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"Tiger Reintroduction In India: Comparative Insights Into Success And Failure From Nauradehi And Satkosia Wildlife Reserves"

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Abstract: *Tiger reintroduction programs represent a critical strategy in global conservation efforts, particularly in India, which harbours over 70% of the world's wild tiger population. Tiger reintroduction is an essential component of India's large carnivore conservation strategy. This paper presents a comparative study of two tiger reintroduction programs: the failed attempt in Satkosia Wildlife Sanctuary (Odisha) and the successful project in Nauradehi Wildlife Sanctuary (Madhya Pradesh). Utilizing a range of ecological and spatial indicators, this study aims to evaluate the relative success, challenges, and future prospects of these initiatives. Ecological indicators will include prey density, habitat quality, and tiger population dynamics (e.g., survival, reproduction, dispersal) while spatial indicators focus on habitat connectivity, human-wildlife interface, and landscape permeability and by comparing the outcomes in these two distinct ecological settings. The findings reveal that while Satkosia had basic ecological potential, poor planning, inadequate monitoring infrastructure, and high community resistance undermined the effort; Nauradehi, on the other hand, demonstrates better spatial continuity, lower human footprint, and stronger administrative preparedness. This study provides valuable insights for optimizing future tiger reintroduction strategies in India and globally.*
Keywords: *Tiger reintroduction, Satkosia, Nauradehi, ecological indicators, spatial indicators, conservation*

INTRODUCTION:

Tigers are essential to the upkeep of thriving ecosystems (Sanghvi, 2024) Unfortunately, poaching, conflicts between humans and wildlife, habitat loss, and other factors pose a threat to tigers. The conservation community promised to increase the global wild tiger population by 2022 in response to these challenges (known as TX2) during the 2010 "Tiger Summit" in St. Petersburg, as well as to monitor the development of the Tiger Range nations (Diepstraten et al., 2022). Tiger conservation, including initiatives like "Project Tiger," encompasses not only tigers but also the entire biological community within their habitat. As apex predators, tigers rely on the stability of herbivorous populations and autotrophs in their forest ecosystems. Healthy tigers are a sign of a strong prey base that is supported by unaltered forest vegetation, indicating the connection between their survival and the health of the ecosystem as a whole. Other local animal populations in the project regions have benefited from this integrated preservation project as well (Khandelwal, 2005). The Global Tiger Initiative, a partnership involving international organisations, civil society groups, and the governments of all Tiger Range countries, was officially launched by the World Bank in 2008 (Global Tiger Initiative, 2009).

In India, conservation-induced displacement has a long history dating back to pre-independence days. It gained momentum, as (Lasgorceix & Kothari, 2009) observe, during the 1970s with the enactment of the Wildlife (Protection) Act (WPA), 1972, and the launch of Project Tiger in 1973, leading to the creation of 50 tiger reserves till date. In their review of 28 cases of displacement from protected areas, they found that the majority of the relocations have been forcible or induced and done in a non-transparent, conflictual, mismanaged, and non-participatory manner. Relocation plans for the most part have been faulty owing to the lack of adequate provision of technical and financial inputs required for successful creation of agricultural livelihoods in the new setting (Rangarajan & Shahabuddin, 2006).

The history of animal reintroduction in India is marked by both successes and failures, reflecting the complexities of wildlife conservation. During earlier attempts in India before independence, in the year 1904, The Maharaja of Gwalior, influenced by Lord Curzon, released African lion cubs into the wild near Sheopur, which attempt later failed as the lions turned to livestock and even attacked humans, leading to them being shot (Asiatic Lion Reintroduction Project). Later, in the year 1957, one lion and two lionesses

from Gir were moved to the Chandraprabha Sanctuary in Uttar Pradesh. Initially, the population grew, but it inexplicably died out by 1965. Factors like inadequate area, lack of monitoring, and unrestricted grazing are believed to have contributed to this failure (Asiatic Lion Reintroduction Project). The significant conservation initiatives started with Project Tiger (1973 onwards); while its primary focus was on in-situ conservation, Project Tiger has also involved the translocation of tigers to re-establish populations in areas where they had become locally extinct. Successful reintroductions have occurred in Panna Tiger Reserve, where tigers were declared extinct in 2009 but were reintroduced from other reserves, leading to a significant population recovery (Press Information Bureau, 2023). Recognizing the vulnerability of the single population of Asiatic lions in Gir, the Wildlife Institute of India (WII) proposed creating a second wild population in 1990. Project Lion, launched in 2020, aims to establish these additional populations and address human-wildlife conflict. Potential reintroduction sites have been identified across multiple states (Asiatic Lion Reintroduction Project). In 2005, the Indian Rhino Vision 2020 was launched, which focuses on increasing the population of the one-horned rhinoceros in Assam by translocating individuals to new protected areas. While the "2020" target has passed, the program has seen considerable success in increasing the rhino population in Kaziranga National Park and Manas National Park (Tiger Safari India; LotusArise). The most recent and high-profile reintroduction project involves the African cheetah to Kuno National Park in Madhya Pradesh. The Asiatic cheetah went extinct in India in the mid-20th century. This intercontinental translocation aims to establish a viable cheetah metapopulation in India. The project has seen initial breeding success, but challenges like cub mortality and adaptation to the new environment remain (African cheetah translocation to India). India's commitment to tiger conservation is exemplified by Project Tiger, a flagship initiative launched in 1973((National Tiger Conservation Authority, 2022). This ambitious program has seen remarkable expansion, growing from an initial nine tiger reserves to 53, collectively encompassing 75,796 square kilometers, which constitutes approximately 2.3% of the nation's geographical area. (National Tiger Conservation Authority, 2023) The sheer scale and sustained nature of this endeavour are globally unparalleled. This concerted effort has positioned India as a global leader in tiger conservation, hosting over 70% of the world's wild tiger population (National Tiger Conservation Authority, 2023; Press Information Bureau, 2024). National tiger population estimates reflect this success, showing a substantial increase from 1,411 individuals in 2006 to a minimum estimated population of 3,167 in 2022. The number of unique tigers identified through camera trapping also rose significantly, from 2,461 in 2018 to 3,080 in 2022 (National Tiger Conservation Authority, 2023).

Tiger Reintroduction Programs: A Global Perspective

Large terrestrial carnivores worldwide have experienced significant geographic range contractions and face continuous threats of local or total extinction (Ripple et al., 2014; Wolf & Ripple, 2017). Tigers (Panthera Tigris), in particular, have seen a 95% decline in their geographic range, with many remnant populations facing extirpation (Wolf & Ripple, 2017). Habitat fragmentation, high human densities, and the poaching of both tigers and their prey are identified as major drivers of this decline (Ramakrishnan et al., 1999; Woodroffe, 2000; Narain et al., 2005; Chapron et al., 2008; Sankar et al., 2010; Wildlife Institute of India, 2013; Ripple et al., 2014; Wolf & Ripple, 2016).

In response to these alarming trends, reintroduction programs have emerged as a critical conservation strategy to restore apex predators to their historical ranges and revitalize ecosystems. However, the success of such ambitious programs is not guaranteed and depends on a multitude of factors. Inadequate assessment of social and political aspects has historically been a major cause of failure for reintroduction programs of threatened or endangered species (Griffith et al., 1989; Reading & Kellert, 1993). The IUCN Guidelines for Reintroductions and Other Conservation Translocations emphasize that social consultations are an integral part of reintroduction planning (IUCN/SSC, 2013).

Globally, successful carnivore recoveries have been observed even in human-dominated landscapes where people and predators have traditionally coexisted (Woodroffe, 2000; Athreya et al., 2016). Conversely, failures often stem from a lack of simultaneous improvement in habitat quality, prey base, habitat protection, and socio-political support (Johnsingh & Madhusudan, 2009; Gray et al., 2017). The importance of understanding local community attitudes and needs is a prerequisite for creating effective coexistence strategies and enhancing participation in conservation (Digun-Aweto et al., 2020). This highlights that reintroduction is not merely an ecological exercise but a complex socio-ecological endeavour.

Tiger Ecology and Habitat Requirements

Tigers are apex predators whose survival is intrinsically linked to specific ecological requirements, including robust prey availability, extensive habitat connectivity, and suitable territorial behaviour. Key elements of ideal tiger habitats include areas with a rich ungulate population, dense and undisturbed vegetation, and ample water availability (Asian Association on Remote Sensing, 2021; Karanth et al., 2004; National Tiger Conservation Authority, 2025). The density of tigers in protected habitats is primarily mediated by prey abundance (Karanth et al., 2004). When prey is scarce, tigers are often compelled to venture outside protected areas, increasing the likelihood of human-wildlife conflict (Patterson et al., 2004; Yirga et al., 2015; Athreya et al., 2016).

Habitat fragmentation poses a significant threat to tiger populations, confining them to small, isolated patches (Asian Association on Remote Sensing, 2021; Dash & Joshi, 2010; Sharma & Singh, 2021). This fragmentation can lead to a decline in prey populations, which severely impacts tiger survival (Ramakrishnan et al., 1999). To counter this, conservation efforts increasingly focus on managing tiger populations as meta-populations, which are interconnected groups of spatially separated populations that interact through dispersal (Sharma et al., 2019; National Tiger Conservation Authority, 2010; Project Tiger Directorate). The identification, maintenance, and restoration of vital habitat corridors are crucial for facilitating tiger movement and genetic exchange between reserves, ensuring the long-term persistence and genetic diversity of the species (Sharma et al., 2019; National Tiger Conservation Authority, 2010).

Socio-Economic Dimensions of Wildlife Conservation

The success or failure of wildlife conservation initiatives, particularly those involving large carnivores, is profoundly influenced by socio-economic factors and the engagement of local communities. Local communities are crucial stakeholders whose acceptance and support are essential for the viability of any carnivore translocation program (Vasudeva et al., 2021). Historically, inadequate assessment of social and political aspects has been a major cause of reintroduction failures (Griffith et al., 1989; Reading & Kellert, 1993). The support and cooperation of local people are increasingly recognized as vital for successful population recovery, moving away from traditional exclusionary approaches (Mishra, 1991; Seddon et al., 2007; Garekae et al., 2016; Kaplan-Hallam & Bennett, 2018).

Human-wildlife conflict (HWC) is a pervasive issue, especially in forest fringes with high human population densities (Vasudeva et al., 2021). These interactions can be positive, negative, or neutral, but prolonged negative outlooks are detrimental to conservation efforts (Störmer et al., 2019; Vasudeva et al., 2021). Livestock depredation by carnivores is a major driver of HWC, posing a serious threat to carnivore conservation in India (Miller et al., 2016; Vasudeva et al., 2021). Fear for livestock and human life, coupled with experiences of losses, negatively affects people's attitudes toward tiger reintroduction (Gray et al., 2017; Hiroyasu et al., 2019; Vasudeva et al., 2021). In communities facing poverty and limited opportunities, hostility towards large carnivores can be reinforced by perceived negative impacts on livelihoods (Treves & Karanth, 2003; Badola et al., 2012; Chapron et al., 2014; Vasudeva et al., 2021).

Effective mitigation strategies for HWC include prevention measures (e.g., physical barriers, deterrents, guarding methods), compensation schemes, awareness and education programs, and participatory approaches (Sharma & Singh, 2023). Transparent and timely compensation can promote community support and tolerance, reducing retaliatory killings (Naughton-Treves et al., 2003; Ogra & Badola, 2008; Agarwala et al., 2010; Dickman et al., 2013; Persson et al., 2015; Digun-Aweto et al., 2020; LeFlore et al., 2020). Furthermore, policies that exclude local inhabitants from forest resources can create contentious relationships with forest managers (Western & Pearl, 1989; West & Brechin, 1991; Zeeshan et al., 2017). Therefore, addressing both tangible (monetary losses) and intangible (fear and trauma) factors is crucial for gaining community support (Vasudeva et al., 2021).

Conservation Policies and Management Strategies in India

India's tiger conservation efforts are globally recognized, primarily through Project Tiger, launched in 1973. This initiative has expanded significantly, now encompassing 53 tiger reserves across 75,796 square kilometers, representing 2.3% of India's geographical area (National Tiger Conservation Authority, 2022). A pivotal shift occurred between 2005 and 2006, moving from a site-specific approach to a comprehensive landscape-level management philosophy, emphasizing strict monitoring (National Tiger

Conservation Authority, 2022; Wildlife Institute of India & National Tiger Conservation Authority, n.d.).
Key policy and management strategies adopted in India include:

- **Landscape-level Conservation:** This approach recognizes that tiger populations exist across broader geographical areas, necessitating integrated management beyond individual reserve boundaries (National Tiger Conservation Authority, 2022; Wildlife Institute of India & National Tiger Conservation Authority, n.d.).

- **Scientific Monitoring:** India employs a rigorous, science-backed monitoring system, notably the All India Tiger Estimation (AITE) conducted every four years. Phase II of this exercise involves the Wildlife Institute of India (WII) utilizing remote sensing and secondary data to generate landscape-level information, integrated with ground-collected data for robust population estimates (National Tiger Conservation Authority, 2022 ; Project Tiger Directorate & Wildlife Institute of India) The Monitoring System for Tigers: Intensive Protection and Ecological Status (M-STrIPES) is a key tool for data collection, incorporating camera trapping and AI/ML for photo identification (National Tiger Conservation Authority, 2022 ; IAS Arthi, n.d. ; Insights IAS, 2025).

- **Designation of Critical Tiger Habitats (CTH) and Buffer Areas:** Policies focus on establishing inviolate core areas within reserves for tiger breeding and dispersal, alongside buffer zones that allow for some human activity while minimizing disturbance (Project Tiger Directorate & Wildlife Institute of India, n.d.).

- **Corridor Identification and Management:** Recognizing habitat fragmentation, GIS modeling is extensively used to identify "least cost pathways" and "potential habitat corridors" to ensure genetic connectivity and facilitate tiger dispersal between populations (Sharma et al., 2019; National Tiger Conservation Authority, 2010)

- **Reintroduction and Supplementation Strategies:** These are planned based on scientific data to augment tiger and prey populations in areas where they have declined or become locally extinct (Wildlife Institute of India & National Tiger Conservation Authority, n.d).

- **Community Involvement:** Policies emphasize engaging local communities in conservation, providing alternative livelihoods, and mitigating human-wildlife conflict (Tiger Safari, n.d.; Press Information Bureau, n.d. ; Sharma & Singh, 2023). The National Human-Wildlife Conflict Mitigation Strategy and Action Plan (2021-26) aims to systematically reduce HWC while ensuring wildlife conservation and sustainable development (Press Information Bureau).

Despite these comprehensive strategies, challenges persist, including habitat encroachment, illegal hunting, unregulated cattle grazing, forest fires, mining, and expanding infrastructure (National Tiger Conservation Authority, 2022). The challenge also lies in aligning large-scale economic development with safeguarding forests and mitigating human-tiger conflict (Wildlife Institute of India & National Tiger Conservation Authority, n.d.). While This paper focuses on contrasting two case studies: Firstly, the failed attempt of tiger reintroduction in Satkosia Wildlife Sanctuary (Odisha) and the translocation planning in Nauradehi Wildlife Sanctuary (Madhya Pradesh) now coming under Veerangana Durgavati Tiger Reserve. Satkosia's effort in 2018 was the first inter-state reintroduction initiative under NTCA, but it collapsed within a year due to community backlash, poor ecological connectivity, and inadequate planning. In contrast, Nauradehi is currently being developed as a potential recovery site, supported by stronger habitat metrics and spatial integration.
The objectives of this study are to:
1. Compare the ecological and spatial parameters of Satkosia and Nauradehi;
2. Identify key factors behind the failure and success potential of these reintroduction programs.
This paper attempts to answer: Why did the Satkosia project fail, and what makes Nauradehi potentially more suitable for tiger reintroduction?

Study Area Details
Satkosia Wildlife Sanctuary (Odisha)

Established in the year 1976, Satkoshia Wildlife Sanctuary covers an area of approximately 964 km² and spreads across Angul, Cuttack, Boudh, and Nayagarh districts in Odisha, which was designated in 2007 under India's Project Tiger initiative (NTCA, 2022). Geographically, it is situated at the convergence of the Eastern Ghats and the Deccan Plateau, distinguished by the Mahanadi River running through it, deep canyons, and mixed deciduous forests. Despite of this ecological richness, the area supports a moderate prey base and fragmented forest patches, which present challenges for sustaining large carnivores like tigers. The 2018 tiger reintroduction project in Satkosia aimed to revive the region's dwindling tiger population by translocating tigers from Kanha Tiger Reserve in Madhya Pradesh. However, the project faced strong opposition from local communities, concerns over human-wildlife conflict, and the tragic death of a translocated male tiger, which ultimately led to the suspension of the initiative (Jhala et al., 2021). Satellite-based Forest assessments also revealed increasing fragmentation and human encroachment in the core areas, limiting habitat continuity (FSI, 2021).

Nauradehi Wildlife Sanctuary (Madhya Pradesh)

Located in the heart of the central Indian landscape, Nauradehi Wildlife Sanctuary is the largest sanctuary in Madhya Pradesh, covering around 1,197 km². It spreads across the districts of Sagar, Damoh, and Narsinghpur and lies within the Satpura-Maikal corridor, which connects important reserves such as Panna, Bandhavgarh, and Satpura (WII, 2020). The landscape comprises dry deciduous forests, grasslands, and river systems, offering a relatively undisturbed habitat for a variety of species, including leopards, sloth bears, and ungulates. Nauradehi was identified by the Wildlife Institute of India and NTCA as a priority site for tiger reintroduction due to its large unoccupied habitat, viable prey density (~30–35/km²), and low human population in the core zone. Moreover, it has a favourable location with potential connectivity to nearby tiger reserves through identified wildlife corridors (NTCA, 2022). The Madhya Pradesh Forest Department has been actively preparing the landscape through habitat restoration, prey augmentation, and community sensitization in anticipation of tiger reintroduction (WII, 2020).

Case Studies:

Nauradehi Wildlife Sanctuary (Veerangana Durgavati Tiger Reserve): A Success Story

Nauradehi, located in Madhya Pradesh, had its tiger population wiped out by 2011 (Indian Masterminds, 2024). A reintroduction initiative commenced in 2017 with the translocation of a tigress, Radha (N1), from Kanha National Park and a tiger, Kishan (N2), from Bandhavgarh National Park in 2018 (Bandhavgarh-National-Park.com, 2020).

Key factors contributing to Nauradehi's success:

- **Adequate Habitat and Prey Base:** Nauradehi, being the largest wildlife sanctuary in Madhya Pradesh, provided substantial contiguous habitat with a healthy prey base (Indian Masterminds, 2024; Bandhavgarh-National-Park.com, 2020). Its connectivity to other tiger habitats like Panna and Satpura further enhanced its potential (Times of India, 2023).

- **Effective Monitoring and Management:** The Forest Department closely monitored Radha and Kishan, initially housing them in enclosures to facilitate acclimatization before their release (Bandhavgarh-National-Park.com, 2020). Despite the loss of Kishan in a territorial fight, Radha successfully reproduced multiple times, demonstrating effective establishment (Times of India, 2023).

- **Community Support (Implicit/Managed):** While explicit detailed studies on community engagement in Nauradehi are limited in the public domain, the sustained success suggests that potential conflicts were either pre-empted or effectively managed, allowing the tigers to establish and breed without significant community backlash. The focus on protection and habitat quality likely minimized direct human-wildlife interaction in core areas.

- **Adaptive Management:** The loss of Kishan, while unfortunate, did not derail the project, highlighting the adaptive capacity of the management to continue fostering the population through Radha's successful

breeding. The current population stands at 19 tigers, all descendants of Radha and Kishan, indicating robust population growth (Indian Masterminds, 2024).

Satkosia Tiger Reserve: A Challenged Reintroduction

Satkosia Tiger Reserve in Odisha had its tiger population dwindle to functional extinction with only one individual remaining by 2018 (Frontiers, 2021). An ambitious India's first interstate tiger translocation project was initiated in 2018, involving two tigers (Mahavir from Kanha and Sundari from Bandhavgarh, MP) (Shankar IAS Parliament, n.d.).

Key factors contributing to Satkosia's challenges and eventual failure:

- **Inadequate Prey Base and Habitat Suitability:** Research suggests that Satkosia lacked an adequate prey population to sustain the translocated tigers, making the area inhospitable (ClearIAS, 2024). The existing female tigress in the core area also created territorial challenges, pushing translocated individuals into human-dominated areas (Shankar IAS Parliament, n.d.).
- **Poor Community Engagement and Human-Wildlife Conflict:** This was identified as a major cause of failure (Frontiers, 2021; ClearIAS, 2024). The project faced severe protests from villagers living on the fringes of the reserve due to fears for their livelihoods, lives, and livestock (Shankar IAS Parliament, n.d.). Incidents of livestock depredation and a human fatality allegedly caused by Sundari intensified local opposition (Shankar IAS Parliament, n.d.). There was a significant lack of consultation and confidence-building with local communities prior to and during the translocation (Frontiers, 2021).
- **Insufficient Management Preparedness and Monitoring:** The translocation was reportedly done in haste, with inadequate preparedness of field staff and tiger reserve management. Capacity for tiger monitoring was poor, leading to delays and inefficiencies in tracking tiger movements (Shankar IAS Parliament, n.d.; ClearIAS, 2024).
- **Lack of Socio-Political Support (from the ground up):** While the project had national backing, the strong local resistance ultimately led to its suspension (Shankar IAS Parliament, n.d.). The failure to address community concerns effectively became a major impediment.

To provide a clear chronological context for the reintroduction efforts in both reserves, the following table summarizes key timelines and population statuses.

Table 1: Timeline of Tiger Reintroduction and Population Status in Nauradehi and Satkosia

Year	Event/Milestone	Nauradehi Details	Satkosia Details
2007	Satkosia notified as Tiger Reserve; Local tiger census	-	12 tigers recorded
2008	Sariska, Panna reintroduction initiated; Panna population wiped out	-	-
2009	Panna reintroduction from neighboring PAs	-	-
2015-16	Nauradehi reintroduction project launched	Initial release of a "couple of big cats"	-
2018	N1 & N2 reintroduced in Nauradehi; Satkosia reintroduction initiated; Satkosia population decline	Tigress N1 and male Tiger N2 reintroduced	First inter-state translocation with Mahavir (male) and Sundari (female) from MP ; Only 1 tiger remained by 2018-19
2021	Nauradehi cubs spotted	Two cubs spotted with a tigress	-
2022	All India Tiger Estimation (AITE) results; Satkosia project suspended	Nauradehi population grown to 6 (including cubs) ; Overall minimum estimated population 3,167	No tigers detected in Satkosia ; Project suspended as Mahavir died and Sundari left

2023	Nauradehi declared Tiger Reserve	Veerangana Durgavati Tiger Reserve	-
2024 (Mar)	Nauradehi current population	Reserve is home to "a dozen tigers" and "about 15 tigers"	-

METHODOLOGY

This study employs a comparative case study approach to investigate the factors influencing the success and failure of tiger reintroduction programs in India, specifically focusing on the Nauradehi Wildlife Sanctuary (now Veerangana Durgavati Tiger Reserve) and Satkosia Tiger Reserve. This qualitative methodological design is particularly suited for in-depth analysis of complex, real-world phenomena within their specific contexts, allowing for rich insights into the causal mechanisms at play (Yin, 2018).

Dimension	Indicators
Ecological	Habitat size and contiguity, prey base density and diversity, landscape connectivity
Institutional & Governance	Coordination between NTCA, state governments, WII; inter-state legal frameworks; resource mobilization
Community Engagement	Local perceptions, resettlement and compensation efficacy, historical conflicts, livelihood alternatives
Operational & Monitoring	Real-time monitoring via telemetry, veterinary preparedness, response protocols, adaptive management practices

The selection of Nauradehi and Satkosia as case studies is based on their contrasting outcomes within a similar geographical and policy context (India's tiger conservation efforts). Nauradehi represents a successful reintroduction, evidenced by consistent tiger breeding and population growth, while Satkosia serves as a case of significant challenges and eventual suspension of the reintroduction efforts. This comparative design allows for the identification of convergent and divergent factors contributing to success and failure, thereby strengthening the generalizability of findings to other reintroduction programs. Data collection involved a systematic review process, where information relevant to the pre-identified thematic areas (habitat, prey, anti-poaching, community engagement, management, socio-political context) was extracted from various Government reports, Scientific publications and filed studies and various media reports were, cross-referenced, and synthesized for each case study.

The comparative framework employed in this study is based on a multidimensional qualitative analysis designed to systematically explore the divergent outcomes of tiger reintroduction efforts at Satkosia and Nauradehi. The framework is structured around four key analytical dimensions:

Table 2: Analytical Dimensions and Indicators in Tiger Reintroduction Programs

Dimension	Indicators	Nauradehi Wildlife Sanctuary (Success)	Satkosia Tiger Reserve (Failure)	Expected Influence
Ecological	**Habitat size and contiguity**	Size: 1197 sq km, largest in MP characterised by tropical dry deciduous forest with extensive continuous grasslands (Nauradehi Wildlife Sanctuary,2021)	Size: 963.87 sq km (Forest Survey of India, 2021 ; Vasudeva et al., 2021) with degraded habitat and unsuitability and faces threars like encroachment, illegal hunting, mining and expanding infrastructure. (National Tiger Conservation Authority, 2022).	Determines biological feasibility, tiger adaptation, and long-term sustainability. Suitable and contiguous habitat provides space and resources for tigers to establish territories and breed.
Ecological	**Prey base density**	"Substantial prey base, including four different categories of antelopes, and other animals such as wild boar". Diverse herbivores including Four-horned antelope, nilgai, chinkara, sambar deer, blackbuck antelope, barking deer, grey langur, rhesus macaque, chital, and wild boar. (Nauradehi Wildlife Sanctuary, 2021)	Identified as a "limited prey base" and "lacked an adequate prey population to sustain relocated tigers, making the area inhospitable"; NTCA stressed the need for "prey recovery to ensure an adequate food source for tigers" for future attempts (New Indian Express, 2024).	Sufficient and diverse prey is fundamental for tiger survival, reducing the likelihood of human-wildlife conflict due to livestock depredation.
Ecological	**Landscape connectivity**	Functions as a vital corridor connecting Panna, Satpura, and Bandhavgarh Tiger Reserves (Nauradehi Wildlife Sanctuary, 2021; Corridor Coalition). This facilitates tiger movement and genetic exchange (Sharma et al., 2019)	Not explicitly highlighted as a strong functional corridor in the context of its reintroduction failure. The general context of many Indian tiger reserves existing as "small islands" (National Tiger Conservation Authority, 2022) suggests potential isolation.	Ensures genetic flow, facilitates dispersal, and enhances the long-term viability of tiger meta-populations.
Ecological	**Water availability**	Robust hydrological network, sitting astride Narmada and Ganges River basins with numerous major rivers and rivulets (Bajpai, 2024) Ample water is a key element of ideal tiger habitats (Asian	Not specifically responsible as a positive or negative factor for Satkosia's reintroduction failure, but general habitat degradation could imply impacts on water sources.	Essential for tiger survival and the health of the ecosystem supporting prey.

		Association on Remote Sensing, 2021)		
Institutional & Governance	**Coordination between NTCA, state governments, WII**	Upgrade to Veerangana Durgavati Tiger Reserve in 2023 signifies heightened institutional commitment and resource allocation under Project Tiger (Bajpai, 2024 ; Nauradehi Wildlife Sanctuary, 2023). Madhya Pradesh Wildlife Action Plan emphasizes "upliftment of local communities" and balancing "conservation and development" (Madhya Pradesh Forest Department).	Project suspended by NTCA (New Indian Express, 2024). Long-standing issues of delayed rehabilitation due to "lack of funds from the NTCA" (National Human Rights Commission, 2025). MEE rating improved from 'fair' (53% in 2014) to 'very good' (75% in 2022), yet reintroduction failed, suggesting a disconnect (National Human Rights Commission, 2025).	Influences policy execution, responsiveness to challenges, and institutional commitment. Strong coordination ensures resources and expertise are effectively deployed.
Institutional & Governance	**Inter-state legal frameworks**	Nauradehi's reintroduction is part of a broader, strategic landscape connectivity program in Madhya Pradesh (Kaushik, 2024).	Satkosia was India's first inter-state tiger translocation project (New Indian Express, 2024) Its failure highlighted the need for strengthening NTCA guidelines and national coordination.	Provides the legal and administrative basis for translocations and ensures consistency across state boundaries.
Institutional & Governance	**Resource mobilization**	Explicit goal to "generate funds for implementation of various schemes proposed in planning" (Nauradehi Wildlife Sanctuary).	Rehabilitation was delayed "due to lack of funds from the NTCA" (National Human Rights Commission, 2025).	Adequate and timely funding is crucial for all aspects of reintroduction, from habitat preparation to community support.
Community Engagement	**Local perceptions**	Explicit goal to "generate active support of local people by involving local participation in management" (Nauradehi Wildlife Sanctuary). Broader state policy emphasizes "upliftment of local communities" (Madhya Pradesh Forest Department).	Received "mixed responses" from local communities, causing a "stalemate" Only 35% of respondents felt it important to conserve tigers. "Lack of local community engagement," "poor communication and lack of awareness about the project" fuelled opposition (Vasudeva et al., 2021).	Determines levels of resistance/support, conflict occurrence, and long-term cooperation. Positive perceptions are vital for coexistence.
Community Engagement	**Resettlement and**	Village relocation occurred, acknowledging the	"Alleged human misery due to displacement of 65,000 villagers of 591	Fair and timely compensation and rehabilitation are

	compensation efficacy	"sense of trauma" associated with displacement (Vasudeva et al., 2021)	villages" (National Human Rights Commission, 2025). Petitioners agitated for proper rehabilitation for over a decade due to delayed funds (National Human Rights Commission, 2025).	crucial for mitigating negative impacts and gaining community trust.
Community Engagement	**Historical conflicts**	The absence of prominent reports on conflict in Nauradehi suggests either a historically low incidence of human-wildlife conflict or the presence of effective mitigation strategies that prevented its escalation.	Tiger augmentation program halted due to "incidents of human attack and livestock predation" Male tiger "accused of killing a villager" "Fear for livestock" and "experience of losses due to wildlife" had a negative influence on attitude (Vasudeva et al., 2021).	Past negative interactions can create deep-seated resistance and undermine new conservation efforts.
Community Engagement	**Livelihood alternatives**	MP Wildlife Action Plan aims for "upliftment of local communities" and balancing "conservation and development" (Madhya Pradesh Forest Department). Ecotourism is a goal to benefit local communities (Nauradehi Wildlife Sanctuary,).	Poor economic condition forced people into unlawful activities, perceiving tiger release as a "perceived loss". Compensation schemes and alternative livelihoods are identified as lessons learned for Satkosia.(Vasudeva et al., 2021)	Providing sustainable livelihood alternatives reduces dependence on forest resources and mitigates conflict.
Operational & Monitoring	**Real-time monitoring via telemetry**	"Better conservation practices being adopted" Management activities include "Prioritise and undertake research and monitoring" (Nauradehi Wildlife Sanctuary, 2021).	Characterized by "monitoring gaps". Delays and inefficiencies in tracking and responding to tiger movements (IAS Gyan).	Affects immediate and long-term survival outcomes and project adaptability. Real-time data allows for rapid response to issues.
Operational & Monitoring	**Veterinary preparedness**	Nauradehi will be equipped with veterinary doctors (ThePrint, n.d.).	Not explicitly detailed, but the death of Mahavir and Sundari's health issues (ClearIAS) could imply deficiencies.	Ensures the health and well-being of translocated animals, crucial for their survival and adaptation.
Operational & Monitoring	**Adaptive management practices**	MP Wildlife Action Plan emphasizes "evolving and achieving new milestones" and "balancing conservation and development by	Project suspension indicates a failure of adaptive management to overcome challenges. NTCA stressed "improved conservation	Allows for dynamic adjustments to strategies based on real-time data and emerging challenges,

		practicing ecologically sound development" (Madhya Pradesh Forest Department,).	approaches" for future attempts (New Indian Express, 2024). The study in Satkosia was part of an "adaptive management strategy" to assess concerns (Vasudeva et al., 2021).	crucial for long-term success.

Table No. 3: Comparative Assessment of Tiger Reintroduction in Nauradehi and Satkosia Across Key Implementation Dimensions

Ethical Considerations and Limitations

As the study relies exclusively on publicly available secondary data, ethical considerations related to direct human subjects research (e.g., informed consent, privacy) were not applicable. However, due diligence was exercised to ensure the use of credible, authoritative, and well-referenced sources. The limitations of this study include reliance on secondary data, variability in data reporting (due to reliance on secondary qualitative data), absence of direct field observation, and its temporal scope: The analysis is limited to the periods covered by the available data for each reintroduction project. Despite of these limitations, the comparative case study design, coupled with rigorous qualitative content analysis of multiple credible sources, provides a robust empirical basis for drawing meaningful conclusions regarding the factors influencing tiger reintroduction success and failure in India.

Findings

The empirical analysis reveals four critical dimensions—ecological, institutional, community engagement, and operational—that significantly influenced the outcomes of tiger reintroduction in Nauradehi and Satkosia. The findings reveals that Firstly, Nauradehi shows ecological superiority than Satkoshia as reintroduction thrived due to its inherent ecological suitability, offering extensive, unfragmented territory and a robust prey base that consistently met the tigers' dietary needs, effectively preventing their dispersal into human-dominated areas which in Satkosia's case was the primary limitation. Secondly, Human-Wildlife Coexistence which was the decisive factor as most of the significant divergence between the projects was the management of human-wildlife interactions and community engagement. Nauradehi saw minimal reported conflicts, suggesting effective pre-emption or mitigation strategies that fostered community tolerance. Conversely, Satkosia's failure was profoundly influenced by a breakdown in human-wildlife coexistence, directly resulting from insufficient community consultation and engagement, which fueled widespread protests following livestock depredation and a human fatality, highlighting that ignoring social dimensions can doom conservation efforts. Thirdly, Management Preparedness and Monitoring in which Nauradehi demonstrated robust management preparedness and consistent monitoring, including effective acclimatization and diligent tracking, which enabled the successful establishment and reproduction of its tiger population, even allowing for adaptive responses to individual losses Conversely, Satkosia suffered from hasty planning and inadequate monitoring capacity, leading to an inability to effectively track and manage tiger movements into human areas, which intensified conflicts and eroded public confidence in the project and lastly, long-term Vision and Adaptive Capacity where Nauradehi's subsequent designation as a Tiger Reserve signifies a strong, long-term institutional commitment that provided a robust framework for sustained funding, protection, and habitat management, validating its initial site selection and supporting significant population growth where as Satkosia, despite of its pre-existing Tiger Reserve status, crucially lacked the adaptive capacity to effectively respond to initial setbacks and escalating human-wildlife conflicts, ultimately leading to the project's suspension.

DISCUSSION

This comparative assessment underscores that ecological viability alone does not guarantee reintroduction success. While both Nauradehi and Satkosia were identified based on habitat models, only Nauradehi translated ecological potential into conservation success. The interplay of institutional coordination, community participation, and adaptive operations proved to be decisive. The Satkosia experience exposed systemic flaws in India's first inter-state tiger translocation. In contrast, the Nauradehi model illustrates a

replicable framework where scientific planning was complemented by community-centered governance. The program's integration into state-level wildlife policy and landscape connectivity efforts facilitated smoother implementation and post-release success. Moreover, the study supports the assertion by Jhala et al. (2021) that reintroductions must be treated as socio-political interventions as much as ecological experiments. The Satkosia case also validates IUCN guidelines emphasizing the importance of stakeholder engagement, pre-release planning, and continuous post-release monitoring.

CONCLUSION

The comparative study of Nauradehi and Satkosia demonstrates that tiger reintroduction outcomes are contingent upon multiple interrelated factors. Nauradehi's success was driven by a holistic integration of ecological readiness, institutional efficiency, community trust, and adaptive field management. Satkosia's failure, conversely, highlights the risks of implementing conservation strategies without adequate stakeholder alignment, funding security, or operational readiness.

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