THE UNDERGROUND WORLD AS A NEW TOURISM DESTINATION: A STRATEGY FOR SPELEOTOURISM DEVELOPMENT

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Abstract. This article explores strategic approaches to speleotourism development, considering underground landscapes as potential destinations for educational, recreational, and adventure tourism. It examines the conditions necessary to transform cave resources into responsibly managed tourism products, with particular attention to Uzbekistan. The discussion focuses on resource assessment, environmental conservation, visitor safety, infrastructure planning, professional guide training, and local community participation. A qualitative, desk-based approach is proposed to connect international cave tourism management principles with destination development priorities. The article outlines a phased strategy comprising cave inventories, site-specific feasibility assessments, controlled pilot visits, environmental monitoring, and targeted promotion. It emphasizes that investment and marketing decisions should reflect the characteristics and management capacity of individual sites. The proposed strategic framework aims to support tourism diversification and local economic opportunities while preserving the scientific, ecological, and cultural value of underground environments.

Keywords: speleotourism, cave tourism, underground landscapes, tourism development strategy, Uzbekistan, sustainable tourism, destination management, geological heritage, environmental conservation, community participation.

Introduction

The diversification of tourism destinations creates opportunities to explore natural environments that extend beyond conventional sightseeing routes. Underground landscapes occupy a distinctive place within this process because they combine geological interest, opportunities for exploration, and environmental education. Speleotourism, understood as tourism involving visits to and exploration of caves, can introduce visitors to these environments through guided excursions and appropriately managed adventure activities. Developing such experiences requires a strategy that connects destination attractiveness with conservation, safety, and operational feasibility.

The underground world offers several possible foundations for tourism product development. Cave formations, passages, and underground water features can support experiences centred on geological interpretation and natural heritage appreciation. Where archaeological or cultural significance has been established, interpretation can also explain the relationship between caves and human history. However, the characteristics of individual caves determine which activities are appropriate. Accessible sightseeing routes and technically demanding exploration differ substantially in their infrastructure, equipment, supervision, and visitor requirements.

For Uzbekistan, speleotourism provides a subject for examining how nature-based experiences could complement established cultural and historical tourism offerings. Carefully selected cave destinations could be incorporated into regional itineraries alongside mountain recreation, rural accommodation, and educational excursions. This integration could create opportunities for local service providers and encourage cooperation between tourism businesses and surrounding

communities. Nevertheless, the scale of these opportunities must be assessed through research into site conditions, visitor demand, operating costs, and the capacity of local businesses to participate.

A development strategy must therefore begin with evidence about the resources concerned. A cave's visual appeal does not establish its suitability for public access. Geological stability, environmental sensitivity, route difficulty, seasonal conditions, and emergency response arrangements all influence development decisions. Initial assessments should distinguish caves potentially suitable for general visitors from those requiring specialist access or stronger protection. This classification can guide investment priorities and help prevent promotional activity from exceeding a destination's capacity to manage visitation.

Conservation is central to the strategic planning of underground tourism. Tourism infrastructure and visitor activities may affect cave formations, habitats, and underground conditions. Decisions about lighting, pathways, group sizes, and visiting schedules consequently require site-specific assessment. Environmental monitoring should continue after tourism activities begin so that operating practices can be adjusted when necessary. Within this approach, conservation becomes an ongoing component of destination management and investment planning.

Another strategic consideration is coordination among the institutions and people involved. Researchers contribute knowledge about cave characteristics, conservation specialists assess environmental requirements, and tourism operators translate appropriate activities into visitor experiences. Local communities can contribute services and practical knowledge of the surrounding area, while emergency services support preparedness. Clearly defined responsibilities and arrangements for cooperation are necessary to connect these contributions into a workable management system.

The purpose of this article is to outline a strategy for speleotourism development that links underground resource assessment with responsible destination planning, with particular attention to its potential application in Uzbekistan. The discussion examines priorities for site selection, conservation, visitor safety, professional training, community participation, and promotion. It proposes a phased approach in which assessment and preparation precede controlled implementation, while monitoring informs subsequent development. This framework provides a basis for investigating how underground environments can become viable tourism destinations while retaining their natural and scientific value.

Literature review

Recent literature provides several complementary perspectives on speleotourism development, particularly environmental management, visitor safety, demand forecasting, and stakeholder participation. Together, these perspectives suggest that a development strategy should connect the promotion of underground destinations with evidence about their ecological sensitivity and operational capacity.

Piano et al. (2024) examine tourism sustainability in show caves through a review of environmental impacts and management responses. They identify microclimatic alterations and the introduction of microorganisms as important conservation concerns and propose a multidisciplinary approach to cave management. Their findings support incorporating environmental assessment into the early stages of destination planning rather than treating conservation as a separate activity after tourism development.

Miler et al. (2024) provide site-specific evidence from the Škocjan Caves in Slovenia. Their study demonstrates that tourist visits affect particulate matter concentrations and cave microclimatic conditions, with variations across seasons and locations. They recommend monitoring particulate matter alongside microclimate and biological conditions. For speleotourism strategy, this research supports adaptive management: operating arrangements should be informed by measurements from individual caves and revised as conditions change.

Visitor experience and safety form another strand of research. Kusuma et al. (2025) review factors used in karst tourism development models and identify comparatively limited attention to safety and enjoyment. Their analysis suggests that destination planning should consider these dimensions alongside scientific, educational, aesthetic, and environmental values. Complementing this perspective, Bajić et al. (2024), in a preprint examining Stopića Cave in Serbia, explore tourism demand forecasting. Such forecasting can inform operational planning, although visitor demand must be evaluated separately from a cave's environmental capacity.

Mousazadeh et al. (2023) examine sustainable behaviour in tourism management at Persian Qanats. Although qanats are constructed underground heritage sites, their research offers a relevant comparison for managing sensitive underground destinations. The study emphasizes the behaviour of visitors, local communities, and managers, demonstrating the importance of stakeholder involvement in heritage preservation. Its application to natural caves requires consideration of their different geological and ecological characteristics.

Within the Uzbekistan-focused literature, Usmanova and Lapasova (2023) discuss the condition, prospects, and promotion of speleological tourism. Ismatullaeva and Usmanova (2024) consider Uzbekistan's cave tourism potential through comparisons with New Zealand and Spain. These publications introduce locally relevant development questions, but international comparisons alone cannot establish the suitability or commercial feasibility of individual Uzbek cave sites.

The reviewed literature therefore supports an integrated strategic framework combining resource assessment, conservation monitoring, safety planning, visitor research, and community participation. The present article applies this framework to the planning of speleotourism in Uzbekistan. Its focus is on connecting these components into a phased development process, while recognizing that site selection and investment decisions require additional field evidence.

Research methodology

This article adopts a qualitative, desk-based methodology to develop a strategic framework for speleotourism in Uzbekistan. The approach combines a narrative review of relevant literature with comparative analysis of cave tourism management practices. The reviewed materials address environmental conservation, visitor safety, tourism demand, stakeholder participation, and destination planning. Findings from international studies are considered in relation to Uzbekistan's development context, while recognizing that practices cannot be transferred without assessing local conditions.

The analysis is organized around six dimensions: cave resource assessment, conservation requirements, accessibility and infrastructure, visitor safety, professional and institutional capacity, and community participation. A qualitative SWOT framework is used to structure potential strengths, weaknesses, opportunities, and threats. These considerations inform a proposed sequence of development stages: resource inventory, site screening, detailed feasibility assessment, controlled pilot operation, monitoring, and evidence-based expansion. Conservation and safety are treated as essential conditions for progression between stages.

The study does not include field surveys, stakeholder interviews, environmental measurements, or financial modelling. Accordingly, the proposed strategy represents a conceptual planning framework rather than a validated development programme. Its application to individual caves requires geological and ecological investigations, visitor demand research, consultation with local stakeholders, and site-specific economic and operational assessments.

Analysis and results

The qualitative analysis identifies a phased development strategy as an appropriate framework for planning speleotourism in Uzbekistan. Its principal outcome is a sequence that connects cave resource assessment with destination preparation, controlled operation, and monitoring. Within this framework, tourism development depends on demonstrating that a proposed activity is compatible with a cave's

environmental characteristics and safety requirements. The results represent an analytical synthesis of the reviewed literature rather than measured findings from individual Uzbek caves.

The first strategic priority is to distinguish resource attractiveness from development readiness. Geological formations, underground landscapes, and scientific interest may provide reasons for visiting a cave, but they do not establish whether tourism can operate safely or sustainably. Readiness additionally depends on access conditions, route difficulty, conservation restrictions, management responsibilities, and emergency arrangements. Consequently, an inventory should record both the potential appeal of each site and the information needed to determine its suitability for particular activities.

The analysis suggests three possible management categories for initial screening: sites potentially suitable for guided sightseeing, sites requiring specialist exploration skills, and sites where conservation needs may justify restricted access. These are proposed planning categories rather than classifications of existing Uzbek caves. Their application would require field evidence and consultation with relevant authorities. This differentiation can help direct investment towards appropriate visitor experiences while preventing technically demanding or sensitive sites from being promoted to unsuitable audiences.

Table 1.

Proposed stages of speleotourism development

Stage	Main activities	Expected planning output	Condition for progression
Resource inventory	Document cave characteristics, access, ownership or management arrangements, and existing information	Preliminary resource database	Sufficient information for initial screening
Site screening	Examine potential visitor appeal, environmental sensitivity, and operational constraints	Shortlist for detailed investigation	No identified constraint that rules out the proposed activity
Feasibility assessment	Conduct geological, ecological, safety, demand, and financial assessments	Site-specific development and management proposal	Evidence supporting safe, environmentally acceptable, and viable operation
Pilot operation	Introduce limited guided visits under defined procedures	Evidence on visitor experience and operating conditions	Acceptable monitoring results and effective management
Adaptive management	Review environmental indicators, safety performance, costs, and visitor feedback	Revised operating arrangements	Continued compliance with site-specific requirements
Selective expansion	Adjust services or visitation where evidence supports change	Controlled development of the tourism product	Demonstrated capacity to manage additional activity

Source: Author's synthesis based on the qualitative analytical framework. The stages are proposed planning steps, not observed implementation results.

A second result concerns the relationship between infrastructure and conservation. Investment priorities should follow the requirements of the selected tourism product and the characteristics of the site. Sightseeing routes may require defined pathways, visitor information, and carefully assessed lighting arrangements. Specialist exploration may rely more heavily on equipment, guide competence,

and controlled access. The analysis therefore supports evaluating each proposed facility according to its operational purpose, environmental effects, maintenance requirements, and cost.

Safety emerges as a condition that applies throughout the development process. Initial screening should identify matters requiring detailed investigation, while feasibility assessment should determine route hazards, equipment needs, guide qualifications, and emergency procedures. During operation, visitor briefings and incident records can inform improvements. Marketing should communicate the assessed difficulty of an activity so that visitors can make informed choices. This connection between assessment, operation, and communication helps make safety an ongoing management responsibility.

A third strategic finding is that demand forecasting and environmental capacity serve different purposes. Demand research estimates potential interest, seasonality, and willingness to pay. Environmental assessment examines the level and form of visitation compatible with preserving site conditions. High anticipated demand cannot independently justify larger visitor groups or additional infrastructure. Operating decisions should consider both sources of evidence, alongside staffing and emergency response capacity.

Community participation constitutes another component of the proposed strategy. Local businesses could provide accommodation, transport, catering, and guiding services where demand and operating conditions support these activities. However, participation requires practical arrangements, including training, transparent service agreements, and consultation about access and development. Assessing how benefits and costs are distributed would help determine whether a project contributes to local development. The present study does not estimate employment or income effects.

Table 2.

Suggested indicators for pilot projects

Management dimension	**Suggested indicator**	**Purpose**
Environmental conditions	Site-specific measurements of temperature, humidity, carbon dioxide, and visible disturbance	Identify changes associated with operation
Visitor safety	Incidents, near misses, and compliance with operating procedures	Review hazards and improve controls
Visitor experience	Feedback on interpretation, guiding, access, and activity difficulty	Improve service quality
Operational performance	Operating costs, maintenance needs, and seasonal visitation	Assess commercial and organizational feasibility
Local participation	Local service contracts, employment, and training participation	Examine the distribution of opportunities
Management effectiveness	Completion of monitoring and corrective actions	Assess whether identified problems are addressed

Source: Author's proposed monitoring framework. Indicator selection and acceptable thresholds must be established for each site.

The qualitative SWOT assessment highlights distinctive underground experiences and educational interpretation as potential strengths. Possible weaknesses include incomplete site information and limited specialist capacity, although their extent in Uzbekistan requires investigation. Opportunities involve regional itinerary development, local service provision, and cooperation with research institutions. Threats include environmental disturbance, poorly planned infrastructure, and visitation beyond management capacity. These considerations provide questions for further assessment rather than verified descriptions of the national sector.

The analysis ultimately supports selective implementation through pilot projects. A limited number of thoroughly assessed sites would allow managers to examine environmental responses, visitor satisfaction, operating costs, and institutional cooperation before considering expansion. The resulting strategy links promotion and investment to demonstrated readiness. Further field research is necessary to identify suitable locations and convert this conceptual framework into site-specific development programmes.

Conclusion and recommendations

The study proposes a phased strategy for developing speleotourism in Uzbekistan, linking cave resource assessment with conservation, visitor safety, operational preparation, and local participation. Underground environments could support distinctive educational and adventure experiences and complement regional tourism routes. However, their development depends on site-specific evidence demonstrating that proposed activities are environmentally acceptable, safe, and economically feasible.

The principal conclusion is that strategic planning should distinguish the attractiveness of cave resources from their readiness to receive visitors. Investment priorities, infrastructure design, and promotional activities should follow detailed assessment. As this study uses a qualitative, desk-based methodology, its framework provides planning guidance; it does not establish the suitability of particular caves or quantify their economic benefits.

The following recommendations arise from the analysis:

1. **Prepare a systematic cave resource inventory.** Record geological and ecological characteristics, accessibility, protection status, management responsibilities, and available research. Use this information to identify sites requiring further investigation.
2. **Undertake site-specific feasibility assessments.** Evaluate geological stability, environmental sensitivity, route hazards, visitor demand, operating costs, and emergency response arrangements before approving tourism activities.
3. **Introduce controlled pilot projects.** Begin with limited guided visits at appropriately assessed sites. Use pilot operations to examine visitor experience, environmental responses, maintenance requirements, and management effectiveness.
4. **Develop professional competence.** Provide practical training in cave guiding, environmental interpretation, first aid, and emergency procedures. Guide responsibilities and equipment requirements should correspond to the difficulty of each route.
5. **Establish adaptive monitoring arrangements.** Select environmental, safety, operational, and visitor experience indicators for each site. Define responsibilities for reviewing results and taking corrective action, including adjusting or suspending access where necessary.
6. **Support local participation and institutional coordination.** Involve communities, tourism businesses, researchers, conservation specialists, and emergency services in planning. Transparent agreements should clarify responsibilities, service provision, and the distribution of tourism benefits.
7. **Align promotion with demonstrated operating capacity.** Communicate route difficulty, access conditions, equipment requirements, and conservation rules accurately. Expand marketing and services only when monitoring and feasibility evidence support additional visitation.

Implementing these recommendations would provide a practical basis for evaluating speleotourism opportunities in Uzbekistan. The next research priority is to test the proposed framework through field investigations and carefully monitored pilot projects, allowing future development decisions to reflect the conditions of individual underground destinations.

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