Abstract	
Dissertation title	The Realities and Transformative Processes of Traditional Ecological Knowledge in Contemporary Tibetan Pastoral Societies. Focusing on Pastoralists and Environmental Conservation Organizations.
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This study was motivated by a profound sense of crisis regarding the sustainability of Tibetan pastoral societies, which have been fundamentally undermined by the rapid modernization of market economies and the advancement of environmental policies. Over centuries, the inhabitants of the Tibetan Plateau have domesticated wild animals within a harsh natural environment, developing a unique livelihood system rooted in environmental adaptation that enabled human settlement. Pastoralism, in particular, has served as an indispensable livelihood on the Tibetan Plateau, extending beyond the provision of dairy and meat to include the utilization of animal-derived resources such as fur, leather, and bones for clothing and shelter materials, as well as the recycling of dung for fuel and construction, thereby establishing a resource (circular) mechanism. This pastoral culture has comprehensively supported the essential supply systems of local communities, transcending mere food production to create a sustainable livelihood system adapted to environmental conditions. In other words, pastoralists have integrated livestock, the natural environment, and human life into a cohesive whole, fostering a distinctive culture in harmony with nature.

However, the Traditional Ecological Knowledge (TEK) cultivated within this system—forming the cornerstone of resource management and livelihood sustenance in highland regions—faces existential threats due to state-led policy interventions and the penetration of market economies. Despite its critical importance, research that explicitly describes and visualizes the region-specific and systematic characteristics of TEK remains underdeveloped. Therefore, This study through the visualization of TEK, how pastoral livelihoods represent an adaptive and sustainable lifestyle, flexibly transforming over time. By concretizing this knowledge and its practices, the research highlights their significance as critical considerations in environmental policy. Furthermore, through an analysis of the development of semi-sedentary and fully sedentary livestock

management systems, it demonstrates how the utilization of natural grazing lands and the reorganization of livestock management relate to TEK.

Alongside the progression of national environmental policies, three distinct pastoral forms have emerged on the Tibetan Plateau: individual traditional pastoralists operating at the household level, livestock cooperatives based on semi-sedentary or fully sedentary management, and environmental protection organizations emphasizing TEK utilization.

Against this backdrop, this study employs a multidisciplinary approach integrating participatory observation, interviews, qualitative data analysis, and a historical evaluation of policies to elucidate the practical application of TEK in pastoral livelihoods and to explore a novel model for the co-management of TEK and modern scientific knowledge. The analytical framework is structured around four key pillars:

1. Policy Impact Assessment: This study examines the multilayered impacts of state-led environmental policies—specifically the Grain for Green Project and Ecological Migration Policy—on the lifestyles of pastoralists in resettlement villages and the ecosystems of natural grazing lands subjected to grazing bans (Chapter 1) .
2. TEK Utilization Analysis: The study analyzes the deployment of TEK under the constraints imposed by mobility restrictions and land-use limitations resulting from these policies, focusing on traditional household-based pastoralism and livestock cooperatives employing semi-sedentary or fully sedentary management. The findings reveal that TEK, rooted in long-term trial-and-error and experiential accumulation, retains adaptive flexibility in areas where modern scientific knowledge is difficult to apply, despite significant knowledge and skill loss. However, challenges in fodder management during sedentary operations emerge as a prominent issue (Chapter 2 and Chapter 3).
3. Grassroots Environmental Initiatives: The study scrutinizes the activities of grassroots environmental protection organizations, empirically demonstrating how the integration of TEK and modern scientific knowledge advances afforestation efforts in local communities. This integration is shown to enable large-scale greening, suggesting new possibilities for environmental conservation (Chapter 4).
4. Co-Management Framework: Drawing on global case studies, the study theoretically constructs a new framework for the co-management of TEK and modern scientific knowledge to address challenges such as fodder management in sedentary systems and to ensure the survival of TEK

and sustainable pastoralism across the Tibetan Plateau. The Geographical Indication (GI) system is adopted as a theoretical perspective to explore its applicability (Chapter 5).

Dissertation Structure

Introduction: This section outlines the research problem, objectives, positioning, challenges, methodology, and dissertation structure. Focusing on the distribution and history of Tibetans on the Tibetan Plateau, this chapter provides an overview of the geographical and historical contexts of the study sites—five locations in the Qinghai-Tibet region and one in Aba Tibetan and Qiang Autonomous Prefecture, Sichuan Province. It also introduces the specific subjects of analysis (individual pastoralists, livestock cooperatives, and environmental protection organizations) and the socio-economic characteristics of their respective administrative villages.

Chapter 1: This chapter analyzes the Ecological Migration Policy and Grain for Green/Grassland Restoration policies implemented since the 2000s in the upper Yangtze River basin following the 1998 Yangtze floods and 1999 sandstorms in Beijing. It evaluates policy outcomes in resettlement villages and original habitats, identifying key challenges and highlighting the policies' inadequate focus on the sustainable livelihoods and cultural contexts of pastoralists.

Chapter 2: Focusing on two households in regions affected by the Ecological Migration Policy, this chapter examines TEK utilization in livestock management and land use across two periods (1980s–1990s and post-2000s). It reveals that pre-2000 seasonal migration patterns were highly systematic, aligning TEK practices with regional ecosystems, while post-2000 privatization of grazing lands reduced grazing ranges and livestock diversity, complicating TEK application. Nonetheless, adaptive TEK innovations persist in certain contexts.

Chapter 3: This chapter explores the Rural Revitalization Strategy launched in 2018 and examines two livestock cooperatives employing year-round grazing and semi-sedentary management, assessing TEK utilization and transformation in land use and sedentary operations.

Chapter 4: Focusing on grassroots environmental organizations since the 2010s, such as *dpra khyung dpal bzang*'s desertification prevention initiatives, this chapter demonstrates how TEK-based practices (e.g., plant species utilization and controlled grazing) achieve greening and cultural preservation, complementing modern conservation efforts. TEK remains preserved on the Tibetan Plateau through religious beliefs and oral traditions. While conventional conservation approaches have largely centered on scientific knowledge, *dpra khyung dpal bzang*'s integration of TEK with

science demonstrates the effectiveness of a hybrid model, offering a promising alternative for sustainable environmental management in the region.

Chapter 5: Investigates the potential for sustainable pastoralism in Qinghai by addressing feed management challenges faced by individual traditional herders and specialized livestock cooperatives through an empirical study applying Japanese feed formulation techniques. Focusing on a household (the M family), the study analyzed the nutritional content of locally available feed resources and formulated rations using an Excel-based Japanese sheep feed calculation program. From November 2023 to March 2024, 160 lambs were raised under a full-stall feeding system. As a result, the average body weight increased by 14 kg per lamb, and the survival rate reached 90%, surpassing the regional average. These findings demonstrate that scientific feed management can effectively improve productivity and maintain animal health even under the conditions of shrinking natural pasturelands, while also indicating its potential applicability to collaborative management models.

Discussion: aims to propose a co-management model based on Traditional Ecological Knowledge (TEK) and modern scientific knowledge by addressing the challenges faced by three key actors in Tibetan pastoral society: individual traditional pastoralists, livestock cooperatives, and environmental protection organizations. Importantly, this proposed model is examined in alignment with the policy direction of China's Rural Revitalization Strategy implemented since 2018, which emphasizes both regional revitalization and the regeneration of traditional culture. To begin with, the study presents a methodology for the systematic collection and visualization of TEK. Specifically, it proposes gathering and organizing the experiential knowledge of pastoralists into a structured database in order to enhance its accessibility and applicability in practice.

Subsequently, as part of a co-management strategy that integrates TEK with scientific knowledge, the study introduces seasonal variation analysis of grassland vegetation cover using satellite imagery. This method helps establish a scientifically grounded estimation of the carrying capacity of natural pastures. On this basis, the study proposes to optimize seasonal grazing practices and, in cases where livestock numbers exceed the carrying capacity, to recommend stall feeding (enclosed rearing). In doing so, it offers a practical framework for mitigating environmental degradation caused by overgrazing and for addressing persistent feed management challenges.

Finally, the study develops a model for promoting the production and branding of high-value livestock products hat reflect regional geographical features and traditional pastoral techniques. To

this end, it proposes leveraging the Geographical Indication system (GIs) in coordination with pilot villages, cooperatives, and environmental protection organizations. This initiative, it is argued, has the potential to simultaneously advance regional economic revitalization, environmental conservation, and the long-term sustainability of pastoralism

In conclusion: the discussions across the chapters were comprehensively synthesized. This study elucidated the practical application of TEK within Tibetan pastoral society and proposed a theoretical framework for co-management based on TEK and modern scientific knowledge to support sustainable pastoral systems. However, limitations were acknowledged, including constraints on the number of survey participants and insufficient empirical validation of the proposed strategies' feasibility. Nevertheless, the significance of this research lies in its provision of a guideline for the sustainability of pastoral livelihoods and its academic contribution to the nascent field of TEK studies, which remains in an early developmental stage.