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Tianchuang and Enclaves: Comparing “Non-Contiguous Management Spaces” in National Parks of China and Nigeria

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Abstract

National parks are established to ensure ecological integrity and unified management. However, due to frequent human activities, complex land-tenure arrangements, and limited governance capacity, certain areas within park boundaries are excluded from centralized oversight, resulting in “non-contiguous management spaces.” At present, cross-national evidence on non-contiguous management spaces, particularly in developing countries, is quite limited. This study employs a qualitative comparative research design based on a literature review and policy analysis, taking *Tianchuang* in China’s Wuyishan National Park and Enclaves in Nigeria’s Gashaka-Gumti National Park as typical cases to compare their concept and characteristics, causes of formation, socio-ecological consequences, and governance models. The results show that: (1) In terms of concept and characteristics, *Tianchuang* and Enclaves are both land parcels inside park boundaries but outside unified park management. *Tianchuang* typically appear as numerous small, fragmented patches, whereas Enclaves are more often contiguous village blocks. Livelihoods associated with *Tianchuang* are more diverse, whereas those in Enclaves are mainly based on farming and herding. (2) In terms of formation, both stem from trade-offs in boundary delimitation to balance conservation and development. *Tianchuang* reflects an intentionally designed, proactive avoidance within a unified planning framework to mitigate conflicts and facilitate park establishment, whereas Enclaves embody a passive tolerance shaped by limited state capacity and respect for local pastoral livelihoods to prevent social conflict. (3) In terms of socio-ecological consequences, both *Tianchuang* and Enclaves provide room for local development but may weaken ecological connectivity, increase human–wildlife conflict, and affect community livelihoods and trust. *Tianchuang* reveals unclear mandates and complex coordination, whereas Enclaves expose regulatory capacity gaps and dependence on local and external actors. (4) In terms of governance models, both adopt a “co-existence” approach. *Tianchuang* are managed through a top-down, government-led governance model, whereas Enclaves rely on a bottom-up, multi-party deliberative governance model. Based on these findings, this study proposes policy implications for improving the governance of *Tianchuang* and Enclaves and provides broader insights into the governance of non-contiguous management spaces in developing-country national parks.

Keywords: national parks; *Tianchuang*; Enclaves; non-contiguous management spaces; China; Nigeria

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1. Introduction

As the Earth enters the Anthropocene, national parks have become the most important category of natural protected areas globally and a crucial vehicle for China's ecological civilization construction. A national park is a specific area designated and directly managed by the state, bearing immense responsibilities for safeguarding ecological security, optimizing the ecological spatial layout, and promoting regional sustainable development [1–3]. Given their vital role in biodiversity conservation, natural resource protection, and biosphere sustainability [4,5], national parks are classified by the International Union for Conservation of Nature (IUCN) as Category II within its six-category protected area management system. Currently, Canada, Brazil, and Australia hold the highest number of national parks globally [6], while China has set the goal of largely completing the world's largest national park system by 2035. As national park construction advances, balancing ecological conservation targets with community development needs has become the crux of national park management. Within the designated boundaries of national parks, certain areas remain excluded from unified national park management because of intensive human activities, complex land tenure, and limited governance capacity, thus constituting “non-contiguous management spaces.” While such spaces help relieve the tension between ecological conservation and community development [7], they also pose significant challenges to ecosystem integrity and management unity.

Over the past several decades, governance approaches to national parks have gradually evolved from predominantly state-centered conservation toward more collaborative, adaptive, and polycentric forms of governance in response to increasingly complex conservation and development challenges [8,9]. Contemporary protected-area governance increasingly emphasizes stakeholder participation, institutional coordination, adaptive learning, and the integration of ecological conservation with human livelihoods. Accordingly, collaborative governance, adaptive governance, and polycentric governance have become influential perspectives for understanding governance processes in protected areas [10–12], while the social-ecological systems framework provides an important lens for explaining interactions between ecological conservation and human activities [13]. However, governance pathways vary considerably across countries because of differences in institutional capacity, historical land-use systems, governance traditions, and livelihood dependence. Within this broader governance context, different governance arrangements have emerged for non-contiguous management spaces as countries seek to reconcile biodiversity conservation with long-established human activities. These arrangements therefore represent context-specific manifestations of broader protected-area governance paradigms and provide an important theoretical basis for comparative analysis across different national contexts.

“Non-contiguous management spaces” are ubiquitous in national parks globally, yet existing case studies predominantly focus on developed countries, leaving research on developing countries relatively scarce. In the United States, Inholdings play the role of “non-contiguous management spaces” in national parks, which largely consist of historical land uses that predated the establishment of the parks. The Inholdings lead to management complexity because of the misalignment between local governments' or private property rights and federal conservation legislation, while also contributing to biodiversity loss [14]. To mitigate the negative effects caused by Inholdings, boundary management, key parcel acquisition, and community collaboration are implemented by local governments and conservation planners. In Australia, the “non-contiguous management spaces” in national parks are Indigenous Communities, such as Mutitjulu in Uluru-Kata Tjuta National Park, which are retained as relatively independent governance units due to the restoration of their traditional land rights. Through co-management structures, Indigenous communities occupy a central position in conservation and development [15],

facilitating a negotiated balance among resource utilization, cultural inheritance, and ecological objectives [16].

In contrast, studies in African protected areas have increasingly focused on governance challenges associated with inhabited settlements and community livelihoods. Research from Mt. Elgon in Uganda and Kenya emphasizes the role of historical institutions, community participation, and multi-level governance in reconciling conservation with local livelihoods [17,18], while studies from Kruger National Park in South Africa similarly highlight the importance of collaborative management between park authorities and neighboring communities [19]. Nigeria's Gashaka-Gumti National Park (GGNP) Enclaves¹ represent another typical form of non-contiguous management space, where Fulani pastoralists continue traditional farming and grazing within the protected area. Although local livelihoods have gradually diversified through ecotourism and infrastructure development [20] agricultural expansion, grazing pressures, and hunting continue to challenge conservation objectives [21,22].

In China, "non-contiguous management spaces" within national parks manifest primarily in the form of *Tianchuang*, and related research is still in its nascent stages. *Tianchuang* originates from boundary delineation and management feasibility [17,18], and may sever ecological processes, exacerbate fragmentation and negatively impact farmer livelihoods [19–21]. Scholars recommend promoting refined management, realizing the transition from merely "boundary adjustment" to "robust management" [23]. However, existing studies on *Tianchuang* remain largely confined to the Chinese context, with limited attention to broader international comparisons.

Although a few cross-national comparative studies on non-contiguous management spaces have recently emerged, systematic comparisons between developing-country cases remain limited [24]. Existing studies have also tended to examine individual aspects, such as governance institutions, ecological impacts, or boundary management, rather than providing a systematic comparison. Compared with developed countries, non-contiguous management spaces in developing countries are characterized by stronger livelihood dependence, more pronounced conservation–development conflicts, and more complex governance challenges. Therefore, a systematic comparison of governance experiences from different developing-country contexts is needed.

Accordingly, this study adopts Wuyishan National Park in China and Gashaka-Gumti National Park in Nigeria as comparative case studies. It develops a comparative framework encompassing four dimensions: concepts and characteristics, causes of formation, socio-ecological consequences, and governance models, thereby providing a more comprehensive understanding of non-contiguous management spaces in developing-country national parks. The remainder of this paper is organized as follows. Section 2 introduces the study areas, data sources, and methodology. Sections 3–6 compare the two case studies from the four dimensions above. Finally, Sections 7 and 8 present the discussion and conclusions, respectively.

2. Data and Methodology

This study employs a qualitative comparative research design based on a literature review and policy analysis. Policy documents and planning reports issued by relevant government agencies in China and Nigeria were collected, while academic literature was retrieved from the Web of Science, Scopus, and China National Knowledge Infrastructure (CNKI), focusing on national park governance, protected-area management, community participation, socio-ecological systems, and non-contiguous management spaces. Wuyishan National Park and Gashaka-Gumti National Park were selected as the study sites because they contain representative forms of non-contiguous management spaces. The comparative framework follows a logical sequence for understanding and analyzing a

governance phenomenon: identifying what it is, explaining why it emerges, assessing what consequences it generates, and examining how it is governed. These four questions correspond to the analytical dimensions of concepts and characteristics, causes of formation, socio-ecological consequences, and governance models, respectively.

Within these two national parks, China's *Tianchuang* and Nigeria's Enclaves were selected as the focal cases because they represent comparable forms of non-contiguous management spaces under distinct institutional and livelihood contexts. First, regarding spatial representativeness, Wuyishan National Park contains the largest number of *Tianchuang* among China's first batch of national parks [25], while GGNP is the only legally recognized national park in Nigeria, and one of the few within the broader West African protected-area system, that permits the long-term existence of Enclaves [26]. Second, regarding local livelihoods, both regions exhibit strong resource dependence typical of developing countries. Wuyishan's *Tianchuang* spaces are characterized by traditional tea plantations, whereas Nigeria's GGNP Enclaves are characterized by traditional farming and grazing activities. Essentially, both represent non-contiguous management spaces that have evolved to reconcile ecological conservation with local livelihood needs under different institutional contexts.

3. Concept and Characteristics

Within Wuyishan National Park, because of complex land tenure, frequent human activities, land-use planning conflicts, and future regional development demands, certain areas have temporarily been excluded from unified national park management. These special spatial configurations are referred to as "*Tianchuang*" [27]. *Tianchuang* exhibit the following characteristics (Figure 1): Firstly, Wuyishan National Park, officially established in China in 2021, holds the largest number of *Tianchuang* among the first batch of five national parks, with its total of 156 *Tianchuang* accounting for 44.57% of all *Tianchuang* across national parks nationwide [25]. Secondly, from a spatial perspective, over half of the *Tianchuang* within the park are smaller than 1 hm² in area, exhibiting severe fragmentation and dispersion. Thirdly, regarding topography and geomorphology, *Tianchuang* are mostly distributed around villages and tea mountain regions in lower mountainous and hilly terrains. Fourthly, in terms of land-use types, *Tianchuang* are predominantly forest land, simultaneously encompassing a large number of tea plantations vital to local tea farmers' livelihoods, alongside minor arable land.

The Enclaves of Nigeria's GGNP are formally defined as "lands set aside within the national park for livestock grazing and farming, serving as general control zones to protect and support traditional livelihoods" [26]. GGNP contains five officially recognized enclave communities [28], which exhibit the following characteristics (Figure 2) [26,27,29]. Firstly, they are contiguous land parcels organized around villages and located relatively close to the national park boundary. Secondly, local livelihoods are dominated by crop cultivation and animal husbandry. Common crops include maize, peanuts, and millet [30], supplemented by limited hunting and fishing. As farming and grazing activities alternate seasonally, crops are highly prone to foraging by primates, resulting in human—wildlife conflict. Thirdly, the main land-use types are built-up areas, croplands, and grasslands. Certain wetlands have been reclaimed or used for residential expansion [31]. Fourthly, demographically, they are multi-ethnic settlements in which the Fulani constitute a major population group. The five officially recognized enclaves accommodate approximately 15,000 residents [28]. The broader landscape also includes historically established informal settlements and seasonal pastoral camps.

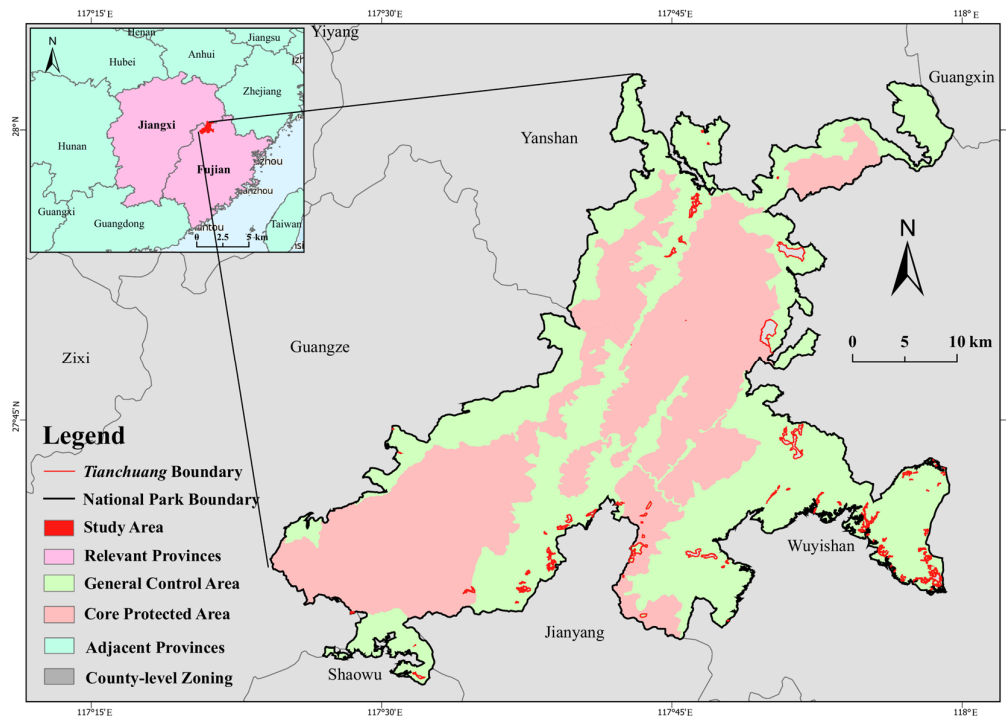


Figure 1. The spatial distribution of *Tianchuang* in Wuyishan National Park. Map prepared by the authors based on spatial data provided by the Wuyishan National Park Administration. “Relevant Provinces” refer to the provinces in which Wuyishan National Park is located.

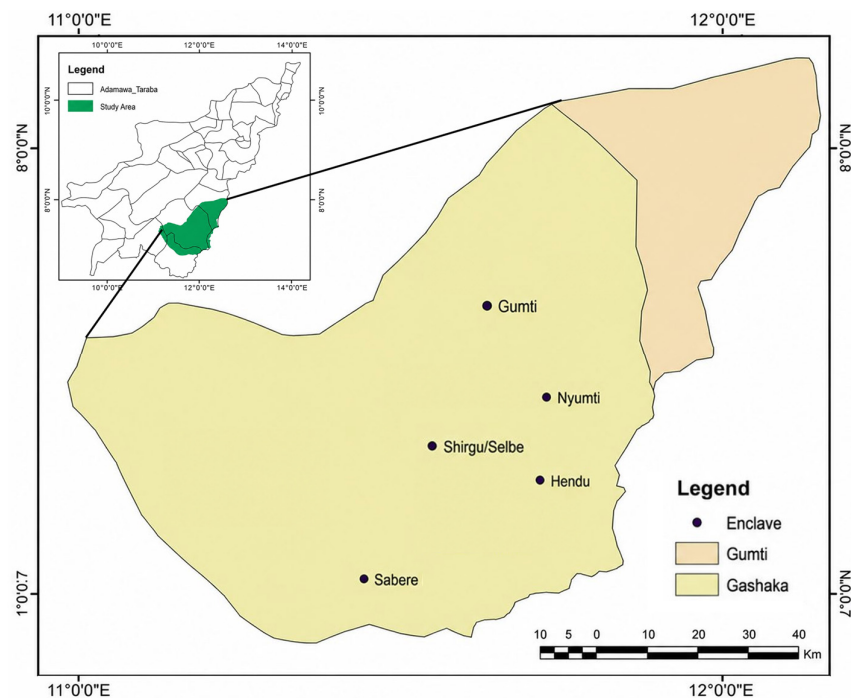


Figure 2. The spatial distribution of Enclaves in GGNP. The map was prepared by the authors with reference to Reference [21]. The points indicate the approximate locations of the enclaves.

In summary, *Tianchuang* and Enclaves share the common characteristic of being located within the geographic boundaries of national parks while remaining outside unified park management. Their land-use functions are incompatible with the conservation objectives of

the surrounding protected areas, typically consisting of croplands, villages, or pastures that do not meet strict conservation requirements. The primary differences are structural. *Tianchuang* are predominantly characterized by numerous small and highly fragmented patches associated with relatively diversified livelihoods, whereas GGNP's Enclaves are generally contiguous village-based landscapes integrating croplands and grazing areas, with local livelihoods dominated by crop cultivation and animal husbandry.

4. Causes of Formation

4.1. Causes of Tianchuang Formation: Proactive Avoidance Under Land-Use Planning Conflicts

The term *Tianchuang-setting* originated as a spatial adjustment measure to resolve land-use planning conflicts during the delimitation of the “Three Zones and Three Lines”, and was later applied to the boundary delineation of national park pilots. The “Three Zones and Three Lines” framework is central to China's national territorial spatial planning [25]. The “Three Zones” designate agricultural, ecological, and urban spaces for production, conservation, and development, respectively. The “Three Lines” refer to the permanent Basic Farmland Protection Line, the Ecological Conservation Redline, and the Urban Development Boundary—rigid control lines with mandatory use restrictions [32]. Before this unified framework, separate authorities in agriculture, environmental protection, and urban-rural development had independently drawn their own control lines. Inconsistent competent bodies and conflicting delineation criteria (Table 1) led to frequent overlaps and land-use conflicts among these lines. To integrate authority and establish unified standards, the “Three Zones and Three Lines” was formally introduced in 2019 [33].

Table 1. Pre-reform competent authorities and delineation criteria of “Three Zones and Three Lines” in China.

Three Zones	Three Lines	Pre-Reform Competent Authorities	Delineation Criteria
Ecological Space	Ecological Conservation Redline	Ministry of Environmental Protection (predecessor to the Ministry of Ecology and Environment), National Development and Reform Commission	Ecological importance and ecological sensitivity
Agricultural Space	Permanent Basic Farmland	Ministry of Land and Resources (predecessor to the Ministry of Natural Resources)	Farmland quality and agricultural production capacity
Urban Space	Urban Development Boundary	Ministry of Housing and Urban-Rural Development (predecessor to the Ministry of Natural Resources), Ministry of Land and Resources	Existing built-up areas and future population and economic targets

During delimitation, *Tianchuang-setting* was developed specifically to handle legacy land-use conflicts. Where a control line is drawn, small parcels inside it whose actual use contradicts the zone's primary function are carved out and allowed to retain their original use [24]. Two typical forms exist: (1) designating high-quality farmland or ecological patches within the urban development boundary as *Tianchuang* to preserve agricultural and ecological functions; (2) designating urban built-up areas or high-quality permanent basic farmland within the ecological conservation redline as *Tianchuang* to safeguard existing development patterns and the supply of arable and construction land [34].

Although the exact origin of the term *Tianchuang* within the national park system remains uncertain [24], the practice itself dates back to the earliest stages of national park construction. During the first pilot phase (2015–2020), unified national guidelines had not yet been issued, and both legal frameworks and boundary delineation standards were still under development [35,36]. Lacking clear policy guidance and facing the extreme difficulty of coordinating permanent basic farmland, township settlements, and infrastructure-dense zones, pilot

management units drew on the *Tianchuang*-setting approach used in the “Three Zones and Three Lines” initiative when demarcating boundaries. They deliberately retained these special areas inside the park boundaries, preserved their original land uses, and temporarily excluded them from unified park management (Figure 3).

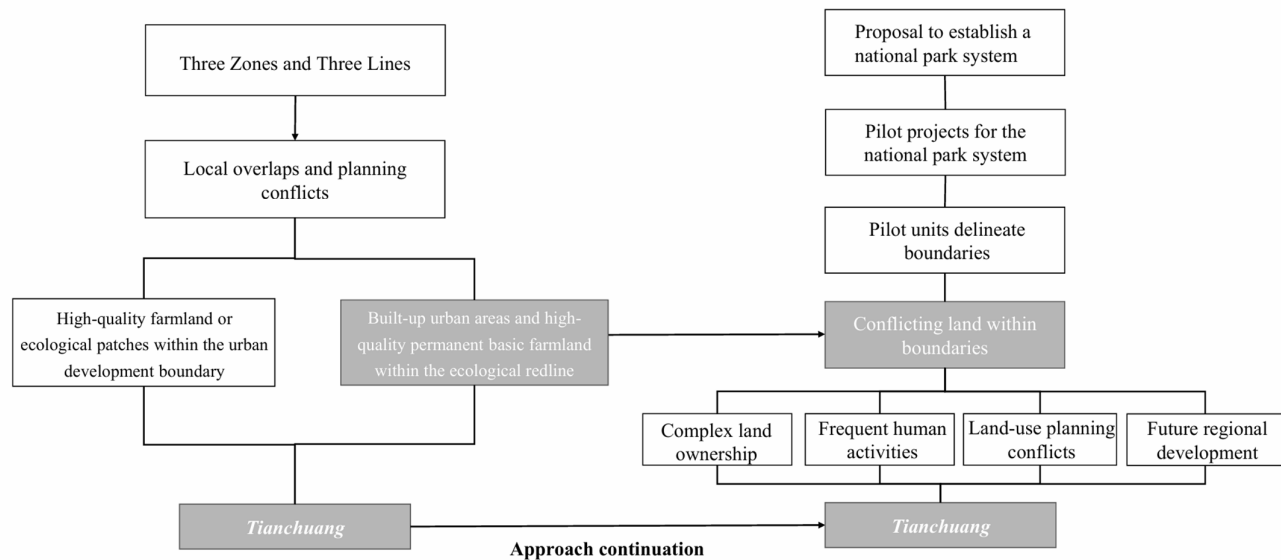


Figure 3. The “Three Zones and Three Lines” and the *Tianchuang* policy in China’s national parks. The figure was prepared by the authors with reference to Reference [27].

4.2. Causes of Enclave Formation: Passive Tolerance Under Pastoral Livelihood Traditions

Since Nigeria established its national park system in 1991, strict protection has been nominally enforced, prohibiting permanent settlements and continuous human activities within park boundaries. However, the establishment of Gashaka-Gumti National Park (GGNP) incorporated landscapes that had already been occupied and used by Fulani pastoral communities. GGNP was formed through the merger of the former Gashaka and Gumti Game Reserves, where long-established pastoral settlements, seasonal grazing routes, and traditional resource-use practices had existed before the designation of the national park [28,37]. In practice, however, many parks retain existing communities or long-term use zones, giving rise to Enclaves [38]. For instance, in Cross River National Park, villages such as Okwango and Mpot were designated as relocation targets and subjected to heavy-handed regulatory suppression and alternative livelihood projects [39]. Similarly, Kainji Lake National Park contains retained villages and lakeside settlements, although management has generally emphasized relocation, restriction, and gradual regulation of human activities [40]. Unlike these cases, the persistence of GGNP Enclaves is closely associated with the historical continuation of pre-existing pastoral settlements and the negotiated retention of settlement and grazing areas during earlier reserve management [28]. Rather than being systematically relocated, these settlements were gradually incorporated into a changing institutional context shaped by traditional authority, state intervention, withdrawal of management capacity, and subsequent national park administration [20,41]. These historical transitions determined the changing roles of authorities and governance arrangements across different stages (Table 2) [37].

Table 2. The authorities and governance model of the GGNP Enclaves.

Stage	Authorities	Governance Model	Status
Traditional Use	Traditional Chiefs	Self-governance by local society	Form of camps, not incorporated into national conservation planning
Game Reserve	State forestry officials, Traditional Chiefs	Joint state-local governance	Deliberative agreement to designate camps as Enclaves
State Withdrawal	Traditional Chiefs	Local society maintains order	Increased autonomy of Enclave governance
National Park	National Park Service, Traditional Chiefs	Deliberative governance model	Tolerated by the National Park Service, not integrated into the unified management system

The formation and evolution of the Enclaves can be divided into four stages (Figure 4). Stage 1 (1960s–1970s): Traditional Use. To support seasonal migration, Fulani groups repeatedly established family-based camps along meadows and forest edges for livestock concentration, water access, and temporary residence. These camps, organized under tribal chiefs and possessing clear boundaries, formed the core of the household livestock economy [30]. Stage 2 (1972–1980s): Game Reserve. During boundary demarcation, forestry officials consulted Chiefs on the fate of the camps. At that time, these pastoral camps had already developed into relatively stable settlements and grazing units, supported by traditional authorities and established patterns of resource use [37]. Recognizing that forced evictions would trigger social conflict while boundary adjustment would undermine ecological protection targets, a compromise was reached: specific camps were retained as Enclaves without altering the outer reserve boundaries, allowing the reserve to maintain ecological integrity while accommodating pre-existing pastoral land-use practices [37]. State-local joint patrols and anti-poaching operations were tentatively launched through the establishment of ranger outposts. Stage 3 (1980s–1990s): State Withdrawal. Fiscal austerity forced the withdrawal and consolidation of outposts, effectively terminating joint patrols and weakening state intervention. As formal management presence declined, traditional authorities increasingly resumed responsibility for regulating settlement and grazing practices within the Enclaves. The Fulani maintained complex grazing orders primarily through the traditional “Chief–Family–Camp” governance structure [29]. Stage 4 (1990s–present): National Park. In 1991, Gashaka and Gumti merged to form GGNP under the Federal National Park Service. While the new system emphasized ecological protection, it inherited the unresolved tension between strict conservation requirements and pre-existing Enclave settlements [21,22]. Faced with limited regulatory capacity and policy uncertainty, some pastoral households responded to increasing uncertainty through short-term coping strategies such as intensive overgrazing and early livestock sales, and encroachment by external pastoralists emerged. Prioritizing social stability, park management opted for passive tolerance of the order maintained by traditional structures and broad negotiations [42]. Park management gradually shifted toward accommodating existing Enclave arrangements through negotiation with traditional institutions rather than enforcing complete relocation.

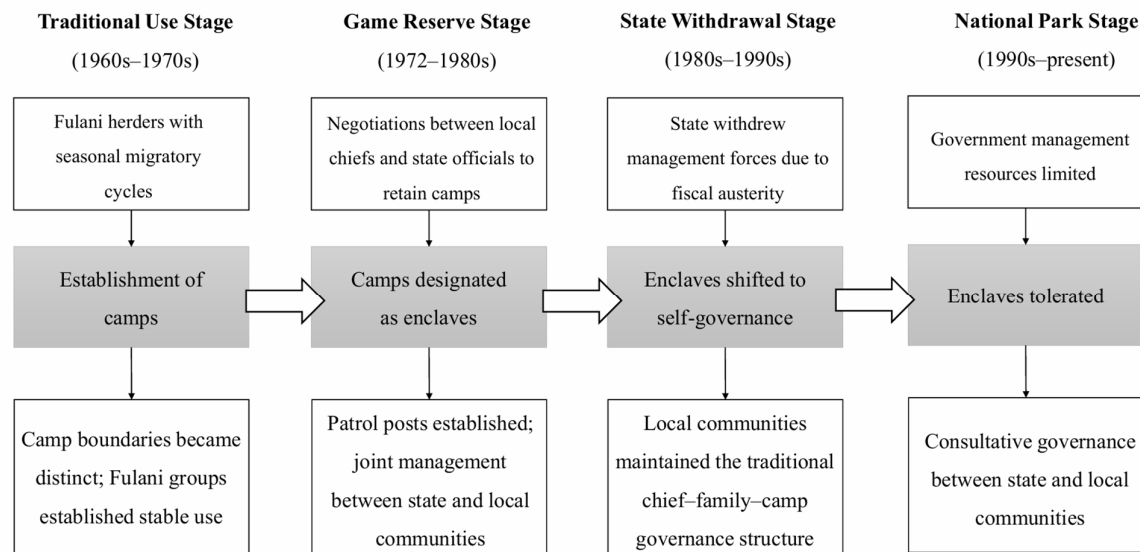


Figure 4. The evolution of the GGNP Enclaves.

5. Socio-Ecological Consequences

5.1. Socio-Ecological Consequences of Tianchuang

- (1) **Ecological effects.** *Tianchuang* causes ecosystem fragmentation [25], posing potential ecological risks and threats to integrity [32]. Wildlife does not avoid these parcels. When *Tianchuang* is used for grazing, construction, or agriculture, it is more likely to trigger human–wildlife conflict. In Wuyishan National Park, *Tianchuang* and the associated human footprints have become the most critical environmental factor influencing the suitable habitat distribution of the flagship species Cabot's Tragopan (with a contribution rate of 25.88%). The species has been forced to undergo substantial temporal and spatial shifts in its daily behavioral rhythms in order to withstand the high-frequency human disturbances radiating from these areas [43]. Current evidence suggests that *Tianchuang* functions as a driver of landscape fragmentation, weakening ecological connectivity, destroying ecological corridor functions, and greatly increasing management complexity. However, given that *Tianchuang* is a relatively recent phenomenon, its ecological effects may involve a time lag, and the full extent of its impact requires long-term monitoring and empirical support.
- (2) **Institutional effects.** *Tianchuang* reflects the tensions between national park system development and the existing mechanisms of land management, fiscal distribution, and local development. While acting as a buffer zone, *Tianchuang* also introduces problems of unclear mandates and insufficient coordination [44]. Moreover, because China's national parks cover vast territories and involve multiple jurisdictions, the agencies responsible for natural resources, agriculture, and local departments often fail to align their protection and development objectives, leaving cross-departmental and cross-boundary coordination a persistent challenge [45]. In Wuyishan National Park, which straddles Fujian and Jiangxi provinces, cross-provincial coordination is particularly difficult, as the overlapping responsibilities of different bureaus make it hard to reconcile conflicting priorities.
- (3) **Social effects.** While *Tianchuang* serves as a tool for local and community development, it also brings risks to community livelihoods and trust. In Wuyishan National Park, retaining certain tea plantations and tourism facilities as *Tianchuang* helps support local revenue and employment, yet simultaneously increases ecological

pressure. Because *Tianchuang* communities are excluded from regional development planning, they often struggle to access targeted development resources [44]. Imperfect ecological compensation mechanisms may further exacerbate local social tensions [46]. Moreover, the existence of *Tianchuang* may weaken public trust in park boundaries and protection standards, leading to a loosening of ecological constraints and a decline in institutional authority that ultimately threatens long-term conservation targets. These dynamics warrant further longitudinal follow-up and comparative research on representative cases.

5.2. Socio-Ecological Consequences of Enclaves

- (1) Ecological effects. Over the past 20 years, GGNP has experienced considerable land-cover changes, driven partly by human activities associated with the Enclaves—including farming, grazing, logging, and poaching—which pose ongoing pressures on the park’s ecological integrity [21,47]. Human–wildlife conflict, especially crop damage, represents the most prominent ecological risk for local communities [22]. Meanwhile, management intensity directly shapes ecological outcomes; when patrols, anti-poaching operations, and scientific monitoring are sustained, wildlife visibility and local species diversity may improve [48]. Recent studies also indicate that inadequate law enforcement capacity and limited monitoring resources remain important constraints for biodiversity conservation in GGNP [49]. In summary, current ecological effects are predominantly negative, but with consistent law enforcement, long-term monitoring, and targeted conflict mitigation, the related losses are manageable.
- (2) Institutional effects. Management agencies generally face funding shortages, staff deficits, and risks to ranger safety, which constrain effective implementation of conservation regulations [49]. Limited enforcement capacity and unstable security conditions increase the difficulty of regulating human activities associated with the Enclaves and raise the costs of biodiversity management. Existing practices also demonstrate that external actors, including NGOs and research institutions, can contribute to conservation through education, monitoring, and capacity building [50]. However, institutional challenges remain closely associated with unclear responsibilities, insufficient resources, and the difficulty of coordinating conservation objectives with local livelihood needs.
- (3) Social effects. While the national park provides some employment opportunities and public services, its ecotourism potential remains largely untapped due to remoteness and poor transport links [30]. Although communities are equipped with schools, health clinics, and water and electricity infrastructure, actual access to these services remains inadequate; for example, many residents still rely on rivers and streams for water [20]. Existing studies suggest that tourism benefits and improved infrastructure can enhance residents’ willingness to participate in conservation [29]. At the same time, however, persistent farming, grazing, and logging within the Enclaves, combined with insufficient funding and publicity, limit the potential benefits of tourism and economic development.

6. Governance Models

6.1. *Tianchuang* Governance Practices: Top-Down, Government-Led Governance

Currently, three primary spatial strategies are used to address land-use conflicts between ecological conservation and human activities within China’s natural protected areas: Withdrawal, Boundary Adjustment, and *Tianchuang*-setting. In 2024, the National Forestry and Grassland Administration stated in its Reply to the Proposal on Accelerating the Modernization of China’s Natural Protected Area System [51] that it is necessary to

“correctly handle the dialectical relationship between Withdrawal and Boundary Adjustment, and to treat the issue of *Tianchuang*-setting with utmost seriousness”. A thorough understanding of *Tianchuang*-setting therefore calls for a comparison of these three mechanisms, clarifying their differences in applicable contexts, governance methods, responsible entities, and resulting spatial morphologies (Table 3).

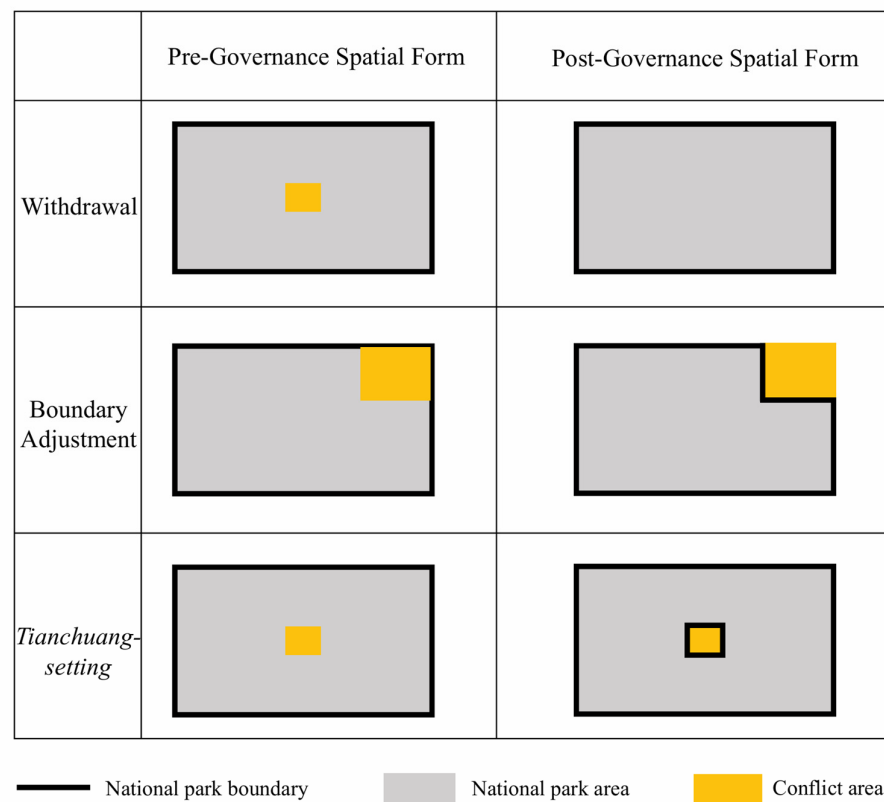
Withdrawal refers to the removal of existing human activities through ecological relocation and usage restrictions, without adjusting national park boundaries or the Ecological Conservation Redline, thereby converting the land back to ecological use under the unified management of the national park. This approach is primarily applied in Core Protection Zones, targeting areas of intense human-nature conflict that combine relocation feasibility with high potential for ecological restoration [52]. Permanent basic farmland located in Core Protection Zones may be temporarily retained as general arable land before being gradually withdrawn from cultivation to restore ecological functions. More broadly, for areas classified under the policy rubric of “One None, Two Haves” classification, namely those with no conservation value, severe regulatory conflicts, and a status quo that significantly undermines ecological functions, transition periods and withdrawal pathways can be established [7]. The practical effectiveness of withdrawal policies is fundamentally constrained by fiscal capacity, public acceptance, and the quality of resettlement conditions [53].

Boundary Adjustment entails officially excising specific areas from the national park’s jurisdiction by modifying the park boundaries or altering land-use classifications, and transferring them to local governments for management, thereby achieving a complete separation of spatial jurisdiction and management responsibility [54]. This approach is suitable for regions with clearly defined functions, concentrated and contiguous layouts, and historically stable utilization patterns, typically located directly adjacent to the park boundaries. Once such areas are excluded, the resulting line constitutes the final, official boundary of the national park. In general, regions classified under the “Two Nones, One Have” rubric (possessing no conservation value, having no major ecological impact, yet presenting severe regulatory conflicts) can be legally subjected to Boundary Adjustment [7]. Land removed through Boundary Adjustment generally retains its original land-use classification and does not entail large-scale relocations, which keeps administrative costs relatively low. However, this approach carries risks of weakened regulatory oversight, localized ecological degradation, and impaired ecological connectivity and functional integrity [55].

Tianchuang-setting refers to a mechanism whereby existing land-use patterns and management responsibilities are maintained, while the land is temporarily excluded from the national park’s unified management system and governed instead by local municipalities, pending integration when future conditions mature (Figure 5). This approach is particularly suited to areas located deep inside park interiors that are characterized by complex land tenure, concentrated populations, and conditions under which Withdrawal or Boundary Adjustment remain infeasible in the short term. Common examples include permanent basic farmland, township hubs, and infrastructure-dense zones. For instance, certain permanent basic farmlands and croplands situated deep within national parks may be temporarily retained as *Tianchuang*, awaiting integration once conditions permit. Similarly, relatively independent and contiguous urban functional zones and townships located strictly within the Ecological Conservation Redline can be formally designated as Urban Development Boundaries through the application of *Tianchuang*-setting.

Table 3. Differences among the Withdrawal, Boundary Adjustment, and *Tianchuang*-setting.

Three Approaches	Applicable Conditions	Boundary Changes	Authorities
Withdrawal	① Significant conflicts between ecological protection and human activities ② Relocation feasibility ③ Ecological restoration potential	No change in the boundary; ecological relocation and land-use restrictions	National park authority
Boundary Adjustment	① Near the boundary ② Clear, concentrated, contiguous, and stable land-use functions	Adjust the national park boundary to formally exclude the area	Local government
<i>Tianchuang</i> -setting	① Deep inside the park, complex land tenure ② Concentrated population ③ Infeasible for immediate withdrawal or boundary adjustment	Retain within the boundary, temporarily not incorporated into unified management	Locally led with national park participation

**Figure 5.** Spatial forms of Withdrawal, Boundary Adjustment, and *Tianchuang*-setting. The figure was prepared by the authors with reference to Reference [27].

Tianchuang governance is fundamentally characterized by a top-down, government-led model. At present, the management of *Tianchuang* communities has evolved into a structure dominated by local authorities, with auxiliary participation from the National Park Administration [24]. In practice, local governments and the regional management branches of national parks carry out concrete implementation tasks. Through the promulgation of local regulations and targeted planning, they explore highly differentiated approaches to *Tianchuang* management. For instance, the Regulations of Fujian Province on

Wuyishan National Park [56] explicitly stipulate that local governments are directly responsible for coordinating the production activities, living conditions, and socio-economic development of residents within the park and its peripheral communities. Moreover, the Master Plan of the Protection and Development Area Around Wuyi Mountain National Park (2021–2035) [57] proposes that national park management agencies guide *Tianchuang* industries toward ecologically sustainable trajectories through formal mechanisms such as commercial franchising and social participation [44].

6.2. Enclaves' Governance Practices: Bottom-Up, Multi-Party Deliberative Governance

Currently, GGNP relies heavily on the traditional governance structures of the Fulani communities. As the statutory administrative body, the National Park Service (NPS) faces persistent capacity constraints, while non-governmental organizations (NGOs) fulfill coordinating and bridging roles between the state and local communities. Together, these three actors have gradually formed a multi-actor governance arrangement involving state authorities, local communities, and external organizations (Figure 6).

The NPS plays a coordinating role in overall governance. As the statutory administrative authority, the NPS is responsible for the preservation, protection, and management of vegetation and wildlife within GGNP. GGNP has established community-based institutions, including Community Development Associations and Community Relations Committees. It has also appointed Community Liaison Officers and Environmental Protection Officers to maintain communication, gather feedback, and assist in the formulation of park management strategies [20]. The management of Enclaves is also being gradually incorporated into park governance, with management plans currently being developed by park managers in coordination with the NPS and local communities. The NPS also seeks to strengthen relationships with local communities by supporting essential social services and development initiatives. In recent years, GGNP has actively pursued cooperation with NGOs such as the Africa Nature Investors (ANI) Foundation, with the NPS and ANI establishing a 30-year delegated management Partnership Agreement in 2017 to support conservation activities, ranger capacity building, ecotourism operations, and community development initiatives [28]. Furthermore, the NPS has worked to strengthen the involvement of traditional governance structures in park management and decision-making, although the extent of formal recognition and local decision-making authority remains context-dependent.

The Fulani communities rely on the “Chief-Family-Camp” traditional governance structure to maintain internal socio-spatial order within the Enclaves. Each pastoral camp is organized and coordinated by tribal chiefs (e.g., Ardo), who play important roles in regulating grazing arrangements, managing shared resources, and mediating internal community affairs [37]. Through this structure, Fulani communities have developed a locally embedded governance system that maintains customary rules governing land use and pastoral activities. Moreover, these chiefs function as socio-political conduits between the state apparatus and external organizations, facilitating communication and negotiation during conservation-related activities [28]. For instance, some chiefs work with the National Park Service to dismantle illegal poaching networks and sign binding resource-use and conservation agreements with organizations such as the ANI Foundation, while encouraging their community members to adopt alternative livelihood programs.

Non-governmental organizations (NGOs) play a bridging role in Enclave governance. On the one hand, through project guidance and financial support, NGOs facilitate community participation and support conservation initiatives. For instance, the ANI Foundation promotes livelihood development, skills training, and the establishment of women's cooperatives [48]. Organizations such as the Nigerian Conservation Foundation (NCF) fund school operations, maintain roads, underwrite boundary patrols, and co-draft

management plans with the NPS. On the other hand, scientific initiatives such as the Gashaka Primate Project contribute to ecological research, monitoring, and conservation awareness, while associated community-based activities may help diversify local income sources and strengthen willingness to participate in conservation.

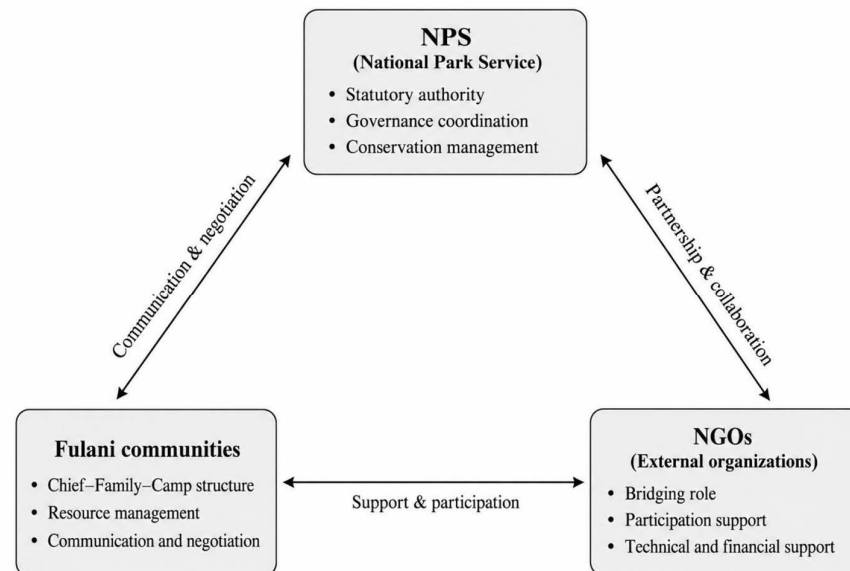


Figure 6. Deliberative governance practices in the GGNP Enclaves. The figure was prepared by the authors with reference to Reference [27].

7. Discussion

As non-contiguous management spaces within national parks, *Tianchuang* and Enclaves differ in their characteristics, causes of formation, socio-ecological consequences and governance models. Although they stem from different institutional backgrounds, both cases demonstrate that protected-area governance cannot rely on uniform exclusionary approaches to human activities. Instead, it must strike a balance between regulatory control and local needs to achieve synergies among ecological protection, social stability, and local development. The comparison between *Tianchuang* and the GGNP Enclaves is summarized in Table 4.

Table 4. Comparison of *Tianchuang* and Enclaves in national parks.

Aspect	Similarities	Differences	
		<i>Tianchuang</i>	Enclaves
Characteristics	Spatial pattern	Located within national park boundaries, not incorporated into unified management.	Small and numerous, fragmented.
	Land usage, livelihoods	Conflict with the surrounding environment, primarily consisting of croplands, villages, or pastures.	Contiguous village blocks connected to active croplands and grazing lands.
Causes of formation	Inclusive spaces to balance conservation and development.	Tea cultivation, tourism, agriculture.	Mainly crop cultivation and animal husbandry, minor hunting and fishing.
Socio-ecological consequences	Buffer space, but weaken connectivity, heighten human–wildlife conflict, and lower trust.	Proactive avoidance to circumvent land-use planning conflicts.	Passive tolerance of historically established pastoral livelihoods.
Governance models	Accommodation of human activities through coexistence.	Fragmentation, corridor disruption, unclear mandates.	Persistent ecological impacts from resource use, high reliance on local and external actors.
		“Top-down”, government-led governance.	“Bottom-up”, multi-party deliberative co-management.

The divergent governance pathways of *Tianchuang* and GGNP Enclaves reflect differences in institutional contexts rather than ecological conditions alone. Previous studies have shown that protected-area governance is strongly shaped by institutional arrangements, state capacity, historical land-use systems, and livelihood dependence [58,59]. In China, the Overall Plan for Establishing a National Park System (2017) [60] established a state-led governance framework based on unified administration and coordinated planning, enabling governments to address land-use conflicts through administrative adjustment and spatial planning. Within this institutional context, *Tianchuang* functions as a flexible and potentially transitional governance arrangement that reconciles conservation objectives with existing land uses while allowing flexibility for future management adjustment [18]. By contrast, Nigeria's National Park Service Act (1999) [61] combines statutory park management with provisions for community participation, creating institutional space for collaboration between park authorities, customary institutions, and external organizations. Comparative studies suggest that collaborative management partnerships in African protected areas often emerge not only from participatory governance objectives but also from persistent shortages of funding, personnel, and technical capacity. Accordingly, the NPS–Africa Nature Investors partnership and the continued involvement of Fulani chiefs in GGNP represent broader institutional adaptations to governance constraints. These differences are reinforced by contrasting livelihood systems: *Tianchuang* accommodates land uses that remain administratively adjustable, whereas the Enclaves support historically embedded pastoral systems closely linked to customary institutions and seasonal grazing. Consequently, the comparison suggests that governance of non-contiguous management spaces cannot be adequately explained by a single governance paradigm. Instead, adaptive, collaborative, and polycentric governance operate in different combinations according to national institutional capacity and socio-historical contexts.

The comparison yields three governance implications for managing non-contiguous management spaces in developing-country national parks. First, governance interventions should begin with a thorough understanding of historically embedded livelihood systems. In *Tianchuang*, agricultural production has evolved through long-term human–land interactions and cannot be transformed abruptly. Likewise, the Fulani pastoral system in the GGNP Enclaves is closely associated with customary institutions and seasonal grazing practices. Recognizing these livelihood traditions provides a more practical foundation for reducing conservation conflicts and promoting gradual livelihood transitions. Second, differentiated management should replace uniform governance approaches. China's recent policy of “backfilling a portion of *Tianchuang* while retaining areas with conservation value” demonstrates that different types of non-contiguous spaces require different management responses. Similarly, in GGNP, the continued existence of the Enclaves has been accompanied by efforts to improve governance through adaptive management planning and collaborative partnerships. Management decisions should therefore reflect ecological value, livelihood dependence, and local governance capacity rather than pursuing uniform spatial integration. Third, effective governance depends on sustained collaboration among governments, communities, and external organizations. In China, strengthened coordination among government departments provides the institutional basis for resolving land-use conflicts, whereas in GGNP cooperation among the National Park Service, Fulani chiefs, NGOs, and private conservation partners has enhanced governance capacity and local legitimacy. Building such multi-actor partnerships is essential for improving the long-term effectiveness of governance in non-contiguous management spaces.

8. Conclusions

National parks are established to ensure ecosystem integrity and unified management, yet within their boundaries exist “non-contiguous management spaces”. These areas are excluded from unified national park management due to intensive human activities, complex land tenure, and limited governance capacity. Cross-national comparative research on these “non-contiguous management spaces” remains limited, and governance experiences from developing countries are particularly scarce. Against this background, this study takes Wuyishan National Park and Nigeria’s Gashaka-Gumti National Park as cases to compare “non-contiguous management spaces” in Chinese and Nigerian national parks. It identifies the following similarities and differences between China’s *Tianchuang* and Nigeria’s Enclaves (Table 4).

Firstly, in terms of concept and characteristics, both *Tianchuang* and Enclaves are land parcels located within national park boundaries but outside unified park management, whose land-use functions are inconsistent with surrounding land-use functions, typically manifesting as croplands, villages, or pastures that do not meet strict protection requirements. China’s Wuyishan National Park *Tianchuang* mostly presents a “small and numerous” fragmented pattern, with more diversified community livelihoods; GGNP Enclaves are mostly contiguous village blocks, with community livelihoods primarily based on farming and grazing. Secondly, regarding the causes of formation, both essentially represent inclusive spaces generated to balance conflicts between ecological protection and regional development. *Tianchuang* reflects an intentional, proactive avoidance designed to mitigate land-use planning conflicts during park boundary delineation and facilitate park establishment. Enclaves represent a passive tolerance resulting from the government’s limited regulatory capacity and respect for local ethnic groups’ reliance on grazing to reduce social conflict. Thirdly, in terms of socio-ecological consequences, although both increase local development space and alleviate human–land conflicts, they also present potential risks of weakening integrity and ecological connectivity, increasing human–wildlife conflict, and lowering trust in protection standards. In addition, *Tianchuang* also face problems such as localized fragmentation and unclear mandates among different subjects. Enclaves face problems such as continuous ecological impacts from resource dependence and high reliance on local and external organizations due to insufficient regulation. Fourthly, in terms of governance models, both adopt a “co-existence” approach. *Tianchuang* are managed through a “top-down,” government-led governance model, while Enclaves are managed through a “bottom-up,” multi-party deliberative governance model.

Beyond the two case studies, this research contributes to the broader understanding of governance for non-contiguous management spaces in protected areas. Theoretically, the comparison demonstrates that governance outcomes are shaped by the interaction of institutional capacity, historical livelihood systems, and governance contexts, rather than by ecological conditions alone or a single governance paradigm. Practically, the findings highlight the importance of recognizing historical livelihoods, adopting differentiated management strategies, and strengthening collaboration among governments, communities, and external organizations. Although derived from *Tianchuang* and GGNP Enclaves, the comparative framework and governance implications developed in this study may provide a useful reference for other protected areas facing similar conservation–development conflicts, particularly in developing countries where protected areas frequently co-exist with long-established human settlements and resource-dependent livelihoods.

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Note

- ¹ According to the Oxford Dictionary of Geography, “enclaves” can be defined in both narrow and broad senses [62]. Narrowly, enclaves are divided into “exclaves” and “enclaves” based on the spatial relationships between different regions or countries. An exclave refers to a portion of a country geographically separated from its main territory, while an enclave refers to a small area within one country that is administered by another, or an area within an underdeveloped economy that is controlled by foreign capital and remains largely disconnected from the domestic economy. Broadly defined, an enclave refers to any “surrounded unit” within a country, encompassing administrative enclaves between provinces, municipalities, and counties, as well as mining areas, farms, and forest zones shaped by national culture and resource distribution. Drawing on this broad understanding, this paper adopts the concept of “internal enclaves” to define Enclaves in Nigerian national parks. Specifically, these are “communities or units located within the statutory boundaries of a national park and are spatially surrounded by the park, yet continue to operate under traditional models of complex land tenure, community habitation, or ongoing resource utilization, and remain not fully incorporated into the park’s unified protection and management system”.

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