

A Comparative Study on Grassland Ecological Protection and Sustainable Development of Herders in China and Mongolia

-- From the Perspective of International Law and Global Governance under UNCCD COP17

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Abstract: The Mongolian Plateau grassland, a typical arid semi arid grassland ecosystem in Eurasia, spans both China and Mongolia. It jointly bears the multiple pressures of climate change, grassland degradation, and intensifying desertification, where herder livelihood security and regional ecological security are deeply intertwined. The 17th Session of the Conference of the Parties (COP17) to the United Nations Convention to Combat Desertification (UNCCD), themed "Restoring Land, Rekindling Hope," launched the "Rangelands Priority Initiative." Coinciding with the United Nations' 2026 International Year of Rangelands and Pastoralists (IYRP), and drawing upon the UNCCD treaty text and the SDG 15.3 Land Degradation Neutrality (LDN) target, this conference has explicitly affirmed the policy value of grassland ecological restoration, indigenous pastoral wisdom, community agency, and transboundary collaborative governance at the levels of multilateral international law and global governance. Grassland ecological protection and the sustainable development of herders constitute a two-way coupled relationship within the grassland social-ecological system: grassland is the material foundation for herder sustainable development, while herders are the core practicing subjects of grassland protection. A bidirectional transmission exists between them, potentially leading either to a vicious cycle of "degradation — poverty" or fostering a virtuous cycle of "ecological improvement — livelihood enhancement." According to the UNCCD's Global Land Outlook – Thematic Report on Rangelands and Pastoralists, approximately 40% of the global land area has experienced some degree of land degradation, with over 3.2 billion people directly bearing the survival pressures caused by land degradation, which results in an estimated global economic loss of up to US\$878 billion annually. Globally, rangelands cover 54% of the land surface, sustaining the livelihoods of about 2 billion people; nearly half of these rangelands are already degraded or at risk of degradation, yet only 24 countries have included rangelands in their national climate plans. For a long time, rangeland issues have remained marginalized within the global climate and land governance framework. This paper adopts the analytical perspective of pastoral "mobile wisdom." Grounded in the mandatory obligations of the UNCCD and the LDN target of SDG 15.3, and integrating treaty provisions with the soft law guidance of COP decisions, it systematically analyzes the interaction mechanisms between grassland ecological protection and herder sustainable development. It compares the institutional practices of grassland ecological protection in China and Mongolia: China pursues a governance path driven by national projects and underpinned by institutional safeguards, relying on policies such as "Grazing Withdrawal for Grassland Restoration" and the "Grassland Ecological Protection Subsidy and Reward Policy" to achieve synergistic improvement of ecological restoration and herder livelihoods. Mongolia constructs a governance model combining legal-economic constraints and community-based self-governance, utilizing the Livestock Tax Law and Pasture User Groups (PUGs) to revitalize indigenous pastoral traditions. The study finds that the differences in the governance approaches of the two countries stem from variations in institutional foundations, resource endowments, and social structures. The mobility mindset embedded in Traditional Ecological Knowledge (TEK) represents a core source of resilience for arid grasslands in coping with climate uncertainty. Grounded in the UNCCD-COP17 international law framework, this paper proposes countermeasures such as establishing a cross-border ecological monitoring network, jointly building ecological protection corridors, promoting the integration of traditional ecological knowledge with modern science and technology, and deepening ecological cooperation under the Green Silk Road. These proposals aim to provide theoretical references and practical pathways for the collaborative protection of transboundary grasslands on the Mongolian Plateau and for fulfilling LDN implementation targets.

Keywords: Grassland ecological protection; Sustainable development of herders; Mobile wisdom; Traditional Ecological Knowledge (TEK); UNCCD-COP17; Land Degradation Neutrality (LDN); Transboundary global governance; China and Mongolia.

1. Introduction

Grasslands cover 54% of the Earth's land surface, supporting the survival and development of approximately 2 billion people. They possess multiple ecological functions including carbon sequestration, windbreak and sand fixation, water source conservation, and biodiversity maintenance. However, the global rate of grassland degradation is four

times that of forests. Land degradation and drought disasters have become global environmental crises. According to UNCCD assessments, nearly half of the world's rangelands are degraded. The Eurasian steppe is particularly significantly impacted by climate change, with grassland productivity potentially dropping by 43% under extreme drought scenarios, directly threatening food security in pastoral areas and the livelihoods and well-being of millions of herders. Economic

estimates released at COP17 indicate that global grasslands provide ecosystem services valued at US\$21–47 trillion annually, with every US\$1 invested in grassland restoration potentially yielding a comprehensive return of US\$4–36. Nevertheless, global investment in grassland protection and restoration remains critically insufficient. As a transboundary, complete ecological unit, the Mongolian Plateau grassland is not divided by national borders. China's Inner Mongolia and Mongolia share the same grassland ecosystem and face common practical challenges: climate warming, grassland degradation, desertification expansion, and frequent extreme meteorological disasters. The vulnerability of the pastoral social-ecological system continues to intensify.

The grassland ecosystem and herder communities constitute a typical social-ecological coupled system. Grasslands provide basic production materials such as forage and water for animal husbandry, determining herder production capacity; conversely, herders' grazing behaviors and production choices directly determine the direction of grassland ecological evolution. Ecological protection and herder sustainable development are not simply opposing forces. Mishandling their relationship can trap them in a vicious cycle where "protection squeezes livelihoods, and livelihoods destroy ecology." Proper coordination, however, can foster a virtuous cycle where ecological improvement drives social progress.

The United Nations Convention to Combat Desertification (UNCCD), which entered into force in 1994, is the core multilateral environmental treaty (hard law) for combating desertification, land degradation, and drought globally, currently with 197 Parties. Both China and Mongolia are formal Parties to the Convention. Article 3 (Principles), paragraph (a) of the Convention explicitly stipulates that Parties should ensure that populations and local communities participate in the design and implementation of programs for combating desertification and/or mitigating the effects of drought, and create an enabling environment at higher levels to facilitate action at national and local levels. Article 3(b) states that Parties should, in a spirit of international solidarity and partnership, promote subregional, regional, and international cooperation and coordination, concentrating resources on affected areas. Article 3(c) advocates for partnership-based cooperation among governments, communities, and land users to achieve sustainable land resource use. These provisions constitute the international legal foundation mandating that grassland governance must integrate community participation and transboundary collaboration, obligating State Parties to incorporate local communities, i.e., grassland herders, into land governance decision-making systems. The 2030 Agenda for Sustainable Development (2015) established SDG 15.3 – Land Degradation Neutrality (LDN) as a global target. LDN is defined as "a state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems." It requires Parties to follow a three-tier response hierarchy: "avoid, reduce, and reverse" land degradation, aiming to achieve a degradation-neutral world by 2030 through combating desertification and restoring degraded land. This target has become a common action program for all UNCCD Parties. By 2024, over 130 countries had established voluntary national LDN targets, but only two-thirds included rangeland and pasture governance content in their target

documents.

The seventeenth session of the Conference of the Parties (COP17) to the UNCCD was held in Ulaanbaatar, Mongolia, in 2026. Coinciding with the UN's "International Year of Rangelands and Pastoralists," the conference issued the Ulaanbaatar Declaration (soft law, implementation guidance) and officially launched the "Rangelands Priority Initiative," mobilizing approximately US\$1.2 billion to support 45 rangeland restoration projects – the largest funding mobilization specifically for rangelands in the Convention's history. The conference continued the "Riyadh–Ulaanbaatar Action Agenda." The Declaration states that "people play a central role in land restoration, rangeland management, soil and water conservation, and drought resilience actions, with women, youth, civil society, and others being important participants." It calls for a global shift away from the outdated perception of pastoralists as degraders, recognizing pastoralist communities as key partners in land restoration. It emphasizes the value of traditional ecological knowledge, transboundary collaborative governance, and herder livelihood security, aiming to translate global governance political commitments into on-the-ground practice.

Existing research often focuses separately on the effectiveness of China's grassland policies or Mongolia's community-based grazing systems. Few studies, from the perspective of multilateral convention international law and global governance, systematically analyze the coupled mechanisms between grassland ecological protection and herder sustainable development by invoking specific UNCCD treaty articles, COP decisions, and global statistics, while using "mobile wisdom" as a core analytical dimension to compare the underlying logic of ecological protection and livelihood transition in the two countries. Based on the UNCCD-COP17 international law and global governance framework, this paper compares the practical challenges of grassland protection in China and Mongolia, analyzes the interaction mechanisms between grassland ecological protection and herder sustainable development, explores the modern value of traditional pastoral ecological knowledge, and explores collaborative pathways for transboundary grassland governance, providing case references for sustainable grassland management in arid and semi-arid regions.

2. Common Challenges Facing the Grassland Ecosystems of China and Mongolia – Regional Implementation Issues from a Global Governance Perspective

Driven by climate change, the overall temperature of the Mongolian Plateau has significantly risen, with extreme weather events such as droughts and blizzards becoming more frequent. Grassland degradation and desertification have become urgent ecological and livelihood issues that China and Mongolia must jointly address. Land degradation in this region is not merely an isolated national issue; it is a concentrated manifestation of the global crisis of arid and semi-arid lands in Northeast Asia, directly affecting the implementation performance of both countries regarding their UNCCD obligations and the SDG 15.3 LDN target. Ecological crises directly transmit to the broader herder population, forming a negative cycle of ecological degradation and livelihood damage. According to UNCCD

statistics, from 2015 to 2019, the world lost at least 100 million hectares of productive land annually. East-Central Asia is one of the regions most severely affected by land degradation, with over 20% of its territory experiencing varying degrees of degradation.

2.1. Mongolia: Desertification Pressure under Climate Crisis

Over the past 80 years, the temperature increase in Mongolia has significantly exceeded the global average. Currently, 76.8% of Mongolia's territory is affected by desertification, with grassland vegetation cover continuously declining. By the end of 2024, Mongolia's livestock population reached 57.6 million head, resulting in severe overgrazing and forming a vicious cycle of "poverty – overgrazing – grassland degradation." Concurrently, extensive mining development continues to damage grassland soils and groundwater, squeezing herders' living space and further intensifying the human-livestock-grassland conflicts, placing dual pressure on pastoral ecological security and herder livelihoods. Following extreme disasters such as dzuds (severe winter conditions), massive livestock deaths occur. To compensate for economic losses, herding households often further expand their herds, amplifying grassland pressure. Disaster, poverty, and grassland degradation thus reinforce each other. According to the UNCCD-PRAIS implementation report assessment, Mongolia has voluntarily submitted national LDN targets, pledging to curb further grassland degradation. However, the proportion of degraded land within the country continues to show an upward trend, posing significant practical obstacles to achieving the 2030 LDN target.

2.2. China's Inner Mongolia: Background of Grassland Degradation and Restoration

Historical monitoring data indicates that approximately 90% of natural grasslands in Inner Mongolia have experienced varying degrees of degradation, with over 50% classified as moderately or severely degraded. After more than two decades of large-scale grassland ecological engineering projects, Inner Mongolia's grassland ecology has significantly recovered. However, internal degradation risks persist, and the threat of drought due to climate change continues to undermine the stable development of pastoral animal husbandry. Balancing ecological protection with herder income growth remains a long-term challenge. Some herding households face practical issues such as increased breeding costs and difficulties in transitioning after livestock reduction. The conflict between ecological protection and livelihood development has not been fully resolved. As a UNCCD Party, China has taken the lead globally in achieving LDN, providing a practical model for developing countries to implement SDG 15.3.

2.3. Practical International Legal Demands for Transboundary Grassland Governance

Grassland ecosystems possess complete transboundary attributes; sand and dust migration, wildlife migration, and climate fluctuations do not respect national borders. Single-country grassland governance is insufficient to fundamentally resolve regional ecological risks. According to UNCCD Article 3(b)'s principle of international cooperation, and as explicitly emphasized in UNCCD-COP17 decisions regarding transboundary land restoration and drought

resilience building, transboundary ecological issues require Parties to engage in information sharing, joint monitoring, and coordinated action. This constitutes a cooperative obligation incumbent upon Parties under the Convention. China and Mongolia engaging in grassland ecological cooperation is not only an international legal obligation under the UNCCD multilateral environmental agreement but also a practical necessity for maintaining regional ecological security, safeguarding transboundary herder livelihoods, and aligning with the Green Silk Road / China-Mongolia-Russia Economic Corridor development. From a global governance perspective, the governance practices on the Mongolian Plateau can also provide a referenceable East Asian experience for arid transboundary grassland belts worldwide.

3. Analysis of the Coupling Relationship between Grassland Ecological Protection and Herder Sustainable Development in China and Mongolia

Grassland ecological protection and herder sustainable development are not simply mutually exclusive opposites. Instead, they form a closely nested, bidirectionally interacting coupled whole within the grassland social-ecological system. The grassland ecosystem provides the material foundation for herder production and livelihoods, while herders' production decisions and interest demands profoundly shape the direction of grassland evolution. Three layers of internal interaction mechanisms exist between them: material resources, interests-behaviors, and systemic feedback. The UNCCD's Global Land Outlook – Thematic Report on Rangelands and Pastoralists specifically points out that rangeland governance must integrate ecology, livelihoods, and indigenous knowledge as one whole; ecological restoration that divorces itself from social dimensions cannot achieve long-term LDN goals. This assertion aligns with the statutory principle of community participation in UNCCD Article 3(a) and resonates with the "avoid-reduce-reverse" three-tier governance logic of SDG 15.3. Constrained by conditions such as property rights systems, fiscal capacity, industrial foundations, and external disturbances, this coupling relationship exhibits differentiated realities within the grassland domains of China and Mongolia. Re-examining the intrinsic connection between grassland protection and herder livelihoods from the perspective of the UNCCD-COP17 global governance framework holds significant practical importance for promoting collaborative governance of the transboundary grasslands on the Mongolian Plateau.

3.1. Theoretical Mechanisms of the Three-Layer Coupling between Grassland Ecological Protection and Herder Sustainable Development

3.1.1. Material Resource Coupling: Grassland as the Natural Material Foundation for Herder Sustainable Development

From the perspective of material resources, grassland is the most critical production factor in pastoral areas. Forage supply, soil conditions, and water distribution collectively form the resource base upon which animal husbandry depends. Grassland vegetation coverage and forage yield directly determine the theoretical carrying capacity of rangelands,

constrain livestock herd sizes, and profoundly impact the livestock output and economic income of herding households. When grassland degrades or desertifies, forage yield declines, forage supply becomes insufficient, and the buffering capacity of pastoral areas against extreme climate shocks such as droughts and blizzards shrinks. Livestock mortality risk rises, and herder livelihood vulnerability significantly increases.

The benefits brought by grassland ecological restoration are not limited to traditional animal husbandry. After vegetation recovery, grasslands can support moderate-scale grazing production and also provide a sound ecological foundation for diversified industries such as grassland eco-tourism, grass product processing, and grassland carbon sequestration, expanding income-generating channels for herders and providing diverse resource conditions for their sustainable development. In short, the quality of grassland resource endowment fundamentally determines the resource ceiling for pastoral development. Without a healthy and stable grassland ecosystem, herder sustainable development loses its essential material carrier.

3.1.2. Interest-Behavior Coupling: Herder Sustainable Development as the Social Safeguard for Effective Long-Term Grassland Protection

At the interest-behavior coupling level, herders are the direct users and frontline stewards of grassland resources. Whether grassland ecological protection policies can achieve long-term, on-the-ground success depends not merely on engineering techniques but largely on whether institutional designs can respond to herders' survival and development interests. This is the concrete manifestation of UNCCD Article 3(a)'s principle of "local community participation in decision-making" within the grassland context. The UNCCD-COP17 "Rangelands Priority Initiative" repeatedly warns that ecological governance relying solely on closure and control, lacking community interest safeguards, typically yields only short-term and unsustainable protection outcomes. Only by treating herders as governance partners, rather than as objects of control, can long-term land management mechanisms be established. If ecological protection goals rely only on administrative control, lacking supporting livelihood safeguards and interest compensation, a serious imbalance between conservation obligations and development rights can result. Driven by survival pressures, herders may resort to disguised overgrazing and evasive behaviors. Ecological protection then depends only on external enforcement, making long-term sustainability difficult to achieve.

Conversely, when effective interest-linking mechanisms are established through institutional arrangements such as ecological compensation, industrial support, and community co-management, allowing herders to tangibly share the dividends of ecological protection, their role shifts from being controlled to being stewards. They proactively implement protection measures like rest grazing, rotational grazing, and livestock-grassland balance, transitioning from passive constraint to active stewardship. Thus, only by safeguarding herders' sustainable development rights and interests can grassland ecological protection gain a solid social foundation.

3.1.3. Systemic Feedback Coupling: Two Evolutionary Pathways – Virtuous and Vicious Cycles

At the systemic feedback level, a self-reinforcing closed-loop evolutionary path forms between grassland ecology and herder livelihoods, potentially evolving either into a negative vicious cycle or a positive virtuous cycle. These two patterns

result from the interplay of institutions, policies, and resource endowments. This reflects the core logic of the SDG 15.3 LDN framework, which emphasizes "avoiding, reducing, and reversing degradation" while focusing on the dynamic equilibrium of social-ecological systems.

On one hand, there is the Negative Vicious Cycle (Degradation-Poverty Closed Loop): Grassland degradation reduces forage yield, decreasing livestock income. Herding households expand herds to compensate for lost income, and overgrazing further exacerbates degradation. Compounded by extreme shocks like blizzards and droughts, massive livestock deaths occur, plunging herders into poverty, who then further overdraw grassland resources. Ecological and livelihood crises amplify each other, forming a difficult-to-break closed loop.

On the other hand, there is the Positive Virtuous Cycle (Ecology-Livelihood Synergy Closed Loop): Ecological restoration projects rehabilitate grasslands, gradually restoring forage production capacity. Ecological compensation and diversified industries broaden herders' income sources, reducing their survival dependence on natural grasslands. Herders, receiving tangible benefits from ecological protection, actively participate in grassland stewardship, consolidating restoration gains and achieving mutually reinforcing ecological and livelihood benefits.

3.2. Real-World Manifestations of the Grassland-Herder Livelihood Coupling Relationship in China and Mongolia

3.2.1. China's Inner Mongolia: Policy-Driven Construction of Virtuous Ecology-Livelihood Coupling

At the material resource level, after more than two decades of large-scale ecological restoration projects, the comprehensive vegetation cover of Inner Mongolia's grasslands reached 46.48%. Fresh grass yield in restored areas increased by over 40% compared to pre-restoration levels. The material supply capacity of rangelands has significantly recovered, supporting both moderate grazing for livestock production and laying an ecological foundation for confined feeding, grassland culture tourism, and grass-based industries.

At the interest-behavior level, relying on the Grassland Ecological Protection Subsidy and Reward Policy, an incentive-restraint mechanism of "Grazing Ban Subsidies + Livestock-Grassland Balance Rewards" has been established, directly linking grassland protection responsibilities with herders' economic benefits. In 2026, Xilingol League's special rest-grazing subsidy fund reached RMB 280 million, directly disbursed to herder households to compensate for economic losses due to ecological controls. Simultaneously, herders are guided to develop diversified livelihoods such as confined feeding, purchased forage, eco-tourism, and off-farm employment, reducing their reliance on natural rangeland grazing. This mobilizes herders' intrinsic motivation for participation in protection, practically implementing the UNCCD's community participation principle.

At the systemic feedback level, Inner Mongolia's pastoral areas are gradually forming a virtuous cycle of "grassland restoration – resource enhancement – livelihood improvement – active stewardship." However, the coupling relationship still has limitations. Some herders face high transition costs after livestock reduction and remain relatively dependent on policy subsidies. The stability of the virtuous cycle still needs further consolidation. This practice provides

a Chinese case study for the "engineering restoration + economic compensation" model under the UNCCD framework for arid regions.

3.2.2. Mongolia: Coexistence of Negative Cycles and Community Resilience

At the material resource level, over the past 80 years, temperature increases in Mongolia have far exceeded the global average, with 76.8% of its territory affected by desertification and grassland supply capacity continuously declining. By the end of 2024, the national livestock herd reached 57.6 million head, far exceeding the theoretical carrying capacity, creating a severe imbalance between resource supply and grazing demand. Extensive mining development further damages grassland soils and groundwater, continuously squeezing herders' living space and steadily weakening the material foundation for pastoral development.

At the interest-behavior level, Mongolia implemented the Livestock Tax Law in 2021, aiming to constrain overgrazing through progressive taxation. However, the system leans towards punitive control, lacking supporting livelihood support policies. It struggles to change the practical reality that low-income herders heavily depend on livestock numbers for income. Pure economic penalties are insufficient to fundamentally alter herder grazing behavior. This confirms the UNCCD-COP17 warning that punitive regulations alone, lacking livelihood support, cannot reverse land degradation trends. Meanwhile, Pasture User Groups (PUGs), as a grassroots community self-governance practice, attempt to coordinate protection and development contradictions internally. Through democratic consultation among herders, PUGs delineate pasture boundaries and establish rotational grazing rules, embedding herder livelihood demands into pasture management institutions. This represents a local practice of UNCCD Article 3(a)'s community participation principle. However, constrained by factors such as insufficient fiscal resources, conflicts with mining, and pasture fragmentation, overall promotion effectiveness remains limited.

At the systemic feedback level, some pastoral areas in Mongolia are deeply entrenched in the negative vicious cycle of "poverty – overgrazing – grassland degradation." Traditional pastoral mobile wisdom, including seasonal transhumance and community-shared pastures, possesses considerable ecological resilience and can mitigate grassland-livestock conflicts at the local community level. However, it cannot resolve the structural contradictions between ecology and livelihoods at the national level.

3.3. Institutional and Social Causes of the Divergence in Coupling Relationships between China and Mongolia

Despite sharing similar natural background conditions on the same Mongolian Plateau, the coupling relationships between grassland ecological protection and herder sustainable development in China and Mongolia exhibit significant divergence. This is not solely due to climatic factors but results from the interplay of multiple conditions: land tenure, national fiscal capacity, industrial foundations, and external disturbances.

First, land tenure system differences: China implements a household grassland contract responsibility system, with relatively clear grassland rights and boundaries, providing a

property rights basis for implementing ecological compensation and livestock-grassland balance supervision. Mongolia's grasslands are predominantly publicly owned, but simultaneous privatization and fragmentation of pastures undermine the institutional conditions for large-scale unified governance.

Second, differences in national fiscal investment capacity: China possesses strong fiscal capacity to implement billion-yuan-level grassland ecological projects and provide large-scale cash ecological compensation, directly regulating grassland-livestock relationships. Mongolia has limited fiscal resources, making large-scale herder subsidies difficult to implement; governance relies more on legal regulations and community self-governance.

Third, differences in industrial economic foundations: Inner Mongolia has diverse non-agricultural and non-pastoral employment channels, facilitating the diversification of herder livelihoods and reducing their survival dependence on natural grasslands. Mongolia's pastoral economy is highly dependent on animal husbandry, with herders having singular income sources and limited livelihood alternatives, forcing them to rely on increasing livestock numbers to sustain household income.

Fourth, differences in external disturbance factors: Mongolia's extensive mining development continuously damages grasslands, exacerbating human-livestock-grassland conflicts. China implements strict controls on development in grassland areas, effectively reducing the impact of industrial and mining development on grassland ecosystems.

3.4. Global Governance Implications of the Relationship under the UNCCD-COP17 Framework

The UNCCD-COP17 in 2026 launched the "Rangelands Priority Initiative" and issued the Ulaanbaatar Declaration, explicitly opposing the simplistic view of herders as the cause of grassland degradation. It advocates recognizing pastoralist communities as key partners in grassland ecological restoration and emphasizes that land tenure security, community participation, traditional pastoral rights, and herder livelihood security should be incorporated into the institutional design of grassland governance. These contents constitute COP decision soft law. While they lack treaty-binding force, they represent soft governance obligations that UNCCD Parties should implement, further developing the principles set forth in Convention Article 3.

From the perspective of Convention-based global governance, grassland ecological protection is no longer a purely environmental governance issue; it is a complex, intertwined issue involving ecological protection, livelihood development, cultural preservation, and climate resilience. Relying solely on enclosure and control can achieve short-term vegetation recovery, but lacking social support, protection outcomes are difficult to sustain long-term. Only by coordinating grassland ecological protection with herder sustainable development, achieving synergy between ecological, economic, and social benefits, can the global LDN implementation target be genuinely achieved. The comprehensive governance practices of China and Mongolia provide two important reference models globally for handling the relationship between protection and development in arid and semi-arid grasslands. From a comparative global governance perspective, extensive arid pastoral regions worldwide, such as those in Central Asia and the African

Sahel, similarly face the "degradation-poverty" closed-loop challenge. The experiences of China and Mongolia possess significant cross-regional reference value.

4. Differentiated Governance Pathways for Grassland Ecological Protection in China and Mongolia from the Perspective of Mobility

Facing the same ecological crisis, China and Mongolia, leveraging their respective institutional systems, land tenure regimes, and socio-cultural foundations, have forged two distinct pathways for grassland governance: China adopts a nationally driven model with dual engines of engineering measures and institutional safeguards; Mongolia chooses a model of policy hard constraints combined with community-based soft autonomy. The two countries exhibit significant differences in how they transform and preserve traditional pastoral "mobility," reflecting different institutional logics for handling the "grassland protection – herder sustainable development" coupling relationship. Both models can be interpreted under the global governance paradigm advocated by UNCCD-COP17, which promotes multiple pathways for sustainable land management.

4.1. The Chinese Model: Engineering Governance and Institutional Safeguards under National Strategic Leadership

China elevates grassland ecological protection to a national strategic level, using major ecological projects and ecological compensation systems as two key instruments to systematically address the grassland-livestock imbalance, coordinate grassland protection with herder livelihoods, and promote simultaneous progress in ecological protection and livelihood security.

First, the Grazing Withdrawal for Grassland Restoration Project (initiated in 2003) systematically restores severely degraded grasslands through measures such as grazing bans, enclosures, rest grazing, and rotational grazing, with cumulative investment approaching RMB 100 billion, covering 13 pastoral provinces and regions across China. It curbs the trend of grassland desertification and degradation at its source. After project implementation, grassland vegetation cover and fresh grass yield significantly improved, and the ecological barrier function of windbreak and sand fixation in northern China continued to recover.

Second, the Grassland Ecological Protection Subsidy and Reward Policy (fully implemented in 2011) establishes an incentive-restraint mechanism combining "Grazing Ban Subsidies + Livestock-Grassland Balance Rewards," directly linking grassland protection responsibilities with herders' economic benefits. It uses economic leverage to guide herders to actively reduce livestock numbers and resolve grassland-livestock conflicts. The policy breaks the "protection versus income increase" dichotomy, establishing a long-term grassland protection system and responding to the core issue of "how to balance protection with herder development."

In terms of practical outcomes, the comprehensive vegetation cover of Inner Mongolia's grasslands reached 46.48%, fresh grass yield in restored areas increased by over 40% compared to pre-restoration levels, and the livestock-grassland balance index was controlled within 10%, indicating that grassland stocking pressure is within a reasonable range. Taking the 2026 special rest-grazing

subsidy of RMB 280 million in Xilingol League as an example, policy subsidies directly benefit a broad range of herders.

In terms of mobility, policies such as fencing, grazing bans, and rest grazing have reduced large-scale, trans-regional traditional nomadic movements. Herder livelihood models have undergone transformation: herders diversify their livelihoods through confined feeding, purchased forage, eco-tourism, and off-farm employment. They transition from traditional "spatial mobility adapting to nature" towards a market-oriented diversified adaptation model, using non-pastoral income and market exchanges of materials to buffer the pressure on natural grasslands. By diversifying livelihoods and reducing direct dependence on grasslands, coordination between grassland protection and herder sustainable development is achieved.

4.2. The Mongolian Model: A Local Governance Path Combining Legal Constraints and Community Self-Governance

Mongolia's grassland governance faces two core challenges: livestock overloading and mining damage to pastures. On one hand, it relies on national legal and economic tools for control; on the other hand, it activates grassroots community forces, attempting to preserve traditional grazing mobility mechanisms and relying on communities to balance pasture protection with herder survival and development.

First, the economic-legal tool: The Livestock Tax Law (implemented in 2021) applies a progressive tax system, imposing taxes on livestock raised beyond set limits. It uses economic leverage to encourage herders to reduce herds and optimize livestock structures, aiming to control total pasture stocking rates. However, this system presents practical contradictions: many ordinary herders heavily depend on livestock numbers for household income; excessive taxation can squeeze the living space of low-income herders; without sufficient supporting livelihood support, conflicts between ecological controls and herder livelihoods can easily arise.

Second, the community self-governance mechanism: Pasture User Groups (PUGs) encourage herders to voluntarily form community organizations. Through democratic consultation, they delineate pasture boundaries, establish rotational grazing rules, and rebuild shared pastures and seasonal transhumance mechanisms. They rely on bottom-up community forces to resolve the grassland "tragedy of the commons." Within this mechanism, herders independently participate in pasture stewardship, embedding their livelihood demands into pasture management institutions. This represents a local practice coordinating grassland protection and sustainable development at the community level, aligning with the UNCCD-COP17 global governance orientation encouraging local community participation in land governance and practically implementing the principle of Convention Article 3(a).

The core logic of Mongolia's governance path is "external institutional regulation + endogenous local governance." At the community level, traditional practices such as seasonal transhumance and collective shared pastures are maintained, relying on spatial rotation of grazing to provide recovery periods for pastures and enhancing community resilience against blizzards and droughts. However, this model also faces practical challenges including pasture privatization

fragmentation, excessive total livestock numbers, impacts from mining development, and insufficient livelihood support. Some pastoral areas remain trapped in the negative cycle of ecological degradation and damaged herder livelihoods.

4.3. Comparative Insights from the Two Governance Pathways

Table 3-1. Comparative Insights from the Two Governance Pathways

Dimension	China (Inner Mongolia)	Mongolia
Governance led logic	Driven by national strategy, engineering+institutional dual wheel drive	National legal constraints+community autonomy collaboration
Liquidity implementation method	Traditional cross regional nomadic shrinkage; Diversified livelihoods, market regulation replacing spatial mobility	Preserve seasonal transitions, community shared pastures, and maintain grazing space mobility
Core tools for coordinating protection and development	Returning grazing to grassland project, grassland ecological compensation policy (economic compensation to support people's livelihoods)	Livestock Head Tax Law, PUGs for Ranch Users (Community Self Consultation)
advantage	Quick repair results, policy support to ensure the livelihoods of herdsmen, and promote the formation of a virtuous cycle of protecting and increasing income	Activate local nomadic wisdom, strengthen community resilience, and respect the traditional rights and interests of herdsmen
Realistic challenges	The weakening of traditional nomadic spatial mobility has put pressure on some herders to transform their livelihoods; There is room for improvement in the reward standards	The pressure on the total number of livestock, mining interference, and insufficient livelihood support have led to a vicious cycle in some areas

The two pathways are rooted in their respective social systems, land tenure arrangements, and economic foundations; neither is inherently superior. They represent two typical adaptation models for arid grasslands: one relies on national power to restructure the human-livestock-grassland relationship, resolving protection-development conflicts through ecological compensation and diversified livelihoods; the other attempts to protect traditional spatial mobility grazing, relying on community self-governance to balance ecology and livelihoods. The practical experiences of both can serve as mutual references and align with the UNCCD-COP17 global governance concept promoting multiple pathways for sustainable grassland land management.

5. The Modern Governance Value of "Mobile Wisdom" and Traditional Ecological Knowledge (TEK)

The UNCCD-COP17 and the Global Land Outlook – Thematic Report on Rangelands and Pastoralists repeatedly emphasize the irreplaceable value of traditional indigenous knowledge in grassland restoration and climate resilience building. They call on Parties to integrate Traditional Ecological Knowledge (TEK) into national land governance policy systems, achieving complementarity between indigenous knowledge and modern science. This initiative also echoes relevant provisions of the UN Declaration on the Rights of Indigenous Peoples concerning respect for traditional indigenous knowledge. The mobile wisdom embedded in pastoral civilization is the TEK accumulated over generations by herders on the Mongolian Plateau. It represents a survival paradigm for coping with environmental uncertainty and a source of indigenous thought for coordinating grassland protection and herder sustainable development, encompassing three core elements: dynamic adaptation, cross-boundary resource integration, and spatial decoupling of risks.

5.1. Ecological Implications of Mobile Wisdom

First, dynamic adaptation: abandoning the static mindset of fixed-location grazing, relying on transhumance and rotational grazing, dynamically adjusting grazing areas in

response to precipitation and vegetation phenology, adapting to the fluctuating and variable natural conditions of arid grasslands.

Second, cross-boundary resource symbiosis: breaking down administrative boundaries, promoting the cross-regional flow of grassland resources and management experience, constructing a collaborative governance system.

Third, spatial decoupling of risks: relying on spatially dispersed arrangements to reduce the systemic impact of localized droughts, blizzards, and grassland degradation, enhancing the resilience of pastoral social-ecological systems.

5.2. Real-World Expressions of Mobile Wisdom under the Two Models

Mongolia preserves more spatial mobility, relying on community shared pastures and seasonal transhumance to achieve pasture rest and rotation, using spatial mobility as the primary means to cope with climate fluctuations and balance pasture utilization with herder livelihoods. In Inner Mongolia, traditional nomadic spatial mobility has contracted, with mobile wisdom transforming into livelihood mobility and market factor mobility. This is achieved through diversified livelihoods and forage market circulation to maintain livestock-grassland balance, thereby coordinating grassland protection and herder development. Both manifestations represent the practical evolution of mobile wisdom under different institutional environments.

5.3. Integration Pathways of Traditional Ecological Knowledge (TEK) and Modern Science and Technology

Traditional Ecological Knowledge contains long-term herder observations of phenology, water sources, disasters, and vegetation succession, constituting a complete indigenous cognitive system. However, it cannot independently cope with the pressures of modern climate change. TEK should be integrated with modern scientific and technological tools such as satellite remote sensing and GIS spatial analysis: combining herders' local experiences in disaster identification and water source assessment with remote sensing grassland monitoring data to optimize grazing zoning and timing, forming locally adapted pasture

management plans. Traditional Ecological Knowledge is not merely fragmented historical experience but a governance resource complementary to modern science. It can help achieve synergy between grassland protection and herder sustainable development, providing localized solutions for Mongolian Plateau grassland governance, representing a governance direction promoted globally by UNCCD-COP17.

6. Future Pathways for China-Mongolia Transboundary Cooperation under the UNCCD-COP17 Framework

The UNCCD-COP17 Ulaanbaatar Declaration and the "Riyadh-Ulaanbaatar Action Agenda" call on Parties to strengthen transboundary collaboration, technology sharing, and community empowerment to promote grassland ecosystem restoration, enhance drought resilience, and implement LDN targets. In accordance with the mandatory obligation of regional international cooperation under UNCCD Article 3(b), transboundary grassland cooperation should not only focus on ecological restoration but also on the sustainable development of herder communities in transboundary pastoral areas. Based on the Green Silk Road (China-Mongolia-Russia Economic Corridor) development context, China and Mongolia can deepen practical cooperation from four dimensions, coordinating ecological protection and livelihood development and fulfilling their cooperation obligations under the UNCCD multilateral environmental agreement.

6.1. Establish a Joint Transboundary Grassland Monitoring Network

Build a shared data platform for desertification, vegetation dynamics, and meteorological disasters, breaking down transboundary data barriers to enable dynamic early warning of grassland degradation and drought disasters. This provides data support for transboundary grazing regulation and disaster emergency response, fulfilling the Convention's monitoring obligations and providing a data foundation for the two countries to scientifically balance grassland carrying capacity with herder livelihoods. This cooperation responds to the UNCCD-COP17 call for a unified transboundary land monitoring initiative, addressing the current shortfall of fragmented transboundary grassland data in Northeast Asia.

6.2. Conduct Mutual Learning in Ecological Technologies and Joint Scientific Research

Engage in joint scientific research on desertification control, native grass species breeding, and livestock-grassland balance management. China can share its practical experience in large-scale ecological restoration projects and ecological compensation systems; Mongolia can share its experience in community self-governance and traditional grazing management. A key focus should be on how to safeguard herder livelihoods under ecological controls, developing technology demonstration projects and promoting cross-border flows of technology and materials. Simultaneously, replicable experiences can be summarized for global arid pastoral regions, contributing East Asian cases to the UNCCD's global rangeland initiative.

6.3. Jointly Build Transboundary Grassland Ecological Protection Corridors

Restore the ecological connectivity of transboundary grasslands, safeguard habitats for transboundary migratory wildlife such as Mongolian gazelles, and rebuild grassland spatial mobility. Establish joint transboundary patrol mechanisms to build a strong biodiversity protection barrier and resolve the problem of ecological spatial fragmentation caused by fencing and human development. During the construction of ecological corridors, the production rights and interests of herders along the routes should be fully considered, avoiding ecological construction squeezing herder livelihood space, and practicing the Convention's governance principle of "synergizing protection and development."

6.4. Promote Exchange of Traditional Ecological Knowledge and Empower Communities

Build platforms for exchange between herders from China and Mongolia to share Traditional Ecological Knowledge, promote the integration of TEK with modern technologies, and cultivate community stewardship capacities. Fully leverage herders' frontline agency to explore win-win models for ecological protection and herder income enhancement. Drawing on the experiences of both countries, explore diverse tools such as ecological compensation, community co-management, and eco-industries to tangibly realize herder sustainable development, echoing the "International Year of Rangelands and Pastoralists" and the UNCCD-COP17 advocacy for community agency.

7. Conclusions and Discussion

Grassland ecological protection on the Mongolian Plateau represents a typical transboundary environmental governance issue. UNCCD-COP17 provides a multilateral international legal framework and global governance consensus for collaborative grassland governance in China and Mongolia. According to the principles set forth in UNCCD Article 3, grassland governance should adhere to community participation, transboundary collaboration, and partnership-based governance. A three-layer bidirectional coupling relationship of material-interests-behaviors exists between grassland ecological protection and herder sustainable development: grassland provides the material resource foundation for herder sustainable development; herders' development aspirations and production behaviors determine whether grassland protection policies can achieve long-term success. The relationship can fall into a vicious cycle of "grassland degradation – herder poverty," or it can build a virtuous cycle of "ecological restoration – livelihood enhancement." Due to differences in institutions, fiscal capacity, and industrial foundations, China and Mongolia exhibit two distinct manifestations of this coupling relationship. From a global governance perspective, half of the world's rangelands face degradation risks, yet grassland issues have long been marginalized within the global environmental governance system. The experiences of the Mongolian Plateau hold reference value for the vast arid and semi-arid pastoral regions globally.

Faced with the same challenges of grassland degradation and climate change, China and Mongolia have respectively developed two governance models: one driven by national

engineering projects and institutional support, and the other based on community self-governance with legal constraints. China, through engineering restoration and ecological compensation, has achieved a virtuous cycle of ecology and livelihoods via livelihood diversification. Mongolia attempts to preserve traditional pastoral spatial mobility through legal constraints and community self-governance, but constrained by insufficient livelihood support, some pastoral areas remain trapped in negative cycles.

The mobile wisdom nurtured by pastoral civilization represents the most precious indigenous governance asset of the Mongolian Plateau. "Mobility" is not limited to the spatial movement of traditional transhumance; it also encompasses livelihood mobility, technological knowledge mobility, and the flow of material factors. Whether it is China's livelihood diversification transition or Mongolia's community-based transhumance, both are essentially different forms of "mobility" aimed at enhancing the climate resilience of pastoral social-ecological systems and coordinating grassland protection with herder livelihoods. Traditional Ecological Knowledge should not be simply preserved as a cultural heritage but must be deeply integrated with modern institutions and technologies to become a practical governance tool, aligning with the UNCCD-COP17 global governance shift emphasizing indigenous ecological knowledge.

In the future, China and Mongolia should rely on the ecological bond of the Green Silk Road to fulfill their responsibilities as UNCCD Parties, promoting transboundary monitoring, joint scientific research, ecological corridor construction, and mutual learning of indigenous knowledge. In transboundary governance, attention cannot be solely on ecological indicators; ecological spatial connectivity, cross-border flows of technical knowledge, and community empowerment must also be considered. They should jointly mitigate grassland degradation, explore grassland carbon sequestration potential, advance the implementation of SDG 15.3 LDN targets, and achieve coordinated and sustainable development of people and nature on the Mongolian Plateau.

Grassland governance cannot simply replicate a single model. It must respect the institutional backgrounds, cultural traditions, and practical national conditions of each country, balancing the triple objectives of ecological protection, herder livelihoods, and cultural preservation. This also provides an East Asian regional practice sample for grassland governance in arid and semi-arid regions globally.

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