

Tourists' Spatial Perception and Place Imagination in Frontier Ecotourism Destinations: A Case Study of the Ejina Oasis in Inner Mongolia (Post-print)

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Abstract

Tourist destination perception is one of the important research fields in tourism geography. Against the backdrop of the “Belt and Road” Initiative, research on tourists’ spatial perception and place imagination holds important theoretical and practical significance for promoting the branding construction of borderland eco-tourism destinations and facilitating the “de-marginalization” of borderlands and tourism development. Taking the Ejina Oasis as an example, this study comprehensively integrates content analysis, social network analysis, text analysis, and social interview methods to explore the characteristics of tourists’ spatial perception imagery and the construction process of place imagination in borderland eco-tourism destinations. The results show that: (1) Oasis landscape ecology and natural scenery constitute the most important part of spatial perception in eco-tourism destinations, among which the *Populus euphratica* forest occupies a central position in tourists’ spatial perception imagery network, and the *Populus euphratica* symbol has become tourists’ aesthetic and consumption preference. (2) K-core analysis reveals that *Populus euphratica* elements run through all hierarchical changes of cohesive subgroups, and the *Populus euphratica* landscape and its extended socio-cultural meanings are the key focus of tourists’ attention. With the increase of K-core levels, tourists transition from focusing on oasis *Populus euphratica* forest landscapes to comprehensive natural landscapes including oasis forests, landforms, water bodies, etc. Among oasis cultural landscapes, except for the Heicheng Ruins and Ceke Port, others receive less favor from tourists. (3) Based on the unique landscape symbols, typical regional symbols, and accumulated cultural symbols of the borderland, through embodied experiences in real space and cultural construction in imagined space, tourists develop rich life imaginations, frontier imaginations, and mysterious land imaginations about the Ejina Oasis, shaping a distinctive

place imagery of the oasis.

Full Text

Preamble

Destination perception represents a crucial research domain in tourism geography. Against the backdrop of the Belt and Road Initiative, investigating tourists' spatial perception and place imagination in frontier ecotourism destinations holds significant theoretical and practical importance for promoting brand development, "de-marginalization," and tourism growth in border regions. Due to their remote locations, limited transportation access, and sparse populations, frontier areas have experienced minimal industrialization and urbanization, preserving vast tracts of pristine landscape ecology and natural scenery that have recently emerged as popular ecotourism destinations.

Using the Ejin Oasis in Inner Mongolia as a case study, this research integrates content analysis, social network analysis, text analysis, and social interviews to examine the characteristics of tourists' spatial perception imagery and the construction processes of place imagination in frontier ecotourism destinations. The findings reveal: (1) Oasis landscape ecology and natural features constitute the most significant components of spatial perception in ecotourism destinations, with the *Populus euphratica* forest occupying the core position in tourists' spatial perception networks, transforming the tree into a symbol of aesthetic and consumption preference. (2) K-core analysis demonstrates that the *Populus euphratica* element permeates all levels of cohesive subgroup evolution, with the landscape and its extended socio-cultural meanings representing primary tourist concerns. As K-core levels increase, tourist focus shifts from the oasis *Populus euphratica* forest landscape toward integrated natural landscapes encompassing forests, landforms, and water bodies. Apart from the Heicheng ruins and Ceke Port, other oasis cultural landscapes receive limited attention. (3) Drawing upon unique frontier landscape symbols, typical regional symbols, and layered cultural symbols, tourists construct rich life imaginations, frontier imaginations, and mystical imaginations of the Ejin Oasis through embodied experiences in real space and cultural construction in imagined space, thereby shaping a distinctive place image.

1 Study Area Overview

Ejin Banner lies in China's northwestern frontier at the westernmost edge of Inner Mongolia. The Ejin Oasis represents the banner's essence, situated in the central-eastern part of Ejin Banner between 99°03'~100°00' E and 40°30'~42°30' N. As a large alluvial fan at the terminus of the Heihe River, the oasis is primarily distributed along the banks of the eastern and western Ejin Rivers and the Guring Lake basin. It is bordered by the Badain Jaran Desert to the southeast, the Mazong Mountain range to the west, the China-Mongolia border to the north, and the Dingxin Oasis in Jinta County, Gansu Province

to the south [Figure 1: see original paper]. The oasis area has remained stable at approximately 3328 km². Located deep within the Eurasian continent, the region features a typical temperate desert continental climate with annual precipitation of 37 mm (minimum 7 mm) and annual average temperature of 8.6°C, classifying it as an extremely arid zone.

The banner's registered population is 18,600, with a GDP of 3.81 billion yuan and a tertiary industry ratio of 6.5:26.9:66.6. The Ejin Oasis integrates diverse landscapes including *Populus euphratica* forests, Gobi deserts, grasslands, lakes, and wetlands, forming a renowned ecotourism destination. The Ejin *Populus euphratica* forest is one of only three remaining natural riverine *Populus euphratica* forest sites globally, covering 2,620 km² as a national nature reserve and one of 200 key ecotourism destinations designated in China's National Ecotourism Development Plan (2016-2025). Surrounding deserts and Gobi include the Badain Jaran, Tengger, Ulan Buh, Central Gobi, and Mazong Mountain Gobi, positioning the oasis within China's concentrated desert-Gobi distribution zone.

In 2019, the banner received 7.02 million tourist visits generating 6.819 billion yuan in tourism revenue, representing year-on-year growth of 10% and 8% respectively. As a critical component of northern China's ecological security barrier, the Ejin Oasis has achieved remarkable success in ecotourism destination development under the "ecology-based banner" and "tourism-prospering banner" strategies since 2000. However, challenges persist, including a singular destination image, pronounced seasonal fluctuations, and deterritorialization in tourism space production. Understanding tourist-destination interactions from the visitor perspective to better meet demand from the supply side and achieve meaningful brand creation remains the primary challenge for oasis ecotourism development.

2 Data and Methods

2.1 Data Sources and Processing

Network text data. This study collected online travelogues from three major Chinese travel websites—Ctrip, Mafengwo, and Baidu Travel—as samples of tourist spatial perception. The search and screening period covered January 2018 to December 2019. The filtering criteria included: (1) Content must document actual travel experiences ("travel traces, itinerary, and impressions") with minimum 800 characters; promotional materials and agency advertisements were excluded. (2) Publication timing considered that Ejin's *Populus euphratica* ecotourism emerged after 2000, with self-driving tourists multiplying after the Beijing-Xinjiang Expressway's full opening in 2017; thus travelogues from 2015-2019 were selected. (3) Influence threshold selected travelogues with over 1,000 clicks to ensure impact on potential tourists. After content filtering and manual screening, 68 travelogues totaling 198,000 characters were obtained.

Social interview data. Field research conducted September 25-October 5,

2019 in Ejin provided supplementary ecotourism development information. Tourist interviews focused on perceptions of oasis ecotourism development, interpretation and attribution of local meaning, and potential conflicts between embodied experience and cultural imagination. Twenty-three tourists of diverse gender, age, and education levels were selected through random sampling at visitor centers, Populus euphratica forest scenic areas, Juyan Lake, the Dead Forest, and tourist rest points for semi-structured interviews lasting 15-30 minutes. Follow-up interviews via WeChat and QQ explored pre- and post-visit consistency and variation in spatial perception and place imagination. Interview transcripts were coded and archived as supplementary materials for triangulation with network text findings to enhance research validity and reliability.

2.2 Research Methods

2.2.1 Content Analysis Content analysis systematically transforms unsystematic, qualitative symbolic content into systematic, quantitative data. Its advantages in analyzing tourist spatial perception have led to widespread application in destination image research, including word frequency, sentiment, and cluster analysis. However, since content analysis cannot reflect semantic associations and structural relationships among high-frequency terms, it requires integration with methods like social network analysis.

2.2.2 Social Network Analysis Social network analysis characterizes network morphology, properties, and structure by examining relationships within networks. This study employs it to explore Ejin Oasis tourist spatial perception network characteristics through network density, centrality, and cohesive subgroup analysis.

Network density measures the ratio of actual to theoretically possible relationships, reflecting connection tightness among nodes (high-frequency words):

$$D = \frac{L}{N(N-1)}$$

where D is network density, L is actual relationships, and N is node count.

Centrality measures network centralization, including degree, closeness, betweenness, and eigenvector centrality. Eigenvector centrality comprehensively evaluates node importance by considering both adjacent node quantity (degree centrality) and their importance:

$$EC_i = \lambda \sum_{j=1}^N A_{ij} X_j$$

where EC_i is node i 's eigenvector centrality, λ is the eigenvalue, A_{ij} indicates connection between nodes i and j (1 if connected, 0 otherwise), X_j is node j 's centrality index, and N is node count.

Cohesive subgroup analysis simplifies complex network structures to reveal hidden substructures. Using K-core analysis based on internal relationship frequency (node degree centrality), this study exposes cohesive subgroups in tourist spatial perception networks. A K-core is a subnetwork where each node's degree centrality is at least K , with larger K values indicating tighter subgroups.

2.2.3 Text Analysis Text analysis employs critical theories and methods to penetrate from surface to deep text layers, revealing latent meanings beyond ordinary reading. Based on semiotics, narratology, and cultural studies, this research combines content and social network analysis with interview data to interpret socio-cultural-ecological meanings embedded in network texts, exploring tourists' social construction and cultural imagination of the Ejin Oasis ecotourism destination.

2.2.4 Social Interviews Building on in-depth experiential and participatory observation, researchers used random sampling to conduct semi-structured interviews with 23 tourists at various locations. Interview durations ranged 15-30 minutes, with follow-up via social media to examine pre-/post-visit perception consistency and variation.

3 Results

3.1 Tourist Spatial Perception Imagery

3.1.1 High-Frequency Word Analysis ROST CM6 software analyzed network travelogue texts, filtering irrelevant vocabulary to extract high-frequency perception feature words. Among the top 30 high-frequency terms, 14 were closely related to *Populus euphratica*, accounting for 52.6% of total frequency. "Populus euphratica" and "Populus euphratica forest" ranked 1st and 2nd respectively, with combined frequency representing 23.8% of the top 30 terms' total frequency. The "Dead Forest" (formed by dead *Populus euphratica* trees due to Heihe River channel changes) ranked 6th, while "millennium" and "golden" (characterizing *Populus euphratica* life traits and landscape conditions) ranked 8th and 9th. This indicates the Ejin Oasis has become inextricably linked with *Populus euphratica*, establishing it as a new spatial consumption symbol.

3.1.2 Spatial Perception Network Analysis While high-frequency words reveal attention hotspots, they cannot reflect semantic associations or deep structural relationships. Spatial perception networks can present connection degrees among high-frequency terms and describe internal perception structures.

Network density and structure. The calculated network density is 0.314, indicating relatively dense connections among nodes (spatial perception terms). Using co-occurrence frequencies to construct a co-occurrence matrix and visualizing it via NetDraw software reveals a "center-periphery-edge" structure [Figure 2: see original paper]. Node size indicates direct connections—larger nodes

signify greater network importance, while line thickness represents association strength.

Populus euphratica forest occupies the core position with the most connections and strongest associations to Ejin Banner, Populus euphratica, desert, Sidaoqiao, and “golden.” Ejin Banner, Populus euphratica, and desert form second-tier nodes with strong mutual associations and moderate connections to other nodes. Third-tier nodes including Heicheng, Dead Forest, Juyan Lake, Erdaoqiao, Sidaoqiao, and Badaoqiao maintain certain peripheral associations. Overall, perception content concentrates heavily on natural landscapes, particularly Populus euphratica forests (Erdaoqiao, Sidaoqiao, and Badaoqiao are viewing route locations within the Populus euphratica forest scenic area, equivalent to the forest itself), Dead Forest, and Juyan Lake. Among cultural landscapes, only Heicheng ruins and Ceke Port receive attention, while history, culture, folk customs, urban construction, and festival activities remain largely ignored.

Centrality analysis. Eigenvector centrality values obtained via Ucinet software show Populus euphratica forest has the highest centrality, making it the most important and intensely perceived element. Closely linked nodes like Populus euphratica, Dead Forest, Badaoqiao, and Erdaoqiao also exhibit high centrality as key perception factors. This confirms that natural resources and environment constitute the core of ecotourism destination perception, consistent with findings from other ecotourism sites (e.g., Jiuzhaigou), demonstrating that destination attributes significantly influence tourist spatial perception.

Cohesive subgroup analysis. K-core analysis reveals that as K-value increases from 1 to 7, subgroup member quantity first decreases then increases, with composition varying markedly while internal relationships strengthen. The K=7 subgroup (16 high-frequency terms) represents the strongest, most tightly connected cohesive subgroup. Throughout hierarchical changes, Populus euphratica elements remain fundamental across all cohesive subgroups, indicating that Populus euphratica landscapes (e.g., “golden,” “autumn,” “scenery,” “sunset”) and their extended socio-cultural meanings (e.g., “life,” “hero,” “millennium”) constitute primary tourist concerns. As K-core levels increase, tourist focus transitions from Populus euphratica forest landscapes to integrated natural landscapes encompassing forests, landforms, and water bodies. Apart from the Western Xia Heicheng ruins and Ceke land port, other cultural landscapes receive limited attention.

3.2 Tourist Place Imagination of the Oasis

Place imagination involves both objective perception of physical environments and subjective representation of geographic worlds. Based on unique frontier landscape symbols, typical regional symbols, and layered cultural symbols, tourists construct distinct oasis place imagery through embodied experiences in real space and cultural construction in imagined space.

3.2.1 Populus Euphratica Habitat and Life Imagination *Populus euphratica* is an ancient and rare species with exceptional resilience to cold, heat, drought, waterlogging, alkalinity, and wind-sand stress—the only arboreal species capable of forming forests in desert environments, earning it the title “soul of the desert.” Each October, vast *Populus euphratica* leaves turn from green to golden, creating a spectacular desert spectacle.

The stark contrast between harsh habitat and stunning beauty provides the landscape symbol for tourists’ life imagination. *Populus euphratica* is constructed as a desert hero tree symbolizing national spirit, its life course filled with hardship and struggle: “Despite scorching sun and severe cold, it stands tenaciously and unyieldingly; even when fallen, it maintains a defiant posture.” Walking through dead *Populus euphratica* forests caused by water scarcity, tourists shift focus from natural ecology to human-nature relationships: “We must learn to respect and revere nature; failure to protect it brings ruthless punishment.”

3.2.2 Desert Landscape and Frontier Imagination Ejin Banner lies deep within the Eurasian interior, far from the sea, with extensive deserts and Gobi covering 15.17% and 5.93% of its total area respectively. Historically a strategic frontier region defending against northwest nomadic peoples, it inspired Tang Dynasty poet Wang Wei’ s famous verse: “In boundless desert, straight smoke rises; over endless river, the round sun sets.”

The desolate yet magnificent desert landscape and profound historical memory serve as regional symbols stimulating tourists’ frontier imagination. Through embodied experience and cultural imagination, tourists construct the oasis as a remote, desolate, and silent “frontier” image. Facing endless Gobi wilderness, tourists not only appreciate the desert’ s majestic beauty but also evoke frontier imagery: lone desert smoke, river sunset caravans, camel bells, fluttering banners, and war drums. Historical figures like Huo Qubing, Li Guang, Li Ling, Su Wu, Wang Wei, and Chen Zi’ ang become cultural symbols in tourists’ frontier imagination.

“Ejin was a strategic frontier passage to the northern desert, contested by military strategists throughout history...Many famous generals visited: Huo Qubing, Li Guang, Li Ling.” (FT03-ZYB-A)

“Ejin was a mandatory stop on the ancient Silk Road, where many literati left immortal poems. Everyone knows Wang Wei’ s ‘boundless desert smoke, endless river sunset.’ ” (FT04-TJ-A)

3.2.3 Flowing Sand and Mystical Imagination Juyan Lake, the Heihe River’ s terminal lake, maintains approximately 40 km² water area after restoration, playing a vital role in oasis ecosystem stability. Historically renowned, legends recount how Laozi, founder of Taoism, rode a blue ox westward through the Hexi Corridor to the Weak Water River banks, finally ascending to immortality at Juyan Lake and vanishing without further historical record, leaving

behind the “flowing sand immortal trace” legend.

This legend becomes a cultural symbol constructing the oasis’ s mystical image. In travelogues, Juyan Lake is depicted as a Gobi jade, a mystical realm: “There is always an ethereal, transcendent purity that inspires admiration,” imagining Laozi’ s passage: “Seeing the sunrise’ s splendor, such stunning beauty...with reeds swaying and gulls soaring...why not spend eternity here?” Some tourists deliberately connect Juyan Lake with historical legends and celebrity anecdotes to accentuate its mystical image, confirmed in social interviews.

“Juyan Lake is claimed as Laozi’ s ascension site, King Mu’ s meeting place with the Queen Mother of the West, where Li Guang watered his horses and Genghis Khan camped...This is a mysterious sea.” (FT05-CJX-A)

“This was where Su Wu herded sheep and where Laozi attained immortality...If Laozi chose this place for immortality, it shows the charm and mystery of this treasured land.” (FT06-FRG-A)

4 Discussion

This study integrates content analysis, social network analysis, text analysis, and social interviews to examine frontier ecotourism destination spatial perception imagery and place imagination construction from macro and meso scales, following a “perception elements—perception structure—perception meaning” logic. This approach responds to scholars’ calls for supply-side understanding of tourism demand under humanism and postmodernism, supplementing traditional scientific positivist methods in tourism geography perception studies and revealing how destinations are socially constructed as imagined spaces.

As tourism competition intensifies, destination branding has become a focal point. In the experiential consumption era, branding research increasingly emphasizes bottom-up perception, identification, and negotiation rather than marketing-oriented image reshaping. Frontier ecotourism destinations should consider tourist spatial perception and place imagination alongside ecological and cultural characteristics, grasping tourist concerns to better meet demand from the supply side and enhance destination status, thereby promoting branding.

Driven by the Belt and Road Initiative, inland border opening policies, and domestic market demand, frontier ecotourism destinations have attracted core region tourists. Through frequent host-guest interactions, traditional frontier imaginations of “primitive,” “backward,” and “remote” are gradually fading, promoting de-marginalization. However, frontier areas also face re-marginalization risks due to special location conditions, accumulated historical memory, and harsh environments, with “frontier imagination” and “mystical imagination” becoming prominent markers. Branding should incorporate frontier spatial characteristics, emphasizing spiritual components of borderland tourism by connecting

ecotourism with sacred experiences of life, dreams, and faith to overcome negative marginal imaginations and promote de-marginalization.

Tourism destination perception represents a vital research field, with perception and social construction mechanisms forming the academic foundation and basis for development management. Due to length constraints, this paper has not deeply analyzed the mechanisms underlying spatial perception and geographic imagination, requiring further theoretical exploration in future research to reveal underlying regularities.

5 Conclusion

Using network text data and social interview materials, this study integrated multiple methods to examine tourist spatial perception imagery characteristics and place imagination construction processes in frontier ecotourism destinations, yielding four key findings:

- 1) Tourist spatial perception in frontier ecotourism destinations is strongly influenced by oasis ecological environments, with landscape ecology and natural features comprising the most important perception elements (*Populus euphratica*, *Populus euphratica* forest, Dead Forest, Juyan Lake, Heihe River, desert). *Populus euphratica* forest occupies the core position in tourist spatial perception networks as the most important and intensely perceived element, with the *Populus euphratica* symbol becoming a tourist aesthetic and consumption preference, shaping the oasis into the veritable “hometown of *Populus euphratica* forests.”
- 2) In tourist spatial perception network cohesive subgroups, *Populus euphratica* elements permeate all hierarchical levels as the focal point and core. The landscape and its extended socio-cultural meanings (“life,” “hero,” “millennium”) constitute primary tourist concerns. As subgroup levels increase, tourist focus transitions from *Populus euphratica* forest landscapes to integrated natural landscapes, while cultural landscapes beyond Heicheng ruins and Ceke Port receive limited attention.
- 3) Frontier spatial attributes significantly influence oasis place imagination. Based on unique landscape symbols, typical regional symbols, and layered cultural symbols, tourists construct rich life imaginations, frontier imaginations, and mystical imaginations of the Ejin Oasis, creating a distinct place image.
- 4) The comprehensive methodological integration enriches and supplements tourism destination spatial perception studies. Frontier ecotourism destination branding should align with frontier spatial characteristics and connect with sacred tourism experiences to eliminate negative marginal imagination influences and promote tourism development.

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Tourists' Spatial Perception and Place Imagination in Frontier Ecotourism Destination: A Case of Ejin Oasis, Inner Mongolia

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Abstract: Destination perception is one of the important research fields in tourism geography. In the context of the "One Belt and One Road" initiative, the study on tourists' spatial perception and place imagination in frontier ecotourism destinations holds important theoretical and practical significance for promoting the branding of frontier ecotourism destinations, frontier "demarginalization," and tourism development. Industrialization and urbanization are least prominent in China's frontier areas owing to their remote location, inconvenient transportation, and sparse population. As a result, various primitive landscape ecology and natural features have been preserved and have recently become popular ecotourism destinations. Using the Ejin Oasis in Inner Mongolia, China as a case study, this research thoroughly explored the characteristics of tourists' spatial perception imagery and the construction process of place imagination in frontier ecotourism destinations via comprehensively integrating content analysis, social network analysis, text analysis, and social interview methods. Results show that: (1) Oasis landscape ecology and natural features constitute the most important parts of the spatial perception of ecotourism destinations, with the *Populus euphratica* forest occupying the core position in tourists' spatial perception networks, transforming the tree into a symbol of aesthetic and consumption preference. (2) K-cores analysis revealed that the *Populus euphratica* element dominated the level change process of all cohesive subgroups and its extended social and cultural significance constituted the primary tourist content. With the increase in the K-cores level, tourists shifted their focus from the oasis *Populus euphratica* forest landscape to an integrated natural landscape of oasis forest, landform, and water. Apart from the Heicheng ruins and Ceke Port, the remaining oasis cultural landscapes were less popular among tourists. (3) Basing on the unique landscape, typical regional,

and layered cultural symbols of the frontier and with the help of the embodied experience of the real space and the cultural construction of the imagination space, tourists experienced rich life, frontier, and mysterious imaginations of the Ejin Oasis, thus creating a distinct place image. Through the detailed analysis of the spatial perception image and local imagination construction of frontier ecotourism destinations from the outside to the inside, this study enriched and supplemented the studies on the spatial perception of tourism destinations. On the basis of the frontier spatial characteristics, the branding process of frontier ecotourism destinations should be connected with the sacred tourism experience to remove the negative influence of marginal imagination.

Key words: frontier ecotourism destination; spatial perception; place imagination; placeness; Ejin Oasis

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv –Machine translation. Verify with original.