

Legal Pathways for Gender-Inclusive Circular Enterprises: Forest Rights and The Protection Of Traditional Ecological Knowledge In Northeast India



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Abstract

Forest-based livelihoods in Northeast India follow circular practices grounded in Traditional Ecological Knowledge (TEK) held by tribal women, who use selective harvesting, rotational gathering and low-waste processing to maintain ecological balance. However, TEK remains invisible in Indian law. Patent law excludes it, the Biodiversity Act documents species but not decision rules, and the GI Act recognises products without recognising women's knowledge. Forest rights law grants access but not knowledge-based rights. Customary institutions further limit women's participation in governance. Recent amendments to the Forest (Conservation) Act weaken Gram Sabhas and reduce community control, affecting TEK-based enterprises. This chapter argues for recognising TEK as collective knowledge, integrating gender-sensitive procedures across forest and IP systems, and aligning FRA with livelihood schemes to support sustainable, women-led circular systems.

Keywords: Traditional Ecological Knowledge, Circular Economy, Forest Rights, Intellectual Property, Gender.

Introduction

Sustainable development discussions, today, examine the role of local knowledge in ecological stability and community livelihoods (Berkes, 2012). In this context, many communities rely on practices that support regeneration of resources and limit waste. These practices form Traditional Ecological Knowledge (hereinafter TEK). TEK is collective, oral and based on long term experience (Berkes, 2012). Ecologically, it supports soil health, plant diversity and reliable access to forest produce (Swiderska, 2016).

In this context, Northeast India presents a clear example of TEK-based forest use. Especially, women in Khasi, Jaintia and Garo communities manage plant selection, seasonal extraction, drying, curing and processing of forest products (Tiwari and Singh, 2015). They learn these practices within households and community groups (Tiwari and Singh, 2015). Their knowledge supports small enterprises that depend on non-timber forest products (Tiwari and Singh, 2015). Also, their practices often align with circular economy principles that focus on regeneration, reuse and low waste.

Despite this role, Indian law does not recognise TEK as a legal interest. The Patent Act excludes traditional knowledge from patentability. The Biological Diversity Act collects knowledge through People's Biodiversity Registers but does not secure strong

rights for its holders. The Forest Rights Act recognises community access rights but not knowledge-based rights. Even customary institutions in Meghalaya and parts of Assam place women outside formal decision roles (Agarwal, 2001; NESRC, 2017). These factors limit the visibility of women's TEK in forest governance. They also restrict the growth of circular enterprises that depend on ecological rules.

Moreover, policy documents that promote circular economy goals do not link their strategies with TEK. They focus on industrial sectors and waste management. They do not reflect the ecological planning present in TEK-based systems. This produces a gap between national policy and community practice. It also creates risks for women who work in forest-based enterprises. They face unstable access to forests, weak recognition of their knowledge and limited participation in governance (Nongbri, 2003; Shangpliang, 2012; TERI, 2020).

In this backdrop, this chapter examines these issues through doctrinal analysis. For this, it studies the Forest Rights Act, the Biological Diversity Act, the Patent Act and the Geographical Indications Act. Also, it reviews judicial decisions that affect forest governance. Moreover, it analyses governance structures in Assam and Meghalaya. By doing this, the chapter seeks to identify points where the law does

not match ecological practice. It also seeks to study the gender-based exclusions that emerge across forest and IP processes. Moreover, it examines the impact of these exclusions on sustainable production.

Overall, the chapter aims to provide a clear understanding of how TEK, gender and law interact in forest-based livelihoods. It seeks to identify practical reforms that support TEK based circular systems and strengthen women's rights. It situates these reforms within broader sustainability goals linked to biodiversity conservation, gender equality and responsible production. The chapter contributes to research on law and sustainability by showing how knowledge systems shape ecological outcomes and by identifying legal gaps that influence these outcomes.

2. Conceptual Framework

The present research is grounded in four interrelated concepts i.e., circular economy principles, traditional ecological knowledge (TEK), gender and sustainability jurisprudence and legal pluralism. They emanate a combined lens for understanding the intersectionality of ecological regeneration, community knowledge and fragmented legal recognition while situating tribal women's forest-based livelihoods from Assam and Meghalaya. The first concept i.e., circular economy aids in chalking out the type of production systems which are at stake. The second one i.e., TEK maps the epistemic and cultural aspects of such systems. Gender and Sustainability jurisprudence provides a normative angle to assess how law situates women into ecological labour. Legal pluralism aids in exploring the causes behind the customary and statutory regimes being pulled in multiple directions in the Northeast India.

- **Circular Economy Principles:** reuse, regeneration, low-waste production

The concept has been defined in terms of 3R i.e., 'reduce, reuse, recycle' (Kirchherr, Reike, & Hekkert, 2017). However, the now its definitions has moved beyond just 3R towards a systemic transition in relation to the resource flow process vide economy. Kirchherr et al. has demonstrated that the circular economy is commonly defined as something decreasing resource input and waste (Kirchherr et al., 2017). However, they also pointed out that it needs re-designing of production and consumption systems for segregating growth from limited resource usage (Kirchherr et al., 2017). Recent works stressed upon regenerative systems whereby slow, close and narrow material loops vide reuse, repair, remanufacture and recycling (Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Schröder et al., 2020). This, in turn, reduces emissions and leakages. The research by Ellen MacArthur Foundation accordingly, emphasised that a circular economy ensures products and materials within circulation (Ellen MacArthur Foundation, 2019). This, in turn, rejuvenates nature instead of treating ecosystems as extractive aspect. Such an abstract concept could be seen already rooted in the everyday practices in context of the forest-based

enterprises. It could be noted in practices like selective harvesting of non-timber forest products, seasonal rules rotational gathering and processing techniques that are low-energy and low-waste emanating. In terms of Northeast India, certain empirical studies have demonstrated that the rules are crafted by local institutions which seeks to maintain soil fertility, forest cover and water systems while ensuring livelihoods (Geissdoerfer et al., 2017). In terms of the circular economy, such practices project an informal form of circularity. Such circularity entails practices like reusing and recycling of materials within local ecosystems, minimisation of waste through careful usage of biomass and regeneration is based out of the customary norms regarding the harvest practices.

The present research situates circular economy as a normative benchmark. It seeks to explore a system whereby a legal framework is considered enabling when it fosters such regenerative, low-waste enterprises by ensuring access to forest, recognising community-based innovations and permitting value-addition and market access without undermining ecological limits. Where laws fragment resource rights, commodify knowledge without consent, or force women's enterprises into linear, extractive models, they are read as incoherent with circular economy principles.

- **Traditional Ecological Knowledge (TEK):** collective, oral, ecological knowledge

Traditional Ecological Knowledge (TEK) is commonly described as a large, collectively held and culturally developed body of knowledge, practices, and beliefs (Berkes, Colding, & Folke, 2000). They evolve over time and are passed down to younger generations through cultural means about the relationship between humans and their environment. It is not an individual "invention," rather a collective and highly relational body of knowledge (Berkes, 2012; Karlsson, 2011). The transmission of TEK is typically oral and non-verbal through stories, rituals, work songs, division of labor, and apprentice-like learning (Gadgil, Berkes, & Folke, 1993). In Northeastern India, TEK provides the foundation for community-based natural resources management, including agro-forestry systems and sacred forest conservation which provide livelihoods and biodiversity conservation together (Tynsong & Tiwari, 2010). Women from indigenous tribes are frequently among the most important holders of this type of knowledge. They can identify edible and medicinal plants and tell when to harvest plants. They understand soil-water-forest interactions, and they conserve seed and plant diversity. Research on women in the area has found that because their traditional knowledge allows them to be constantly in touch with their local ecosystem, they have become marginalized from formal decision making by policies and programs (Tynsong & Tiwari, 2010).

In this work, TEK is examined in terms of ecological and cultural commons. Such commons is to be studied as a shared, intergenerational knowledge system that

aids in circular practices in forest-based livelihoods. It entails three effects for the analysis:

- i. Epistemic form: TEK can't be categorized as an individual's 'patentable' invention because it is oral, contextual and collective.
- ii. Embeddedness in livelihood: The way TEK has been embedded within people's livelihoods means that the way TEK is expressed cannot be separated from how people carry out their work and social relations.
- iii. Vulnerability to misappropriation: Many of the ways that TEK is passed down through generations have traditionally been by women. They undertake this unpaid work by collecting, processing and passing on knowledge. Some vulnerabilities exist for these communities if they document or digitize their TEK for use in biodiversity or intellectual property frameworks. It ranges from being vulnerable to having their TEK used by others without any level of control over the use or without any type of equitable sharing of the benefits.

Therefore, TEK is not just seen as "input" to a new generation of eco-enterprises. It is instead considered a primary legal subject. Something that needs protection, regulation and equitable distribution among tribal communities, with tribal women recognized as key guardians and decision-makers of TEK.

- Gender and Sustainability Jurisprudence: feminist legal theory, ecofeminism, indigenous agency Feminist legal theory foregrounds its premise upon the aspect that law is not neutral to gender and that it can be used to reinforce patriarchy. Although legal structures and mechanisms may be equal, many laws and institutions are developed using patriarchal systems and processes. In India, Ratna Kapur and other feminist scholars have demonstrated how gender equality jurisprudence has brought about some gains, however, these legal advancements often vacillate between providing protection and equality (Kapur, 2018; MacKinnon, 1989). They do not address the root causes of the social subordination of women (Kapur, 2018; MacKinnon, 1989). Therefore, feminist jurisprudence asks: Which people's experiences are recognized within legal reasoning? Who's labor and knowledge are invisible? Building upon feminist critiques of law, ecofeminists challenge such way by interlinking the subjugation of women with the subjugation of nature. For example, Vandana Shiva states that reductionist and patriarchal models of science and development devalue women's labor and ecological cycles and argue for a "feminine principle" of development based on diversity, subsistence and nonviolence (Shiva, 1988). In ecofeminist debates in India, it is argued that women's daily labor in collecting firewood, water, fodder, etc. provides environmental stewardship (Agarwal, 1992). However, laws and policies treating these women as marginalized and not as key actors in their own right (Agarwal, 1992). Contemporary scholarships have identified the presence of elements of ecofeminism in

India's environmental law and policy (Singh & van Houtum, 2002; Agarwal, 2010). However, jurisprudence still does not center women's ecological labor and decision-making. The study of gender and sustainability jurisprudence occurs at three different levels:

- i. Doctrinal Critique: Examining if statutes such as the 'Forest Rights Act' (FRA) or 'the Biodiversity Act' conceptualize "community", "beneficiary", or "rights holder" in ways that acknowledge women's labor and contributions and how women are included in the implementation process.
- ii. Material Focus: Highlighting tribal women's forest-based labor and eco-enterprises as examples where gendered power, environmental regulation and market forces intersect.
- iii. Indigenous Agency: Viewing tribal women as agents and not only as vulnerable subjects that engage in negotiations, interpretations and resistance against the State and customary norms.

The literature demonstrates that in India and throughout the Global South there are numerous studies on women-led cooperatives, self help groups and community initiatives that utilize indigenous knowledge to achieve climate and livelihood resilience, while also facing structural barriers in regards to land, resources and political rights (Singh & van Houtum, 2002; Agarwal, 2010; UNDP, 2016). Through this theoretical framework, intellectual property law and forest governance will be analyzed using a gendered lens. When GI registrations include men as representatives, when Gram Sabhas or forest committees exclude women's voices, and when benefits-sharing agreements include men's names as the primary recipients, it demonstrates the aspects of gendered invisibility. In contrast, women are actively involved in sustaining TEK-based circular enterprises.

- Legal Pluralism: customary vs. statutory law in tribal contexts

Legal pluralism is defined as the co-existence of multiple legal frameworks in the same space consisting of customary, religious, community-based, and state. Legal centralism, the view that the state's legal framework is the sole framework governing society, has been critiqued by John Griffiths (Griffiths, 1986). He argues that state law is just one of many normative frameworks, and that people live their lives according to many overlapping, often conflicting, semi-autonomous social fields (Griffiths, 1986). Northeast India is an exemplary case of legal pluralism. There are constitutional provisions, autonomous district councils and judicial decisions that recognize customary laws of all the different tribes in addition to central and state statutory law (Cairns & Das, 2019). Customary law governs access to forests and land use rights, inheritance and dispute resolution. Simultaneously, the national laws, such as the 'Forest Rights Act, the Biodiversity Act, the Geographical Indications Act and the Patent Act', provide the framework for rights relating to forests,

biological resources and traditional knowledge. However, from a gender perspective, legal pluralism is a double-edged aspect. Customary law and institutions can reflect ecologically responsible practices and community-centered values that align with TEK and circular economy practices. However, research has shown that customary law and institutions in Northeast India are generally male-dominated and that women may be excluded from decision-making regarding land and forests, even in matrilineal societies, like the Khasi (Karlsson, 2008; Nellithanam, 2020). In this chapter, legal pluralism is employed as a map to help identify:

- i. Normative intersections between customary rules for forest use and TEK transmission and resource sharing, and statutory rules for forest rights, biodiversity access and IP protection.
- ii. Jurisdictional gaps and overlaps: for example, community rights recognized in the FRA and mediated by local bodies that do not include women, or GI and patent procedures. They ignore customary norms of collective ownership.
- iii. Power imbalances in whose norms will prevail amidst conflict situations: state bureaucracies, male village elders, IP offices, or women's collectives and cooperatives.

The application of this lens allows the research to consider not only what the statutes stipulate, but also how they are interpreted (and/or ignored) in tribal contexts in which customary law enjoys significant social legitimacy.

3. Forest Rights and TEK in Northeast India

The relationship of forest rights, traditional ecological knowledge (TEK) and gendered livelihoods in northeast India is all influenced by an intersectional relationship between statutory law, customary institutions and judicial interpretations. Although the region has strong community-based forest governance structures, much of the legal framework (particularly the 'Forest Rights Act, 2006') is centered around access to resources rather than recognizing TEK as a separate, legally protectable interest. This chapter will examine the doctrinal structure of the FRA. It highlights examples from the Khasi, Jaintia and Garo communities through case studies. Also, it analyzes governing institutions and evaluates how courts have interpreted forest rights in ways that impact TEK, in indirect yet significant manner.

- Forest Rights Act, 2006: recognition of community rights, doctrinal gaps in TEK protection. The Forest Rights Act (hereinafter the 'FRA') was created to rectify "historic injustice" suffered by Scheduled Tribes and other long-term residents who traditionally lived in forests. Legally, the Act has provided a means for communities to regain some level of control over their forests in three major ways. Firstly, the FRA recognizes community ownership and usage rights to minor forest products (MFP) under Section 3(1)(c). Secondly, Section 3(1)(i) establishes Community Forest Resource (CFR) rights that allow

communities to protect, restore, and manage their forests using customary methods. Finally, sections 5 and 6 designate the Gram Sabha as the frontline agency responsible for establishing rights and protecting the biological diversity within these areas. Notwithstanding the establishment of community rights to their forests, the FRA's framework is largely focused upon resource and territorial issues, i.e., the degree to which individuals can access, manage and utilize the resources of the forest (Bose, 2019). The framework of the FRA does not focus upon the knowledge systems that are essential for the sustainable management of forest ecosystems. Specifically, Traditional Ecological Knowledge (TEK), defined by Berkes as a collective and cumulative body of knowledge, beliefs and practices that are transmitted from generation to generation, is explicitly omitted from the Act as a category of right or interest (Berkes et al., 2000). Scholars such as C.R. Bijoy point to an omission in the Act in this regard. Although the Act does acknowledge customary knowledge systems, it does not contain specific protections against the unauthorized appropriation, misuse or exploitation of knowledge by non-community members (Bijoy, 2020). As a result of this omission, the FRA is especially problematic for communities in the Northeast region of India, where TEK provides the fundamental basis for livelihoods derived from forest ecosystems. The knowledge that women in particular possess regarding species identification, seasonal harvesting, soil dynamics and the processing of forest-derived products are all critical factors for ensuring ecological regeneration and minimizing waste in forest-based production systems that align with the principles of a circular economy. As such, the failure of the Forest Rights Act to establish rights related to TEK creates a legal void i.e., although communities may have rights to harvest, the knowledge base underlying harvesting strategies is unprotected and unacknowledged.

- Case studies: Khasi, Jaintia, Garo women's forest-based livelihoods

Research conducted in Meghalaya and Assam demonstrates how Khasi, Jaintia and Garo women are at the center of maintaining their livelihoods through forest-based TEK intensive practices. For example, in the Khasi and Jaintia regions, women were traditionally responsible for gathering broom grass, lac, wild fruit and medicinal herbs as well as making woven items such as baskets. Rekha M. Shangpliang's research concerning the Khasi women and forest law found that although women in matrilineal society can inherit land, they are limited in their ability to make decisions regarding forest use due to patriarchal clan council and village dorbars' decision-making processes (Shangpliang, 2012). Women in the Jaintia Hills also used oral histories to demonstrate that they maintained knowledge of edible plants, seed varieties and natural dye plants, which assisted the community in adapting to environmental stressors (climate change, etc.), market changes, and other types of

change (Tiwari & Singh, 2015; Swiderska, 2016). Similarly, studies of Garo women in agroforestry and bamboo-based business ventures demonstrated similar findings. Garo women's knowledge of multiple species crop rotation, composting, regenerating bamboo and bamboo craft generated circular production systems with little to no environmental waste (Tynsong & Tiwari, 2010; Talukdar et al., 2021). Through anthropological research by Karlsson, followed by additional analysis of women's TEK in these societies by S. Mukherjee and Sruthi, demonstrates that women's TEK in these societies are not supplementary to women's livelihoods (Karlsson, 2011; Mukherjee & Sruthi, 2020). Rather, it represents women's central role in managing ecological resources (Shangpliang, 2012; Shiva, 1988; Singh et al., 2010). The women as "seed keepers," holders of herbal knowledge and main processors of forest biomass represent a circular economy model of regeneration, reuse and low-waste production (Agarwal, 2001; Borah, 2021; Pushpangadan, 2010; National Biodiversity Authority, 2021). However, women's TEK are largely unaccounted for within formal forest management documentation, benefit sharing agreements and Intellectual Property regimes (Pushpangadan, 2010; National Biodiversity Authority, 2021).

- Governance structures: Gram Sabhas, Forest Management Committees, gendered exclusions

Gram Sabhas are central to the governance of forests in accordance with the FRA. They are allowed to start claims for rights, to verify rights to lands and to govern the use of forest areas (Government of India, 2006). The guidelines that apply to Gram Sabha meetings include a requirement that one-third of the membership of Gram Sabha should comprise of women (Ministry of Tribal Affairs, 2018). This gives the potential for the traditional ecological knowledge (TEK) held by women to influence the development of community forest plans and the making of decisions in the context of those plans.

However, the governance of forests in Northeast India is far more complicated than the legal framework would suggest. It is shaped by legal pluralism. In addition to the role of Gram Sabhas there are other custom-based bodies (for example, Dorbar Shnong – the Khasi village assembly, Raid councils, clan-based institutions and Autonomous District Councils) that have their own authority over the forests (Cairns & Das, 2019; Karlsson, 2008). There are also various types of Forest Management Committees (FMCs), Joint Forest Management (JFM) bodies and departmental structures (line departments) that all operate in a form of overlap.

Several scholars, including A.K. Nongkynrih, have demonstrated that while there are matrilineal societies in Khasi culture, the institutionalized forms of governance that exist within these societies are still structurally male-centric (Nongkynrih, 2006; Nongbri, 2003; NESRC, 2017). Women who are land custodians, are typically excluded from deliberative and executive

roles within village councils and district councils (Nongbri, 2003; Upadhyay, 2019). The same patterns can be seen in Jaintia and Garo regions, where women gather, process and sell forest products. However, they are seldom involved in forest planning, Community Forest Resources demarcation, or the preparation of management plans under the FRA (Shangpliang, 2012; TERI, 2020).

The above governance structure emanated dual effects:

- TEK is invisible in the formal decision-making processes: The fact that women have ecological knowledge does not mean that this knowledge will be translated into representation on Gram Sabha issues, claim verification processes or management decisions.
- Fragmentation exists between customary and statutory systems: When customary bodies are predominant in forest governance, the formal procedures of the FRA may be ignored, set aside, or selectively implemented. Therefore, it leads to inconsistency in the recognition of TEK (Griffiths, 1986; Merry, 1988).

Therefore, while the FRA aims to democratize forest governance, the exclusion of women based upon customary norms, limits the degree to which the TEK of women is used to develop legally recognized forest management strategies (Agarwal, 2001; Bose, 2019).

- Judicial pronouncements interpreting FRA and their implications for TEK

While, as outlined above, the FRA does not specifically protect (TEK), the way that the law is interpreted by courts and other legal actors has the potential to indirectly protect it. One example is the Niyamgiri judgment i.e., Orissa Mining Corporation Ltd. v. Ministry of Environment & Forests & Others, (2013) 6 SCC 476. In this case, the Supreme Court ruled that Gram Sabhas have the right to decide if proposed mines are harmful to the traditional cultural, spiritual, or community rights of the Dongria Kondh people. Implicitly, the Court recognized that forest rights include the relationship between the people who live in those forests and the ecosystems in which they live. This relationship has been passed down from generation to generation. While the Court did not use the term "ecological knowledge," the Court made it very clear that the knowledge and cosmology that are unique to each community are also legally-protectable interests under the FRA. On the other hand, the Wildlife First & Others v. Ministry of Environment & Forest & Climate Change & Others, W.P. (C) 109/2008 case clearly shows how the FRA is being used to pit community rights against conservation. The February 2019 eviction order (which was later stayed) signalled the judicial willingness to prioritize a protectionist approach to conservation over community rights. This type of conservationism is based on the same logic as T.N. Godavarman Thirumulpad v. Union of India & Others, (1997) 2 SCC 267. It sees the forest as a place to be restricted and controlled by bureaucrats, often at the expense of the knowledge-based ways in which communities live and

practice their culture. When combined with *Lafarge Umiam Mining Pvt. Ltd. v. Union of India & Others*, (2011) 7 SCC 338, which allowed limestone mining in Meghalaya as long as environmental assessments were completed and customary decision-making processes were followed, the regional implications of this become even clearer. In the *Lafarge Umiam Mining* case, although the Supreme Court acknowledged the existence and importance of Khasi customary institutions, the Court ultimately gave priority to the assessment of environmental impacts by bureaucrats over the ecological knowledge of the community. As a result, a hierarchy of environmental knowledge exists in Indian environmental law and policy, with state-certified science-based environmental knowledge considered to be more valuable and deserving of legal protection than the more context-specific and ecologically adaptive knowledge of the community. Additionally, *Centre for Environmental Law, WWF-India v. Union of India & Others*, (2013) 8 SCC 234, reinforced the idea of strong conservation in protected areas. They further supported more exclusionary conservation policies that would undermine community-led TEK-based stewardship of forest resources.

Overall, it could be observed from these judgments that Courts recognize the cultural, spiritual, and territorial aspects of forest rights. However, they rarely articulate TEK as a separate legal category. Instead, they consistently favor scientific forestry and bureaucratized procedures over the community-based knowledge systems.

Therefore, while the *Niyamgiri* ruling has tremendous transformative potential for recognizing TEK in the context of Gram Sabhas, subsequent and parallel conservation jurisprudence has effectively diminished that potential.

Northeast India is a region where opportunities to promote forest rights and traditional ecological knowledge (TEK) exist. However, they are also fraught with tension. On one hand, the Forest Rights Act (FRA) affords communities an expansive set of rights in relation to forest resources. On the other hand, it doctrinally under-theorizes TEK. Indeed, the Khasi, Jaintia, and Garo women manage local ecosystem services through their knowledge-based forest livelihoods. Yet, these same women are marginalized within governance systems that include customary male authorities as well as bureaucratic institutions.

Moreover, while the judiciary has created an interpretative space for TEK through decisions such as *Niyamgiri*, competing conservationist juridical perspectives have constrained this interpretive space. Hence, to create gender inclusive circular enterprises that draw upon TEK, legal frameworks will need to transition from merely focusing on the distribution of resources and instead provide explicit recognition of rights based upon knowledge. Furthermore, the representation of women at every level of governance will be essential in creating equitable decision-making

processes. In addition, strengthening Gram Sabha authority in the context of the Northeast and achieving harmony between statutory and customary law will help ensure that the rights and interests of tribal women are represented in the forest rights architecture in India. It would allow the forest rights architecture to meaningfully reflect the ecological and economic wisdom currently being practiced by tribal women in India.

4. Recent Forest Law Amendment and the Future of FRA-based TEK Protection in North East India

The law governing the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (the “FRA”) has not undergone formal revision since the 2012 Amendment Rules, but it has undergone significant changes in terms of the legal context that governs it. In an answer given to a Lok Sabha unstarred question number 1632 on 5th December 2024 by the Ministry of Tribal Affairs (MoTA), they stated that “there is no proposal under consideration for legal amendment” to the current Act because the “current Act provides adequate provision[s] regarding forest rights and safeguard[s] to procedure[s]” (Lok Sabha Unstarred Question Number 1632, 5 December 2024). However, even though the statutory text of the Act itself has not changed since the last formal revision, the working space available for the implementation of the FRA has been transformed. It has often been dramatically reduced through revisions to several other forest laws, most particularly the Forest (Conservation) Amendment Act, 2023 (the “FCAA 2023”). Therefore, for tribal communities in Assam and Meghalaya, who use their women’s TEK to create circular enterprise opportunities using the forest as a base, these changes are very significant. What has primarily caused problems for these tribes is not a change in the language of the FRA. Instead, it was the diminishing of the operational architecture for implementing the Act through neighboring legislation, such as the FCAA 2023. Consequently, assessing the role of the FRA in protecting TEK will require the examination of how the FCAA 2023 modifies the landscape of rights-based claims.

• Redefining “Forest” and Shrinking FRA’s Protective Domain

The amended FCAA 2023 limits the definition of “forest” in relation to the Forest (Conservation) Act, 1980 (FCA), to a narrower set of lands that can be considered subject to environmental protection. According to commentaries by Saxena (2024) and Ramakrishnan (2024), the amendment essentially disqualifies large portions of lands from being examined environmentally and from the necessary consultation and rights recognition process provided for in FRA to divert forestland (Ramakrishnan, 2024). For instance:

- i. restrict FCA’s application to lands that have been designated as “forest” in official government

records PRS Legislative Research, 2023;

ii. include exemptions from FCA for forestlands that lie within 100 km of an international border for “strategic linear” and security-related purposes (IDR, 2025);

iii. allow some zones to be diverted for defense, public utility and “eco-tourism” type uses, with lessened procedural requirements (CJP, 2025).

These changes significantly affect the North East region of India, as large sections of Meghalaya and portions of Assam are located in the area within 100 km of the international borders. The North East region of India is rich in community forests, sacred groves and ecologically sensitive ecosystems (Karlsson, 2011). Therefore, although the Gram Sabha is mandated to oversee the diversion of forestland under the FRA. However, in practice, its authority over the assessment of projects will be diminished in the affected regions (Ministry of Tribal Affairs, 2018). Additionally, the TEK-based systems of governance used by Khasi, Jaintia and Garo women are dependent upon the continued integrity of their forest ecologies and customary systems of governance (Tiwari & Singh, 2015; Shangpliang, 2012). Therefore, they will be unable to effectively participate in assessments of projects. It is majorly because the legal mechanisms for scrutiny that previously applied no longer exist due to the amended provisions of the FCA.

As such, the amended provisions of the FCAA create “ecological blind spots.” There, the FRA’s rights-based approach to project planning and implementation does not apply because the FCA has bypassed the decision-making threshold that would trigger environmental protections.

- The “Right-First” Model of FRA versus the “Clearance First” Logic of FCAA 2023

The most important legal accomplishment of the FRA was that it had a “rights-first” model. It refers to a model whereby individuals, community and CFR forest rights must first be recognized before any forest diversion could take place (Government of India, 2006; Ministry of Tribal Affairs, 2018). This has been further strengthened by the Supreme Court’s ruling in *Orissa Mining Corporation Ltd. v. Ministry of Environment & Forests* (2013) 6 SCC 476. This model has been disrupted by the FCAA 2023. Scholars have argued that the new framework of the FCAA indicates a “clearance-first, compliance-later” approach (Saxena, 2024; Ramakrishnan, 2024):

a. Projects falling into categories exempted under the FCAA can get rapid in principle approval (PRS Legislative Research, 2023);

b. FCAA compliant projects will only be required to follow the requirements of the FRA regarding rights recognition and Gram Sabha consent after they have already received approval (IDR, 2025);

c. State level forest departments and central clearance agencies will once again have priority over the communities in terms of decision-making authority (CJP, 2025).

Ramakrishnan (2024) describes this transformation as an “administrative inversion” where the FCA process becomes dominant over the FRA process. Thus, it creates a de facto hierarchical relationship between a rights statute and a regulatory statute (Ramakrishnan, 2024). Saxena (2024) describes the FCAA as a “structural threat” to forest-dwelling peoples. This is because the FCAA would allow states to “legitimately bypass” the recognition of claims through categorizing land into exempted purposes (Saxena, 2024). As a result of the FCAA for TEK, community knowledge will no longer be considered in the decision-making process. Instead, diversion approvals will be based on the results of technocratic environmental assessments, defense imperatives and administrative expediency.

- Gendered Impacts: TEK, Women’s Ecological Labour and the Receding Role of Gram Sabhas

Although the FRA formally provided an opportunity for women to use their ecological and political agency, it did so in a way that was at least conceptually inclusive of women’s perspectives. The Gram Sabha involvement has been unevenly implemented. However, it represents a means through which women from the Khasi, Jaintia and Garo communities could potentially provide their knowledge and make claims to community forest resources and develop conservation approaches based on TEK (Traditional Ecological Knowledge).

If the exemption under the Forest Conservation Act (FCAA) results in forest diversion being undertaken in such a way as to bypass Gram Sabhas, then the ecological labor of women will be made institutionally invisible. There are two problems here:

i. FRA’s gender-sensitive provisions are rendered inactive: Even the requirement that women make up one third of Gram Sabha members will be irrelevant. This is because these bodies will no longer have a role in determining the forest use outcomes of major projects. After all, they were not consulted regarding those projects.

ii. TEK becomes delinked from legality: TEK is held disproportionately by women. This means that they are unable to shape forest-use decisions if diversion is authorised without the rights-recognition process.

Anthropological research (Shangpliang, 2012; Mukherjee & Sruthi, 2020) demonstrates that many women in Meghalaya hold important ecological knowledge about seeds, plant-based medicine, forest harvest cycles and regenerative practices. As such, when the government decides to rapidly divert forests, this intimate knowledge is formally devalued. Circular economic systems like bamboo weaving, wild edibles, medicinal plants and broom grass also rely on continuous forest use. As such, the disruption of these systems via rapid diversion causes both ecological and gendered losses.

Hence, the FCAA of 2023 does not just weaken the FRA. Instead, it weakens women’s ecological citizenship by sidelining gram sabhas where TEK is

voiced, debated and made visible to the state.

- The Emerging Regime: A “Functional Amendment” to FRA without textual changes Ministry of Tribal Affairs have stated that the FRA is “unchanged.” However, civil society reports (CJP, 2025), and legal memoranda (2024-25), show a functional amendment to the FRA i.e., listed as follows:

- i. the FRA is bypassed by the Executive Clearinghouse,
- ii. the procedural obligations are watered down;
- iii. strategic exemptions are put into place.

Unlike a formal statutory amendment, this quiet process:

- a. preserves FRA on paper,
- b. but, hollows out its operational capacity,
- c. and returns power to the forest and environmental Ministries.

For the protection of TEK, this is the most significant threat. FRA was the only statute that recognized community stewardship, Gram Sabha sovereignty and rights-based forest governance. If the architecture of the statute is softened via surrounding amendments, TEK loses the only institutional foothold it had with statutory law.

Hence, the FRA is unaltered. However, the Forest Conservation Amendment Act, 2023 has altered the legal ecological system within which the FRA functions. This has

reduced the geographical area within which the FRA can function, undermined Gram Sabha’s authority and reasserted State authority over diversion decision-making.

Therefore, for tribal women in Northeast India, who utilize their TEK to anchor circular economy based on forests, these changes threaten to further marginalize them. Therefore, the challenge ahead is two-fold, i.e., protection of the procedural integrity of the FRA while advocating for the explicit and gender sensitive inclusion of TEK in forest and biodiversity laws.

5. Intellectual Property Law, TEK and Gendered Exclusions in Forest Governance in Northeast India

Collective and experiential Traditional Ecological Knowledge (TEK) that has been passed down through generations in tribal communities of Northeast India has been an important source of ecological wisdom. The social context of knowledge acquisition and transmission in all three societies (Khasi, Jaintia, Garo) are gendered in that. There, women have historically acquired and preserved primary knowledge on wild food sources, medicinal plants, forest regeneration and growth patterns, seeds preservation, bamboo processing and sustainable harvesting (Shangpliang, 2012; Mukherjee & Sruthi, 2020). However, as significant as it may be, India’s legal structure, specifically its intellectual property law and the legal framework of forest management, does not recognize this type of knowledge. The invisibility of TEK occurs for two reasons. First, Indian intellectual property law, such as the ‘Patent Act, Copyright Act, Trademarks Act,

Designs Act, Geographical Indications of Goods (Registration and Protection) Act, 1999 and the Plant Variety Rights Act, 2001,’ is based on concepts of individualism, novelty and fixation, whereas TEK is primarily a collective, cumulative, oral, contextual and relational body of knowledge (Bavikatte & Robinson, 2011). Second, the institutional arrangements for the management of forests (Gram Sabhas, Forest Management Committees, Autonomous District Councils, Customary Bodies), which govern the use of the forest resources, remain gendered structures. Therefore, it limits the capacity of women to participate formally in decisions regarding the management of their own natural resource base (Plains, 2023). Together, these two forms of exclusion shape the conditions in which women’s circular enterprise based upon their forest-based TEK exists, reproduces, and struggles for recognition. This section examines the doctrinal limitations of India’s current IP regimes, the gendered structural characteristics of forest governance institutions, and how these two forms of exclusion inhibit the recognition and empowerment of women’s circular enterprise based upon their forest-based TEK.

- Patent Act, 1970: Section 3(p) exclusions and the Exclusion of TEK

Section 3(p) of the Patent Act, 1970 excludes:

“an invention which, in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components.”

It was introduced for the sole purpose of preventing biopiracy. The provisions were created based on examples of biopiracy such as the foreign entities seeking patents on Indian traditional uses of turmeric, neem, and basmati (Gupta, 2002). In creating these provisions as a way to protect India’s biological resources from being patented, Section 3(p) inadvertently created a void in the doctrine. This void stands in the fact that while TEK is not eligible for protection through patents, it also does not receive protection in other categories (Pushpangadan, 2010). The exclusion succeeded in blocking patents based on traditional uses. The exclusion did not create an alternate form of protection for traditional knowledge. This produced a doctrinal gap.

The gap affects the knowledge held by tribal women. Their methods of cultivating Lakadong turmeric in Jaintia Hills involve careful soil selection, plant spacing and seasonal timing (Tiwari & Singh, 2015). Their methods of regenerating broom grass in Khasi Hills involve selective cutting and leaving root systems intact (Shangpliang, 2012). Women from the Garo Hills use distinct methods to cure bamboo (Tynsong & Tiwari, 2010). These techniques have been considered ancient, known or customary by patent law (Borah, 2021). Therefore, according to patent law, they cannot be eligible. Patent law also provides no method to register, claim or record such knowledge. Patent examiners require technical drawings, specifications and written disclosures.

Women do not document their knowledge in this form (WIPO, 2017). Their knowledge is oral and learned through practice (Berkes, 2012). However, Patent law does not recognise oral knowledge nor it recognises collective authorship. Instead, it focuses on individual inventors (Antons, 2013). The doctrinal structure makes traditional ecological knowledge unownable as a patent subject.

Hence, the absence of legal recognition affects women's ability to prevent misappropriation. If a privately-owned corporation conducts research into what they do and applies the knowledge to their own business operation, then women can claim no rights at all. They have no legal stake that is recognized by the Act. Therefore, this provision makes them vulnerable because it stops the patenting of their knowledge but not the theft of it.

- **Gendered Innovation and Knowledge Recognition**

The concept of innovation in the patent system is built around the individual inventor working in his laboratory or workshop. This concept is linked with formal science. Women's knowledge related to ecology does not correspond to this approach. The knowledge comes about through their activities on a daily basis. It involves observation of the behavior of plants. It involves adjusting of the time for harvests. It involves selection of specific types of plants. The knowledge has nothing to do with scientific articles or reports (WIPO, 2017). However, the patent systems determine the novelty and inventive step scientifically (Antons, 2013). Vandana Shiva describes this as an epistemic hierarchy (Shiva, 1988). Her work argues that women's work in ecological regeneration is treated as labour rather than knowledge (Shiva, 1988). Scholars such as Arun Agrawal argue that state structures sort knowledge into modern and traditional categories, where the former gains priority (Agrawal, 1995; Singh & Houtum, 2002). Knowledge that does not fit scientific norms is treated as inferior (Fricker, 2007). This affects tribal women because their knowledge is practical and oral. The law treats it as background information rather than innovation. This position influences policymakers. They view TEK as a cultural practice rather than a technical contribution. This perception restricts any scope for recognition or reward within the patent system.

- **Biological Diversity Act, 2002: benefit-sharing, documentation, gender-sensitive challenges**

The Biological Diversity Act recognises the value of biological resources and related knowledge. The Act created three bodies i.e., the 'National Biodiversity Authority, State Biodiversity Boards and local Biodiversity Management Committees.' These institutions oversee access to biological resources. They implement Access and Benefit Sharing obligations (Berkes, 2012). This is because communities with knowledge of plants or natural materials are meant to receive benefits when others use their knowledge. The Act also requires the creation of People's Biodiversity Registers (Agarwal,

2001). These registers collect information about plants, animals, seeds and associated knowledge (Agarwal, 2001). In principle, this supports community rights. However, in practice, it is fraught with challenges. Registers require written documentation of knowledge and documentation makes knowledge visible (Agarwal, 2001). This visibility increases the risk of extraction. Once documented, knowledge enters a fixed form that outsiders may access. Documentation also imposes a burden on communities. They must record practices that were not designed for formal documentation. Scholars have pointed out that documentation without clear safeguards exposes communities to exploitation (Swiderska, 2016; Pushpangadan, 2010). Accordingly, gender gaps are clear in this process. Biodiversity Management Committees in many regions consist of older men (NESRC, 2017). Women hold ecological knowledge but are not included in these bodies (Agarwal, 2001). In Meghalaya, studies report weak participation of women in BMC meetings (TERI, 2020). Their knowledge enters registers through second hand accounts. This results in incomplete documentation (Swiderska, 2016). It also creates misrepresentation (Fricker, 2007). Women lose control over how their knowledge is described (Shiva, 1988).

Benefit-sharing rules aim to compensate communities. However, they do not specify gender-based distribution. When funds reach village councils, they reach male dominated structures (Nongbri, 2003). Women receive limited compensation (Upadhyay, 2019). They have low voice in negotiating benefit-sharing arrangements (Agarwal, 2001). Hence, they have low influence in decisions about access to biological resources. These gender gaps undermine the intention of the Act.

- **Geographical Indications and Community Products**

The 'Geographical Indications Act of 1999' protects goods linked to particular geographical regions. Northeast India has many products recognised for their quality. Examples include Lakadong turmeric, Garo textiles and special varieties of citrus. Geographical Indication (hereinafter the GI) protection depends on producer groups (Geographical Indications Registry of India, 2021). These groups file applications. They only maintain standards and identify authorised users.

Women contribute significantly to such goods' production. They cultivate turmeric. They weave textiles. They harvest and prepare spices. However, producer groups often exclude them (Borah, 2021). The groups include traders, cooperatives or local elites (NESRC, 2017). Representation of women is low (Upadhyay, 2019). Their role as knowledge holders is not recognised (Agarwal, 2001). They do not participate in decision-making about GI applications (Borah, 2021). They do not participate in standard setting (NESRC, 2017).

GI law also requires evidence of historical production

and documentation of unique qualities (WIPO, 2017). Most TEK is oral whereby producers do not keep written records (Berkes, 2012). Women rarely have access to legal expertise or government offices that support GI applications (TERI, 2020). This creates a gap between the law and community practices. This pushes women outside formal structures (Nongbri, 2003). In this manner, their role is acknowledged informally but not through legal rights.

- **Gendered Exclusions in Forest Governance**

Matrilineal societies in Meghalaya is based on the lineage and inheritance rights of daughters, especially the youngest (Khadduh) (Nongbri, 2003; Mukherjee & Sruthi, 2020). However, governance is not matrilineal. This is because villages and traditional institutions are dominated by men (NESRC, 2017). There is poor representation of women. They participate in meetings in very limited ways (Upadhyay, 2019). They are not involved in leadership roles in dorbars and district councils (Upadhyay, 2019). This weakens their influence on the utilization and conservation of forests.

The Forest Rights Act acknowledges the rights of women. It encourages joint title ownership by women (Forest Rights Act, 2006). It also provides for their involvement in Gram Sabhas (Ministry of Tribal Affairs, 2018). These legal clauses are very strong. However, in Northeast India, particularly in Meghalaya, customary laws and the Sixth Schedule provide autonomous status to the traditional institutions. They maintain traditional customs which discriminate against women in terms of power (Cairns & Das, 2019). This reduces the gender-based effectiveness of FRA provisions. Women do not participate in claims for community forests. They also lack influence in management plans.

Forest departments consider men to be the main actors (Agarwal, 2001). Historical forest policy has considered men to be the harvester of resources (Karlsson, 2011). Women's efforts in collecting, cultivation and processing are perceived as supporting acts (Roy, 2015). This perception is persistent. Whenever forest committees are set up, women are included for formality purposes but they are not assigned any roles or responsibilities (Upadhyay, 2019). The bias has an effect on forest resource allocation. It has an effect on the incorporation of TEK in management plans.

- **Feminist Legal Theory and TEK**

Theorists in the feminist theory assert that law affirms particular forms of knowledge (MacKinnon, 1989; Kapur, 2018). Scientific knowledge and written knowledge are considered while oral knowledge and practical knowledge are marginalized (Agarwal, 1992). The knowledge women have about forests is informal. They do not write reports. They do not do any form of technical assessment. Their knowledge is not documented in any legal document. All these amount to epistemic injustice. Epistemic injustice is described as the failure to regard someone's knowledge as true and credible (Fricker, 2007).

Women in tribes face this injustice when speaking about the cycle of plants and the condition of the forest (Shiva, 1988). Their knowledge is not viewed as an expertise but an anecdote (Berkes, 2012). This influences the institutional response where committees depend on the technical officers than women who manage the forests on a daily basis (Agarwal, 2001).

Eco-feminist scholars observe that there are connections between gender discrimination and ecological degradation (Shiva, 1988; Agarwal, 1992). They emphasize that the practical knowledge of women contributes to biodiversity (Kimmerer, 2012). However, intellectual property law and forest law do not recognize these connections. They design their processes in such a way that excludes women in the ownership of the knowledge.

The problem is further complicated by legal pluralism which involves the existence of both formal and customary law. Customary laws in Meghalaya position women outside leadership positions (Griffiths, 1986; Merry, 1988). In cases where TEK claims arise, the male elders speak for the community (Nongbri, 2003; NESRC, 2017). Women are excluded from speaking. Their knowledge is filtered. Their claims are interpreted by the male counterparts. This leads to misrepresentation and dispossession.

- **Implications for Sustainability and Livelihoods**

Firstly, TEK-based circular enterprises require ecological continuity and knowledge rights. For instance, women gather bamboo, grasses, and other plants. Then they manufacture goods from the raw material and sell them at the market. Women's activities presuppose continuous and dependable access to forests. Women's activities also require recognition of their knowledge (Berkes, 2012; Tynsong & Tiwari, 2010). If the laws ignore TEK, women have no legal protection of their practices. They face the threat of appropriation of their practices by commercial entities (Swiderska, 2016; Gupta, 2002). Furthermore, they face losses caused by forest diversion that disregards their knowledge (Ministry of Tribal Affairs, 2018; Ramakrishnan, 2024).

Secondly, gender exclusion impacts ecological sustainability. Studies prove that women harvest resources in conservative manners (Agarwal, 2001). They organize harvest cycles to allow regeneration (Shiva, 1988; Kimmerer, 2012). Without women's participation in the decision-making processes, the practices change. Overextraction becomes more common (Upadhyay, 2019). In addition, the state of the soil deteriorates and the process of regeneration becomes slower. In this way, the sustainability purposes of communities become less relevant.

Thirdly, circular enterprises require reuse, regeneration and a decrease in the amount of waste. This purpose may be achieved with the help of women's TEK. However, if governance and IP laws exclude women's role, circular enterprises will remain small and unstable. They will not develop, will not

attract investments and will not influence policy-making. Legal fragmentation makes it impossible to achieve the goal of an integrated approach.

IP laws in India and governance of forests are not helpful to women-holders of TEK in the Northeast part of India. Patent laws in the country exclude TEK without any alternatives. At the same time, the Biological Diversity Act describes knowledge but does not ensure rights and takes gender into account. Although the 'Geographical Indications Act of 1999' recognizes only products, not knowledge holders. In addition, governance of forests discriminates against women. It weakens the TEK-based enterprises and ecological outcomes. Therefore, a legal framework for TEK and its holders is necessary for the sustainability of forests and development of circular economy.

6. Circular Economy, Legal Incoherence and Policy Fragmentation in Northeast India

TEK in Northeast India fits the requirements of the circular economy. Circular economy concepts include resource regeneration and low waste and continuous material usage (Kirchherr et al., 2017; Geissdoerfer et al., 2017). Women in Assam and Meghalaya adhere to these principles via harvesting cycles and sustainable forest use (Tiwari & Singh, 2015; Tynsong & Tiwari, 2010). The knowledge of the tribes guarantees regrowth of plant populations. The selection of mature plants helps avoid taking young plants. The harvesting zone rotation decreases the pressure on particular areas. The byproduct utilization provides compost, animal feed or crafts. There is a systematic way of resource management (Berkes, 2012).

The knowledge of women is not an outlying practice. It is a systematic way of ensuring ecological sustainability. Research on forest-based livelihoods in Meghalaya indicates that women use plant indicators for assessing soil fertility and moisture levels (Shangpliang, 2012). They determine the right moment for starting or finishing harvesting (Roy, 2015). They observe the changes in seed size, leaf color and insects activities (Berkes, Colding & Folke, 2000). Such observations help to avoid over-extraction (Agarwal, 2001). The process serves the same purpose as resource assessment. It guarantees the long-term stable provision of resources.

Nevertheless, the official implementation of the circular economy in India does not pay attention to such TEK systems. Policy documents of NITI Aayog contain information about plastics, metals, construction waste and municipal infrastructure (NITI Aayog, 2021). They do not discuss the link between circularity and TEK (UNDP India, 2022). Forest-based systems are also absent (United Nations, 2015). Such information creates a conceptual gap. The TEK-based circular systems exist, but they are not included in planning documents.

- **Disconnect Between Law and Circular Economy Practice**

Intellectual property law, forest rights law and biodiversity law do not integrate circular economy

principles. Patent law excludes traditional knowledge from protection. Section 3(p) limits patents based on old or known practices. Lawmakers intended to stop biopiracy. They did not create a new category to protect TEK. This creates an exclusion. Knowledge that aligns with circular principles stays outside formal recognition. This disconnection leaves women without legal authority over their ecological insights. Forest rights law focuses on access to land and forest produce. The Forest Rights Act offers rights to forest dwelling communities. The Act does not recognise knowledge as an independent right. Even when communities secure Community Forest Resource rights, the law does not recognise the knowledge used to manage the forest (Gupta, 2002). Knowledge remains invisible in official records. Circular economy frameworks in government documents also do not include FRA based governance (Pushpangadan, 2010). The result is two separate frameworks. One involves forest access rights. The other involves resource efficiency and industrial practices. These frameworks do not intersect (Forest Rights Act, 2006).

Also, the 'Biological Diversity Act' documents biodiversity and creates benefit-sharing rules. It does not link documentation with circular resource use. Registers list species and uses. They do not record the regeneration principles that women follow. They do not record indicators used by women to judge harvest limits. Documentation focuses on cataloguing, not on supporting ecological cycles. This creates a limited understanding of TEK. It records knowledge but ignores decision rules that guide sustainable extraction.

Furthermore, the Geographical Indications Act protects region-specific products. It does not incorporate circular principles. GI committees focus on quality, history and community reputation (Ministry of Tribal Affairs, 2018). They do not require ecological standards based on TEK (NITI Aayog, 2021). They do not engage with sustainable harvesting or regenerative methods (UNDP India, 2022). Hence, Knowledge behind the product remains unrecognised. This disconnect weakens the role of women who maintain ecological standards.

- **Scalability of TEK Based Enterprises**

Enterprises based on TEK encounter challenges in their attempts at scaling up. Production systems based on TEK are based on ecological patterns rather than factory cycles (Tiwari & Singh, 2015). Market requirements tend to put pressure on producers to extract more (Roy, 2015). It contradicts regeneration cycles (Agarwal, 2001). Without any legal support for the ecological rules, producers have to make a choice. They can extract less and lose income or extract more and risk ecological degradation.

Women producers in Khasi broom grass enterprises encounter such challenges. They are used to extracting matured stalks and letting younger stalks grow (Tynsong & Tiwari, 2010). Sometimes, traders may require an early harvest (Upadhyay, 2019). Therefore, women have to decide between their

ecological practices and market requirements. In addition, there is no legal tool to support their ecological decisions. Forest departments do not include TEK into permission to extract (Karlsson, 2011). FRA committees do not always impose TEK-based rules (Cairns & Das, 2019).

During Garo bamboo work, women use special curing techniques to prevent bamboo deterioration (Tynsong & Tiwari, 2010). It requires time, heat and smoke application (Berkes, Colding & Folke, 2000). Some market actors may suggest using chemical preservatives to achieve better results quickly (Swiderska, 2016). Women's ability to resist such change is low. Their techniques are not covered by any law. Women do not have any power in the producer organizations to set production standards.

In the case of wild edible enterprises in Meghalaya, women apply rotational harvesting (Shangpliang, 2012). However, traders need a constant supply of products (Roy, 2015). At the time of increased demand, traders urge extracting from rested places (Upadhyay, 2019). In some cases, women do not have institutions to enforce their rules (Nongbri, 2003). Their knowledge is socially recognized but not legally. Therefore, their enterprises develop slowly as they preserve ecological boundaries. Producers require even development.

- Legal Incoherence Across Sectors

Circular economy frameworks define loops of resource use. Loops cannot exist without systems of governance that underpin them. In Northeast India, laws concerning forests, IP and livelihood initiatives affect different parts of circular systems. These laws are distinct and this distinction leads to inconsistency. The Forest Rights Act promotes community governance of natural resources. The Act does not safeguard TEK. IP laws protect innovation formally. TEK is not covered by IP laws. The biodiversity law safeguards documentation of knowledge. The Act does not address circular principles. Livelihood schemes support economic development. Ecological rules are not included in these schemes. Circular economy policy concerns industrial waste. Circular economy law does not concern cycles of the forest sector. These frameworks are not linked.

A circular system needs compatibility of rights, knowledge and economy. However, the current legal system fails to provide this compatibility. Women follow customary norms to achieve ecological balance and customary norms are not legally binding in statutory processes.

- Policy Fragmentation and Scheme Limitations

Van Dhan Vikas Kendras aim to help the value addition of tribes (TRIFED, 2023). They encourage processing of minor forest produce (Ministry of Tribal Affairs, 2018). They offer machinery, training, and marketing assistance (Bose, 2019). Such centers assume constant availability of the raw material. Availability depends on access to the forests and ecological conditions (Cairns & Das, 2019). Communities often have unresolved rights under

Forest Rights Act (TERI, 2020). In addition, forest departments regulate access to the forest in many areas. This causes uncertainty. Van Dhan plans do not incorporate the TEK-based guidelines for harvesting in a sustainable manner. Training sessions concentrate on processing and marketing. Ecological knowledge is absent from training.

In addition, the National Rural Livelihood Mission helps self-help groups (Ministry of Rural Development, 2022). The mission offers training for women in enterprise development (Ministry of Rural Development, 2022). Training includes aspects of credit, accounting and product packaging (Upadhyay, 2019). There is no training for women regarding documentation of TEK or assertion of ecological rights. NRLM incorporates women into markets (Roy, 2015). However, there is no involvement of women as ecological managers.

These programs work independent from forest management institutions. There is no mechanism that ties Van Dhan centers to the Gram Sabha-level forest planning process. There are no guidelines that connect NRLM groups with the Community Forest Resource management process. This causes an absence of TEK-based guidelines in scheme design. As a result, there appear to be contradictory production objectives and ecological rhythms.

- Fragmentation Across Governance Institutions

Various organizations influence forest-dependent livelihoods. The Autonomous District Councils regulate major parts of Meghalaya and some parts of Assam (Cairns & Das, 2019). The forest department regulates lands outside the council jurisdiction. The biodiversity board regulates documentation. IP office regulates innovation rights. The livelihood department regulates schemes. These various departments work independently. They do not exchange information or plan in coordination.

Such fragmentation influences the women producers. If they apply for forest permit from the forest departments, these forest departments assess their applications in terms of administrative considerations (Agarwal, 2001). They do not assess them in terms of TEK. If they apply for the livelihood support schemes, the livelihood scheme officers assess them in terms of business considerations (Ministry of Rural Development, 2022). They do not assess them in terms of forest access restrictions. If they apply for the recognition in the IP framework, they have to fulfill the technical requirements which are different from TEK (Antons, 2013).

- Gender Sensitive Implementation Gaps

The issue of gender inclusion is evident from various policies. FRA mentions women in Gram Sabhas. NRLM works on women's associations. GI Act does not mention anything about gender participation but includes collective actions. These inclusions are restricted in nature.

The traditional institutions in Meghalaya ensure male dominance (Nongbri, 2003; NESRC, 2017). Women

who strive for inclusion in the decision-making process regarding forest-related issues are hindered by cultural aspects (Upadhyay, 2019). Their names can be included in the list of committees (Ministry of Tribal Affairs, 2018). But the impact of these women is not substantial. The Sixth Schedule area's Gram Sabhas fail to involve women in an active manner (Cairns & Das, 2019).

In Assam, village committees vary in their inclusion of women. Forest department staff often meet male leaders during inspections (Roy, 2015). Women describe their knowledge informally (Agarwal, 2001). However, this knowledge does not enter official records (TERI, 2020). Biodiversity Management Committees also show low participation of women (National Biodiversity Authority, 2021). PBRs record species lists but do not capture the decision rules women follow (National Biodiversity Authority, 2021). This weakens the representation of TEK.

Policy documents on circular economy do not include gender-based analysis (NITI Aayog, 2021). They do not examine the role of women in forest-based circular systems (UNDP India, 2022). They do not reference TEK. This absence leads to policies that replicate existing gender gaps.

- **SDG Commitments and Practical Gaps**

India's commitments under SDG 5, SDG 12 and SDG 15 require gender inclusion, sustainable production and biodiversity protection. TEK supports these goals. However, gender gaps in governance weaken the link between commitments and outcomes.

SDG 5 seeks gender equality. Women in Northeast India hold essential ecological roles. Yet, their exclusion from forest governance reduces their rights. SDG 12 seeks responsible consumption and production. Harvesting based on TEK fits this requirement. Nevertheless, policy frameworks that do not take into account TEK reduce achievements. Sustainable Development Goal 15 requires sustainable forest usage. The practices of women help the process of regeneration. However, the lack of involvement in the decision-making procedure impacts the quality of forest governance.

In this context, integrated approach is needed. Otherwise, the commitment to certain principles will be nothing but empty declaration.

Governance Outcomes and Circular Systems

Circular systems based on forest are dependent on ecological continuity. Ecological continuity is dependent on knowledge, rights, and institutional framework. Women offer knowledge. A framework of rights provides partial support. However, institutions fail to integrate all these elements. Thus, it weakens circular systems.

The absence of recognition of TEK in the legal framework increases the risks of scaling. Enterprises that adhere to TEK are small enterprises. Enterprises that do not take TEK into account risk ecological degradation. The policies often force communities to rely on higher levels of extraction. This leads to increased alienation from circular concepts.

It is necessary that coherent policy and legal frameworks include TEK in forest management, in documentation of biodiversity, and in the livelihood programmes. It should also create gender-balanced governance structures. In addition, the ecological limits should be reflected in the production guidelines. Finally, it should connect circular economy policy and forest-based systems.

Overall, circular economy goals in Northeast India require the coherence of TEK, forest governance, and livelihood programs. The frameworks now work independently. TEK reflects circular concepts. Legal framework fails to recognize TEK. The livelihood programs ignore ecological knowledge. There is gender bias in the governance structures.

7. Proposed Reforms, Pathways and Concluding Remarks

There is thus an enormous scope for developing a legal and policy regime to promote Traditional Ecological Knowledge (TEK) and women practitioners. To begin with, Assam and Meghalaya have stable ecological systems. Women sustain the systems with informed decisions that facilitate regeneration and wastage reduction. The legal and policy framework will be able to reinforce these ecological systems through their importance in forest governance and circular economies.

- **Gender Inclusive Intellectual Property Pathways**

Intellectual property systems may allow women as producers and decision makers. In case of GI laws, there may be conditions requiring women's representation in the producer teams. To implement such condition, applicants need to specify knowledge sources behind the reputation of the product. In addition, authorized users lists should include women involved in ecological activities and handicrafts production. In addition, IP authorities may prepare materials explaining ways to submit oral knowledge using recorded statements. This is helpful for the communities that lack written documentation.

A Register of TEK allows formal registration of ecological practices. Entries should be made via village gatherings with active participation of women. Each entry would contain information about the practice itself, terms of use and ecological boundaries associated with the practice.

- **FRA Amendments and TEK Recognition**

The Forest Rights Act can be made to include provisions recognizing TEK as a component of community forest rights. The FRA regulations could mandate Gram Sabha to document TEK while preparing Community Forest Resource plans. These would document harvest cycles, soil, plant indicators, and regeneration guidelines. Women need to have equal representation on the committees for Community Forest Resources. Therefore, their involvement would lead to more precise management plans.

A provision could be added to the FRA that mandates

the consultation of documented TEK by the administrators before approving any diversion of forests. This would strengthen the community's claim and serve as ecological safeguards. The monitoring of the CFR would include TEK-based indicators.

- Institutional Support and Capacity Strengthening

Biodiversity, livelihood and forest governance managing agencies must develop TEK modules in their capacity building trainings. They must be trained on how communities observe plant regeneration and growth. The knowledge will assist in making administrative decisions. In addition, documentation missions must involve local women who use TEK in documentation. It will help in accurate documentation of biodiversity registers and plans.

Digital documentation can capture explanations through audio or video files. It makes written documentation unnecessary. There must be TEK cells in each district to assist the communities in developing records for forest governance, benefit sharing and GI registration. There must be women supervisors in such TEK cells.

In addition, livelihood missions must help in establishing TEK-based enterprises by coordinating production with ecological seasons. Training missions must provide knowledge of regeneration limits. This will enable women to achieve sustainable production. Market missions must help in marketing TEK-based products with clear documentation of ecological methods.

- Sui Generis TEK Law

A special TEK law could provide recognition in the best possible way. The law could define TEK as a body of knowledge generated through community experience. The law could provide for rights in favor of the communities and state that women participate in every step of the decision making process. Any research or commercial use of TEK must have prior consent. The benefit-sharing must go to women producers and not only to institutions run by men. TEK Authority could facilitate this process. The TEK authority could have biodiversity experts, gender experts and community members. The TEK Authority could coordinate with IP offices, forest departments and livelihood missions. This would save on duplication of effort and increase recognition.

- Integration of Forest Rights and Livelihood Schemes

The livelihood schemes should be integrated with forest governance. Van Dhan units could use the CFR Management Plans for determining product selection and extraction levels. The NRLM units could coordinate with Village Forest Committees before embarking upon enterprises. This will help avoid conflict of interests between production objectives and environmental constraints.

In addition, the scheme guidelines could also include environmental considerations based on TEK. The officers could encourage enterprises which are based on careful harvesting rather than quick extraction.

TRIFED and NRLM officials could consider TEK while preparing cluster-level plans.

Concluding Remarks

The legal and policy reforms may help empower women possessors of TEK. The current legal and policy framework ignores or excludes such knowledge. IP law does not consider collective rights but centres on individual creation. Forest law recognizes access but not ecological expertise. Biodiversity law captures the knowledge but provides no protection. Livelihood programs encourage production but have no ecological measures. All of these weaken the capacity of communities to establish sustainable economies based on forests.

Amendments to FRA can help in developing knowledge-based governance. GI reform with gender inclusiveness will recognize TEK. Institutional measures will allow documentation and protection of TEK. Separate TEK law can ensure a consistent regime of rights, consents, and benefits. Inter-ministerial integration can resolve policy fragmentation.

This chapter will contribute to the discussion about gender, law and ecology. The necessity of TEK recognition for sustainable management of forests is identified. The institutional causes of gender inequality in IP and forest management systems are established. Legal options for TEK-based governance are developed, combining the community rights, ecological knowledge and livelihoods.

Further research can study how TEK-based governance will affect the result of the forest governance if the women will dominate the CFR planning. The impact of GI reform on the female producers may be analysed. The effectiveness of TEK Registers can be evaluated. The impact of livelihood integration on ecological stability of forest-based economy may be investigated.

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