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ECOTOURISM POTENTIAL OF THE BUKHARA REGION AND ANALYSIS OF ITS DEVELOPMENT TENDENCIES

ABSTRACT

Ecotourism is globally recognised as a sustainable development instrument capable of harmonising economic growth, environmental conservation, and socio-cultural enrichment. The Bukhara region of Uzbekistan possesses an exceptional portfolio of ecotourism assets that remain significantly underexplored in contemporary academic literature. This study aims to systematically assess the ecotourism potential of the Bukhara region and to analyse the principal tendencies shaping its development trajectory between 2018 and 2024. A mixed-method research design was employed, integrating SWOT-analysis, stakeholder interviews (n = 45), field observations at eight key natural sites, and secondary data obtained from the State Committee of Uzbekistan for Tourism Development and regional statistical agencies. The results demonstrate that Bukhara possesses four distinct ecotourism clusters: the Kyzylkum Desert zone, the Nuratau-Kyzylkum Biosphere Reserve, the Tudakul-Shurkul wetland complex, and the Jeyran Ecological Centre corridor. Visitor arrivals to these clusters grew by 63.4 % over the study period, yet average per-capita spending remained 2.3 times lower than the national ecotourism benchmark. SWOT-analysis reveals strong natural and cultural endowments offset by critical infrastructure deficits, insufficient trained human capital, and fragmented institutional governance. The study proposes a four-pillar development framework: (i) infrastructure upgrading along certified eco-routes, (ii) community-based tourism integration, (iii) capacity building for local guides and operators, and (iv) inter-agency coordination mechanisms. The findings contribute to the emerging body of Central Asian ecotourism scholarship and provide actionable policy recommendations for regional tourism authorities.

Keywords: ecotourism; Bukhara region; sustainable tourism; SWOT-analysis; Kyzylkum Desert; Nuratau Biosphere Reserve; community-based tourism; Uzbekistan

1. INTRODUCTION

Ecotourism, defined by the International Ecotourism Society (TIES, 2015) as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education," has emerged as one of the fastest-growing segments within global tourism. According to the United Nations World Tourism Organization (UNWTO, 2023), nature-based tourism constitutes approximately 20 % of total international travel and generates an estimated USD 600 billion annually in direct revenues. The convergence of post-pandemic travel recovery, heightened environmental awareness, and the United Nations Sustainable Development Goals (SDGs 8, 13, and 15) has intensified scholarly and policy interest in identifying underexplored ecotourism destinations in transitional economies.

Central Asia, occupying a pivotal position along ancient Silk Road corridors, is progressively attracting international research attention for its remarkable juxtaposition of biodiversity-rich landscapes and millennia-old cultural heritage. Uzbekistan, in particular, enacted the Tourism Development Strategy 2025 and subsequently "Uzbekistan – Tourism Capital 2030" roadmap, both of which designate ecotourism as a strategic priority sector. National visitor arrivals recovered sharply to 6.7 million in 2023, following pandemic-era contractions, with the government targeting 15 million annual tourists by 2030 (Uzbekistan State Committee for Tourism Development, 2024). Within this national context, the Bukhara region occupies a paradoxical position. Internationally renowned for its UNESCO-listed historic centre — a living museum of Timurid and pre-Islamic

architectural heritage — the region simultaneously harbours extraordinary natural assets: the southeastern margins of the Kyzylkum Desert, the Nuratau-Kyzylkum Biosphere Reserve, the Tudakul and Shurkul reservoir-wetland system, and the Jeyran Ecological Centre, home to critically endangered Goitered Gazelles (Gazella subgutturosa). Despite these endowments, ecotourism in Bukhara region remains nascent, with limited infrastructure, sparse academic documentation, and minimal policy integration at the regional level.

Existing scholarship on Uzbekistan's tourism development has predominantly concentrated on cultural and heritage tourism in Samarkand and Bukhara city (Rakhimov, 2020; Yusupova & Hasanov, 2021; Mirzaev, 2022), leaving the region's natural ecotourism assets conspicuously underresearched. Internationally, studies by Buckley (2009), Stroma (2019), and Weaver (2021) have provided robust theoretical frameworks for ecotourism potential assessment, yet their application to Central Asian semi-arid and desert ecosystems remains limited. This gap is significant given that arid-zone ecotourism is experiencing accelerated global growth, with the Sahara, Arabian Peninsula, and Central Asian steppes increasingly featured in high-value niche tourism circuits (Goodwin & Robinson, 2022).

Against this backdrop, the present study pursues three interlinked objectives: (1) to comprehensively map and characterise the ecotourism resource base of the Bukhara region; (2) to analyse quantitative development tendencies in ecotourist flows, economic revenues, and infrastructure indicators between 2018 and 2024; and (3) to conduct a SWOT-analysis and propose evidence-based policy recommendations for sustainable ecotourism development. By addressing these objectives, the study aims to bridge a significant empirical lacuna in Central Asian tourism geography and to support informed decision-making by regional stakeholders.

2. LITERATURE REVIEW

The conceptual foundation of ecotourism rests on three intersecting pillars: ecological sustainability, socio-economic benefit to host communities, and educational enrichment for visitors (Ceballos-Lascuráin, 1996; Honey, 2008). Boo (1990) was among the first to systematically link ecotourism potential assessment to resource inventorying, carrying capacity analysis, and community involvement, establishing a methodological tradition that continues to inform contemporary practice. Buckley (2009), synthesising global case studies, identified infrastructure accessibility, biodiversity richness, governance quality, and marketing reach as the four principal determinants of ecotourism destination competitiveness.

In the post-Soviet Central Asian context, Sobirov et al. (2019) examined the structural constraints impeding ecotourism growth in Uzbekistan, citing bureaucratic land-use regulations, underdeveloped rural accommodation stock, and low guide certification rates as primary barriers. Tashpulatov (2021) analysed the Nuratau region specifically, documenting the pioneering community-based Nuratau Homestay Network as a model of integrated rural ecotourism, demonstrating that community participation can generate per-household supplementary income of up to USD 3,200 annually. Abdullaev and Jalolov (2022) examined the Aral Sea zone's "dark ecotourism" potential, arguing that environmental tragedy sites can catalyse visitor engagement with sustainability narratives, an observation relevant to Bukhara's position as a gateway to northern ecological disaster zones.

Internationally, the concept of ecotourism clustering — spatially organising dispersed natural assets into thematic tourism zones served by shared infrastructure — has gained traction as a tool for improving destination competitiveness without exceeding carrying capacities (Page & Dowling, 2002; Weaver, 2021). Eagles et al. (2002) demonstrated in their review of protected area ecotourism that clustering increases average visitor dwell time by 38 %, substantially enhancing per-capita revenue generation. This clustering approach is particularly relevant to Bukhara region, where natural assets are geographically dispersed across a 39,400 km² territory.

The SWOT analytical framework, originally derived from strategic management, has been extensively validated as a diagnostic tool for ecotourism destination planning (Helms & Nixon, 2010; Neto, 2021). Several recent studies applied SWOT-analysis specifically to emerging ecotourism markets, including Mongolia's Gobi Desert (Gantulga & Oyunbaatar, 2022) and Iran's

Dasht-e Kavir desert (Khaksari et al., 2023), providing methodological precedents for the present study's application to Bukhara's analogous arid-zone setting. Methodological triangulation of SWOT with quantitative trend analysis is advocated by Ritchie and Crouch (2003) as best practice in destination competitiveness research, an approach adopted in this study.

3. MATERIALS AND METHODS

3.1 Research Design

This study adopted a mixed-methods sequential explanatory design (Creswell & Plano Clark, 2018), in which quantitative trend analysis of secondary statistical data was conducted first to identify patterns, followed by qualitative stakeholder research to contextualise and explain observed tendencies. This design is well-suited to exploratory ecotourism assessments in data-sparse settings, where official statistics require triangulation with experiential knowledge held by local actors.

3.2 Study Area

The Bukhara region (Buxoro viloyati) occupies an area of 39,400 km² in south-central Uzbekistan (39°46'N, 64°25'E), bordered by the Kyzylkum Desert to the north, Navoi and Samarkand regions to the northeast, Kashkadarya region to the south, and Turkmenistan to the southwest. The region's terrain ranges from desert plains (elevation ~220 m a.s.l.) to piedmont zones of the Nuratau mountain spurs (~1,800 m a.s.l.), creating significant habitat diversity. The region encompasses one UNESCO-listed biosphere reserve, one ecological centre of international significance, 14 natural protected areas, and three major water bodies, constituting a compelling ecotourism resource portfolio.

3.3 Data Collection

Secondary quantitative data were sourced from: (i) the State Committee of Uzbekistan for Tourism Development (annual reports 2018–2024); (ii) Bukhara Regional Department of Tourism's internal monitoring databases; (iii) the Statistics Agency of the Republic of Uzbekistan (regional GDP, employment, and visitor flow data); and (iv) the Ministry of Ecology and Environmental Protection's protected area visitor registers. These sources provided a six-year longitudinal dataset enabling robust trend identification.

Primary qualitative data were generated through semi-structured interviews conducted between September and December 2024. A purposive sampling strategy yielded 45 respondents distributed across five stakeholder categories: regional tourism administrators (n=8), local tourism operators and eco-lodge proprietors (n=12), community representatives from villages adjacent to ecotourism zones (n=10), international and domestic ecotourists (n=11), and academic experts in ecology and tourism planning (n=4). Interviews averaged 42 minutes, were conducted in Uzbek, Russian, or English according to respondent preference, and were audio-recorded with informed consent.

3.4 Data Analysis

Quantitative data were analysed using descriptive statistics and compound annual growth rate (CAGR) calculations, with time-series trend lines fitted in Microsoft Excel 365. Qualitative interview transcripts were translated and subjected to thematic analysis following Braun and Clarke's (2006) six-phase framework, using NVivo 12 software for systematic coding. SWOT-analysis was operationalised using a weighted-scoring matrix (Helms & Nixon, 2010), with factor weights assigned on the basis of both statistical evidence and stakeholder consensus. Triangulation of data sources was conducted systematically to verify findings and enhance credibility (Patton, 2015).

4. RESULTS

4.1 Ecotourism Resource Clusters of the Bukhara Region

Field observation and GIS-assisted resource mapping identified four spatially distinct ecotourism clusters within the Bukhara region. Table 1 presents the principal characteristics of each cluster, synthesising ecological attributes, infrastructure status, and current visitor capacity.

Table 1. Ecotourism clusters of the Bukhara region: key characteristics (2024)

Cluster	Core Natural Assets	Area (km²)	Protected Status	Infrastructure Level	Est. Carrying Capacity (visitors/year)
Kyzylkum Desert Zone	Sand dunes, saxaul forests, desert fauna, camel routes	~12,400	Partial (Kyzylkum Nature Reserve)	Basic (yurt camps, unpaved tracks)	8,000–10,000
Nuratau-Kyzylkum Biosphere Reserve	Unique juniper woodlands, wild almond, 43 endemic plant spp., Urial sheep	~2,278	UNESCO Biosphere Reserve	Moderate (homestay network, eco-trails)	12,000–15,000
Tudakul-Shurkul Wetland Complex	Migratory bird staging area, 180+ bird spp., riparian vegetation	~680	Ramsar candidate zone	Minimal (observation platforms only)	4,000–6,000
Jeyran Ecological Centre Corridor	Goitered Gazelle breeding programme, Przewalski's Horse, steppe ecosystems	~5,140	State Ecological Centre	Good (visitor centre, guided safari)	6,000–8,000

Source: Authors' compilation based on field observations and Bukhara Regional Department of Tourism data (2024)

4.2 Visitor Flow Dynamics 2018–2024

Official visitor data disaggregated to the regional level, combined with operator-level records collected during interviews, yielded the longitudinal dataset presented in Table 2. Aggregate ecotourist arrivals to Bukhara region's natural sites grew from 18,400 in 2018 to 30,060 in 2024, representing a CAGR of 8.5 % and a cumulative growth of 63.4 %. The COVID-19 pandemic caused a sharp contraction in 2020 (−71.2 %), with strong recovery commencing in 2022, driven by the reopening of international borders and the regional government's launch of the "Green Bukhara" promotional campaign.

Table 2. Ecotourist arrivals to Bukhara region natural sites, 2018–2024

Year	Total Arrivals	Domestic (%)	International (%)	YoY Growth (%)	Avg. Spending (USD/visitor)
2018	18,400	61.2	38.8	—	87
2019	22,750	58.4	41.6	+23.6	96
2020	6,540	84.3	15.7	−71.2	54
2021	11,200	78.6	21.4	+71.2	61
2022	21,850	65.1	34.9	+95.1	79
2023	27,400	57.8	42.2	+25.4	103
2024	30,060	54.3	45.7	+9.7	118

Source: State Committee for Tourism Development of Uzbekistan (2024); Bukhara Regional Tourism Department (2024); operator interview data

The proportion of international visitors grew steadily from 38.8 % (2018) to 45.7 % (2024), indicating improving global visibility of the destination. Average per-visitor spending increased from USD 87 to USD 118 over the period, a positive development attributable to the growing premium eco-segment; however, this figure remains 2.3 times below the national ecotourism benchmark of USD 270 (State Committee for Tourism Development, 2024), underscoring the region's unrealised revenue potential.

4.3 Economic Contribution and Employment Generation

Ecotourism's direct economic contribution to the Bukhara regional economy was estimated at USD 3.54 million in 2024, representing approximately 0.38 % of the region's GRP. When indirect and induced multiplier effects (estimated at 1.8× using input-output methodology) are incorporated, total economic impact reaches USD 6.37 million. Employment generated directly in ecotourism-linked activities — guiding, accommodation, transport, and food services at natural sites — was estimated at 412 full-time-equivalent positions in 2024, up from 198 in 2018 (CAGR: 12.9 %). Community-based operators in the Nuratau area reported average household supplementary income of USD 2,850 per annum from ecotourism activities, consistent with Tashpulatov's (2021) findings.

4.4 Infrastructure and Accessibility Assessment

Infrastructure audits at the four clusters revealed significant heterogeneity. The Jeyran Ecological Centre demonstrated the highest infrastructure readiness, with a modern visitor reception facility, bilingual interpretation panels, guided safari vehicles, and paved access road from the M-37 highway. In contrast, the Tudakul-Shurkul wetland complex lacked functional sanitation facilities, consistent waste management, or trained birdwatching guides as of December 2024. The Kyzylkum Desert cluster relied entirely on privately operated yurt camps (n=7), which, while culturally authentic, offer no standardised certification of environmental management practices. Road quality was identified as a critical constraint in all clusters, with 68 % of access routes rated as "poor" or "very poor" by interviewed operators.

4.5 SWOT-Analysis

Table 3. Weighted SWOT-analysis of ecotourism development in Bukhara region

STRENGTHS (Internal)	Weight	WEAKNESSES (Internal)	Weight
Rich and diverse natural heritage: 4 distinct eco-clusters spanning desert, mountain, wetland, and steppe ecosystems	0.18	Critical infrastructure gaps: poor road quality, insufficient sanitation and accommodation capacity at 3 of 4 clusters	0.20
UNESCO Biosphere Reserve status of Nuratau-Kyzylkum enhancing international brand value	0.15	Shortage of qualified ecotourism guides and trained local human capital across all clusters	0.18
Globally rare wildlife assets: Goitered Gazelle, Przewalski's Horse, Urial sheep, 180+ bird species	0.14	Absence of certified eco-label standards and environmental management frameworks for operators	0.15
Proximity to UNESCO-listed Bukhara historic centre enabling cultural-ecological tourism bundling	0.13	Fragmented and insufficiently coordinated institutional governance structure	0.13
OPPORTUNITIES (External)	Weight	THREATS (External)	Weight

Growing global demand for arid-zone and desert ecotourism as mainstream heritage destinations saturate	0.19	Climate change accelerating desertification and reducing water availability in wetland zones	0.21
Government's "Uzbekistan – Tourism Capital 2030" roadmap allocating USD 2.1 billion to tourism infrastructure	0.17	Potential over-visitation and environmental degradation if carrying capacities are exceeded without management	0.17
International development finance availability (UNDP, ADB, EBRD green tourism programmes)	0.14	Competition from well-established Central Asian ecotourism destinations (Kazakhstan, Kyrgyzstan)	0.14
Rising eco-consciousness among millennial and Gen-Z travellers driving premium nature-based product demand	0.12	Low awareness and poor digital marketing reach limiting international market penetration	0.12

Source: Authors' SWOT-analysis based on field data, stakeholder interviews, and secondary sources (2024). Weights reflect relative strategic significance assigned by expert consensus.

5. DISCUSSION

The results of this study collectively affirm that the Bukhara region possesses a substantive and multifaceted ecotourism resource base that significantly exceeds its current level of exploitation. The identification of four distinct ecotourism clusters — spanning desert, biosphere, wetland, and wildlife conservation typologies — aligns with Buckley's (2009) contention that destination competitiveness is proportional to the diversity and complementarity of its natural asset portfolio. Critically, the geographic proximity of these four clusters within a single administrative region creates conditions favourable to integrated itinerary design, wherein visitors can experience multiple ecosystem types within a single trip, a characteristic shown by Eagles et al. (2002) to extend average length of stay and significantly increase per-capita expenditure.

The observed CAGR of 8.5 % in ecotourist arrivals is encouraging but must be contextualised within two important qualifications. First, the absolute base of arrivals (30,060 in 2024) remains modest relative to comparable arid-zone destinations, such as Jordan's Wadi Rum (280,000 visitors/year) or Morocco's Merzouga Desert (190,000 visitors/year), confirming that the Bukhara ecotourism product occupies an early-growth phase on the destination lifecycle curve (Butler, 1980). Second, the revenue-per-visitor gap — USD 118 versus the national benchmark of USD 270 — signals that the current product offering captures a predominantly budget or backpacker market segment rather than the high-yield sustainable tourism market that regional and national strategies aspire to cultivate.

The SWOT-analysis findings reveal a pattern consistent with what Neto (2021) terms the "infrastructure-governance paradox" observed across emerging ecotourism destinations in transitional economies: natural endowments are abundant, but the institutional and physical capital required to convert these endowments into high-quality visitor experiences is systematically lacking. The weighted threat of climate change (weight 0.21) deserves particular policy attention, as modelling by the Scientific-Research Institute of Irrigation of Uzbekistan (2023) projects a 12–18 % reduction in surface water availability in the Bukhara region by 2040, with direct implications for the viability of the Tudakul-Shurkul wetland cluster and the carrying capacity of the Kyzylkum Desert yurt camp network.

The success of the Nuratau Homestay Network, documented by Tashpulatov (2021) and corroborated by the present study's interview data, offers a replicable community-based model that addresses multiple SWOT dimensions simultaneously: it enhances local economic benefit (converting opportunity into strength), builds authentic visitor experiences that compete

favourably with mass-market alternatives, and distributes visitor pressure across multiple small-scale facilities rather than concentrating it at single bottleneck sites. Scaling this model to the Kyzylkum and Jeyran clusters would require targeted capacity-building investment, which the government's tourism infrastructure allocation under "Uzbekistan – Tourism Capital 2030" could strategically fund.

From a marketing perspective, the digital footprint of Bukhara's ecotourism assets requires substantial enhancement. Analysis of English-language travel platforms (TripAdvisor, Google Travel, Lonely Planet) conducted during data collection identified 14 listings for ecotourism activities in the Bukhara region, compared to 312 for cultural heritage activities — a 22:1 disparity that perpetuates the perception of Bukhara as exclusively a cultural destination and systematically fails to capture nature-oriented travellers who might otherwise include the region in their itineraries. This finding resonates with Goodwin and Robinson's (2022) observation that marketing positioning is among the most cost-effective levers available to ecotourism destinations at early-growth stages.

6. PROPOSED FOUR-PILLAR DEVELOPMENT FRAMEWORK

Synthesising findings from quantitative trend analysis, SWOT-evaluation, and stakeholder interviews, this study proposes a Four-Pillar Framework for accelerating sustainable ecotourism development in the Bukhara region, operationalised across a 2025–2030 planning horizon.

Table 4. Four-Pillar Development Framework for Bukhara Region Ecotourism (2025–2030)

Pillar	Strategic Objective	Key Actions	Lead Agency	Target Outcome by 2030
I. Infrastructure Upgrading	Achieve minimum-standard eco-infrastructure at all four clusters	Pave priority access routes; install eco-certified sanitation; establish 3 cluster visitor centres; develop 6 certified eco-trails	Regional Administration + Ministry of Transport	Infrastructure readiness rating ≥ 4/5 at all clusters
II. Community-Based Tourism Integration	Extend the Nuratau homestay model to Kyzylkum and Jeyran clusters	Register and certify 60 community eco-lodges; establish fair-trade revenue sharing; train 120 community guides	UNDP Uzbekistan + Local Government	Community income from ecotourism ≥ USD 5,000/household/year
III. Human Capital Development	Build a critical mass of certified ecotourism professionals	Establish regional guide certification programme; integrate ecotourism modules in Bukhara State University curriculum; annual field training camps	Bukhara State University + State Tourism Committee	300 certified eco-guides active in region; specialised Bachelor's programme launched
IV. Institutional Coordination	Establish unified governance and	Create Regional Ecotourism Coordination Council; implement real-time visitor	Ministry of Ecology + State Tourism Committee	Annual ecotourism monitoring report; master plan adopted; visitor caps enforced

	monitoring architecture	monitoring; develop regional ecotourism master plan with carrying capacity zoning		

Source: Authors' synthesis based on research findings, stakeholder interviews, and international best-practice review (2024–2025)

7. CONCLUSION

This study has demonstrated, through a rigorous mixed-method analysis, that the Bukhara region of Uzbekistan possesses a compelling and multidimensional ecotourism potential that is currently severely underdeveloped relative to its natural endowment. The region's four ecotourism clusters — Kyzylkum Desert, Nuratau-Kyzylkum Biosphere Reserve, Tudakul-Shurkul Wetland Complex, and the Jeyran Ecological Centre Corridor — collectively represent an asset portfolio with a conservatively estimated sustainable visitor capacity of 30,000–39,000 arrivals per annum under current infrastructure conditions, and significantly higher potential upon infrastructure improvement.

Visitor flow data document a CAGR of 8.5 % between 2018 and 2024, confirming growth momentum, yet the persistent gap between per-visitor spending (USD 118) and national benchmarks (USD 270) highlights the imperative to shift the destination's market positioning from budget-oriented to high-yield sustainable tourism. SWOT-analysis identifies infrastructure deficits, human capital shortages, and institutional fragmentation as the three most strategically weighted weaknesses, each amenable to targeted policy intervention within the proposed Four-Pillar Development Framework.

The study's principal theoretical contribution is the empirical application of ecotourism cluster analysis and weighted SWOT methodology to a Central Asian arid-zone context, providing a replicable analytical template for neighbouring Uzbek regions and analogous destinations across the broader region. The principal practical contribution is the actionable Four-Pillar Framework, which aligns with existing national policy commitments, identifies specific lead agencies for each pillar, and establishes measurable 2030 targets against which progress can be monitored.

Future research should employ stated preference methods (contingent valuation, choice experiments) to quantify the economic value of Bukhara's ecotourism assets and to estimate willingness-to-pay among key market segments. Longitudinal monitoring of environmental carrying capacity thresholds — particularly in relation to climate-driven hydrological change — represents a priority research agenda that would strengthen the evidence base for adaptive management of the region's ecotourism zones.

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