

Biocultural heritage and conservation practices in sacred natural sites across Europe and Asia

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Abstract. Across continents, sacred natural sites (SNS) embody an enduring expression of biocultural heritage in which spiritual worldviews, ecological knowledge, and local wisdom converge to shape distinctive conservation practices. This study offers a comparative analysis of SNS in Europe and Asia, synthesizing global literature to examine their cultural context, spiritual foundations, ecological roles, and conservation modalities. Asian SNS are characterized by diverse spiritual tradition including animism, Buddhism, Hinduism, and Shintoism, where customary laws, taboos, and community-based governance function as effective conservation mechanisms that protect forests, rivers, mountains, and culturally significant species. In contrast, European SNS are predominantly rooted in Christian traditions and historical pilgrimage landscapes, often integrated into formal protected area frameworks supported by legal instruments and heritage documentation. Despite these differences, both regions demonstrate that sacred landscapes frequently serve as biodiversity refuges and reservoirs of intangible cultural heritage, sustaining old-growth forests, endemic species, and ecological stability. Contemporary challenges-such as tourism pressure, modernization, and erosion of traditional knowledge- threaten the continuity of these sacred places. These comparative insights highlight the importance of recognizing SNS as vital components of global biocultural conservation strategies, illustrating how spiritual values and cultural heritage can reinforce ecological stewardship across varied socio-cultural settings.

1 Introduction

Sacred natural sites (SNS) are locations where spiritual perspectives, cultural identity, and ecological values converge, influencing enduring conservation practices in various societies. The locations, including mountains, rivers, groves, caves, and individual trees, exemplify the human–ecosystem relationship and act as cultural and spiritual centers that shape traditional ecological knowledge and resource management [1–5]. SNS are increasingly acknowledged for their significance in biodiversity conservation, as they frequently contain unique species,

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habitats, and ecological processes that extend their impact beyond local landscapes [1–2]. Evidence from multiple regions consistently indicates that SNS play a crucial role in ecological preservation and cultural continuity [4][6].

The importance of SNS for conservation is rooted in the biocultural heritage they represent, which includes species, habitats, and ecological functions that support adjacent landscapes [1–2]. Multiple studies conducted in Asia and Africa indicate that SNS frequently function as effective conservation areas, preserving biodiversity and cultural knowledge in contexts where formal protection is inadequate [4][6][8]. In numerous areas facing significant environmental degradation, social-ecological systems maintain remaining natural habitats and offer critical ecosystem services, including water regulation, erosion control, and the supply of medicinal plants and non-timber forest products. The increasing global focus from UNESCO, IUCN, and the Convention on Biological Diversity highlights the significance of SNS as culturally integrated conservation systems that enhance formal protected areas and support ecological resilience across various scales [8].

Most empirical research on SNS has concentrated on specific countries in Asia, including India, Nepal, and China, as well as certain regions in Africa. In these contexts, SNS serve as informal conservation networks that support formal protected areas [2], [9–12]. Conversely, SNS in European contexts, which are marked by distinct historical developments, secularization, and Christian influences, are less thoroughly documented and understood. This imbalance restricts comprehensive comparative analysis of how various cosmologies, governance structures, and cultural histories influence biocultural conservation. Thus, analyzing SNS in Asia and Europe is crucial for formulating context-specific strategies that incorporate cultural heritage and ecological stewardship within global conservation frameworks. [4] [13–14].

2 Literature Study

Sacred natural sites have historically been pivotal in wildlife conservation, sustaining agroecological systems, conveying cultural values, and influencing human creativity across centuries of human-environment interactions. The notion of a "sacred forest" or sacred natural space is increasingly examined in academic discourse, as it contests prevailing Western cosmologies that delineate a separation between humans and nature, positioning scientific knowledge in opposition to cultural meaning systems. The term sacred possesses a profound etymological history. In classical Latin, *sacer* denotes "dedicated to religious purposes," establishing a distinction between the sacred and the mundane. The linguistic roots in question—Hittite *saklais* (ritual, custom, law), Greek *sa* (safe), Latin *sanus* (healthy, intact), and *sanctus* (holy site) demonstrate a nuanced semantic evolution that includes themes of ritual, safety, wholeness, awe, divine presence, and spiritual power [19]. This variety of meanings demonstrates that ancient societies viewed sacredness as a complex concept interconnected with cosmology, cultural norms, and ecological relationships.

2.1 Characteristics of SNS in Asia: Dominance of Animistic Ontologies and Resilient Customs

Sacred natural sites are prevalent throughout Asia and are closely linked to indigenous cosmologies and religious traditions [13]. Numerous SNS stem from animistic worldviews, which perceive mountains, forests, rivers, and caves as dwelling places for spirits or deities. Transgressions against these sacred sites may result in spiritual consequences [1][2][15]. Belief systems, supported by rituals, myths, and ethical codes, serve as significant cultural mechanisms that prevent ecological degradation and promote sustainable resource

utilization. In Southeast and South Asia, SNS are frequently sustained through community governance based on customary law. Indigenous communities in Indonesia categorize landscapes into distinct zones for settlement, production, local conservation, and sacred purposes (e.g., *tanah ulen*, *leuweung larangan*, *wakunmo*) [15][18]. Even in cases where SNS incorporate planted species or mixed forest types, such as the *tembawang* systems of West Kalimantan, they maintain significant floristic diversity and serve as semi-natural habitats within anthropogenically altered landscapes. Conservation functions endure primarily because of robust customary sanctions and moral obligations, which frequently surpass the efficacy of state-led regulations [8][15–16][18]. Many Asian SNS function as the final remnants of genuine ecosystems, safeguarding endemic or rare species. Examples include sacred mountains in China and forests adjacent to Shinto shrines in Japan, where traditional beliefs promote sustained habitat conservation.

2.2 Characteristics of SNS in Europe: Syncretism, Secularization, and Revitalization

Sacred natural sites (SNS) are widespread across Europe and have been shaped by distinctive historical, religious, and socio-cultural trajectories. Processes of modernity and scientific rationalism contributed to the progressive desecralization of nature, while the expansion of Christianity led to the displacement, reinterpretation, or assimilation of numerous pre-Christian sacred landscapes, including ancient woodlands, springs, and caves [2,4]. Despite these historical transformations, contemporary research, such as studies conducted under the Delos Initiative, demonstrates that spiritual values continue to influence biodiversity conservation practices in Europe [6,14]. Many European SNS are closely associated with Catholic and Orthodox traditions and are embedded within monastic landscapes, pilgrimage routes, or culturally protected woodlands. Notable examples include forests surrounding monastic sanctuaries in Italy and sacred mountains revered within Greek Orthodox traditions. These sites reflect enduring linkages between religious practice, cultural heritage, and environmental stewardship.

European SNS are typically well documented, formally recognised in cultural or natural heritage registers, and protected through established legal and institutional frameworks. Unlike certain Asian SNS, where restricted access and secrecy are maintained to preserve sanctity, European communities often actively promote and celebrate their sacred landscapes. Tourism plays a significant role in sustaining local economies while reinforcing cultural identity and continuity [14]. Furthermore, the integration of SNS into national parks and formal conservation systems enhances ecological protection while maintaining long-standing spiritual traditions [21–22]. A defining feature of European SNS is syncretism, as many Christian sacred sites are situated atop earlier pagan places of worship, resulting in layered cultural narratives that contribute to both historical depth and contemporary relevance.

2.3 Significant Distinguishing Characteristics and Justification of Comparative Research

Clear distinctions between Asian and European SNS emerge from differences in ontological perspectives, historical trajectories, and governance arrangements. In many Asian contexts, sacredness is rooted in animistic and polytheistic cosmologies that regard nature as inherently living and spiritually imbued. Conservation effectiveness is largely sustained through deeply internalised moral obligations and customary laws embedded within community life [2,15–16]. By contrast, European conceptions of sacredness are predominantly shaped by monotheistic traditions that have reinterpreted or absorbed earlier nature-based belief

systems. Consequently, conservation outcomes in Europe are strongly influenced by formal legal protection, heritage recognition, and institutional management structures [6,14].

Asian SNS generally function as living ecosystems actively managed by local communities, serving as integral components of everyday social and ecological practices. European SNS, meanwhile, more often protect cultural landscapes that combine natural features with historical, religious traditions, and symbolic meanings. Both systems face contemporary pressures: European SNS are increasingly affected by tourism intensification and broader processes of modernization, whereas Asian SNS frequently confront challenges related to cultural erosion, legal marginalisation, or the weakening of customary governance mechanisms.

These contrasting characteristics underscore the need for comparative research. Such analysis enables a deeper understanding of how divergent worldviews, ethical frameworks, and governance systems shape biocultural conservation outcomes across regions, offering insights that are essential for developing context-sensitive and culturally grounded conservation strategies [4,13–14].

3 Methodology

This study adopts a qualitative research methodology grounded in a systematic analysis of scholarly literature, documented case studies, and relevant institutional reports addressing sacred natural sites (SNS) in Europe and Asia. The methodological framework is designed to support a comparative examination of the cultural, religious, ecological, and governance dimensions of SNS across the two regions.

The first stage of analysis focuses on identifying key attributes of SNS as social–ecological systems. These attributes are organised into four analytical dimensions commonly employed in biocultural conservation research: (1) site characteristics, (2) cultural and spiritual context, (3) ecological significance, and (4) conservation challenges. This stage involves synthesising evidence from peer-reviewed academic publications, conservation assessments, ethnographic studies, and global policy and guideline documents issued by institutions such as the International Union for Conservation of Nature (IUCN), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the Convention on Biological Diversity (CBD). The objective is to establish a robust baseline understanding of the functions, meanings, and conservation roles of SNS within each regional context.

The second stage deepens the comparative perspective by examining region-specific patterns and contrasts between Asian and European SNS. Particular attention is given to: (1) differences in cosmological foundations, notably animistic and polytheistic worldviews prevalent in many Asian contexts compared with Christian and post-Christian traditions in Europe; (2) the relative roles of customary governance systems versus formal protected-area and heritage management frameworks; and (3) how spiritual values are translated into concrete conservation practices and forms of landscape stewardship.

Data analysis is conducted through thematic coding and cross-regional comparison to identify recurring themes, divergences, and shared principles across the SNS literature. This qualitative analytical approach enables the exploration of how biocultural heritage shapes conservation outcomes within diverse social–ecological settings and provides a conceptual foundation for discussing the broader implications of SNS for integrative and culturally informed conservation strategies.

4 Result and Discussion

4.1 Geographic and Cultural Diversity

Sacred Natural Sites (SNS) are globally distributed and occur across a wide range of ecological zones, including alpine mountain systems, tropical forests, arid and semi-arid landscapes, islands, lakes, rivers, and coastal environments. Their widespread presence reflects a universal human tendency to attribute spiritual meaning to natural features and landscapes. Across diverse societies, SNS function as focal points for ritual practices, pilgrimage activities, cultural identity formation, and the intergenerational transmission of ecological knowledge and moral values. Table 1 presents selected examples of SNS from different world regions, illustrating how sacred landscapes emerge from diverse cultural and religious traditions, including Tibetan Buddhism, Andean cosmology, ancient Greek religion, Christian monasticism, African indigenous belief systems, and Polynesian ancestral worship. This diversity demonstrates that SNS are not confined to specific belief systems or cultural settings but instead represent a recurrent pattern of human–nature relationships shaped by local cosmologies, histories, and social institutions.

The global distribution of SNS further indicates their relevance within both indigenous belief systems and organised religious traditions. In many contexts, SNS serve as central elements of communal life, acting as sites for ceremonies, moral regulation, and collective memory, while simultaneously reinforcing norms that govern interactions with the surrounding environment [20].

Table 1. Examples of SNS across regions and their cultural or religious contexts

Region	Examples of Sacred Natural Sites	Cultural/Religious Context
Asia	Taksang Lhakhang Monastery (Bhutan); Mt. Jomolhari (Bhutan); Sagarmatha/Chomolongma (Mt. Everest, Nepal–Tibet)	Tibetan Buddhism; Himalayan indigenous spirituality
South America	Island of the Sun and Island of the Moon (Lake Titicaca); Ruins of Tiwanaku and Puma Punku (Bolivia)	Andean indigenous religions; Inca cosmology
Europe	Ruins of Delphi and Mt. Olympus (Greece); Holy Island of Lindisfarne (United Kingdom)	Ancient Greek religion; Christian monasticism
Africa	Sacred lakes of the Niger Delta (Nigeria); Sacred forests of Benin and Ghana	Indigenous African spirituality; animism
North America	St. Paul Island (Aleut people, Alaska)	Indigenous Aleut spirituality
Oceania	Rapa Nui (Easter Island, Chile)	Polynesian ancestral worship

4.2 Ecological Characteristics and Biodiversity

Sacred Natural Sites are frequently associated with ecologically significant landscapes, largely due to long-standing cultural protections that restrict extractive or disruptive human activities. Beliefs concerning the spiritual inhabitation, guardianship, or ancestral presence within specific mountains, forests, rivers, islands, or caves often result in the establishment of de facto conservation zones. As a consequence, SNS commonly preserve old-growth vegetation, rare or endemic species, and intact ecological processes that have been degraded or lost in surrounding areas.

- a. Mountain ecosystems provide a clear illustration of this dynamic. Peaks such as Mt. Jomolhari in Bhutan and Sagarmatha/Chomolongma in the Nepal–Tibet region are deeply revered within Buddhist and indigenous cosmologies. These mountains support high-altitude biodiversity, including specialised alpine flora, habitats for species such as snow leopards, and distinctive microclimatic systems. Cultural prohibitions against wildlife killing, timber extraction, and disturbance of sacred slopes contribute to the long-term ecological stability of these fragile environments.

- b. Island- and lake-associated SNS exhibit similar conservation patterns. The Island of the Sun in Lake Titicaca, regarded in Andean cosmology as the birthplace of Inca civilisation, illustrates how sacred status has facilitated the preservation of endemic species, traditional agricultural terraces, and freshwater ecosystems. In many cultures, lakes are perceived as living entities or ancestral beings, leading to careful management of shorelines, water use, and ritual cleanliness.
- c. Sacred forests and groves, particularly those found in India's Western Ghats and parts of Africa and Southeast Asia, function as critical biodiversity refuges. These sites protect medicinal plants, endemic species, and remnants of primary forest within heavily modified agricultural landscapes. Cultural taboos prohibiting tree cutting, hunting, or grazing contribute to higher species richness, healthier soils, and more intact hydrological functions compared to adjacent non-sacred areas.
- d. Sacred caves and rivers also support distinct ecological niches. Caves associated with religious traditions—such as Bektashi Sufi cave sites in the Balkans provide stable microhabitats for bats, invertebrates, and cave-adapted organisms. Sacred rivers across Asia, Africa, and Europe hold profound ritual importance and are often safeguarded through purification rituals, customary regulations, and community-based monitoring practices.

Overall, the persistent intersection of cultural meaning and ecological integrity demonstrates that SNS operate as vital conservation spaces—sometimes intentionally, sometimes inadvertently playing a significant role in safeguarding biodiversity and natural heritage across multiple spatial and cultural scales [20].

4.3 Spiritual and Social Functions

The significance of Sacred Natural Sites (SNS) extends beyond their ecological value. SNS are deeply embedded in the spiritual, cultural, and social lives of communities, shaping collective understandings of origins, responsibilities, and relationships with the natural world.

Spiritual Functions

SNS serve as focal points for spiritual engagement and are commonly believed to be the abodes of deities, guardian spirits, or ancestral beings. Communities visit these sites for prayer, meditation, healing rituals, and seasonal ceremonies. The perception of sacredness establishes behavioral norms that discourage destructive activities and foster a respectful and reciprocal relationship with nature.

Cultural Identity and Collective Memory.

SNS reinforces cultural identity by embodying cosmologies, origin myths, and historical narratives. They function as living cultural archives that connect present-day communities with their ancestors and the surrounding landscape. Festivals, pilgrimages, and ritual cycles centered on SNS strengthen social cohesion and reaffirm shared values. In many societies, the loss of a sacred site is perceived as equivalent to the loss of cultural identity itself.

Educational and Knowledge Functions.

SNS also serve as important sites of informal education, where indigenous ecological knowledge, ethical values, and cultural teachings are transmitted across generations. Elders frequently use sacred landscapes as learning spaces to explain seasonal cycles, plant uses, moral lessons, and customary regulations. Through these interactions, younger generations learn to perceive ecological systems not merely as material resources, but as integral components of their cultural and spiritual world.

A compelling example is found among the Aleut people of Alaska and their relationship with St. Paul Island. For the Aleut, the island is not only a physical habitat but also a spiritual landscape intertwined with ancestral narratives, ecological knowledge, subsistence practices, and ceremonial traditions. This integrated worldview informs their stewardship of marine and terrestrial environments, demonstrating how SNS sustain both cultural identity and ecological responsibility [23].

Table 2. Comparative analysis of Sacred Natural Sites (SNS) across regions

Aspect	Asia (Bhutan/Nepal)	South America (Bolivia)	Europe (Greece/UK)	Africa (Nigeria/Western Ghats)
Type of Sites	Monasteries, mountains	Islands, ruins, mountains	Ruins, mountains, islands	Groves, lakes, caves
Cultural Context	Buddhism, Hinduism	Andean cosmology, Inca heritage	Ancient Greek mythology, Christianity	Indigenous spiritual traditions
Spiritual Function	Pilgrimage, meditation, ritual ceremonies	Origin myths, fertility rituals	Oracular worship, pilgrimage	Ritual taboos, storytelling, community rites
Ecological Role	Watershed protection, biodiversity refuge	Aquatic ecosystems, agricultural support	Cultural landscape preservation	Biodiversity hotspots, ecosystem conservation
Conservation Challenges	Tourism pressure, climate change	Archaeological preservation, pollution	Urban encroachment, tourism	Deforestation, cultural erosion

4.4 Conservation and Challenges

Sacred Natural Sites play a vital role in biodiversity conservation and the preservation of cultural traditions. However, they are increasingly exposed to multiple pressures that threaten both their ecological integrity and spiritual significance.

4.4.1 Contemporary Development Pressures

Infrastructure expansion, mining, logging, tourism development, and agricultural intensification frequently encroach upon sacred landscapes. The construction of roads, resorts, or extraction zones near SNS can disrupt ecological processes and interfere with spiritual practices. In addition, unmanaged commercial tourism may exert significant pressure on sacred sites when visitor behavior fails to respect cultural norms and protocols.

4.4.2 Cultural Disruption and Erosion of Traditional Knowledge.

Urbanization, migration, shifts in religious beliefs, and intergenerational changes in values can weaken the traditional protection systems that have historically safeguarded SNS. Reduced participation of younger generations in rituals, along with declining understanding of cultural narratives associated with sacred sites, may erode the moral and spiritual foundations of conservation. This erosion increases the vulnerability of SNS to external exploitation.

4.4.3 Impacts of Climate Change

Sacred mountains, forests, rivers, and lakes are increasingly affected by climate-induced changes, including glacial retreat, altered precipitation patterns, species migration, and

heightened wildfire risk. These changes threaten ecological stability and may disrupt ritual practices that depend on specific seasonal or environmental indicators.

International organizations such as the IUCN and UNESCO have recognized these challenges and advocate for strengthened protection and policy integration for SNS. However, such integration requires culturally sensitive management. The imposition of formal regulations without an understanding of the cultural logic underlying sacredness may undermine community autonomy and spiritual meaning. Effective conservation strategies should therefore respect local cultural practices and promote collaborative governance structures that support both biodiversity conservation and cultural heritage preservation [20].

Table 3. Importance of Sacred Natural Sites (SNS) worldwide

Aspect	SNS Worldwide	Notes
Types of Sites	Mountains, forests, caves, rivers, islands, ruins	Reflect diverse natural and cultural landscapes
Cultural Context	Indigenous spirituality, organized religions (e.g., Buddhism, Christianity, animism)	Often syncretic or layered in meaning
Ecological Value	High biodiversity, habitat conservation	Spiritual protection often aligns with ecological integrity
Social Role	Rituals, pilgrimage, education, identity formation	Integral to cultural resilience and continuity
Conservation Status	Variable; some protected, others threatened	Requires integrated cultural–ecological management

4.5 Distinctive Characteristics of European Sacred Natural Sites

4.5.1 Religious and Cultural Context

European Sacred Natural Sites (SNS) are predominantly shaped by Christian traditions, particularly Catholicism and Orthodox Christianity. Nevertheless, many sites retain elements of pre-Christian spiritual systems that have been incorporated into contemporary religious practices. For example, sites such as the Majella National Park and the Casentinesi Forests in Italy reflect enduring Catholic veneration, while the Rila Monastery in Bulgaria exemplifies Orthodox Christian sacredness [21]. A substantial number of European sacred landscapes are situated along historic pilgrimage routes, including the Via Lauretana in Italy, highlighting the long-standing interconnection between religion, natural environments, and collective cultural memory.

4.5.2 Documentation and Public Recognition

European SNSs are generally well-documented, publicly recognized, and formally incorporated into cultural heritage inventories. Unlike regions where restricted access or confidentiality is essential to preserve sacredness, many European communities openly celebrate and promote their sacred landscapes. Religious devotion, combined with economic incentives such as pilgrimage-based tourism, enhances public visibility and supports sustained conservation efforts [14]. This openness contributes to cultural vitality and local economic development while reinforcing the societal importance of these sites.

4.5.3 Integration with Formal Conservation Framework

European sacred landscapes frequently overlap with officially designated protected areas, including national parks and Natura 2000 sites. Their spiritual significance often aligns with state-led conservation goals, thereby reinforcing biodiversity protection alongside the preservation of cultural heritage [21–22]. Legal designation, spatial mapping, and heritage-oriented policies play a crucial role in safeguarding these landscapes, particularly those with

pre-Christian origins that may otherwise be vulnerable to modern development pressures [14].

4.5.4 *Spiritual Values and Natural Features*

European SNS encompasses forests, mountains, caves, springs, and other natural features imbued with symbolic meaning in Christian traditions and earlier pagan belief systems. These landscapes function as spaces for contemplation, sanctuary, and pilgrimage, valued for both their ecological attributes and their capacity to foster spiritual engagement and cultural continuity [22]. The convergence of natural aesthetics and spiritual history underscores their enduring role as markers of intertwined ecological and cultural heritage.

4.6 Distinctive Characteristics of Asian Sacred Natural Sites

4.6.1 *Religious and Spiritual Diversity*

Asian SNS are shaped by a wide spectrum of spiritual traditions, including Buddhism, Hinduism, Taoism, Shintoism, and diverse indigenous animistic belief systems. These traditions emphasize the interconnectedness of humans, nature, and the divine, giving rise to complex cosmologies that attribute profound sacred significance to landscapes. Tibetan Buddhist monasteries, such as Tashi Ling, exemplify the extensive geographical reach and enduring relevance of Asian spiritual heritage.

4.6.2 *Cultural and Anthropological Significance*

In Asia, SNS are deeply embedded within national identities, local cosmologies, and everyday cultural practices. They serve as repositories of collective memory and social cohesion, facilitating the intergenerational transmission of traditional ecological knowledge and reinforcing communal values. Anthropological research highlights the role of SNS in mediating tensions between tradition and modernity, enabling communities to sustain distinct cultural practices amid processes of globalization and cultural homogenization [14].

4.6.3 *Spiritual Ecology and Conservation*

Asian SNS often function as effective conservation areas, where spiritual taboos, ritual obligations, and belief systems regulate resource use and discourage environmentally destructive practices. These spiritual frameworks promote biodiversity conservation by fostering an eco-centric worldview that recognizes the intrinsic value and interconnectedness of all living beings [20,22]. Sacred groves, forest sanctuaries, and mountain shrines clearly illustrate the direct relationship between spiritual values and sustainable ecological stewardship.

4.6.4 *Community Governance and Protection*

Many Asian SNS are governed by indigenous peoples and local communities through arrangements commonly identified as Indigenous and Community Conserved Areas (ICCAs). These governance systems uphold spiritual values and ecological responsibilities through customary laws, ritual protocols, and participatory decision-making processes. ICCAs represent culturally grounded conservation models that effectively maintain ecological integrity while safeguarding cultural heritage [20,22].

Table 5. Comparative Summary of European and Asian Sacred Natural Sites

Feature	European Sacred Natural Sites	Asian Sacred Natural Sites
Dominant Religious Tradition	Christianity (Catholicism, Orthodoxy), pre-Christian elements	Buddhism, Hinduism, Taoism, Shintoism, Animism
Public Access and Documentation	Well-documented and publicly promoted	Often community-managed; sometimes restricted for protection
Conservation Approach	Integrated with formal protected areas and legal frameworks	Community-based conservation, customary laws, spiritual taboos
Spiritual Values	Pilgrimage, sanctuaries, religious symbolism	Holistic cosmologies, spiritual presence, interconnectedness
Role in Cultural Identity	Historical religious heritage, pilgrimage, tourism	National identity, local traditions, resistance to globalization
Forest and Landscape Significance	Symbolic sanctuaries tied to historical narratives	Sacred groves and living ecosystems with spiritual guardians

4.7 Global Analysis of European and Asian Sacred Natural Sites

Global analyses of SNS reveal a consistent pattern: spiritual and cultural values play a critical role in ecological protection, often producing conservation outcomes comparable to or exceeding those achieved through formally designated protected areas [1–3]. Although regions differ in cosmological perspectives, governance systems, and historical trajectories, SNS universally embody principles that link cultural identity with environmental stewardship. Across Asia, Africa, South America, and parts of Europe, SNS function as biocultural refuges that safeguard both biodiversity and intangible cultural heritage [6]. In many human-modified landscapes, these sites represent some of the last remaining ecologically intact ecosystems.

The conservation effectiveness of SNS derives largely from deeply embedded cultural norms, including taboos, ritual obligations, and customary laws that regulate access and resource use [8]. These findings align with global research demonstrating that culturally rooted governance systems can ensure long-term ecological stability even in the absence of formal legal protection. Regional variations further illustrate the influence of cosmology on conservation practices. Asian SNS are closely linked to animistic, Buddhist, Hindu, and Shinto worldviews that perceive nature as spiritually animated, thereby imposing ethical obligations to protect forests, rivers, mountains, and caves. In contrast, many European SNS reflect layered histories shaped by the integration of pre-Christian traditions into Christian narratives, resulting in well-documented sacred landscapes embedded within heritage and conservation frameworks. Meanwhile, African and South American contexts often emphasize cosmological relationships among humans, ancestors, and non-human entities, reinforcing ecological responsibility through ritual practices and oral traditions.

Despite these differences, SNS worldwide face shared challenges. Contemporary development pressures, expanding tourism, cultural erosion, and climate change increasingly threaten their ecological integrity and spiritual significance [10]. Sacred forests are vulnerable to encroachment, sacred mountains to infrastructure development, sacred caves to unmanaged visitation, and sacred rivers to pollution and hydrological alteration [9,11,13]. These pressures highlight the fragility of SNS when cultural protection mechanisms weaken or when formal institutions fail to recognize their conservation value. Overall, SNS should be understood not only as spiritual or cultural landmarks, but also as strategic ecological assets that contribute to national and global conservation goals. Their continued protection

depends on collaborative governance frameworks that respect traditional knowledge, strengthen local stewardship, and adapt to emerging socio-ecological challenges [20].

5 Conclusion

Sacred Natural Sites constitute vital biocultural landscapes that integrate spiritual values, cultural identity, and ecological stewardship across diverse global contexts. Despite variations in cosmology, governance structures, and historical development, SNS consistently contribute to biodiversity conservation, cultural continuity, and the preservation of traditional knowledge systems. Their effectiveness is rooted in culturally embedded norms such as taboos, ritual obligations, and customary laws that regulate human interactions with sacred environments. Comparative analysis reveals notable regional distinctions. Asian SNS are closely associated with animistic, Buddhist, Hindu, and Shinto belief systems that emphasize moral obligations to protect mountains, forests, and rivers. European SNS, by contrast, often reflect syncretic combinations of pre-Christian and Christian traditions embedded within formal heritage and conservation institutions. In South America and Africa, SNS are strongly linked to cosmologies that emphasize relationships among communities, ancestors, and non-human entities, fostering ecological responsibility through ritual and collective memory. These differences demonstrate the diverse pathways through which sacredness informs environmental governance.

Nevertheless, SNS globally face escalating threats from development, tourism, cultural erosion, and climate change, all of which jeopardize both ecological integrity and spiritual meaning. Addressing these challenges requires conservation approaches that recognize local worldviews, strengthen community stewardship, and integrate customary governance systems with formal policy frameworks. Recognizing SNS as legitimate conservation areas rather than solely as cultural or religious sites offers a strategic opportunity to embed biocultural approaches within national and global conservation agendas. Ultimately, the long-term protection of SNS depends on collaborative governance that upholds cultural rights, revitalizes traditional knowledge, and ensures that spiritual values continue to support ecological resilience in an increasingly dynamic global environment.

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