is

being gathered through structured and semi-structured field surveys in selected tourism circuits currently under development or recently completed. These circuits span a range of typologies—cultural, religious, coastal, and ecotourism—and are chosen to represent geographic and thematic diversity.

To spatially interpret and evaluate the locational impact of tourism schemes, a GIS-based spatial overlay technique is employed. The overlay integrates multiple geospatial datasets including:

- Existing and proposed tourism circuits,
- Cultural and ecological zones as defined by regional heritage maps and biodiversity inventories,
- Protected areas and environmentally fragile regions identified through satellite imagery and environmental vulnerability indices.

This spatial layering facilitates identification of locational synergies or mismatches—highlighting areas where tourism development aligns well with cultural and ecological assets, and conversely, where it may pose threats to environmental sensitivity. Additionally, proximity analysis is used to assess the accessibility of tourism sites from major transport and hospitality nodes, which influences both tourist flow and scheme effectiveness. Spatial clustering and hotspot mapping help reveal regional imbalances or redundancies in scheme implementation. The methodology thus enables evidence-based inference about the locational coherence and sustainability of tourism infrastructure planning in alignment with national objectives.

2.2 Policy and Schemes highlights

•Swadesh Darshan: Visualization of circuit-level connectivity in the Buddhist Circuit (Bihar–Uttar Pradesh–Nepal). Identified weak last-mile connectivity in Nalanda–Rajgir.
•PRASAD: Pilgrimage destinations like Varanasi and Ajmer mapped with concentric accessibility zones. GIS layering showed high visitor pressure in core zones.
•HRIDAY: Integrated urban heritage GIS mapping in cities like Amritsar and Warangal, revealing spatial overlaps in conservation, traffic, and tourism corridors.
•Sustainable Tourism Indicators: Identified Himalayan ecotourism zones with limited waste treatment access but high tourist footfall.

The evaluation of India's major tourism schemes through a geospatial lens reveals critical insights into planning efficacy and spatial challenges. Under the Swadesh Darshan scheme, the Buddhist Circuit (Bihar–Uttar Pradesh–Nepal) was spatially analyzed to visualize inter-site connectivity and flow patterns. The GIS-based circuit-level mapping highlighted key infrastructural gaps, especially in last-mile connectivity between Nalanda and Rajgir, where inadequate transport linkages reduce tourist mobility and circuit cohesion. This strategic insight emphasizes the need for multi-modal transport integration and last-mile shuttle services to enhance visitor circulation and

heritage experience. The PRASAD scheme, focusing on pilgrimage rejuvenation, revealed through concentric accessibility analysis that destinations such as Varanasi and Ajmer suffer from over-concentration of tourist flows within core sacred precincts. GIS-based pressure mapping identified zones of visitor congestion, underscoring the requirement for distributed visitor facilities, buffer zones, and regulated access nodes to balance spiritual sanctity with sustainable capacity management. In the case of HRIDAY, which aimed at heritage city revitalization, integrated urban GIS mapping in cities like Amritsar and Warangal uncovered significant spatial overlaps between conservation areas, traffic nodes, and tourism corridors. These overlaps often result in planning conflicts and degraded visitor experiences, calling for heritage-sensitive zoning regulations and pedestrian-priority networks. Additionally, the study of Sustainable Tourism Indicators in Himalayan ecotourism zones (e.g., Himachal Pradesh and Uttarakhand) showed a mismatch between tourist influx and ecological infrastructure, particularly waste management facilities, with GIS layers indicating high footfall in areas lacking proper waste treatment systems. This mismatch necessitates a strategic pivot towards eco-infrastructure investments, visitor cap regulations, and community-led waste mitigation strategies to ensure long-term sustainability. These spatially anchored insights support a locationally nuanced and evidence-based approach to national tourism scheme implementation.

2.3 Tourism circuits through mapping

Tourism circuits represent an integrated planning approach where destinations with shared ecological, cultural, or geographical characteristics are linked into cohesive travel routes. The use of **geospatial mapping** in designing these circuits is crucial, as it enables planners to visualize spatial relationships, connectivity, accessibility, and regional complementarities. By leveraging geospatial insights, tourism development can move beyond isolated attractions toward a **networked model** that distributes visitor flows more evenly, reduces ecological stress on single sites, and enhances the overall travel experience. Mapping circuits also helps identify central hubs, linkage corridors, and peripheral destinations, thereby ensuring **balanced regional development**. Moreover, such an approach aligns with the principles of sustainable tourism, as it not only diversifies economic opportunities for local communities but also strengthens conservation outcomes by promoting responsible travel. The case of Gujarat and Rajasthan demonstrates how geospatially informed circuit planning can be employed to showcase ecological diversity, heritage clusters, and cultural landscapes while strategically managing tourism growth at the state level.

2.3.1 Eco Circuits in Gujarat

The Eco Routes map of Gujarat showcases a planned network of circuits designed to connect the state's 22 wildlife sanctuaries and 4 national parks in an organized way. Since visiting all destinations at once is difficult, these routes group ecologically similar areas to make travel easier and more meaningful. The **Eco-Diversity Route** covers Gir, Junagadh, Porbandar, and Jamnagar; the **Aravallis Route** connects Jessore, Ambaji, and Balaram; the **Eastern Forests Route** links Ratnamahal and nearby forest areas; the **Desert Route** explores the Rann of Kutch; and the **Southern Forests Route** includes Rajpipla, Vansda, and Saputara. This circuit development helps distribute tourism across regions, reduce ecological pressure on single sites, and enhance visitor experience by showcasing diverse ecosystems—from deserts and coasts to forests and hills. At the same time, it supports conservation awareness and creates livelihood opportunities for local communities through eco-tourism activities. In short, these eco-circuits balance tourism growth with ecological sustainability in Gujarat.

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Figure 2: Eco Tourist circuits of Gujarat, India- Ministry of Tourism, Gujarat Tourism

2.3.2 Kutch circuit in Gujarat

The **Kutch Tourism Circuit** is organized around **Bhuj**, which acts as the central hub due to its strong connectivity and tourist infrastructure. From Bhuj, visitors take day trips to surrounding destinations such as the **Great Rann of Kutch (Dhordo, Hodka, Kala Dungar)**, **Mandvi** for its beaches and palaces, cultural craft villages like **Bhujodi and Nirona**, and wildlife areas such as the **Kutch Desert Sanctuary**. This hub-and-spoke model ensures Bhuj serves as the main night-halt while distributing tourism across the desert, coastal, and cultural landscapes of Kutch. The circuit map highlights how geospatial planning links diverse attractions, supports local livelihoods, and manages visitor flow sustainably.

Figure 3: Kutch Tourism Circuit, Gujarat Tourism

2.3.3 Rajasthan Tourist circuit

Tourism activity spread in all over Rajasthan state, but this activity is mostly happening in 6 main cities which are the 'Tourist hub' of Rajasthan. These 'tourist hub' cities are Jaipur, Udaipur, Jodhpur, Jaisalmer, Bikaner, and Mount Abu. Almost every tourist who visits Rajasthan state would visit at least one or more of these 'tourist hub' locations as part of his / her tourist itinerary.

Department of Tourism, Rajasthan has identified nine tourist circuits based on geography and attractions which are mentioned below.

- Desert Circuit: Jodhpur-Jaisalmer-Bikaner
- Mewar Circuit: Udaipur-Rajsamand-Chittaurgarh-Bhilwara
- Dhundhar Circuit: Jaipur-Dausa-Tonk
- Shekhawati Circuit: Sikar-Jhunjhunun-Churu
- Vagad Circuit: Dungarpur-Banswara
- Godwar Circuit: Sirohi-Pali-Jalore
- Marwar Circuit: Ajmer-Nagaur
- Brij-Mewat Circuit: Alwar-Bharatpur-Karauli-Dholpur-Sawai Madhopur
- Hadoti Circuit: Kota-Bundi-Jhalawar

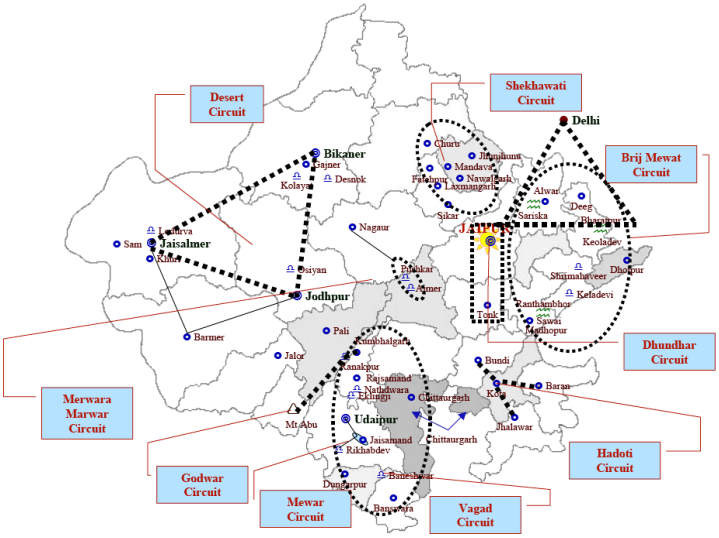

Figure 4: Rajasthan Tourist Circuit, Rajasthan Tourism

The mapping of tourism circuits in Gujarat and Rajasthan demonstrates how geospatial insights can transform tourism planning from fragmented site-based development into a strategically networked model. By identifying hubs, linkages, and clusters of attractions, circuits help distribute visitor flows, reduce pressure on overburdened destinations, and highlight diverse ecological and cultural assets. This approach not only enhances the overall travel experience but also fosters sustainable development by creating livelihood opportunities, promoting regional balance, and supporting conservation goals. Ultimately, circuit-based tourism mapping illustrates the critical role of geospatial intelligence in aligning tourism growth with ecological sustainability and community well-being.

3. Results and Discussion

India's tourism transformation is deeply embedded in place-based identities and regionally rooted narratives. Integrating geospatial insights into tourism planning offers a strategic edge—ensuring that development is both spatially inclusive and environmentally responsive. This ongoing study asserts that future policy frameworks must shift from generic promotions to nuanced, spatially-informed interventions to optimize tourism's socio-economic and ecological value.

3.1 Findings and Outcomes

3.1.1 Spatial Trends

The spatial analysis of India's tourism schemes reveals a marked concentration in the north-central belt, including states like

Uttar Pradesh, Madhya Pradesh, and Rajasthan, while regions such as the Northeast and tribal-dominated areas remain significantly underrepresented. This spatial imbalance suggests a strategic oversight in leveraging the untapped cultural, ecological, and heritage richness of these peripheral regions. Infrastructure enhancements are predominantly clustered around state capitals and urban centers, indicating a centralized development bias. Such skewed investments risk neglecting remote yet tourism-worthy destinations, such as tribal hinterlands and ecologically sensitive zones, which hold immense potential for experiential and sustainable tourism. Strategically, there is a need to shift from a centralized investment model to a distributed spatial approach that prioritizes inclusive and location-sensitive development, ensuring that emerging destinations are brought into the tourism mainstream through targeted geospatial mapping and infrastructure provision.

3.1.2 Performance Indicators

The assessment of tourism schemes using geospatial performance metrics reveals varying degrees of spatial efficiency and impact. The Circuit Completeness Ratio highlights inconsistencies in route continuity, often leaving gaps in connectivity between heritage clusters and natural attractions, thereby reducing the potential of integrated circuit-based tourism. The Regional Impact Index—factoring in parameters such as employment generation, tourist footfall, and local income redistribution—shows higher values in traditionally popular circuits, underlining the need for more equitable tourism-induced economic benefits across regions. Additionally, Sustainability Scores based on STCI (Sustainable Tourism Criteria for India)-aligned spatial indicators show that schemes perform poorly in terms of ecological balance, resource optimization, and biodiversity protection in high-traffic zones. These insights suggest that future tourism planning must adopt spatial performance-based design strategies, where route planning, employment forecasting, and environmental carrying capacity are geospatially modeled to maximize long-term sustainability and regional inclusivity.

3.1.3 Policy Implications

The findings underscore a pressing need for integrating geospatial intelligence in tourism policy formulation and execution. Conducting geospatial audits during the conceptualization stage of tourism schemes can help identify locational gaps, resource imbalances, and infrastructural deficits. The incorporation of real-time geospatial dashboards for dynamic monitoring will enhance the responsiveness of policy mechanisms, enabling timely interventions based on data-driven insights. Furthermore, an emphasis on locational equity must become a strategic policy imperative to bridge the spatial disparities in tourism development. This involves not only redistributing financial allocations but also recalibrating scheme eligibility criteria to favor underdeveloped and marginalized regions. By embedding geospatial analytics into the policy framework, tourism development can be steered towards more balanced, inclusive, and sustainable spatial outcomes.

3.2 Strategic Recommendation

To optimize tourism planning in India through geospatial insights, the study proposes a set of integrated strategic recommendations. Firstly, Geospatial Tourism Planning Units (GTPUs) should be adopted by delineating tourism zones at micro-levels using GIS-supported land-use, environmental, and cultural data layers. This spatially nuanced classification would enable the identification of high-potential, underutilized, and ecologically sensitive tourism clusters, allowing for more tailored policy interventions. Secondly, the allocation of tourism development schemes must be driven by spatial indicators such as tourism density, infrastructure gaps, and environmental carrying capacity. This data-driven prioritization can help prevent over-tourism in saturated destinations while channeling funds toward emerging or underserved regions with high growth potential. Third, the establishment of a National Tourism Geoportal is recommended as a centralized, interactive, and public-facing digital platform. This portal should integrate real-time GIS dashboards, scheme performance metrics, and spatial impact visualizations to enhance transparency, stakeholder engagement, and citizen participation in tourism governance.

Scheme	**GIS/Geospatial Insights**	**Key Issues Identified**	**Strategic Recommendations**
Swadesh Darshan	Circuit-level connectivity mapping in Buddhist Circuit (Bihar–UP–Nepal)	Weak last-mile connectivity, especially Nalanda–Rajgir	Introduce multi-modal transport, shuttle services, and road upgrades to improve tourist flow
PRASAD	Concentric zone mapping in Varanasi and Ajmer to analyze tourist pressure distribution	High visitor pressure in core pilgrimage zones; over-saturation and erosion of sanctity	Develop buffer zones, disperse amenities, and regulate access in core heritage areas
HRIDAY	Urban heritage GIS mapping in Amritsar, Warangal showing overlaps of tourism, traffic, and heritage	Spatial conflicts in planning and navigation; visitor congestion in narrow heritage corridors	Implement heritage-sensitive zoning, pedestrian-only precincts, and integrated mobility plans
Sustainable Tourism Indicators	GIS analysis of Himalayan ecotourism regions (e.g., Himachal, Uttarakhand)	High tourist footfall without matching waste infrastructure; ecological vulnerability	Invest in waste treatment, enforce tourist caps, and promote community-driven eco-management

Table 2: Strategic recommendations based on identified issues

In addition, a shift toward location-specific smart tourism infrastructure is essential, wherein technological interventions—such as sensor-based crowd management, multilingual AR guides, or eco-friendly mobility solutions—are tailored to local terrain typologies, cultural contexts, and ecosystem sensitivities. This context-responsive planning ensures both visitor

satisfaction and environmental stewardship. Lastly, the success of geospatial tourism planning hinges on robust inter-ministerial GIS coordination, particularly between the Ministry of Tourism (MoT), Ministry of Environment, Forest and Climate Change (MoEFCC), and Ministry of Housing and Urban Affairs (MoHUA). Developing interoperable spatial data protocols and shared platforms can ensure convergence of objectives and resources, particularly in integrated destination development, sustainable infrastructure creation, and climate-responsive tourism policy.

4. Conclusion

India's tourism sector has progressed from early branding campaigns to integrated, sustainability-oriented interventions, reflecting a paradigm shift towards geospatially informed planning. The analysis of national schemes such as Incredible India, Swadesh Darshan, PRASAD, HRIDAY, and Dekho Apna Desh highlights that while locational strengths such as heritage-rich clusters and ecologically sensitive regions have shaped policy focus, spatial imbalances persist with development concentrated in traditional tourism belts and peripheral regions remaining underrepresented. GIS-based analyses demonstrate how spatial tools can effectively identify infrastructural gaps, visitor pressure zones, and ecological vulnerabilities, underscoring the need to embed geospatial performance indicators—including circuit completeness, regional impact, and sustainability scores—into scheme evaluation frameworks. The study recommends institutionalizing Geospatial Tourism Planning, adopting spatially driven allocation criteria, enable convergence between cultural preservation, ecological stewardship, and regional equity. Ultimately, the integration of geospatial intelligence must evolve from a supplementary tool to a central pillar of India's tourism strategy, ensuring development that is inclusive, sustainable, and spatially balanced.

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