

Localization and Adaptation: A Study on the Role of Herders in Grassland Ecological Governance

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Abstract: Grassland ecological governance is a critical approach to achieving green development and promoting harmonious coexistence between humans and nature. Herders should play a pivotal role in grassland ecological governance, and their role and status warrant re-examination. This study first constructs an ideal role cluster for herders in grassland ecological governance based on social role theory, encompassing the integration of traditional grassland culture with modern ecological governance techniques, implementers and supervisors of grassland ecological governance, and co-formulators and executors of governance policies. Subsequently, it analyzes the dilemmas faced by herders in the actual process of grassland ecological governance from two perspectives-structural barriers and endogenous deficiencies-resulting in a gap between their actual and ideal role clusters. Finally, from the perspective of role empowerment, the study proposes six strategies to provide recommendations for the adaptation and optimization of herders' roles.

Keywords: Role Theory; Grassland Ecological Governance; Herders' Roles; Collaborative Governance

1. Introduction

Against the backdrop of China's efforts to strengthen and innovate social governance, General Secretary Xi Jinping has emphasized the importance of green development and environmental governance. Notably, the report of the 20th National Congress of the Communist Party of China outlined objectives for promoting green development and fostering harmonious coexistence between humans and nature. Grasslands in China, primarily distributed across the semi-arid, arid, and high-altitude regions of the west and north,

cover a total area of 3.928 million square kilometers, accounting for approximately 40.9% of the country's land area. Grasslands are not only a critical component of China's ecological security but also a vital stage for socioeconomic and cultural activities. The complexity and vastness of grassland ecosystems render ecological governance a challenging issue. Traditionally, grassland ecological governance has relied heavily on government regulation [1], which achieved some success in its early stages. However, as the persistence and severity of governance challenges have become increasingly evident, the costs and limitations of government regulation have come to light. Consequently, the governance model has shifted from sole government leadership to collaborative governance involving multiple stakeholders. This "governance shift" not only highlights the boundaries and interactions among different social roles (e.g., government, market entities, and the public) but also raises a new research question: how to better understand and leverage the functions and responsibilities of these diverse roles in grassland ecological governance. Recent studies indicate that pastoral areas need to advance green development by balancing environmental protection and economic growth while improving government-controlled environmental governance models [2]. In the context of urbanization in pastoral areas and grassland ecological governance, the agency and mobility characteristics of herders require re-examination [3]. A literature review of grassland governance research reveals that domestic and international research directions are broadly aligned, though domestic studies tend to focus on specific institutional measures, while international studies emphasize theoretical frameworks [4]. Existing research primarily explores the theoretical value, practical significance, and pathways of social and public participation in grassland governance. However, insufficient attention has been paid to the role positioning of herders in grassland ecological governance. Influenced by the erosion of traditional grassland culture and

transformations in livelihood practices, herders often face role confusion, grappling with questions such as "Who am I? What should I do?" when participating in grassland ecological governance. This role confusion significantly constrains the effectiveness of grassland governance.

Social role theory and collaborative governance theory provide robust analytical perspectives for addressing the aforementioned issues. Social role theory emphasizes that different social actors (e.g., government institutions, market entities, civil society, and local communities) should have clearly defined ideal role clusters in specific social affairs. Deviations between ideal and actual role clusters lead to role conflicts, necessitating targeted strategies for role adaptation [5]. Collaborative governance theory, on the other hand, elucidates the interactions and synergistic effects among diverse actors' roles in multi-stakeholder governance activities. By recognizing the unique contributions and limitations of each role, strategies for collaborative grassland governance can be designed and implemented more effectively, facilitating the restoration and sustainable utilization of grassland ecosystems. This study aims to explore the ideal role cluster positioning of herders in the context of modernization and persistent ecological pressures, analyze their role dilemmas and underlying logical drivers, and propose adaptation strategies based on collaborative governance theory.

2. Collaborative Governance: The Ideal Role Cluster of Herders in Grassland Ecological Governance

"Collaborative governance" as a significant concept in the field of social governance [6], emphasizes the dynamic interaction of boundaries and responsibilities among diverse social actors. Gerry Stoker notes that, despite potential ambiguities in the boundaries and responsibilities of multiple actors in governance, this does not imply a lack of clarity in their role positioning.

Grasslands serve as a critical base for livestock production, a center for biodiversity conservation, and a barrier for ecological security in China. Establishing grassland ecological governance that integrates fairness and long-term effectiveness is essential for

advancing China's green development strategy [7]. Grassland ecological governance refers to the process whereby herders, government organizations, and other stakeholders, guided by mutually agreed norms, engage in negotiation, resource exchange, and coordinated interaction to collectively and effectively manage the ecology of public grasslands [8].

The issues of grassland ecological governance can be broadly categorized into three dimensions: first, practical matters related to grassland ecological protection and sustainable management, such as grassland vegetation protection and afforestation; second, issues concerning production and livelihoods in the new era, such as the industrialization of grasslands; and third, issues related to population migration and management, such as grazing bans for grassland restoration, ecological migration, and fenced enclosures. The core governance actors in grassland ecology primarily consist of local governments and herders, with other stakeholders potentially involved depending on the specific governance issue.

According to social role theory, different actors in various grassland ecological governance issues should have specific ideal role clusters and responsibilities. The government serves not only as a regulator and policymaker but also as a coordinator and facilitator, guiding and supporting the active participation of other actors. Market entities, such as businesses and investors, act as providers of resources and technology through capital investment and innovation. Civil society and local communities, as direct stakeholders in grassland ecosystems, play an irreplaceable role in sustainable governance through their traditional knowledge, practical experience, and participatory awareness.

Herders are the core actors in grassland ecological governance. Having long engaged in production and livelihoods in and around grasslands, they possess a high degree of familiarity with local ecosystems and deep-rooted, place-based knowledge of grassland ecology. Evolving from a nomadic lifestyle to their current role as key actors in grassland ecological governance, herders must transition from an "independent" survival role to a multifaceted role cluster across various governance issues, collaborating with local governments and other organizations to achieve "multi-stakeholder collaborative governance" of grassland ecology. Consequently, the role positioning of herders is determined both by their intrinsic characteristics and by the internal logical relationships within

China's grassland ecological governance structure. The author posits that, in the current context of grassland ecological governance, herders should assume a role cluster that encompasses being integrators of traditional grassland culture and modern ecological governance techniques, implementers and supervisors of grassland ecological governance, and co-formulators and executors of grassland ecological governance policies.

2.1 Herders as Integrators of Traditional Grassland Culture and Modern Ecological Governance Techniques

This role underscores the importance of herders in preserving the grassland way of life. As the human group with the longest historical presence in grasslands, herders have developed production and livelihood practices, as well as place-based knowledge, rooted in the characteristics of grassland ecosystems. These are of irreplaceable value for understanding and protecting grassland ecology. Implementing grassland ecological governance does not entail abandoning all production and livelihood activities in grasslands. Instead, it involves integrating herders' traditional cultural practices, production methods, and lifestyles with contemporary scientific advancements in ecological governance. This integration allows for the continued transmission and optimization of these traditions, fostering respect and protection for the grassland environment through practical activities. Ultimately, this promotes the mutual sustainable development of humans and grasslands, forming a new era of grassland production and lifestyle practices grounded in sustainable ecological governance.

2.2 Herders as Implementers and Supervisors of Grassland Ecological Governance

This role highlights the significance of herders in grassland ecological protection and sustainable management. Through their long-term engagement with grasslands, herders have developed a keen sensitivity to environmental changes, enabling them to provide real-time feedback on the health and dynamics of grassland ecosystems. Consequently, herders can leverage their traditional knowledge and experience to

monitor changes in the grassland environment, supplying critical firsthand data for ecological protection. This contributes effectively to advancing grassland ecological governance issues related to ecological protection and sustainable management.

2.3 Herders as Co-Formulators and Executors of Grassland Ecological Governance Policies

This role emphasizes the importance of herders in the formulation and implementation of policies within the ecological governance process. In traditional grassland communities, herders have often assumed roles as leaders and decision-makers, playing a critical part in maintaining internal community harmony and facilitating interactions with external entities. Herders are well-positioned to represent community interests in the decision-making processes of grassland ecological governance, offering practical and insightful suggestions for policy formulation. Moreover, as previously noted, herders possess profound place-based ecological knowledge. As representatives of local communities and their knowledge cultures, herders should actively participate in the policy formulation process for grassland ecological governance. Additionally, within grassland communities, herders typically exhibit strong social networks and organizational capabilities. Consequently, they can play a coordinating role at the community level, fostering cooperation among community members and facilitating effective communication with external stakeholders, thereby advancing the implementation of ecological governance policies.

3. Structural Barriers and Endogenous Deficiencies: Role Dilemmas of Herders in Multi-Stakeholder Collaborative Governance

In the current process of grassland ecological governance, herders have not been able to fully assume or adapt to their ideal role clusters, and the vision of "multi-stakeholder collaborative governance" for grassland ecology has not been realized. Within this governance context, herders frequently encounter dilemmas such as role conflict, role misalignment, role deviation, and even role failure. This study argues that these role-related issues stem from a combination of structural barriers and endogenous deficiencies faced by herders in grassland ecological governance.

3.1 Structural Barriers

The governance structure refers to the institutional arrangements for the division of labor and collaboration among various governance actors and their subunits. The governance structure, governance institutions, and governance culture collectively constitute the "structure" within the social role experience [9]. The structural barriers to herders' participation in multi-stakeholder collaborative governance are primarily manifested in the following three aspects.

3.1.1 Governance Structure Boundaries and Herders' Governance Roles

The absence of clear responsibility boundaries within the governance structure results in ambiguity regarding herders' governance roles. In specific social affairs, different social actors should have well-defined ideal role positions, and role confusion arises from discrepancies between ideal and actual roles. Ideally, herders' governance roles should hold a central position within the governance structure, bearing significant responsibilities [10]. However, in practice, the lack of clear responsibility delineation within the governance structure has left herders' roles undefined, causing confusion in their participation and hindering effective collaborative governance.

The "position" of herders within specific social structures and their "interrelationships" with other actors remain unclear, leading to role confusion. For instance, the evolution of grassland contracting policies and the "dual rights and one system" policy in Inner Mongolia illustrates this issue. Although these policies established herders as primary actors in production and management, ambiguities in implementation details have led to practical challenges. For example, in 1984, Inner Mongolia implemented grassland contracting policies that allocated grasslands to individual households. However, herders continued the customary practice of communal grassland use. In the 1990s, the state introduced the "dual rights and one system" policy, which, despite its establishment, lacked clear regulations on many details. For instance, there were no standardized rules for installing fences on grasslands, leading to situations where herder A's livestock might graze on herder B's allocated grassland. If herder B wished to install a fence, questions such as which

authority's approval was required or how the fence should be constructed remained unanswered, with no uniform arrangements or responses provided. Consequently, herders lack clarity regarding the behavioral standards for their roles, unsure of what they should or should not do and how to act. Furthermore, the evolving governance structure resulting from changes in grassland governance policies has created numerous ambiguous gray areas, leaving herders uncertain about how to participate effectively in specific grassland ecological governance activities.

3.1.2 Challenges in Knowledge Access, Policy Transparency, and Economic Resources

Institutional barriers, primarily manifested in the areas of knowledge access, policy transparency, and economic resources, significantly constrain the role space of herders. On one hand, institutional constraints on accessing tacit knowledge pose a major challenge to herders' participation in governance. Despite the internet era breaking geographical barriers for the dissemination of explicit knowledge, the transmission of tacit knowledge still heavily relies on direct, person-to-person interaction, which remains influenced by geographical factors [11]. Consequently, knowledge dissemination continues to be affected by geographic isolation. Grassland regions, located in remote areas of the country, face difficulties in accessing both explicit and tacit knowledge about grassland management and protection without institutional encouragement and the consistent presence of knowledge mediators. This geographic isolation prevents herders from acquiring tacit knowledge, hindering their effective participation in grassland governance practices. For instance, herders often lack timely access to the latest research on sustainable grazing methods, grassland ecological protection techniques, and the impacts of climate change on grasslands. Without scientific knowledge to support them, herders struggle to integrate their traditional pastoral culture with scientific methods, impeding the adoption of scientific livestock management and sustainable grazing practices.

On the other hand, policy opacity and disconnection represent significant institutional barriers to herders' participation in grassland ecological governance. Grassland governance policies and information issued by government and management agencies often fail to reach herders in a timely and effective manner. This is due not only to limited communication channels but also to a significant gap between official terminology and

the cultural and educational levels of herders. Herders struggle to accurately comprehend complex policy documents and technical language, particularly when the information does not adequately account for their cultural background and educational attainment, leading to misinterpretations and misunderstandings. Furthermore, the design and formulation of policies often lack thorough field-based research and fail to fully consider or analyze the actual needs of herders. This results in policies that are disconnected from herders' realities, creating challenges in implementation.

Additionally, socioeconomic constraints constitute a significant factor. In the context of limited economic resources and the absence of institutional funding support, herders struggle to afford the costs of modern livestock technology training or to purchase advanced management tools and equipment. These economic limitations reduce herders' ability to enhance production efficiency and participate in modern grassland governance. For instance, a lack of knowledge and access to advanced livestock technologies may prevent herders from effectively managing livestock health or adopting more environmentally friendly grazing practices. In summary, the institutional constraints on accessing tacit knowledge, the opacity and disconnection in policy formulation, and socioeconomic limitations collectively restrict herders' access to information and resources. These barriers hinder herders from fulfilling the ideal role of integrators of traditional grassland culture and modern ecological governance techniques. Furthermore, they prevent herders from participating in the policy formulation process, limiting their ability to serve as co-formulators and executors of governance policies. These constraints not only impede herders' effective participation in grassland governance but also restrict their contributions to ecological protection and sustainable management of grasslands.

3.1.3 Transformation of Traditional Grassland Production and Livelihood Culture Hindering Role Experience

The globalization and marketization of the grassland economy have profoundly impacted and challenged herders' traditional lifestyles and cultural practices. The processes of globalization and marketization have altered

external market demands for grassland products, compelling herders to adjust their traditional grazing and agricultural production models to meet international market requirements and standards.

During this adaptation process, herders must respond to new market demands regarding product quality, output, and cost. This necessitates abandoning or modifying traditional production methods, such as seasonal migration and grazing practices, which can adversely affect the long-term ecological balance of grasslands. For instance, to meet market demands for a continuous supply of products, herders may reduce migration frequency and increase livestock numbers, leading to issues such as overgrazing and grassland degradation. Additionally, market pressures for low-cost products may drive herders to adopt more extensive production methods, which could threaten the sustainability of grassland ecosystems. Consequently, while globalization and marketization bring economic opportunities to grassland regions, they also pose significant challenges to herders' production and livelihood practices. These processes distort and undermine traditional cultural practices, preventing herders' traditional grassland culture from effectively contributing to the collaborative governance framework and obstructing their role experience.

3.2 Endogenous Deficiencies

From the perspective of herders themselves, endogenous deficiencies are a primary cause of their role dilemmas. These deficiencies are mainly reflected in three aspects: outdated governance concepts, insufficient governance capabilities, and lack of willingness.

3.2.1 Outdated Governance Concepts

Role disorder is a prominent issue. Adhering to traditional lifestyles, grassland culture often emphasizes harmonious coexistence with nature. This fundamentally conflicts with the focus of modern grassland governance, which prioritizes ecological efficiency and economic sustainability. Such differences in governance concepts create psychological and cultural barriers for herders when adopting and implementing modern governance measures, ultimately leading to role disorder. For example, due to these conceptual differences, herders may adopt a conservative stance toward new technologies or changes to traditional grazing practices. Although herders possess rich place-based knowledge, this knowledge often diverges from the technical and methodological requirements of modern grassland

governance. Traditional knowledge, such as indigenous methods of classifying flora and fauna or observing weather changes, is highly valuable in herders' production and livelihoods but is difficult to apply directly within modern governance systems. Consequently, while some herders may outwardly agree to adopt ecological governance concepts for grazing, they often continue to rely on traditional methods in practice. As a result, herders struggle to consistently fulfill the roles of ecological governance implementers, supervisors, and integrators of traditional culture and modern ecological techniques.

3.2.2 Insufficient Governance Capacity

Secondly, insufficient governance capacity leads to role conflict. Herders predominantly reside in remote areas with harsh natural conditions, making them highly vulnerable to ecological disasters and limiting their risk resilience. As implementers and supervisors of grassland ecological governance, herders should integrate their grazing culture into the contemporary context by combining it with the latest grazing and ecological governance technologies. This would enable them to become integrators of traditional culture and modern governance techniques, thereby implementing and supervising grassland ecological governance to promote sustainable development. However, due to low levels of education and the isolation of remote regions, herders often lack access to and understanding of the latest ecological management concepts and policies. This hinders their ability to adopt new technologies and methods in grassland governance, resulting in insufficient governance capacity. When the natural environment is degraded, disrupting traditional livelihoods and living conditions, some herders who are unable to adopt new technologies and methods fall into poverty. Consequently, they become overly reliant on external economic support. To alleviate economic hardship, some herders resort to overgrazing, which exacerbates or even triggers ecological crises in grasslands.

In response to severe grassland ecological issues, the state has implemented grazing bans and rest periods, imposing strict restrictions on herders' grazing activities and livestock numbers. On one hand, the issue of livestock feed has become increasingly prominent, requiring herders to purchase large quantities

of additional fodder, which increases production costs. On the other hand, government policies aimed at reducing and controlling livestock numbers have led to a continuous decline in herders' pastoral income. Limited by their governance capacity and driven by livelihood concerns, some herders violate grazing ban regulations, resulting in a cycle of "destruction alongside governance" in grassland ecological management [12]. This places herders in a role conflict dilemma, where individual interests supersede collective interests: they desire grassland ecological restoration but, due to economic constraints, seek greater benefits from grasslands, thereby causing further degradation. This creates a vicious cycle where grassland crises remain unresolved, and herders' livelihoods become unsustainable. Their collaborative governance strategies and behavioral logic are disrupted by numerous "non-governance" factors, leading to role ambiguity and conflict among some herders. They appear as implementers and supervisors of governance on the surface but act as contributors to ecological degradation in practice.

3.2.3 Lack of Governance Willingness

Thirdly, insufficient governance willingness leads to role failure. In grassland ecological governance, the issue of "role dysfunction" among herders is pronounced, resulting in the failure of their governance roles. First, herders' participation in ecological governance is often superficial. Grazing bans and rest periods increase production costs, inducing widespread superficial compliance among herders. For instance, the grassland ecological compensation policy implemented by the State Council in 2011 stipulated that herders could receive subsidies for adhering to grazing bans. However, some herders, while receiving these subsidies, continued to engage in overgrazing to maximize profits. Second, herders' capacity to participate in grassland ecological governance is constrained by their capital endowments. After grassland tenure confirmation, the area of grassland managed by herders is fixed, forcing them to choose between overgrazing and incurring higher production costs (e.g., purchasing fodder). They often opt for the former to minimize costs and pursue short-term gains [13]. Grassland restoration is a long-term process, and larger-scale herders face uncertainties regarding long-term benefits, making them reluctant to bear significant risk of losses [14]. Evidently, most studies on multi-stakeholder participation in grassland ecological governance overlook the limitations

imposed by internal decision-making variables (benefits versus costs). Third, herders generally lack a sense of responsibility and mission in grassland ecological governance, often exhibiting passive engagement, minimal involvement, or participation merely to "meet top-down requirements." Most herders lack proactive and self-initiated participation awareness, display weak willingness to engage, and have insufficient depth of involvement, making it challenging for them to serve as effective policy co-formulators and executors in grassland governance.

4. Role Empowerment: Adaptation and Optimization of Herders' Roles in Multi-Stakeholder Collaborative Governance

In summary, the role positioning of herders in multi-stakeholder collaborative grassland ecological governance is constrained by structural factors such as governance patterns, institutions, and culture, as well as endogenous factors including outdated governance concepts, insufficient governance capacity, and lack of willingness. The interplay of these structural and endogenous factors results in the misalignment of herders' ideal roles in collaborative governance. To address this, role empowerment should be prioritized to strengthen the adaptation and optimization of herders' roles in multi-stakeholder collaborative governance.

4.1 Optimizing Governance Structures and Reinforcing Herders' Role Identity and Responsibility Boundaries

By integrating ecological governance practices, structural elements should be optimized to improve the role environment for herders in multi-stakeholder collaborative governance. First, governance structures should be further refined to clearly define herders' role identity in collaborative governance. Enhancing the grassland ecological governance structure will foster a governance pattern of co-construction, co-governance, and shared benefits among government, communities, and herders, affirming herders' status as key governance actors and leveraging their unique place-based knowledge and functions. Second, relationships among governance actors, particularly between herders and government entities, should be streamlined to clarify

herders' role boundaries in collaborative governance. Reforming government functions involves delineating the responsibility boundaries of various actors, especially the government, in grassland ecological governance, ensuring the government focuses on "what it should do" while delegating tasks it "should not do, cannot do, or cannot do well" to herders and other actors. Finally, through the establishment of regulations, herders' responsibility boundaries in multi-stakeholder collaborative governance should be further clarified, supporting herders to take on greater responsibilities and play a more significant role in policy formulation, implementation, and feedback mechanisms.

4.2 Strengthening Legal Frameworks to Expand Herders' Role Space in Collaborative Governance

Providing legal safeguards for comprehensive grassland ecological governance, the current legal framework-comprising one law, one judicial interpretation, one administrative regulation, and over 20 local regulations and rules-offers robust legal tools to protect grassland resources and ecosystems while combating illegal activities that damage grasslands. Strengthening the legal framework not only effectively curbs illegal encroachments on grassland ecological spaces and unauthorized reclamation but also maximizes the protection of herders' rights and interests, fostering a favorable social environment for lawful grassland management, appreciation, and protection.

Furthermore, during the process of legal system development, state agencies diligently implement the "whoever enforces the law must promote legal awareness" responsibility system, actively conducting legal education activities. These activities emphasize herders' status as governance actors, along with their obligations and responsibilities, while explaining and encouraging legal compliance. This represents the most powerful and direct approach to expanding herders' role space in collaborative governance.

4.3 Refining Cultural Essence to Clarify Herders' Role Consciousness in Traditional Culture

In the context of the new era, enhancing herders' role consciousness regarding their traditional culture requires not only comprehensive research into their cultural heritage but also sharing these research findings with herders to deepen their

understanding of local ecosystems, cultural transformations, and contemporary contexts. The nomadic lifestyle has largely been replaced by settled production methods, and the resulting contradictions and challenges remain unresolved. For instance, issues such as grassland degradation and desertification due to the lack of rotational grazing, as well as ecological crises prompting "ecological migration," have exacerbated the already complex challenges of grassland governance. In response, it is imperative to guide herders in preserving the essence of traditional grassland culture while integrating it with modern scientific technologies to achieve sustainable ecological governance. Establishing diverse channels to promote and encourage herders to innovate their operational methods and content, as well as incentivizing the adoption of sustainable and environmentally friendly tools and equipment, is essential. Additionally, revitalizing traditional environmentally conscious stories, legends, and other folk literature and artistic works can breathe new life into these cultural elements. In this process of promotion and transformation, experts should distill cultural characteristics, transforming place-based narratives into formalized discourse. This will help establish a discourse system and secure greater discursive authority.

4.4 Transforming Herders' Governance Role Concepts

To transform herders' governance role concepts, a top-down practical approach can be adopted, with village committee members and Party members taking the lead in learning and applying new technologies. This approach is likely to influence herders with conservative mindsets. Recognizing and rewarding individuals who serve as role models can inspire and motivate others to embrace new practices.

Moreover, the economic benefits derived from adopting new technologies and methods provide the most compelling evidence to persuade and guide herders. In the context of rapid technological advancement, integrating livestock husbandry with the internet, digitalization, and intelligent systems can save time, enhance efficiency, and create greater development opportunities. For example, during winter, newborn lambs are at risk of

freezing to death, leading to economic losses. However, by adopting new technologies such as installing cameras and heated lamb shelters, lamb mortality can be effectively prevented, minimizing economic losses.

4.5 Role Empowerment to Enhance Herders' Collaborative Governance Capabilities

Given the multifaceted complexity of grassland ecological governance, herders, as key governance actors, face heightened demands for collaborative governance capabilities. Therefore, enhancing herders' role capabilities is critical. First, herders should be provided with greater opportunities to participate in governance. Ecological governance designers must adopt an open mindset, engaging deeply with local herders, governments, and other stakeholders to understand the local natural, social, and cultural contexts. By integrating scientific technologies with place-based ecological knowledge, suitable governance solutions can be developed. Second, the flexibility of governance planning should be emphasized to address changes and challenges, thereby strengthening herders' rights and capabilities as governance decision-makers.

5. Fostering Participation Willingness to Stimulate Herders' Motivation for Collaborative Governance

Governments at all levels and grassland management authorities must shift their perspectives, recognizing the importance of grassland ecological protection and taking responsibility for public education and awareness. Before initiating any project, the interests of herders must be fully considered to ensure their fundamental interests are not compromised. By improving ecological compensation and governance subsidy mechanisms, clarifying the roles of protection actors, encouraging diverse social investments, and aligning ecological security barrier construction with pastoral development, a win-win scenario for ecological protection and pastoral development can be achieved. This approach promotes the coordinated development of the pastoral economy, population, resources, and environment.

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