

Roots, Rituals, and Resistance: The Indigenous Knowledge Systems of the Tharu People in Nepal

Uddhav Sigdel^{1*}, Man Bahadur Sunuwar², Laxmi Adhikari³ and Tara Bahadur Thapa

¹*Central Department of Population Studies, TU,* ²*Tri-Chandra Multiple Campus,*

³*Baneshwor Multiple Campus, New Baneshwor*

*Corresponding Author's Email: sigdel.uddhav@gmail.com

Abstract

Indigenous knowledge systems (IKS) are epistemological traditions that have supported human communities over time which are dynamic, ecologically embedded, and socially reproduced. Although growing scientific and policy attention is being directed towards indigenous knowledge systems. In general, Tharu people continue to be underrepresented in mainstream scientific and development discourses, and in particular, ethnically and geographically marginal communities within South Asia have their traditional knowledge systems devalued. This paper critically analyzed the peer-reviewed studies from the last 25 years (2000-2026) to explore the organization, substance, spread, current issues and scholarly documentation of Tharu indigenous knowledge systems, filling gaps in a theory-based and empirical synthesis. A critical narrative review was undertaken, identifying 40 peer-reviewed journal articles, scholarly monographs, ethnographic documents, policy documents from Scopus, Web of Science, JSTOR and Google Scholar, and synthesizing in themed synthesis and critically evaluating them in relation to epistemology. This study proposes an epistemological sovereignty approach, which combines decolonial theory, critical ethnoecology, and knowledge justice, which can offer a suitable theoretical framework

for the analysis and protection of Tharu IKS in the broader struggle for decolonial sovereignty. Findings carry direct implications for educational policy, conservation governance, intellectual property law, healthcare integration, and community-driven documentation initiatives in Nepal and comparably situated indigenous contexts. This is one of the first critical narrative reviews that brings together, in a single entity, indigenous knowledge theory in a global sense, with insights from the Tharu people, and provides an analytical framework that is interdisciplinary and decolonial in orientation.

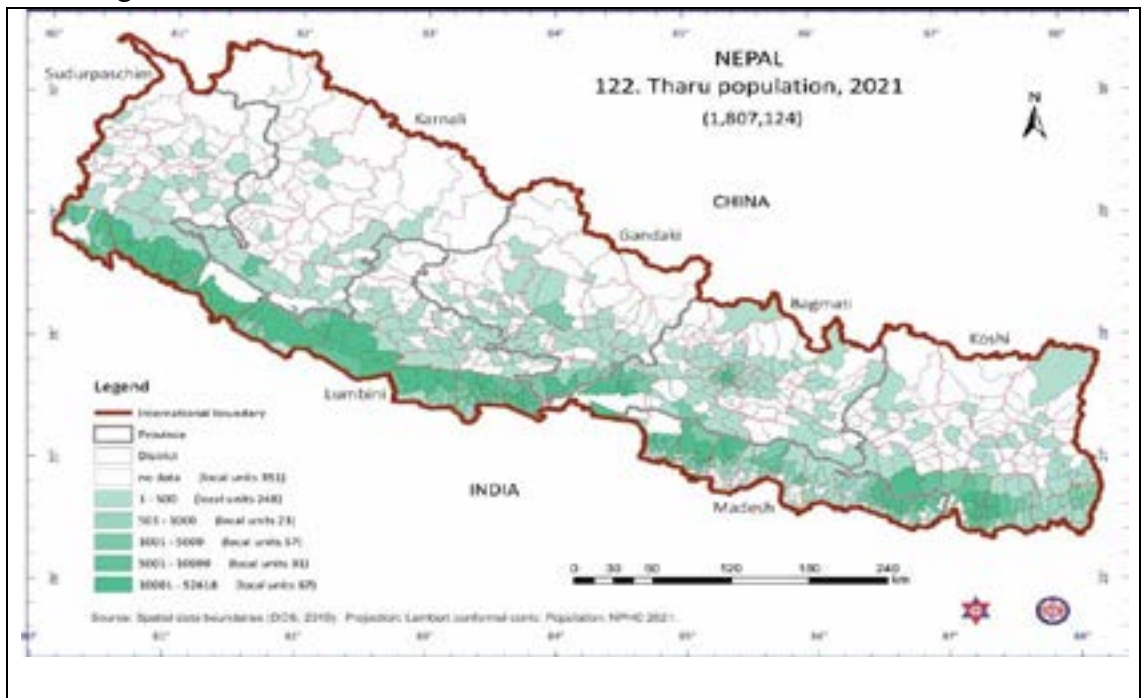
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Introduction

One of the biggest epistemological changes of the late 20th and early 21st centuries is the global assertion of indigenous knowledge systems as legitimate, complex, and ecologically relevant ways of understanding (Smith, 1999). The institutional landscape has been shifting in important ways in the global arena, starting with the inclusion of traditional/indigenous ecological knowledge in international biodiversity frameworks, such as the Convention on Biological Diversity (CBD, 1992) and the Nagoya Protocol (2010). The recognition of local and indigenous knowledge as a knowledge system of equal scientific value in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP, 2007) and the inclusion of TEK within the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in 2016. Indigenous Knowledge, which was once considered to be mere superstition, myth, or raw empirical data needing scientific translation to discuss analytical legitimacy, is now seen as an internally consistent and coherent system of understanding of the natural and social world that is ecologically legitimate (Berkes, 2018; Agrawal, 1995).

But this recognition is far from full and equitable. While rhetorical valuation of indigenous knowledge in international policy discourse, there are ongoing structural inequities that continue to erode the communities, ecologies, and intergenerational transmission networks that sustain indigenous knowledge systems, including dispossession, assimilationist education, development interventionism, and appropriation of indigenous knowledge by intellectual property rights (Shiva, 2016;

Whyte, 2018). Whereas, the scholarly literature on indigenous knowledge systems has expanded significantly since the 1990s, there are significant gaps on the geographical, ethnic and disciplinary dimensions. The Amazon basin, Arctic, sub-Saharan Africa and Pacific Islands have been the focus of disproportionate scholarly research, while indigenous communities in South Asia, including Nepal's diverse indigenous nationalities, are comparatively under-researched in global scholarship on indigenous knowledge.



Source: National Foundation for Development of Indigenous Nationalities, Government of Nepal

The Tharus are one of the historically understood indigenous groups in Nepal. The inner Terai and Terai regions, whose knowledge traditions are well-known for their sophisticated ecological management, ethnomedical practice, agricultural innovations, and cosmological ordering, yet are among the most analytically under-researched in the global indigenous knowledge literature. The Tharu indigenous group in the Terai and inner Terai of Nepal is in a paradoxical situation and has been overlooked in terms of

analysis. The Tharu are one of Nepal's largest indigenous nationalities, with a population of 1.8 million, as per the NPHC 2021 (NSO, 2024), and are highly concentrated in the ecologically rich, politically contested Terai lowlands, but are also one of the most studied in certain disciplinary areas (such as migration history, bonded labor and land rights studies) and one of the least analyzed with regard to the systematic and theoretically informed analysis of indigenous knowledge traditions. The knowledge systems of the Tharu, including traditional forestry management, wetland governance, ethnomedicine, agricultural biodiversity conservation, oral narrative epistemology, and ritual ecological understanding, are intellectual systems of remarkable sophistication and ecological consequence. Before the formalization of Nepal's national system of protected areas, they were managing the forests and wetlands in one of the most ecologically important regions in South Asia, which helped to maintain biodiversity.

This paper fills the gap in scholarship by analyzing the peer-reviewed literature from 2000 to 2026. It aims to critically consolidate theoretical developments in indigenous knowledge systems scholarship around the world, summarize the different domains and characteristics of Tharu IKS in the scholarly literature, analyze the structural forces threatening the continuity and integrity of Tharu knowledge traditions and to develop an epistemological sovereignty framework that offers a more appropriate theoretical framework to analyze, safeguard, and revitalize Tharu IKS in a wider framework of struggles for indigenous self-determination. The paper opens up space for interdisciplinary discussions on sociological, anthropological, demographic, environmental, development, educational, and decolonial approaches.

Situating Global Indigenous Knowledge Systems Paradigm

A series of foundational conceptual debates has influenced scholarly debate on the indigenous knowledge systems and still causes productive intellectual tension. The first and longest-standing is a definitional question of what is indigenous knowledge and what is not indigenous (local, traditional, or non-scientific) knowledge. The seminal work of Agrawal (1995) on 'indigenous knowledge vs. western science' is very important. But the dichotomization of indigenous and Western knowledge systems is methodologically unsustainable, Agrawal contends, as both systems are internally heterogeneous, historically dynamic, and always situated within a power dynamic. The post-essentialist corrective brought forward by Agrawal and further worked out by later

scholarship, however, poses analytical challenges. If indigenous and scientific knowledge systems are not really separable, then there is a possible political downside to the specific protection of indigenous knowledge and to indigenous communities' sovereignty over indigenous knowledge. In a counter-argument, Battiste and Henderson (2000) argue that indigenous knowledge is not so much different from "Western" knowledge per se, but rather is linked with place, community, cosmology, and self-determination. Indigenous knowledge is not local ecological data, but a system of ontology and epistemology, a knowing which is an inseparable totality of being, belonging, and relating which cannot be reduced to a propositional content that is abstract from its social and cosmological context.

This debate has led to a substantial body of scholarship that addresses the "epistemic coloniality" (Mignolo, 2009), which manifests in the systematic depreciation and removal of non-Western knowledge systems as part of colonial and post-colonial power. The general structural framework is Quijano's (2000) concept of the coloniality of power. The classification of the human population into racial or ethnic hierarchies under colonialism was also a classification of knowledge systems. One that allowed for European science to appear as universal and rational and for non-European knowledge to appear as particular and local, superstitious and primitive. This epistemic hierarchy is well documented by post-colonial and decolonial scholars even in the most contemporary development institutions, knowledge production, and policies which profess to incorporate indigenous knowledge (Smith, 2012; Smith, 2021).

When applied to the case of South Asian indigenous knowledge systems, this decolonial critique uncovers the ways in which colonial ethnography, development anthropology and state-sponsored survey research have consistently positioned indigenous knowledge as an object of study over a form of knowledge, have treated it as a resource to be utilized rather than a system to be respected, and have preserved it in museums or documented in databases rather than governed by its own communities (Gurung, 2006). The Tharu case is an example of this.

Theoretical advances in Traditional Ecological Knowledge

The subfield of traditional ecological knowledge (TEK) that Berkes (2018) identified as the cumulative body of knowledge, practice, and belief about the relationship of living beings with one another and with their environment, evolved by

adaptive processes and handed down through generations by cultural transmission, has resulted in the most methodologically sophisticated engagement with indigenous knowledge in the natural sciences. Whether it's rotational fishing in the Pacific, fire management in Aboriginal Australia, or forest governance in the Amazon basin, TEK scholarship has helped bring to light the ecological validity of the indigenous resource management practices.

If indigenous knowledge is not explicitly mentioned, Ostrom's (1990) seminal work on the governance of common-pool resources gave institutional economists a link to the study of community-based resource governance as an alternative to state governance or market privatization. Other researchers have followed Ostrom's lead and explicitly explored the indigenous knowledge aspects of commons governance, proposing that the governance rules recorded by Ostrom cannot be divorced from the ecological knowledge, cosmological values, and social relationships that indigenous communities hold (Gadgil et al., 2000).

However, TEK scholarship has been subject to ongoing critiques from anthropological and decolonial perspectives. This phenomenon of separating ecological knowledge elements from their social, cosmological, and relational dimensions, which is equivalent to isolating indigenous knowledge as a set of propositional statements about the species, ecosystems, and management methods. It reinforces the epistemological fragmentation to which indigenous knowledge scholars object. This is a strong argument put forward by Nadasdy (2003) in the context of TEK being integrated into the formal resource management institutions of Canada, for example, the process of integrating TEK into formal resource management structures systematically alters it, moving its relational, spiritual, and governance dimensions away from the formal processes of western governance and science. Thus undermining its distinctiveness and the sovereignty claims it was integrated to substantiate.

Tharu People

The Tharu indigenous community is in a special and disputed position in the social, ecological, and political context of Nepal. There have been several conflicting hypotheses regarding the origin of the Tharu. Some consider them to have Rajput descent, while others believe that they are of Tibeto-Burman origin, though without a clear consensus (Guneratne, 2002). What is agreed upon is the antiquity of Tharu

settlement in the Terai. Here, archaeological evidence is supplemented by oral history facts showing that Tharu have inhabited the area for many thousands of years, during which they have acquired remarkable adaptive capacities to the ecological conditions of the Terai, including a well-documented resistance to malaria that has led to an unprecedented level of biomedical research.

The Tharu used to be interdependent and skillful at managing the Terai ecosystem. The forest, rivers, wetlands, and grasslands of the Terai not only offered material sustenance but also offered a cosmological environment wherein Tharu identity, ritual, and social organization were embedded. Collective management of community forests (*jangal*) and water bodies with socially regulated harvesting, seasonal closures, and ritual prohibitions was a functional analogue to contemporary conservation science's definition of adaptive co-management regimes (Dinerstein et al., 2007).

The twentieth century saw this ecological-social system disrupted several times; however, with compounding effects. The state's malaria eradication programme in the 1950s and 1960s, which opened the door to large-scale in-migration in the Terai, had a significant influence on the demographic disposition of the Terai and led to progressive land dispossession of the Tharu communities (Guneratne, 1994). The nationalization of forests under the Forest Nationalization Act of 1957 rendered the Tharu forest users' customs a crime by replacing them with rights holders as traditional landowners and making them encroachers. The most significant events were the establishment of the national parks and wildlife reserves Bardiya National Park (1988) and Chitwan National Park (1973), which displaced thousands of Tharu families and further undermined the territorial and ecological basis of Tharu knowledge systems (Rankin, 2004).

At the same time, the *Kamaiya* bonded labour system that ensnared generations of Tharu agricultural laborers in debt-servitude to high-caste landlords systematically undermined Tharu social organization and limited the conditions for transmission and governance of knowledge (Robertson & Mishra, 1997). Although the formal elimination of *Kamaiya* was a major political success, it was largely due to Tharu social mobilization and was only one aspect of the structural inequalities in land access, education, and political representation that are perpetuating vulnerability.

Tharu IKS in scholarship

Although the scholarly writings on Tharu IKS have increased, they still suffer from some analytical spaces that are addressed in this review paper. Much existing scholarship is empirical, and rather than theorizing their epistemological nature, their internal governance logics or the political aspects of such practices, it documents the content of specific Tharu knowledge practices. This produces a body of literature that is rich in ethnobotanical inventories, ethnomedical catalogues, and descriptions of rituals, but lacking in analysis of the structural factors that support, threaten, and constitute Tharu knowledge traditions.

Secondly, there is an almost exclusive separation of the study and documentation of Tharu ethnomedical knowledge, knowledge of agriculture and ecological governance. By disciplinary communities in the existing scholarship, with an absence of a theoretical framework that adequately addresses the integrative nature of Tharu IKS. It is important to note that from Tharu epistemology, the disciplinary limits of healing knowledge, agricultural knowledge, forest governance, and ritual practice do not exist as disciplinary limits but rather as articulations of relations in a coherent ontological space. The epistemological fragmentation against which decolonial indigenous knowledge scholars argue is reproduced at the methodological level of scholarly fragmentation.

Third, there is a lack of theorization of gender roles in the reproduction and transformation of Tharu IKS. Current research highlights that women have played a pivotal role in specific aspects of Tharu knowledge, such as agricultural seed selection and storage, home-based use of medicinal plants and ritual, but fails to systematically examine gender relations and the structuring of access, authority, and transmission of this knowledge, as well as the effects of development interventions and social change on gendered knowledge hierarchies within Tharu indigenous communities.

Conceptual Framework

In this sense, the paper, which also employs the method of anarchy, is fundamentally decolonial. In this regard, the paper is also anarchist and decolonial. As the main analytical framework, this article suggests an epistemological sovereignty framework. Epistemological sovereignty is an extension and critique of three interrelated theoretical traditions: decolonial theory (Quijano, 2000; Mignolo, 2009;

Smith, 2021), knowledge justice scholarship (Fricker, 2007; Anderson, 2020), and critical ethnoecology (Nazarea, 1998; Paulson & Gezon, 2005).

The structural argument is provided by decolonial theory, such as indigenous knowledge systems cannot be understood without taking into account colonial/post-colonial power structures that have systemically devalued, appropriated, and displaced them. Epistemological sovereignty is thus not only an academic concept but also a political claim that is inextricably linked to other struggles for territorial sovereignty, political recognition, and cultural self-determination.

There is also the epistemological dimension and epistemic injustice theory, the “wrong done to indigenous Tharu specifically as knowers” as scientific, legal, and policy institutions have systematically excluded Tharu knowledge holders from being recognized as authoritative knowers (Fricker, 2007). Testimonial injustice is when the knowledge of a medicinal plant is disregarded by formal health systems; hermeneutical injustice is when the concepts or frameworks that are available for interpreting Tharu knowledge of ecological relationships are insufficient to embrace their complexity and validity.

Critical ethnoecology (Nazarea, 1998) adds an analytical emphasis on cultural aspects of human-environment relationships, specifically on the importance of memory, identity, and cosmology in the mediation of ecological practice, which other perspectives on TEK, such as institutional and behavioral, do not address. It is not just instrumental resource management information but also the culturally encoded, cosmologically grounded, and identity-constitutive aspects of Tharu ecological knowledge, which are analytically unraised in the propositional offshoots of ecological knowledge in the studies that limit the field to an ecological dimension.

The epistemological sovereignty framework identifies five analytical dimensions of Tharu IKS as analytically central, namely, ecological knowledge (knowledge of species, ecosystems, environmental processes), governance knowledge (institutional rules, sanctions, and decision-making processes through which knowledge is applied in the processes of collective resource management), technological knowledge (practical skills, agricultural techniques, material culture production, and medicinal preparation), cosmological knowledge (ontological frameworks, rituals, and narrative traditions through which the natural and social world are interpreted and ordered), and

pedagogical knowledge (intergenerational transmission systems, apprenticeship structures, and socialization practices through which knowledge is reproduced). These five dimensions are all separable, but also all interconnected (an intervention in one dimension has dropping effects on the other dimensions).

Research Methods

Research Design and Philosophical Orientation

This study uses a critical narrative review design in a critical realist philosophical approach. Critical realism (Bhaskar, 1998) recognizes that social phenomena, such as knowledge systems, exist in reality with their own generative mechanisms operating at multiple levels (empirical, actual, and real) and which are only partly accessible through any one methodological approach. This philosophical stance resonates with the analytical complexity of IKS scholarship, which entails a focus on the empirical content of specific knowledge practices as well as on the structural forces, such as colonial, developmental, and institutional forces, that shape their reproduction and erosion.

The review paper is also guided by a reflexivity towards decolonization, an awareness of the power dimensions of the act of reviewing and synthesizing indigenous knowledge research in an academic institutional setting. The analytical framework and the conclusions are provided not as judgments by an outsider to Tharu IKS, but as scholarly inputs to a larger conversation that will be led by the knowledge communities of Tharu.

Search Strategy and Source Selection

Database searches were systematically carried out in Scopus, Web of Science, JSTOR, Anthro Source, CAB Abstracts and Google Scholar from January 2000 to April 2026. The terms for the search were as follows: "Tharu indigenous knowledge," "Tharu traditional knowledge," "Tharu of Nepal," "Terai indigenous knowledge," "traditional ecological knowledge of Nepal," "ethnomedical knowledge of Nepal," "indigenous forest governance of Nepal," "Tharu agriculture," "Tharu ritual," "Tharu ethnobotany," "indigenous knowledge of Nepal," "epistemic justice indigenous," and "decolonial knowledge systems. Temporally, 2000-2026 was chosen to reflect scholarship post-millennium and, where necessary, to include basic pre 2000 sources that were theoretically necessary.

The inclusion criteria include peer-reviewed journal articles from outlets indexed in Scopus or Web of Science, scholarly monographs published by academic publishers, ethnographic monographs, doctoral dissertations with obvious scholarly value, and policy documents from reputable international organizations (CBD Secretariat, UNDP, IPBES). Studies that were excluded included the grey literature that lacked peer review, journalistic or advocacy literature that lacked analytical rigor, and studies that were too abstract to be of substantive interest to Tharu IKS or the theories being used. After full-text screening and quality assessment, 40 sources were included for the synthesis.

Analytical Method

Thematic synthesis (Thomas & Harden, 2008) was used as the main method of analysis, which consisted of three steps, for example, free line-by-line coding of included studies, development of descriptive themes, and development of analytical themes. The epistemological sovereignty framework was used for analytical theme development, thereby allowing for structural and political dimensions of knowledge dynamics to be analyzed in addition to descriptive documentation of the knowledge content.

Results and Discussion

Traditional Ecological Knowledge and Forest Governance

Traditional ecological knowledge of forest/wetland systems in the Terai is the most widely documented area of Tharu IKS. The literature shows that there is an advanced body of knowledge and experience that spans species identification and classification, phenological knowledge of plant and animal cycles, knowledge about using species for environmental change assessment, and resource management protocols that are designed to the dynamics of the ecosystem (Bhattarai et al., 2009).

Tharu customary forest governance was based on the institution of *Badghariya/Mahton* (village headman) and the collective *bhariya* governance assembly, which regulated access to forest resources based on the rules of seasonal harvest, protected species, established sacred groves, and had a system of community surveillance that amounted to effective conservation regimes for the biodiversity of the Terai (Choudhary, 2013). The sacred groves (*Tharu ban*) by the Tharu people are significant areas of ecological and cosmological knowledge; they are areas of forest

which are protected by ritual prohibition, and biodiversity is preserved in the same way that social and cosmological order are preserved. Studies in Dang and Bardiya both show that Tharu-protected sacred groves have much greater species diversity than comparable nonprotected forests (Bhattarai et al., 2009).

But the nationalization of the forests in 1957 and the creation of national parks in the forest effectively made this customary system of governance a criminal offense. Scholarly opinion is strong in that it displaces the authority of forest management from the Tharu to the state's conservation bureaucracy; both forest ecosystems have been degraded, and the epistemological and institutional bases of Tharu ecological knowledge have been lost (Rankin, 2004; Dinerstein et al., 2007). Community forestry was introduced in the 1990s and has partially re-established the rights for community governance in some areas, mostly in the hands of Hill-origin communities rather than Tharu communities, indicating the ongoing political marginalization of Tharu communities in community governance institutions (Nightingale, 2005).

Ethnomedical and Ethnobotanical Knowledge

Tharu ethnomedical knowledge is one of the richest and methodically documented areas of Tharu's IKS. The highly diversified flora of the Terai, which includes thousands of plant species, many of which have documented pharmacological properties, has served as the source of a highly developed ethnomedical tradition that has been used in the region for addressing a wide range of physical, social and spiritual health issues (Joshi & Edington, 1990; Bista et al., 2017).

The scholarly literature documents specifically the use of hundreds of plant species by the Tharu healers, including the use of many for *badghar* (village elder-healer) and *guruwa* (shaman-healer) purposes. The use of these plants is documented, for example, in the treatment of malaria, for which Tharu people maintained effective plant-based prophylaxis well before biomedical intervention, or for treatment of snakebite, reproductive health conditions, and the range of illnesses that Tharu ethnomedicine describes within cosmological frameworks rather than biomedical ones (Bhattarai et al., 2009). In fact, the anti-malarial knowledge of Tharu healers with biomedical relevance, such as anti-malarial herbal remedies (mainly *Artemisia* species) and precautionary health measures to avoid malaria infection, was entirely overlooked

and neglected by the colonial and post-colonial health systems until biomedical science confirmed the pharmacological validity of these practices (Gurung & Pyakurel, 2012).

The gendered aspects of the ethnomedicine of the Tharu are analytically important. The healing practice can be formally institutionalized in the hands of guruwa healers, who are mostly men, or the practice can be informally handed down through the women in the family, who are the primary keepers of the knowledge of plant medicine in the home, including the use of plants for obstetrics, gynecology, pediatrics, and nutrition (Paudel et al., 2020). This split between genders in knowledge also results in the formal process of documentation and recognition encountering the dimensions of the ethnomedical system that are held by women, but not formally recognized by healer authorities as a part of the system.

Ethnomedical knowledge of Tharu is under a serious threat of erosion, along with its richness. Allopathic medicine has been introduced to provide real health benefits and has led to a gradual marginalization of indigenous healing in the formal health discourse. The medicinal plant resources are becoming inaccessible to many young Tharu healers due to deforestation, conversion of forest into agricultural land and exclusion of the same from protected areas, while their traditional path of becoming healers is being socially marginalized because they opt not to receive formal biomedical education (Bista et al., 2017). This leaves a gap in knowledge that runs through generations, potentially putting at risk the transmission of a cultural and biomedical knowledge tradition.

Agricultural Knowledge and Agrobiodiversity Conservation

Tharu agricultural knowledge systems are yet another field of the complexity of IKS for which the scholarly literature, while recognizing, has not been sufficiently theorized. The Tharu communities of the inner Terai have traditionally preserved a considerable agrobiodiverse variety of seeds for rice, lentil, mustard, vegetables, medicinal plants, and other crops as part of their sophisticated seed selection, exchange, and storage systems, which can be considered as community-managed plant genetic resource conservation (Bajracharya et al., 2010).

The primary role of the Tharu women as seed keepers is a special one. Household seed banks, community seed exchange ceremonies, and ritual procedures of seed selection and storage of seeds in crop systems hold a form of applied plant science,

which has been germinating genetic diversity in the Tharu crop systems across generations (Shrestha et al., 2013). Tharu knowledge holders have been practicing and passing on their knowledge of superior drought tolerance, pest resistance, and nutritional qualities of traditional varieties over the years. These claims have now been validated through scientific research by agricultural scientists.

The Green Revolution, which entered the Terai from the 1970s onwards and the government extension programmes on hybrid and high yielding varieties have significantly lowered the diversity of crop varieties in Tharu farming systems. The social and economic pressures that promote the uptake of commercial varieties, access to credit, market engagement, and scarcity of labours are genuine and comprehensible, but they have collectively contributed to the loss of a unique agrobiodiversity heritage and the delegitimization of the knowledge systems associated with it.

Ritual, Cosmological, and Ontological Knowledge

Tharu cosmological knowledge, the system of beliefs, stories, and rituals that explain and connect the natural, social, and spiritual worlds, is one of the least theorized areas of Tharu IKS in the current literature. The ethnographic descriptions of the principal festivals, *Maghi* (winter solstice new year), *Jitiya* (ritual for women's health and protection), *Barhi puja* (post-harvest ancestor worship) and the elaborate healing rituals that are mediated by *gurus/guruwa* are documented in the anthropologic literature (Krauskopff & Meyer, 2000).

The epistemological nature of this cosmological system, however, is not sufficiently theorized, that is, how Tharu ritual practices represent and transmit a kind of knowing about the world that is ontologically different, but not incommensurable with, the propositional and empirical knowledge that is valued in the context of western scientific systems. From within the epistemology of the *guruwa*, there is no "cultural belief" vs. "scientific fact" here. It is a knowledge practice that is based on a different ontological framework, one that views the natural, social, and spiritual worlds as interconnected rather than distinct.

The ontological turn in anthropology (Holbraad & Pedersen, 2017) offers pertinent analytical tools for learning to take this cosmological knowledge seriously, yet not simply as literal truth or a cultural metaphor. In the context of the Tharu, this method reveals the cosmological dimension of Tharu IKS as a sophisticated dialogue

with the relationality of human-environment-spirit systems that also contains valuable insights from the ecological sciences (ritual prohibitions for the protection of sacred groves, cosmologically based harvesting calendars that prevent resource overexploitation) but is not reducible to a secular ecological science.

Oral Epistemological Traditions and Knowledge Transmission

Transmission of Tharu IKS is more within oral and performative frameworks of storytelling, song, agricultural ceremony, healing ritual, and intergenerational apprenticeship than textual inscription. In the Tharu oral traditions (*khabariya*, *lorik geet*, *sakhiya naach*, *barka naach*) there are not only artistic performances, but pedagogical systems in which knowledge about ecology, society, morality, and cosmology is encoded, transmitted, and renewed from generation to generation (Krauskopff, 2012).

These oral traditions are rich and analytically complex, as well as highly vulnerable to loss. The formal education that has been expanded in the Nepali language, following the cultural values of the literate, urban, and Hill-caste, has always interfered with the time, attention, and valorization of the oral knowledge tradition. The Tharu IKS pedagogy of agricultural, medicinal, and ritual knowledge practices is apprenticeship-oriented, in which children do not attend formal schools full-time (Lamsal, 2016). The formal education system, with the incentives it provides in terms of literacy, Nepali language skills, and formal occupational qualification, systematically undermines the knowledge domains that Tharu IKS apprenticeship would invest in.

Discussion

Structural Erosion and Epistemological Violence

To date, the overall picture drawn from the literature is of the systematic structural erosion of Tharu IKS in various domains and by multiple mechanisms. The loss of land has deprived people of grounds for ecological and agricultural knowledge. Forest exclusion has broken the institutional and practical links that bind the knowledge of forest governance. The formal health system has been expanded, undermining the legitimacy of ethnomedicine. Agrobiodiversity and its knowledge systems have been replaced through the Green Revolution in agriculture. Education in the assimilationist tradition has affected the oral transmission of knowledge. Combined, these mechanisms form the "epistemicide" of systematic killing of knowledge systems, coined by Walsh

(2013), which happens in parallel to physical and cultural dispossession of indigenous communities.

The analytical approach has far-reaching consequences for the scholarly and policy communities' understanding of the threats to Tharu IKS. The prevailing discourse of the conservation of indigenous knowledge is confined to the documentation and archiving of traditional knowledge and their incorporation into development and conservation projects, which implicitly takes for granted the conditions of indigenous discourses erosion and speaks only of salvation. At the level of epistemological sovereignty, an appropriate answer would have been to directly tackle the structural conditions of erosion for instances land rights restoration, space for indigenous knowledge pedagogies in the formal education system, reform of intellectual property frameworks to protect the territorial sovereignty of the Tharu over their territories and ecologies, and the restructuring of conservation governance to ensure genuine authority for the Tharu over the territories and ecologies of their knowledge.

Bioprospecting and Intellectual Property

Another related aspect of the danger to Tharu IKS is the commercialization of TK by bioprospecting and intellectual property. The pharmaceutical industry and the agricultural biotechnology sector have been aware of the economic potential of TK as an indicator of bio-active compounds in plants and germplasm of crops, respectively, and have been systematically appropriating TK without any proper compensation or consent (Shiva, 2016). Although Nepal has formally committed to protecting TK under the CBD and Nagoya Protocol, the legal framework for TK protection in Nepal is still underdeveloped.

The Tharu case is especially vulnerable to this risk. The incentive structures for biomedical interest in the knowledge of malaria resistance, interest in the pharmaceutical knowledge within Tharu medicinal plant knowledge, and interest in the agricultural value of Tharu-maintained crop genetic resources have created incentive structures that favor extraction of knowledge for commercial application over the protection of the community conditions under which the knowledge is produced. Plant compounds that were discovered during interactions with Tharu and other indigenous Terai healers have later been patented, without any sharing of benefits with the communities from which they originate (Uprety et al., 2012). This should be done by

improving the implementation of existing international instruments and by fundamentally changing the way indigenous knowledge is linked with the world's research and development institutions.

Community-led Initiatives

While the above-mentioned challenges are of a structural nature, there are also important examples of the revitalization of Tharu community traditions documented in the literature that are important to highlight as evidence of the resilience and adaptive capacities of Tharu IKS traditions. The Tharu Cultural Museum and Research Centre in Chitwan has set up documentation programmes that involve the Tharu knowledge holders as experts and authorities instead of informants. Community seed banks established by the initiative of Tharu women's groups in Dang and Kailali districts with support from agroecological NGOs have been able to restore stocks of traditional varieties and the social networks that sustain them (Shrestha et al., 2013). Oral pedagogical traditions are being institutionalized in some community schools through Tharu language and oral tradition programs, which are now part of the school curriculum in addition to formal literacy education (Lamsal, 2016).

The following projects show that under conditions of sufficient institutional support, territorial security, and community authority, IKS revitalization can be achieved. They also call attention to another key aspect of the epistemological sovereignty approach: the most enduring and genuine kinds of protection of IKS are those that are produced by the very communities that know Tharu indigenous people.

Theoretical Contribution

As a substantive theoretical contribution, this article makes three contributions to the interdisciplinary literature on the knowledge systems of indigenous people. First, it expands the epistemological sovereignty framework as a holistic alternative to the two other models, such as an extractive integration model and a cultural preservation model. Both of which treat indigenous knowledge as a heritage artifact to be documented and archived, but on dominant institutions' terms. The epistemological sovereignty framework calls attention to the political and ontological aspect of the protection of indigenous knowledge, which is rooted in the connection between the protection of knowledge systems and the protection of the communities, territories and governance institutions through which they are preserved, and to the fact that the protection and

preservation of indigenous knowledge systems are inseparable from the protection and preservation of their political and territorial sovereignty.

Second, the article fills a theoretical gap in comparative analysis of indigenous knowledge systems by offering the most theoretically sophisticated review of Tharu IKS literature so far. One that exceeds ethnobotanical inventory to include the epistemological, cosmological, gendered, and political aspects of Tharu knowledge systems in a coherent analytical framework. Third, the article presents a framework of decolonizing indigenous knowledge research methodology as it explicitly includes decolonization principles into a critical narrative review approach, which shows that systematic review methodology can be used for epistemological justice and not just to extract or integrate indigenous knowledge.

Conclusion and Implications

The Tharu indigenous knowledge systems of Nepal are one of the most ecologically relevant, culturally powerful, and analytically underutilized intellectual traditions in South Asia. Tharu IKS spans the domains of sophisticated ecological management, ethnomedical practice, agricultural biodiversity conservation, cosmological understanding, and oral pedagogical tradition not only in a culturally valuable but also in an ecologically functional and biomedically relevant way, developed through an intimate relationship over thousands of years with the unique ecosystems of the Terai region. However, these knowledge traditions are under serious and cumulative pressures, such as land dispossession, formal education assimilation, development intervention, and pressures for commodification, to which the current scholarly and policy framework is insufficient.

This critical review paper has shown the need to go beyond extractive and preservationist approaches to indigenous knowledge policy and scholarship to engage with Tharu IKS adequately. The epistemological sovereignty framework presented in this article suggests that there is no distinction between epistemological rights for the protection of indigenous knowledge and the political, territorial, and institutional rights of indigenous communities, and that respecting indigenous knowledge amounts in the real sense to respecting indigenous communities' rights to define, govern and use their own knowledge, on their own terms and using their own processes.

Nepal, being a party to UNDRIP and the CBD, and a state with a constitutional obligation to ensure the rights of the indigenous nationalities (*Adivasi Janajati*), therefore has the political and legal space and mandate to create policy frameworks that are sufficient to meet this challenge. The scholarly community, however, has an obligation to generate knowledge that benefits the interests of Tharu communities, not just to advance their academic careers, and that means methodological creativity, epistemological modesty, and political engagement. There's no need to settle for anything less than the richness and resilience of Tharu indigenous knowledge systems.

Practical and Policy Implications

The results of this review paper led to practical policy, practitioner, and academic implications for dealing with Tharu communities and with indigenous knowledge systems in general. Land and territorial governance also require restoration of the rights of Tharus based on customary land rights, the formal recognition of sacred groves, customary forests, and traditional water management territories in order to allow meaningful continuity to the Tharu knowledge of the ecology and governance of their land. In order to give a priority user group status to Tharu communities in regions where there is historically an area of Tharu territorial governance, the Community Forestry program in Nepal needs to be restructured so that they are not systematically outnumbered in a mixed user group.

To ensure integration of the formal health systems, Nepal should create formalized systems and mechanisms to engage and value the authority and practices of Tharu traditional healers, especially in primary care, maternal and child health, and mental health services, without imposing biomedical oversight. The ethnomedical knowledge documentation should be carried out under free, prior and informed consent (FPIC) protocols, which would give IP rights to the Tharu people.

In terms of education policy, the school curriculum in Tharu clusters should be changed to include Tharu language, oral literature, ecological knowledge and cultural practice aspects of Tharu life in the formal curriculum in a substantive and meaningful way and not as mere cultural attachments. Indigenous Knowledge Studies as a curriculum area is a priority intervention, which has been developed in true partnership with Tharu knowledge systems.

Research governance provisions in Nepalese universities and international research institutions collaborating with Tharu communities should be developed and implemented specifically for indigenous knowledge research, which involves community-controlled data governance, benefit-sharing and publication rights that give Tharu communities control over the representation, application and utilization of indigenous knowledge.

Limitations and Future Research

This review is an extensive study, but it still has some methodological weaknesses that should be noted. Due to the overwhelming volume of scholarship in English, the synthesis has been limited to English-language scholarship, and even less is included on Nepali-language scholarship and the burgeoning scholarship by Tharu scholars and community intellectuals, which is produced in the Tharu language. More non-English sources should be taken into consideration in future reviews systematically, possibly in a collaborative way with the academic and community organizations of the Tharu.

The disciplinary range of the review (anthropology, ecology, sociology, demography, development studies, and education) has the advantage of theoretical breadth but poses difficulties related to methodological comparability across sources. Definitive empirical conclusions are difficult in some areas due to heterogeneity of research designs, scales, and analytical frameworks, especially when it comes to the quantitative level of knowledge loss and revival in the various communities and subregions of the Tharus.

There are a number of directions that should be emphasized for future research. Longitudinal research on the transmission and erosion of IKS within the Tharu communities over time would yield much-needed empirical data that are missing from the current literature. Comparative studies on Tharu IKS dynamics and those of other indigenous communities of the Terai, namely Bote, Majhi, Danuwar, and Rajbansi would allow for deeper analysis of the impact of certain historical, ecological, and political factors on the dynamics of IKS. There is a need for research that is specific in youth participation in Tharu IKS, the context in which youth decide to invest in the traditional knowledge apprenticeship instead of formal education paths. Last but not least, action research methodologies that involve Tharu knowledge holders as true

partners in the design, implementation, and management of research would start to implement the principles of epistemological sovereignty as called for in this paper.

Conflict of Interest

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Ethical Approval

Not applicable (secondary review of published literature).

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